

SERVICE SPECIFICATIONS

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ENGINE MECHANICAL (4A-FE)**Specifications**

Engine tune-up	Drive belt (Alternator)				
	Deflection	New belt	8.5 – 10.5 mm	0.335 – 0.413 in.	
		Used belt	10.0 – 12.0 mm	0.394 – 0.472 in.	
	Tension (Reference)	New belt	60 – 70 kg		
		Used belt	40 – 55 kg		
	Engine coolant capacity (w/ Heater)				
		AE M/T	6.2 liters	6.5 US qts	5.5 Imp. qts
		AE A/T	6.1 liters	6.4 US qts	5.4 Imp. qts
		AT171	5.6 liters	5.9 US qts	4.9 Imp. qts
		AT180	5.2 liters	5.5 US qts	4.6 Imp. qts
	Engine oil capacity				
	w/o Oil cooler	Drain and refill			
		w/o Oil filter change	3.0 liters	3.2 US qts	2.6 Imp. qts
		w/ Oil filter change	3.3 liters	3.5 US qts	2.9 Imp. qts
		Dry fill	3.7 liters	3.9 US qts	3.3 Imp. qts
	w/ Oil cooler	Drain and refill			
		w/o Oil filter change	3.0 liters	3.2 US qts	2.6 Imp. qts
		w/ Oil filter change	3.3 liters	3.5 US qts	2.9 Imp. qts
		Dry fill	4.1 liters	4.3 US qts	3.6 Imp. qts
	Engine oil API grade				
		Europe and Australia	SE, SF, SG or better		
		Others	SD, SE, SF, SG or better		
	Battery specific gravity		1.25 – 1.27 when fully charged at 20°C (68°F)		
	High-tension cord resistance	Limit	25 kΩ per cord		
	Spark plug				
	Type	ND	Q16R-U		
		NGK	BCPR5EY		
	Gap		0.8 mm	0.031 in.	
	Distributor (IIA)				
	Air gap		0.2 mm or more	0.008 in. or more	
	Pickup coil resistance		140 – 180 Ω		
	Ignition timing		10° BTDC @ idle (w/ Terminals TE1 and E1 connected)		
	Firing order		1 – 3 – 4 – 2		
	Valve clearance	Intake	0.15 – 0.25 mm	0.006 – 0.010 in.	
		Exhaust	0.20 – 0.30 mm	0.008 – 0.012 in.	
	Idle speed		800 rpm (w/ Cooling fan OFF)		
	VF voltage		2.5 ± 0.7 V		
	Idle CO concentration	w/ TWC	0 – 0.5 %		
		w/o TWC	1.5 ± 0.5 %		
	Dash pot setting speed				
		M/T	1,800 rpm (w/ Cooling fan OFF)		
		A/T	2,200 rpm (w/ Cooling fan OFF)		
Intake manifold vacuum	at idle speed		More than 440 mmHg (17.32 in.Hg, 58.7 kPa)		

Specifications (Cont'd)

Compression pressure	at 250 rpm	STD		13.5 kg/cm ²	191 psi	1,320 kPa
		Limit		10.0 kg/cm ²	142 psi	981 kPa
	Differential of pressure between each cylinder			1.0 kg/cm ² (14 psi, 98 kPa) or less		
Idle pulley tension spring	Free length			38.4 mm		1.512 in.
	Installed tension at 50.2 mm (1.976 in.)			3.6 – 4.0 kg	7.9 – 8.8 lb	35 – 39 N
Cylinder head	Head surface warpage	Limit		0.05 mm		0.0020 in.
	Manifold surface warpage	Limit		0.10 mm		0.0039 in.
	Cylinder head thickness			95.3 mm		3.75 in.
	Valve seat	Refacing angle		30°, 45°, 60°		
		Contacting angle		45°		
		Contacting width		1.2 – 1.6 mm		0.047 – 0.063 in.
	Spark plug tube protrusion height			46.8 – 47.6 mm		1.843 – 1.874 in.
Valve guide bushing	Inside diameter			6.01 – 6.03 mm		0.2366 – 0.2374 in.
	Outside diameter	STD		11.000 – 11.027 mm		0.4331 – 0.4341 in.
		O/S 0.05		11.050 – 11.077 mm		0.4350 – 0.4361 in.
	Protrusion height			12.7 – 13.1 mm		0.500 – 0.516 in.
	Replacing temperature (cylinder head side)			80 – 100°C		176 – 212°F
Valve	Valve overall length	STD	Intake	91.45 mm		3.6004 in.
			Exhaust	91.90 mm		3.6181 in.
		Limit	Intake	90.95 mm		3.5807 in.
			Exhaust	91.40 mm		3.5984 in.
	Valve face angle			45.5°		
	Stem diameter		Intake	5.970 – 5.985 mm		0.2350 – 0.2356 in.
			Exhaust	5.965 – 5.980 mm		0.2348 – 0.2354 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.
		Limit	Intake	0.08 mm		0.0031 in.
			Exhaust	0.10 mm		0.0039 in.
	Valve head edge thickness					
		Limit		1.0 mm		0.039 in.
Valve spring	Free length			43.8 mm		1.724 in.
	Installed length			34.7 mm		1.366 in.
	Installed load	STD		15.8 kg	34.8 lb	155 N
		Limit		14.6 kg	32.3 lb	143 N
	Squareness	Limit		2.0 mm		0.075 in.
Valve lifter	Outer diameter	STD		27.975 – 27.985 mm		1.1014 – 1.1018 in.
	Inner diameter					
	(Cylinder head lifter bore)	STD		28.005 – 28.026 mm		1.1025 – 1.1033 in.
	Oil clearance	STD		0.020 – 0.051 mm		0.0008 – 0.0020 in.
		Limit		0.10 mm		0.0039 in.
Manifold	Manifold surface warpage					
		Limit	Intake	0.20 mm		0.0079 in.
			Exhaust	0.30 mm		0.0118 in.

Specifications (Cont'd)

Camshaft	Thrust clearance	STD	Intake	0.030 – 0.085 mm	0.0012 – 0.0033 in.
			Exhaust	0.035 – 0.090 mm	0.0014 – 0.0035 in.
		Limit		0.11 mm	0.0043 in.
	Journal oil clearance	STD		0.035 – 0.072 mm	0.0014 – 0.0028 in.
		Limit		0.10 mm	0.0039 in.
	Journal diameter	STD			
			Exhaust No. 1	24.949 – 24.965 mm	0.9822 – 0.9829 in.
			Others	22.949 – 22.965 mm	0.9035 – 0.9041 in.
	Circle runout	Limit		0.04 mm	0.0016 in.
	Cam lobe height	STD	Intake	35.21 – 35.31 mm	1.3862 – 1.3902 in.
			Exhaust	34.91 – 35.01 mm	1.3744 – 1.3783 in.
		Limit	Intake	34.81 mm	1.3705 in.
			Exhaust	34.51 mm	1.3587 in.
	Camshaft gear spring end free distance			17.1 – 17.5 mm	0.6732 – 0.6890 in.
	Camshaft gear backlash	STD		0.020 – 0.200 mm	0.0008 – 0.0079 in.
		Limit		0.30 mm	0.0188 in.
Cylinder block	Cylinder head surface warpage	Limit		0.05 mm	0.0020 in.
	Cylinder bore	STD	Mark "1"	81.00 – 81.01 mm	3.1890 – 3.1894 in.
			Mark "2"	81.01 – 81.02 mm	3.1894 – 3.1898 in.
			Mark "3"	81.02 – 81.03 mm	3.1898 – 3.1902 in.
		Limit		81.23 mm	3.1980 in.
	On standard sized piston	Limit		81.73 mm	3.2177 in.
	On O/S 0.50 sized piston	Limit			
	Cylinder bore wear	Limit		0.2 mm	0.008 in.
	Difference of bore between cylinder			0.05 mm	0.0020 in.
	Taper and out-of-round	Limit		0.02 mm	0.0008 in.
Piston and piston ring	Piston diameter	STD	Mark "1"	80.93 – 80.94 mm	3.1862 – 3.1886 in.
			Mark "2"	80.94 – 80.95 mm	3.1866 – 3.1870 in.
			Mark "3"	80.95 – 80.96 mm	3.1870 – 3.1874 in.
		O/S 0.50		81.43 – 81.46 mm	3.2059 – 3.2071 in.
	Piston to cylinder clearance			0.06 – 0.08 mm	0.0024 – 0.0031 in.
	Piston ring end gap	No. 1	STD	0.25 – 0.45 mm	0.0098 – 0.0177 in.
			Limit	1.05 mm	0.0413 in.
		No. 2	STD	0.15 – 0.40 mm	0.0059 – 0.0157 in.
			Limit	1.00 mm	0.0394 in.
		Oil	STD	0.10 – 0.70 mm	0.0039 – 0.0276 in.
			Limit	1.30 mm	0.0512 in.
	Ring to ring groove clearance	No. 1		0.04 – 0.08 mm	0.0016 – 0.0031 in.
		No. 2		0.03 – 0.07 mm	0.0012 – 0.0028 in.
	Piston pin installing temperature			20°C	68°F
Connecting rod	Thrust clearance	STD		0.15 – 0.25 mm	0.0059 – 0.0098 in.
		Limit		0.30 mm	0.0118 in.
	Connecting rod bearing center wall thickness				
		STD	No. 1	1.486 – 1.490 mm	0.0585 – 0.0587 in.
			No. 2	1.490 – 1.494 mm	0.0587 – 0.0588 in.
			No. 3	1.494 – 1.498 mm	0.0588 – 0.0590 in.
		U/S 0.25		1.607 – 1.613 mm	0.0633 – 0.0635 in.

Specifications (Cont'd)

Connecting rod (cont'd)	Bearing oil clearance	STD	0.020 – 0.051 mm	0.0008 – 0.00020 in.
		Limit	0.08 mm	0.0031 in.
	Rod bend	Limit	0.05 mm	0.0020 in.
	Rod twist	Limit	0.05 mm	0.0020 in.
Crankshaft	Thrust clearance	STD	0.02 – 0.22 mm	0.0008 – 0.0087 in.
		Limit	0.30 mm	0.0118 in.
	Thrust washer thickness	STD	2.440 – 2.490 mm	0.0961 – 0.0980 in.
	Main journal oil clearance	STD	0.015 – 0.033 mm	0.0006 – 0.0013 in.
		U/S 0.25	0.018 – 0.056 mm	0.0007 – 0.0022 in.
		Limit	0.10 mm	0.0039 in.
	Main journal diameter	STD	47.982 – 48.000 mm	1.8891 – 1.8898 in.
	Main journal finished diameter			
		U/S 0.25	47.745 – 47.755 mm	1.8797 – 1.8801 in.
	Main bearing center wall thickness			
		STD	2.002 – 2.005 mm	0.0788 – 0.0789 in.
		Mark "1"		
		Mark "2"	2.005 – 2.008 mm	0.0789 – 0.0791 in.
		Mark "3"	2.008 – 2.011 mm	0.0791 – 0.0792 in.
		Mark "4"	2.011 – 2.014 mm	0.0792 – 0.0793 in.
		Mark "5"	2.014 – 2.017 mm	0.0793 – 0.0794 in.
		U/S 0.25	2.121 – 2.127 mm	0.0835 – 0.0837 in.
	Crank pin diameter	STD	39.985 – 40.000 mm	1.5742 – 1.5748 in.
	Crank pin finished diameter			
		U/S 0.25	39.745 – 39.755 mm	1.5648 – 1.5652 in.
	Circle runout	Limit	0.06 mm	0.0024 in.
	Main journal taper and out-of-round			
		Limit	0.02 mm	0.0008 in.
	Crank pin journal taper and out-of-round			
		Limit	0.02 mm	0.0008 in.

Torque Specifications

Part tightened	kg-cm	ft-lb	N-m
Cylinder head bolt	610	44	60
Cylinder head x Camshaft bearing cap	130	9	13
Cylinder head x Spark plug	180	13	18
Cylinder head x Intake manifold	195	14	19
Cylinder head x Exhaust manifold	250	18	25
Cylinder block x Timing belt idler pulley	375	27	37
Cylinder block x Oil pump	220	16	22
Cylinder block x Crankshaft bearing cap	610	44	60
Cylinder block x Oil pan	50	43 in.-lb	4.9
Camshaft x Camshaft timing pulley	600	43	59
Crankshaft x Crankshaft pulley	1,200	87	118
Crankshaft x Flywheel	800	58	78
Connecting rod cap x Connecting rod	500	36	49
Oil pump x Oil strainer	95	82 in.-lb	9.3

ENGINE MECHANICAL (4A-GE)

Specifications

Engine tune-up	Drive belt (Alternator)				
	Deflection	New belt	4 – 5 mm	0.16 – 0.20 in.	
		Used belt	6 – 7 mm	0.24 – 0.28 in.	
	Tension (Reference)	New belt	70 – 80 kg		
		Used belt	30 – 45 kg		
	Engine coolant capacity (w/ Heater)		6.0 liters	6.3 US qts	5.3 Imp. qts
	Engine oil capacity				
	w/o Oil cooler	Drain and refill			
		w/o Oil filter change	3.0 liters	3.2 US qts	2.6 Imp. qts
		w/ Oil filter change	3.3 liters	3.5 US qts	2.9 Imp. qts
		Dry fill	3.7 liters	3.9 US qts	3.3 Imp. qts
	w/ Oil cooler	Drain and refill			
		w/o Oil filter change	3.4 liters	3.6 US qts	3.0 Imp. qts
		w/ Oil filter change	3.7 liters	3.9 US qts	3.3 Imp. qts
		Dry fill	4.1 liters	4.3 US qts	3.6 Imp. qts
	Engine oil API grade		SE, SF, SG or better		
	Battery specific gravity		1.25 – 1.27 when fully charged at 20°C (68°F)		
	High-tension cord resistance	Limit	25 kΩ per cord		
	Spark plug				
	Conventional tipped type				
	Type	ND	K20R-U		
		NGK	BKR6EYA		
	Air gap		0.8 mm	0.031 in.	
	Platinum tipped type				
	Type	ND	PK20R8		
		NGK	BKP6EP8		
	Air gap	STD	0.8 mm	0.031 in.	
		Limit	1.0 mm	0.039 in.	
	Ignition timing		10° BTDC @ idle (w/ Terminals TE1 and E1 connected)		
	Firing order		1 – 3 – 4 – 2		
	Valve clearance	Intake	0.15 – 0.25 mm	0.006 – 0.010 in.	
		Exhaust	0.20 – 0.30 mm	0.008 – 0.012 in.	
	Idle speed		800 rpm (w/ Cooling fan OFF)		
	VF voltage		2.5 ± 1.25 V		
	Idle CO concentration	w/ TWC	0 – 0.5 %		
		w/o TWC	1.5 ± 0.5 %		
	Dash pot setting speed (w/ Air flow meter)		1,800 rpm (w/ Cooling fan OFF)		
Intake manifold vacuum	at idle speed		500 mmHg (16.69 in.Hg, 66.7 kPa)		
Compression pressure	at 250 rpm	STD	13.4 kg/cm ²	190 psi	1,314 kPa
		Limit	10.0 kg/cm ²	142 psi	981 kPa
	Difference of pressure between each cylinder		1.0 kg/cm ² (14 psi, 98 kPa) or less		

Specifications (Cont'd)

Idler pulley tension spring	Free length Installed load at 50.2 mm (1.976 in.)	43.5 mm 9.47 – 10.47 kg 20.9 – 23.1 lb 93 – 103N	1.713 in.
Cylinder head	Warpage Cylinder block side Limit Intake manifold side Limit Exhaust manifold side Limit Valve seat refacing angle Contacting angle Contacting width	0.05 mm 0.05 mm 0.10 mm 30°, 45°, 60° 45° 1.0 – 1.4 mm	0.0020 in. 0.0020 in. 0.0039 in. 0.039 – 0.055 in.
Valve guide busing	Inside diameter Outside diameter STD O/S 0.05 Replacing temperature (Cylinder head side)	6.01 – 6.03 mm 11.033 – 11.044 mm 11.083 – 11.094 mm 80 – 100°C	0.2366 – 0.2374 in. 0.4344 – 0.4348 in. 0.4363 – 0.4368 in. 176 – 212°F
Valve	Valve overall length STD Intake Exhaust Limit Intake Exhaust Valve face angle Stem diameter Intake Exhaust Stem oil clearance STD Intake Exhaust Limit Intake Exhaust Margin thickness STD Limit	99.60 mm 99.75 mm 99.10 mm 99.25 mm 44.5° 5.970 – 5.985 mm 5.965 – 5.980 mm 0.025 – 0.060 mm 0.030 – 0.065 mm 0.08 mm 0.10 mm 0.8 – 1.2 mm 0.5 mm	3.9213 in. 3.9272 in. 3.9016 in. 3.9075 in. 0.2350 – 0.2356 in. 0.2348 – 0.2354 in. 0.0010 – 0.0024 in. 0.0012 – 0.0026 in. 0.0031 in. 0.0039 in. 0.031 – 0.047 in. 0.020 in.
Valve spring	Free length Installed tension at 34.7 mm (1.366 in.) STD Limit Squareness Limit	41.09 mm 16.3 kg 35.9 lb 160 N 14.6 kg 32.2 lb 143 N 1.8 mm	1.6177 in. 0.071 in.
Valve lifter	Lifter diameter Inner diameter (Cylinder head lifter bore) STD Oil clearance STD Limit	27.975 – 27.985 mm 28.000 – 28.021 mm 0.015 – 0.046 mm 0.07 mm	1.1014 – 1.1018 in. 1.1024 – 1.1032 in. 0.0005 – 0.0018 in. 0.0028 in.
Manifold	Manifold surface warpage Limit Intake Limit Exhaust	0.05 mm 0.30 mm	0.0020 in. 0.0118 in.
Camshaft	Thrust clearance STD Limit Journal oil clearance STD Limit Journal diameter Circle runout Limit Cam lobe height STD Limit	0.08 – 0.190 mm 0.25 mm 0.035 – 0.072 mm 0.10 mm 26.949 – 26.965 mm 0.04 mm 35.419 – 35.510 mm 35.21 mm	0.0031 – 0.0075 in. 0.0098 in. 0.0014 – 0.0028 in. 0.0039 in. 1.0610 – 1.0616 in. 0.0016 in. 1.3823 – 1.3980 in. 1.3862 in.

Specifications (Cont'd)

Cylinder block	Cylinder head surface warpage	Limit	0.05 mm	0.0020 in.	
	Cylinder bore diameter	STD	81.00 – 81.01 mm	3.1890 – 3.1894 in.	
		Mark "1"	81.01 – 81.02 mm	3.1894 – 3.1898 in.	
		Mark "2"	81.02 – 81.03 mm	3.1898 – 3.1902 in.	
	On standard sized piston	Limit	81.23 mm	3.1980 in.	
	On O/S 0.50 sized piston	Limit	81.73 mm	3.2177 in.	
	Cylinder bore wear	Limit	0.2 mm	0.008 in.	
	Difference of bore between cylinder		0.05 mm	0.0020 in.	
Taper and out-of-round	Limit	0.02 mm	0.0008 in.		
Piston and piston ring	Piston diameter	STD	80.89 – 80.90 mm	3.1846 – 3.1850 in.	
		Mark "1"	80.90 – 80.91 mm	3.1850 – 3.1854 in.	
		Mark "2"	80.91 – 80.92 mm	3.1854 – 3.1858 in.	
		Mark "3"	81.39 – 81.42 mm	3.2043 – 3.2055 in.	
	O/S 0.50		0.10 – 0.12 mm	0.0039 – 0.0047 in.	
	Piston oil clearance		0.03 – 0.08 mm	0.0012 – 0.0031 in.	
	Piston ring groove clearance	No. 1	0.03 – 0.07 mm	0.0012 – 0.0028 in.	
		No. 2	0.25 – 0.47 mm	0.0098 – 0.0185 in.	
	Piston ring end gap	STD	0.20 – 0.42 mm	0.0079 – 0.0165 in.	
		Oil	0.15 – 0.52 mm	0.0059 – 0.0205 in.	
		Limit	No. 1	1.07 mm	0.0421 in.
		No. 2	1.02 mm	0.0402 in.	
		Oil	1.12 mm	0.0441 in.	
	Connecting rod	Thrust clearance	STD	0.15 – 0.25 mm	0.0059 – 0.0098 in.
		Limit	0.30 mm	0.0118 in.	
Connecting rod oil clearance					
		STD	0.020 – 0.051 mm	0.0008 – 0.0020 in.	
		STD	0.019 – 0.073 mm	0.0007 – 0.0029 in.	
		U/S 0.25	0.08 mm	0.0031 in.	
Limit					
Connecting rod bearing center wall thickness					
		STD	No. 1	1.486 – 1.490 mm	0.0585 – 0.0587 in.
			No. 2	1.490 – 1.494 mm	0.0587 – 0.0588 in.
			No. 3	1.494 – 1.498 mm	0.0588 – 0.0590 in.
			U/S 0.25	1.607 – 1.613 mm	0.0633 – 0.0635 in.
Rod bent		Limit	per 100 mm (3.94 in.)	0.03 mm	0.0012 in.
Rod twist		Limit	per 100 mm (3.94 in.)	0.05 mm	0.0020 in.
Connecting rod bolt		STD	8.860 – 9.000 mm	0.3488 – 0.3543 in.	
		Limit	8.600 mm	0.3386 in.	
Bushing inside diameter			20.012 – 20.022 mm	0.7879 – 0.7883 in.	
Piston pin diameter		20.006 – 20.016 mm	0.7876 – 0.7880 in.		
Piston pin oil clearance	STD	0.004 – 0.008 mm	0.0002 – 0.0003 in.		
	Limit	0.05 mm	0.0020 in.		

Specifications (Cont'd)

Crankshaft	Thrust clearance	STD	0.02 – 0.22 mm	0.0008 – 0.0087 in.
		Limit	0.30 mm	0.0118 in.
	Thrust washer thickness	STD	2.440 – 2.490 mm	0.0961 – 0.0980 in.
	Main journal oil clearance			
		STD	0.015 – 0.033 mm	0.0006 – 0.0013 in.
		U/S 0.25	0.018 – 0.056 mm	0.0007 – 0.0022 in.
		Limit	0.10 mm	0.0039 in.
	Main journal diameter	STD	47.982 – 48.000 mm	1.8891 – 1.8898 in.
		U/S 0.25	47.745 – 47.755 mm	1.8797 – 1.8801 in.
	Main bearing center wall thickness			
		STD	2.002 – 2.005 mm	0.0788 – 0.0789 in.
		Mark "1"	2.005 – 2.008 mm	0.0789 – 0.0791 in.
		Mark "2"	2.008 – 2.011 mm	0.0791 – 0.0792 in.
		Mark "3"	2.011 – 2.014 mm	0.0792 – 0.0793 in.
		Mark "4"	2.014 – 2.017 mm	0.0793 – 0.0794 in.
		U/S 0.25	2.121 – 2.127 mm	0.0835 – 0.0837 in.
	Crank pin diameter	STD	41.985 – 42.000 mm	1.6529 – 1.6535 in.
		U/S 0.25	41.745 – 41.755 mm	1.6435 – 1.6439 in.
	Circle runout	Limit	0.06 mm	0.0024 in.
	Main journal taper and out-of-round			
		Limit	0.02 mm	0.0008 in.
	Crank pin journal taper and out-of-round			
		Limit	0.02 mm	0.0008 in.

Torque Specifications

Part tightened		kg-cm	ft-lb	N-m
Camshaft timing pulley x Camshaft		600	43	59
Idle pulley x Cylinder block		375	27	37
Crankshaft pulley x Crankshaft		1,400	101	137
Cylinder head x Cylinder block	1st	300	22	29
	2nd	90° turns		
	3rd	90° turns		
Oil nozzle x Cylinder block		250	18	25
Cylinder head x Union		300	22	29
Camshaft bearing cap x Cylinder head		130	9	13
Intake manifold x Cylinder head		280	20	27
Intake manifold stay x Intake manifold		220	16	22
Intake manifold stay x Cylinder block		400	29	39
EGR pipe x Exhaust manifold		700	51	69
Exhaust manifold x Cylinder head		250	29	39
Exhaust manifold stay x Exhaust manifold		400	29	39
Exhaust manifold stay x Cylinder block		400	29	39
Main bearing cap x Cylinder block		610	44	60
Connecting rod cap x Connecting rod	1st	400	29	39
	2nd	Additional 90°		
Flywheel x Crankshaft		750	54	74

EFI SYSTEM (4A-FE)

Specifications

Fuel pressure regulator	Fuel pressure at No vacuum		2.7 – 3.1 kg/cm ² (38 – 44 psi, 265 – 304 kPa)	
Cold start injector	Resistance Fuel leakage		2 – 4 Ω Less than one drop of fuel per minute	
Injector	Resistance Injection volume Difference between each injector Fuel leakage		Approx. 13.8 Ω 40 – 50 cc/15 sec (2.4 – 3.1 cu in.) 5 cc (0.31 cu in.) or less One drop or less of fuel per minute	
Throttle body	Throttle valve fully closed angle		6°	
Throttle position sensor	Throttle opening angle (from vertical)	Clearance between stop screw and lever	IDL – E2	PSW – E2
	–	0.60 mm (0.0236 in.)	Continuity	No continuity
	–	0.80 mm (0.0315 in.)	No continuity	No continuity
	Less than 7.5°	–	Continuity	No continuity
	73°(M/T), 63°(A/T) 79°(M/T), 69°(A/T)	– –	No continuity No continuity	No continuity Continuity
Start injector time switch	Resistance	STA – STJ	20 – 40 Ω 40 – 60 Ω	Below 30°C (86°F) Above 40°C (104°F)
		STA – Ground	20 – 80 Ω	–
Water temp. sensor and intake air temp. sensor	Resistance	at –20°C (–4°F)	10 – 20 kΩ	
		0°C (32°F)	4 – 7 kΩ	
		40°C (104°F)	0.9 – 1.3 kΩ	
		60°C (140°F)	0.4 – 0.7 kΩ	
		80°C (176°F)	0.2 – 0.4 kΩ	
Oxygen sensor	Heater resistance		5.1 – 6.3 Ω	
ECU	HINT: ● Perform all voltage and resistance measurements with the ECU connected. ● Verify that the battery voltage is 11 V or above when the ignition switch is ON. ● The testing probes must not make contact with the ECU oxygen and VF terminals.			
	Voltage			
	Terminal	STD voltage (V)	Condition	
	+B – E1	10 – 14	Ignition switch ON	
	+B1 – E1			
	BATT – E1		–	
	IDL – E2	4.5 – 5.5	Ignition switch ON	Throttle valve open
	PSW – E2			Throttle valve fully closed
	No. 10 – E01 No. 20 – E02	10 – 14	Ignition switch ON	
	W – E1	10 – 14	No trouble (“CHECK ENGINE” warning light off) and engine running	

Specifications (Cont'd)

ECU (Cont'd)	Voltage (Cont'd)				
	Terminals	STD voltage (V)	Condition		
	PIM – E2	3.3 – 3.9	Ignition switch ON		
	VCC – E2	4.5 – 5.5			
	THA – E2	2.0 – 2.5	Ignition switch ON	Intake air temperature 20°C (68°F)	
	THW – E2	0.4 – 0.7		Coolant temperature 80°C (176°F)	
	STA – E1	6 – 14	Cranking		
	IGT – E1	0.7 – 1.0	Idling		
	A/C – E1	5 – 14	Ignition switch ON	A/C switch ON	
		0		A/C switch OFF	
	T – E1	10 – 14	Ignition switch ON	Check connector TE1 – E1 not connect	
		0		Check connector TE1 – E1 connect	
	Resistance				
	Terminals	Resistance (Ω)		Condition	
	IDL – E2	Infinity		Throttle valve open	
		0		Throttle valve fully closed	
	PSW – E2	0		Throttle valve fully open	
		Infinity		Throttle valve fully closed	
	THA – E2	2,000 – 3,000		Intake temperature 20°C (68°F)	
	THW – E2	200 – 400		Coolant temperature 80°C (176°F)	
	G1 – G⊖	140 – 180		–	
NE – G⊖	140 – 180		–		
Fuel cut rpm (w/ Vehicle speed 0 km/h and coolant temperature 80°C (176°F))		Fuel cut rpm w/o TWC	1,700 rpm		
		w/ TWC	1,900 rpm		
		Fuel return rpm w/o TWC	1,200 rpm		
		w/ TWC	1,200 rpm		
ISC valve	Resistance	at cold	2WD	30 – 33 Ω	
			4WD	30 – 34 Ω	

Torque Specifications

Part tightened		kg-cm	ft-lb	N·m
Fuel line	Union bolt type	300	22	29
	Flare nut type	310	22	30
Fuel pump x Fuel tank		40	35 in.-lb	3.9
Cylinder head x Delivery pipe		150	11	15
Pressure regulator x Delivery pipe		95	82 in.-lb	9.3
Fuel inlet hose x Delivery pipe		300	22	29
Cold start injector pipe x Delivery pipe		180	13	18
Cold start injector pipe x Cold start injector		180	13	18
Intake manifold x Cold start injector		95	82 in.-lb	9.3
Intake manifold x Throttle body		220	16	22

EFI SYSTEM (4A-GE)

Specifications (Cont'd)

Fuel pressure regulator	Fuel pressure	at No vacuum	2.7 – 3.1 kg/cm ² (38 – 44 psi, 265 – 304 kPa)
Cold start injector	Resistance Fuel leakage		3 – 5 Ω Less than one drop of fuel per minute
Injector	Resistance Injection volume Difference between each injector Fuel leakage		Approx. 13.8 Ω 50 – 53 cc/15 sec (3.1 – 3.2 cu in.) 5 cc (0.31 cu in.) or less One drop or less of fuel per minute
Throttle body	Throttle valve fully closed angle		6°
Throttle position sensor	Clearance between stop screw and lever	Between terminals	Resistance
	0.35 mm 0.0138 in.	IDL – E2	Less than 2.3 kΩ
	0.59 mm 0.0232 in.	IDL – E2	Infinity
	Throttle valve fully opened position	VTA – E2	3.3 – 10 kΩ
	–	VCC – E2	3 – 7 kΩ
Start injector time switch	Resistance	STA – STJ	20 – 40 Ω Below 30°C (86°F)
		STA – Ground	40 – 60 Ω Above 40°C (104°F) 20 – 80 Ω –
Intake air temp. sensor (w/o Air flow meter) and water temp. sensor	Resistance	at –20°C (–4°F)	10 – 20 kΩ
		at 0°C (32°F)	4 – 7 kΩ
		at 20°C (68°F)	2 – 3 kΩ
		at 40°C (104°F)	0.9 – 1.3 kΩ
		at 60°C (140°F)	0.4 – 0.7 kΩ
		at 80°C (176°F)	0.2 – 0.4 kΩ
Air flow meter (w/ Air flow meter)	Resistance	VS – E2	20 – 400 Ω (Measuring plate fully closed)
			20 – 3,000 Ω (Measuring plate fully open)
		VC – E2	100 – 300 Ω
		FC – E1	∞ (Measuring plate closed)
			0 (Measuring plate open)
		THA – E2	10 – 20 kΩ (–20°C, –4°F)
			4 – 7 kΩ (0°C, 32°F)
			2 – 3 kΩ (20°C, 68°F)
			0.9 – 1.3 kΩ (40°C, 104°F)
			0.4 – 0.7 kΩ (60°C, 140°F)
	VB – E2	200 – 400 Ω	
Water temp. sensor and intake air temp. sensor	Resistance	at –20°C (–4°F)	10 – 20 kΩ
		0°C (32°F)	4 – 7 kΩ
		40°C (104°F)	0.9 – 1.3 kΩ
		60°C (140°F)	0.4 – 0.7 kΩ
		80°C (140°F)	0.2 – 0.4 kΩ
Oxygen sensor	Heater resistance	at 20°C (68°F)	5.1 – 6.3 Ω

Specifications (Cont'd)

ECU

HINT:

• Perform all voltage and resistance measurements with the ECU connected.

• Verify that the battery voltage is 11 V or above when the ignition switch is ON.

• The testing probes must not make contact with the ECU oxygen and VF terminals.

Voltage (ECU w/o Air flow meter)

Terminal	STD voltage (V)	Condition	
+B +B1 – E1	10 – 14	Ignition SW ON	
BATT – E1	10 – 14	–	
IDL – E2	4.5 – 5.5	Ignition SW ON	Throttle vale open
VTA – E2	0.5 or less		Throttle valve fully closed
	3.5 – 5.5		Throttle valve fully open
VCC – E2	4.5 – 5.5		–
IGT – E1	0.7 – 1.0	Idling	
STA – E2	6 – 14	Cranking	
No. 10 – E01 No. 20 – E02	10 – 14	Ignition SW ON	
W – E1	10 – 14	No trouble (“CHECK ENGINE” warning light off) and engine running	
PIM – E2	3.3 – 3.9	Ignition SW ON	
VCC – E2	4.5 – 5.5		
THA – E2	2.0 – 2.8	Ignition SW ON	Intake air temp. 20°C (68°F)
THW – E2	0.4 – 0.7		Coolant temp. 80°C (176°F)
A/C – E1	10 – 14		Air conditioning ON
T – E1	10 – 14		Check connector TE1 – E1 not connect
	0.5 or less		Check connector TE1 – E1 connect

Resistance (ECU w/o Air flow meter)

Terminals	Resistance (Ω)	Condition
IDL – E2	Infinity	Throttle valve open
	2,300 or less	Throttle valve fully closed
VTA – E2	3,300 – 10,000	Throttle valve fully open
	200 – 800	Throttle valve fully closed
VCC – E2	3,000 – 7,000	–
THA – E2	2,000 – 3,000	Intake air temp. 20°C (68°F)
THW – E2	200 – 400	Coolant temp. 80°C (176°F)
G1, G2 – G⊖	140 – 180	–
NE – G⊖	140 – 180	–

Specification (Cont'd)

ECU
(Cont'd)

HINT:

- Perform all voltage and resistance measurements with the ECU connected.
- Verify that the battery voltage is 11 V or above when the ignition switch is ON.
- The testing probes must make contact with the ECU oxygen and VF terminals.

Voltage (ECU w/ Air flow meter)

Terminals	STD voltage (V)	Condition	
+B +B1 - E1	10 - 14	Ignition SW ON	
BATT - E1	10 - 14	-	
IDL - E2	10 - 14	Ignition SW ON	Throttle valve open
VTA - E2	0.1 - 1.0		Throttle valve fully closed
	4 - 5		Throttle valve fully open
VCC - E2	4.5 - 5.5		-
IGT - E1	0.7 - 1.0	Idling	
STA - E2	6 - 14	Cranking	
No. 10 - E01 No. 20 - E02	10 - 14	Ignition SW ON	
W - E1	10 - 14	No trouble ("CHECK ENGINE" warning light off) and engine running	
VC - E2	4.5 - 5.5	-	
VS - E2	2.0 - 5.5	Ignition SW ON	Measuring fully closed
	6 - 9		Measuring plate fully open
	2 - 8	Idling	
THA - E2	2.0 - 2.8	Ignition SW ON	Intake air temp. 20°C (68°F)
THW - E2	0.4 - 0.7		Coolant temp. 80°C (176°F)
A/C - E1	10 - 14		Air conditioning ON
T - E1	10 - 14		Check connector TE1 - E1 not connect
	0.5 or less		Check connector TE1 - E1 connect

Resistance (ECU w/ Air flow meter)

Terminals	Resistance (Ω)	Condition
IDL - E2	Infinity	Throttle valve open
	2,300 or less	Throttle valve fully closed
VTA - E2	3,300 - 10,000	Throttle valve fully open
	200 - 800	Throttle valve fully closed
VCC - E2	3,000 - 7,000	-
VS - E2	20 - 400	Measuring plate fully closed
	20 - 3,000	Measuring plate fully open
VC - E2	100 - 300	-
THA - E2	2,000 - 3,000	Intake air temp. 20°C (68°F)
THW - E2	200 - 400	Coolant temp. 80°C (176°F)
G⊕ - G⊖	140 - 180	-
NE - G⊖	140 - 180	-

Specification (Cont'd)

ECU (Cont'd)	Fuel cut rpm (w/ Vehicle speed 0 km/h and coolant temperature 80°C (176°F))	Fuel cut rpm w/o Air flow meter w/ Air flow meter Fuel return rpm w/o Air flow meter w/ Air flow meter	1,450 rpm 1,600 rpm 1,050 rpm 1,200 rpm
Fuel Pressure VSV	Resistance at cold		33 – 39 Ω
Idle-up VSV	Resistance at cold		37 – 44 Ω
ACV	Resistance at cold		22 – 26 Ω

Torque Specifications

Part tightened		kg-cm	ft-lb	N·m
Fuel line	Union bolt type	300	22	29
	Flare nut type	310	22	30
Fuel pump x Fuel tank		40	35 in.-lb	3.9
Cylinder head x Delivery pipe		175	13	17
Pressure regulator x Delivery pipe		75	65 in.-lb	7.4
Fuel inlet hose x Delivery pipe		300	22	29
Cold start injector pipe x Delivery pipe		150	11	15
Cold start injector pipe x Cold start injector		150	11	15
Intake manifold x Cold start injector		75	65 in.-lb	7.4
Intake manifold x Throttle body		220	16	22

COOLING SYSTEM

Coolant capacity (w/heater)		4A-FE	AE M/T	6.2 liters	6.5 US qts	5.5 Imp.qts
			AE A/T	6.1 liters	6.4 US qts	5.4 Imp.qts
			AT171	5.6 liters	5.9 US qts	4.9 Imp.qts
			AT180	5.2 liters	5.5 US qts	4.6 Imp.qts
		4A-GE		6.0 liters	6.3 US qts	5.3 Imp.qts
Radiator	Relief valve opening pressure	STD		0.75 – 1.05 kg/cm ²		
				(1.07 – 14.9 psi, 74 – 103 kPa)		
		Limit		0.6 kg/cm ²	8.5 psi	59 kPa
Thermostat	Valve opening temperature					
	Stars to open at			80 – 84°C	176 – 183°F	
	Fully opens at			95°C	203°F	
	Valve opening travel			8 mm or more	0.31 in. or more	

LUBRICATION SYSTEM

Oil pressure (normal operating temperature)		at Idle speed at 3,000 rpm	More than 0.3 kg/cm ² (4.3 psi, 29 kPa) 2.5 – 5.0 kg/cm ² (35.6 – 71.1 psi, 245 – 490 kPa)	
Oil pump	4A-FE			
	Body clearance	STD	0.080 – 0.180 mm	0.0031 – 0.0071 in.
		Limit	0.20 mm	0.0079 in.
	Tip clearance	STD	0.025 – 0.085 mm	0.0010 – 0.0033 in.
		Limit	0.35 mm	0.0138 in.
	Side clearance	STD	0.025 – 0.085 mm	0.0010 – 0.0033 in.
		Limit	0.10 mm	0.0039 in.
	4A-GE			
	Body clearance	STD	0.100 – 0.191 mm	0.0039 – 0.0075 in.
		Limit	0.20 mm	0.0079 in.
	Tip clearance	STD	0.060 – 0.180 mm	0.0023 – 0.0071 in.
		Limit	0.35 mm	0.0138 in.
	Side clearance	STD	0.025 – 0.075 mm	0.0010 – 0.0030 in.
		Limit	0.10 mm	0.0039 in.

IGNITION SYSTEM (4A-FE)

Ignition timing		See page A-2
Spark plug		See page A-2
Firing order		1 – 3 – 4 – 2
High-tension cord	Resistance Limit	25 kΩ per cord
Ignition coil	Primary coil resistance	2WD 1.28 – 1.56 Ω
		4WD 0.38 – 0.46 Ω
	Secondary coil resistance	2WD 10.4 – 14.0 kΩ
		4WD 7.7 – 10.3 kΩ
Distributor (IIA)	Air gap	0.2 mm or more 0.008 in. or more
	Signal generator (pickup coil) resistance	140 – 180 Ω

IGNITION SYSTEM (4A-GE)

Ignition timing		See page A-6	
Spark plug		See page A-6	
Firing order		1 - 3 - 4 - 2	
High-tension cord	Resistance	Limit	25 k Ω per cord
Ignition coil	Primary coil resistance		0.4 - 0.5 Ω
	Secondary coil resistance		10.2 - 13.8 k Ω
Distributor	Air gap	0.2 - 0.4 mm	0.008 - 0.016 in.
	Signal generator (pickup coil) resistance	140 - 180 Ω	

STARTING SYSTEM

Starter	Type		Planetary		Reduction	
	Rated voltage and output power		12 V 0.8 kW		12 V 1.0 kW	
	rpm		More than 3,000 rpm		←	
	Center bearing oil clearance					
		STD	0.03 mm	0.0012 in.	-	
		Limit	0.1 mm	0.004 in.	-	
	Brush	Length	STD	14.0 mm	0.551 in.	13.5 mm 0.531 in.
			Limit	9.0 mm	0.354 in.	8.5 mm 0.335 in.
	Spring installed load	STD	1.6 kg (3.5 lb, 16 N)		1.785 kg - 2.415 kg	
					(3.9 - 5.3 lb, 18 - 24 N)	
		Limit	0.9 kg (2.0 lb, 9N)		1.2 kg (2.6 lb, 12 N)	
	Commutator					
	Outer diameter	STD	28 mm	1.10 in.	30 mm	1.18 in.
		Limit	27 mm	1.06 in.	29 mm	1.14 in.
	Undercut depth	STD	0.6 mm	0.024 in.	←	
		Limit	0.2 mm	0.008 in.	←	
	Circle runout	Limit	0.05 mm	0.0020 in.	←	

CHARGING SYSTEM

Battery specific gravity			
When fully charged at 20°C (68°F)		1.25 - 1.27	
Alternator	Rated output		12 V 70 A
	Rotor coil resistance		2.8 - 3.0 Ω
	Slip ring diameter	STD	14.2 - 14.4 mm 0.559 - 0.567 in.
		Limit	14.0 mm 0.551 in.
	Brush exposed length	STD	10.5 mm 0.413 in.
		Limit	4.5 mm 0.177 in.
Alternator regulator (IC)	Regulating voltage	at 25°C (77°F)	13.9 - 15.1 V
		at 155°C (239°F)	13.5 - 14.3 V

