2009 GENERAL INFORMATION

Service Specifications - Highlander

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

Bolt Type

Hexagon Head Bolt			Stud Bolt	Weld Bolt	Class
Normal Recess Bolt		Deep Recess Bolt			
4	No Mark	No Mark	No Mark		4T
5					5T
6	w/ Washer	w/ Washer			6T
7					7T
8					8T
9					9T
10					10T
11					11T

Fig. 1: Standard Bolt Classification Chart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SERVICE SPECIFICATIONS - STANDARD BOLT

STANDARD BOLT TORQUE SPECIFICATIONS

			Specified torque

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Class	Diameter (mm)	Pitch (mm)	Hexagon head bolt			Hexagon flange bolt		
			N*m	kgf*cm	ft.*lbf	N*m	kgf*cm	ft.*lbf
4T	6	1	5	55	48 in.*lbf	6	60	52 in.*lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	-	-	-
5T	6	1	6.5	65	56 In.*lbf	7.5	75	65 in.*lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	-	-	-
6T	6	1	8	80	69 in.*lbf	9	90	78 in.*lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	-	-	-
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	-	-	-
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

HOW TO DETERMINE NUT STRENGTH

Nut Type

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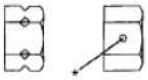
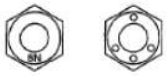
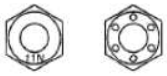
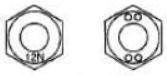
Present Standard Hexagon Nut	Old Standard Hexagon Nut		Class
	Cold Forging Nut	Cutting Processed Nut	
No Mark 	-	-	4N
No Mark (w/ Washer) 	No Mark (w/ Washer) 	No Mark 	5N (4T)
	-	-	6N
-			7N (5T)
	-	-	8N
		No Mark 	10N (7T)
	-	-	11N
	-	-	12N

Fig. 2: Standard Nut Classification Chart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

- *: Nut with 1 or more marks on one side surface of the nut.
- Use a nut with the same nut strength classification number (or more) as the bolt strength classification number when tightening parts with a bolt and nut.

Example:

- Bolt = 4T
- Nut = 4N or more

1AR-FE ENGINE CONTROL SYSTEM

SERVICE DATA

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1AR-FE ENGINE CONTROL SYSTEM - SERVICE DATA

Camshaft timing oil control valve assembly		
Resistance	at 20°C (68°F)	6.9 to 7.9 ohms
Throttle body		
Resistance	2 (M+) -1 (M-)	0.3 to 100ohms at 20°C(68°F)
Accelerator pedal assembly		
Standard voltage (Accel Sensor Out No.1)	Released	0.5 to 1.1 V
	Depressed	2.6 to 4.5 V
Standard voltage (Accel Accel Sensor Out No.2)	Released	1.2 to 2.0 V
	Depressed	3.4 to 4.98 V
Mass air flow meter		
Resistance	1 (THA) - 2 (E2)	13.6 to 18.4kohms at-20°C(-4°F)
	1 (THA) - 2 (E2)	2.21 to 2.69 kohms at 20°C (68°F)
	1 (THA) - 2 (E2)	0.49 to 0.67 kohms at 60°C (140°F)
Crankshaft position sensor		
Resistance	Cold	1630 to 2740 ohms
	Hot	2065 to 3225 ohms
Engine coolant temperature sensor		
Resistance	20°C (68°F)	2.32 to 2.59 kohms
	80°C(176°F)	0.310 to 0.326 kohms
Knock sensor		
Resistance	at 20°C (68°F)	120 to 280 kohms
Air fuel ratio sensor		
Resistance	1 (HA1A) - 2 (+B)	1.8 to 3.4ohms at 20°C(68°F)
Oxygen sensor		
Resistance	1 (HT1B) - 2 (+B)	11 to 16ohms at 20°C(68°F)
Circuit opening relay		
Specified condition	3-5	10 kohms or higher
	3-5	Below 1 ohms (when battery voltage is applied to terminals 1 and 2)
Integration relay (EFI relay)		
Specified condition	2E-12 - 2E-7	10 kohms or higher
	2E-12 - 2E-7	Below 1 ohms (when battery voltage is applied to terminals 2E-10 and 2E-9)
Integration relay (A/F relay)		
Specified condition	2A-4 - 2C-1	10 kohms or higher
	2A-4 - 2C-1	Below 1 ohms (when battery voltage is applied to

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		terminals 2E-10 and 2E-7)
Ignition No.1 relay		
Specified condition	3-5	10 kohms or higher
	3-5	Below 1 ohms (when battery voltage is applied to terminals 1 and 2)
Ignition No.2 relay		
Specified condition	3-5	10 kohms or higher
	3-5	Below 1 ohms (when battery voltage is applied to terminals 1 and 2)

TORQUE SPECIFICATIONS

1AR-FE ENGINE CONTROL SYSTEM - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Camshaft timing oil control valve assembly x Cylinder head cover sub-assembly		10	102	7
Air cleaner cap x Air cleaner case		5.0	51	44 in.*lbf
Throttle body assembly x Intake air surge tank		10	102	7
Fuel tube bracket x Throttle body		7.5	76	66 in.*lbf
Tire pressure warning ECU x Bracket		8.5	87	75 in.*lbf
ECM bracket x Body		8.0	82	71 in.*lbf
Accelerator pedal sensor assembly x Body		5.4	55	48 in.*lbf
Camshaft position sensor x Cylinder head cover sub-assembly		10	102	7
Crank position sensor x Cylinder block sub-assembly		10	102	7
Engine coolant temperature sensor x Cylinder head sub-assembly		20	204	15
Knock control sensor x Cylinder block sub-assembly		20	204	15
Air fuel ratio sensor x Exhaust manifold	without SST	44	449	32
	with SST	40	408	30
Oxygen sensor x Exhaust pipe	without SST	44	449	32
	with SST	40	408	30

2GR-FE ENGINE CONTROL SYSTEM

SERVICE DATA

2GR-FE ENGINE CONTROL SYSTEM - SERVICE DATA

Camshaft timing oil control valve assembly	1-2	6.9 to 7.9 ohms at 20°C (68°F)
Throttle body	2 (M+) -1 (M-)	0.3 to 100ohms at 20°C(68°F)
Duty vacuum switching valve	1-2	19 to 21 ohms at at 20°C (68°F)
Acceleration pedal assembly	Accelerator Position No. 1	Accelerator pedal is released: 0.5 to 1.1 V
		Accelerator pedal is depressed: 2.5 to 4.5 V
	Accelerator Position	Accelerator pedal is released: 1.2 to 2.0 V

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	No. 2	Accelerator pedal is depressed: 3.4 to 5.0 V
Mass air flow meter	Standard Condition	Below 0.70 g/s
Crankshaft position sensor	1-2	1630 to 2740 ohms at -10 to 50°C (14 to 122°F) 2065 to 3225 ohms at 50 to 100°C (122 to 212°F)
Engine coolant temperature sensor	1-2	2.32 to 2.59 kohms at approx. 20°C (68°F) 0.310 to 0.326 kohms at approx. 80°C (176°F)
Knock control sensor	1-2	120 to 280kohms at 25°C (77°F)
Air fuel ratio sensor (for Bank 1)	1 (HA1A) - 2 (+B)	1.8 to 3.4 ohms at 20°C (68°F)
	1 (HA1A) - 4(A1A-)	10 kohms or higher (always)
Air fuel ratio sensor (for Bank 2)	1 (HA2A) - 2 (+B)	1.8 to 3.4ohms at 20°C(68°F)
	1 (HA2A) - 4 (A2A-)	10 kohms or higher (always)
Heated oxygen sensor (for Bank 1)	2(HT1B) - 1 (+B)	11 to 16ohms at 20°C(68°F)
	2(HT1B) - 3(E2)	10 kohms or higher (always)
Heated oxygen sensor (for Bank 2)	1 (HT2B) - 2 (+B)	11 to 16ohms at 20°C(68°F)
	1 (HT2B) - 4 (E2)	10 kohms or higher (always)
Integration relay (EFI relay)	(2E-12) - (2E-7)	10 kohms or higher (No battery voltage applied)
	(2E-12) - (2E-7)	Below 1 ohms (Battery voltage applied to terminals 2E-10 and 2E-9)
Integration relay (C/OPN relay)	(2E-13) - (2E-7)	10 kohms or higher (No battery voltage applied)
	(2E-13) - (2E-7)	Below 1 ohms (Battery voltage applied to terminals 2E-8 and 2D-12)
Integration relay (A/F relay)	(2A-4) - (2C-1)	10 kohms or higher (No battery voltage applied)
	(2A-4) - (2C-1)	Below 1 ohms (Battery voltage applied to terminals 2E-10 and 2E-7)
Ignition relay No. 1	3-5	10 kohms or higher (No battery voltage applied)
	3-5	Below 1 ohms (Battery voltage applied to terminals 1 and 2)
Ignition relay No. 2	3-5	10 kohms or higher (No battery voltage applied)
	3-5	Below 1 ohms (Battery voltage applied to terminals 1 and 2)
	3-4	Below 1 ohms

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Fuel pump relay		(No battery voltage applied)
	3-4	10 kohms or higher (Battery voltage applied to terminals 1 and 2)
	3-5	10 kohms or higher (No battery voltage applied)
	3-5	Below 1 ohms (Battery voltage applied to terminals 1 and 2)

TORQUE SPECIFICATIONS

2GR-FE ENGINE CONTROL SYSTEM - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Camshaft timing oil control valve assembly x Cylinder head cover sub-assembly	10	102	7
Harness protector x Cylinder head cover sub-assembly	8.3	84	73 in.*lbf
Throttle body x Intake air surge tank assembly	10	102	7
Duty vacuum switching valve x Front engine mounting insulator assembly	4.0	41	35 in.*lbf
Front engine mounting insulator assembly x Front frame assembly	52	530	38
Transverse engine mounting bracket x Automatic transaxle assembly	64	653	47
Transverse engine mounting bracket x Front engine mounting insulator assembly	87	887	64
No. 1 ECM bracket x Instrument panel reinforcement assembly	8.0	82	71 in.*lbf
No. 2 ECM bracket x Blower assembly	8.0	82	71 in.*lbf
Accelerator pedal assembly x Body	5.4	55	48 in.*lbf
VVT sensor x Cylinder head cover sub-assembly	10	102	7
Crankshaft position sensor x Cylinder block sub-assembly	10	102	7
Engine coolant temperature sensor x Cylinder head sub-assembly	20	204	15
Knock control sensor x Cylinder block sub-assembly	20	204	15
Air fuel ratio sensor (bank 1) x Exhaust manifold sub-assembly RH : for use with SST	40	408	30
Air fuel ratio sensor (bank 1) x Exhaust manifold sub-assembly RH : for use without SST	44	449	32
Air fuel ratio sensor (bank 2) x Exhaust manifold sub-assembly LH : for use with SST	40	408	30
Air fuel ratio sensor (bank 2) x Exhaust manifold sub-assembly LH : for use without SST	44	449	32
Heated oxygen sensor (bank 1) x Front No. 3 exhaust pipe sub-assembly : for use with SST	40	408	30
Heated oxygen sensor (bank 1) x Front No. 3 exhaust pipe sub-assembly : for use			

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without SST	44	449	32
Heated oxygen sensor (bank 2) x Front exhaust pipe assembly : for use with SST	40	408	30
Heated oxygen sensor (bank 2) x Front exhaust pipe assembly : for use without SST	44	449	32

1AR-FE ENGINE MECHANICAL

SERVICE DATA

ENGINE

ENGINE - SERVICE DATA

Ignition timing	with Terminals TC and CG connected of DLC3	8 to 12° BTDC at idle
	without Terminals TC and CG connected of DLC3	5 to 15° BTDC at idle
Idle speed		600 to 700 rpm (Transmission neutral position)
Compression	Standard	1450 kPa (14.7 kgf/cm^2 , 210 psi) or higher
	Minimum	980 kPa (9.9 kgf/cm^2 , 142 psi)
	Difference	200 kPa (2.0 kgf/cm^2 , 29 psi) or less

CYLINDER HEAD

CYLINDER HEAD - SERVICE DATA

Warpage	Cylinder head lower side		0.05 mm (0.00197 in.)
	Intake manifold side		0.10 mm (0.00394 in.)
	Exhaust manifold side		0.10 mm (0.00394 in.)
Compression spring	Free length		50.0 mm (1.97 in.)
	Maximum deviation		1.0 mm (0.0394 in.)
	Maximum angle		2°
Intake valve	Valve stem diameter		5.470 to 5.485 mm (0.2154 to 0.2159 in.)
	Margin thickness	Standard	1.0 mm (0.0394 in.)
		Minimum	0.50 mm (0.0197 in.)
	Overall length	Standard	103.92 mm (4.09 in.)
		Minimum	103.42 mm (4.07 in.)
Exhaust valve	Valve stem diameter		5.465 to 5.480 mm (0.2152 to 0.2157 in.)
	Margin thickness	Standard	1.0 mm (0.0394 in.)
		Minimum	0.50 mm (0.0197 in.)
	Overall length	Standard	112.91 mm (4.44 in.)

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		Minimum	112.41 mm (4.43 in.)
Valve guide bush	Bush inside diameter		5.510 to 5.530 mm (0.2169 to 0.2177 in.)
	Standard oil clearance	Intake	0.025 to 0.060 mm (0.000984 to 0.00236 in.)
		Exhaust	0.030 to 0.065 mm (0.00118 to 0.00256 in.)
	Maximum oil clearance	Intake	0.08 mm (0.00315 in.)
		Exhaust	0.10 mm (0.00394 in.)
	Bush bore diameter (Cylinder head side)		10.285 to 10.306 mm (0.405 to 0.406 in.)
	Bush bore diameter (Valve guide bush)	Standard	10.333 to 10.344 mm (0.4068 to 0.4072 in.)
		O/S 0.05	10.383 to 10.394 mm (0.4088 to 0.4092 in.)
	Bush length	Intake	41.3 to 41.7 mm (1.626 to 1.642 in.)
		Exhaust	46.8 to 47.2 mm (1.843 to 1.858 in.)
	Protrusion height	Intake	14.8 to 15.2 mm (0.582 to 0.598 in.)
		Exhaust	14.2 to 14.6 mm (0.559 to 0.575 in.)
Camshaft oil clearance	Standard oil clearance	Intake No. 1 journal	0.035 to 0.072 mm (0.00137 to 0.00283 in.)
		Exhaust No. 1 journal	0.049 to 0.086 mm (0.00193 to 0.00339 in.)
		Other journal	0.025 to 0.062 mm (0.000984 to 0.00244 in.)
	Maximum oil clearance	Intake No. 1 journal	0.085 mm (0.00335 in.)
		Exhaust No. 1 journal	0.095 mm (0.00374 in.)
		Other journal	0.085 mm (0.00335 in.)
Camshaft thrust clearance	Standard		0.060 to 0.155 mm (0.00236 to 0.00610 in.)
	Maximum		0.170 mm (0.00669 in.)
Spark plug tube	Standard protrusion height		112 mm (4.41 in.)
Cylinder head ring pin	Standard protrusion height		6.5 to 7.5 mm (0.256 to 0.295 in.)
Intake valve seat	Standard width	Inspection	1.1 and 1.5 mm (0.0433 and 0.0591 in.)
		Repair	1.0 to 1.4 mm (0.0394 to 0.055 ? in.)

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Exhaust valve seat	Standard width	Inspection	1.1 and 1.5 mm (0.0433 and 0.0591 in.)
		Repair	1.2 to 1.6 mm (0.0472 to 0.0630 in.)

CYLINDER BLOCK

CYLINDER BLOCK - SERVICE DATA

Connecting rod thrust clearance	Standard		0.160 to 0.512 mm (0.00630 to 0.0202 in.)
	Maximum		0.512 mm (0.0202 in.)
Connecting rod oil clearance	Standard		0.030 to 0.063 mm (0.00118 to 0.00248 in.)
	Maximum		0.07 mm (0.00276 in.)
Crank pin	Standard diameter		51.492 to 51.500 mm (2.0272 to 2.0276 in.)
Connecting rod big end inside diameter	Mark 1		54.500 to 54.508 mm (2.1457 to 2.1460 in.)
	Mark 2		54.509 to 54.516 mm (2.1460 to 2.1463 in.)
	Mark 3		54.517 to 54.524 mm (2.1463 to 2.1466 in.)
Bearing center wall thickness	Mark 1		1.483 to 1.487 mm (0.0584 to 0.0585 in.)
	Mark 2		1.488 to 1.491 mm (0.0586 to 0.0587 in.)
	Mark 3		1.492 to 1.495 mm (0.0587 to 0.0589 in.)
Crankshaft thrust clearance	Standard		0.04 to 0.24 mm (0.00157 to 0.00945 in.)
	Maximum		0.30 mm (0.0118 in.)
Thrust washer	Standard thickness		1.93 to 1.98 mm (0.0760 to 0.0780 in.)
Cylinder block	Maximum warpage		0.05 mm (0.00197 in.)
	Cylinder bore	Standard	90.000 to 90.013 mm (3.543 to 3.544 in.)
		Maximum	90.133 mm (3.549 in.)
Piston	Standard diameter		89.980 to 89.990 mm (3.5425 to 3.5429 in.)
	Oil clearance	Standard	0.010 to 0.033 mm (0.000394 to 0.00130 in.)
		Maximum	0.10 mm (0.00394 in.)
		No. 1 ring	0.020 to 0.070 mm (0.000787 to 0.00276 in.)

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Piston ring	Ring groove clearance	No. 2 ring	0.020 to 0.060 mm (0.000787 to 0.00236 in.)
		Oil ring	0.020 to 0.070 mm (0.000787 to 0.00276 in.)
	Standard end gap	No. 1 ring	0.22 to 0.27 mm (0.00866 to 0.0106 in.)
		No. 2 ring	0.37 to 0.42 mm (0.0146 to 0.0165 in.)
		Oil ring	0.10 to 0.20 mm (0.00394 to 0.00787 in.)
	Maximum end gap	No. 1 ring	0.87 mm (0.0342 in.)
		No. 2 ring	1.02 mm (0.0402 in.)
		Oil ring	0.80 mm (0.0315 in.)
Piston pin	Piston pin hole inside diameter	Mark A	22.001 to 22.004 mm (0.86618 to 0.86630 in.)
		Mark B	22.005 to 22.007 mm (0.86634 to 0.86642 in.)
		Mark C	22.008 to 22.010 mm (0.86645 to 0.86653 in.)
	Piston pin diameter	Mark A	21.997 to 22.000 mm (0.86602 to 0.86614 in.)
		Mark B	22.001 to 22.003 mm (0.86617 to 0.86626 in.)
		Mark C	22.004 to 22.006 mm (0.86630 to 0.86638 in.)
	Connecting rod small end bush inside diameter	Mark A	22.005 to 22.008 mm (0.86634 to 0.86645 in.)
		Mark B	22.009 to 22.011 mm (0.86649 to 0.86657 in.)
		Mark C	22.012 to 22.014 mm (0.86661 to 0.86669 in.)
	Oil clearance (Piston side)	Standard	0.001 to 0.007 mm (0.0000394 to 0.000276 in.)
		Maximum	0.013 mm (0.000512 in.)
	Oil clearance (Connecting rod side)	Standard	0.005 to 0.011 mm (0.000197 to 0.000433 in.)
		Maximum	0.017 mm (0.000669 in.)
Connecting rod	Maximum bend		0.05 mm (0.00197 in.) per 100 mm (3.94 in.)
	Maximum twist		0.15 mm (0.00591 in.) per 100 mm (3.94 in.)
	Maximum circle runout		0.003 mm (0.000118 in.)
	Standard main journal diameter		54.988 to 55.000 mm (2.1649 to 2.1654 in.)

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Crankshaft	Maximum main journal taper and out-of-round		0.003 mm (0.000118 in.)
	Standard crank pin diameter		51.492 to 51.500 mm (2.027 to 2.028 in.)
	Maximum crank pin taper and out-of-round		0.003 mm (0.000118 in.)
	Oil clearance	Standard	0.016 to 0.039 mm (0.000630 to 0.00154 in.)
		Maximum	0.05 mm (0.00197 in.)
Cylinder block journal inside diameter (A)	Mark 0		59.000 to 59.002 mm (2.32283 to 2.32291 in.)
	Mark 1		59.003 to 59.004 mm (2.32295 to 2.32299 in.)
	Mark 2		59.005 to 59.006 mm (2.32303 to 2.32307 in.)
	Mark 3		59.007 to 59.009 mm (2.32311 to 2.32318 in.)
	Mark 4		59.010 to 59.011 mm (2.32322 to 2.32326 in.)
	Mark 5		59.012 to 59.013 mm (2.32330 to 2.32334 in.)
	Mark 6		59.014 to 59.016 mm (2.32338 to 2.32346 in.)
Crankshaft main journal diameter (B)	Mark 0		54.999 to 55.000 mm (2.16531 to 2.16535 in.)
	Mark 1		54.997 to 54.998 mm (2.16523 to 2.16527 in.)
	Mark 2		54.995 to 54.996 mm (2.16515 to 2.16519 in.)
	Mark 3		54.993 to 54.994 mm (2.16507 to 2.16511 in.)
	Mark 4		54.991 to 54.992 mm (2.16500 to 2.16504 in.)
	Mark 5		54.988 to 54.990 mm (2.16488 to 2.16496 in.)
Bearing center wall thickness	Mark 1		1.991 to 1.994 mm (0.07839 to 0.07850 in.)
	Mark 2		1.995 to 1.997 mm (0.07854 to 0.07862 in.)
	Mark 3		1.998 to 2.000 mm (0.07866 to 0.07874 in.)
	Mark 4		2.001 to 2.003 mm (0.07878 to 0.07886 in.)
Crankshaft bearing cap bolt	Measuring point		58.5 mm (2.30 in.)
	Standard diameter		9.77 to 9.96 mm (0.385 to

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			0.392 in.)
	Minimum diameter		9.1 mm (0.358 in.)
Connecting rod bolt	Standard		8.5 to 8.6 mm (0.335 to 0.339 in.)
	Minimum		8.3 mm (0.327 in.)
Cylinder block ring pin	Protrusion height	Ring pin A	5.0 to 7.0 mm (0.197 to 0.276 in.)
		Ring pin B	4.0 to 7.0 mm (0.157 to 0.276 in.)
Cylinder block straight pin	Protrusion height	Straight pin A	11.0 to 13.0 mm (0.433 to 0.512 in.)
		Straight pin B	5.0 to 7.0 mm (0.197 to 0.276 in.)
Crankshaft bearing	Dimension A - B or B - A: 0 to 0.7 mm (0 to 0.0276 in.)		
Connecting rod bearing	Dimension A - B or B - A: 0 to 0.7 mm (0 to 0.0276 in.)		

ENGINE UNIT

ENGINE UNIT - SERVICE DATA

Crankshaft backlash	Standard		0.005 to 0.020 mm (0.000197 to 0.000787 in.)
	Maximum		0.020 mm (0.000787 in.)
Camshaft	Maximum circle runout		0.03 mm (0.00118 in.)
	Journal diameter	No. 1 journal	34.449 to 34.465 mm (1.35626 to 1.35689 in.)
		Other journals	22.959 to 22.975 mm (0.90390 to 0.90453 in.)
Cam lobe height	Standard	Intake	44.163 to 44.305 mm (1.73870 to 1.74429 in.)
		Exhaust	44.144 to 44.286 mm (1.73795 to 1.74354 in.)
	Minimum	Intake	44.013 mm (1.73279 in.)
		Exhaust	43.996 mm (1.73212 in.)
Timing chain	Maximum chain elongation		137.7 mm (5.42 in.)
Crankshaft timing sprocket	Minimum sprocket diameter (with chain)		59.94 mm (2.36 in.)
Chain tensioner slipper	Maximum depth		1.0 mm (0.0394 in.)
No. 1 chain vibration damper	Maximum depth		1.0 mm (0.0394 in.)
Timing chain guide	Maximum depth		1.0 mm (0.0394 in.)
No. 1 balance shaft	Thrust clearance	Standard	0.05 to 0.09 mm (0.00197 to 0.00354 in.)
		Maximum	0.09 mm (0.00354 in.)
		Standard	0.05 to 0.09 mm (0.00197 to 0.00354

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No. 2 balance shaft	Thrust clearance		in.)
		Maximum	0.09 mm (0.00354 in.)
Balance shaft backlash	Standard		0.04 to 0.17 mm (0.00157 to 0.00669 in.)
	Maximum		0.17 mm (0.00669 in.)
Cylinder head bolt	Measuring point		106 mm (4.17 in.)
	Standard diameter		10.85 to 11.00 mm (0.427 to 0.433 in.)
	Minimum diameter		10.6 mm (0.417 in.)
Exhaust manifold converter	Maximum warpage		0.7 mm (0.0276 in.)
Stiffening crankcase ring pin	Protrusion height		4.3 to 5.3 mm (0.169 to 0.209 in.)
Camshaft bearing cap setting ring pin	Protrusion height		2.7 to 3.3 mm (0.106 to 0.130 in.)
Camshaft housing straight pin	Protrusion height		5.0 to 7.0 mm (0.197 to 0.276 in.)
No. 1 camshaft bearing	Dimension A - B or B - A: 0 to 0.7 mm (0 to 0.0276 in.)		
No. 2 camshaft bearing	Standard distance		1.15 to 1.85 mm (0.0453 to 0.0728 in.)

TORQUE SPECIFICATIONS

ENGINE

ENGINE - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Spark plug x Cylinder head	25	254	18
Ignition coil x Cylinder head cover	10	102	7

CAMSHAFT

CAMSHAFT - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Camshaft bearing cap x Camshaft housing	16	163	12
Camshaft housing x Cylinder head	27	275	20
Camshaft timing gear x No. 1 camshaft	85	867	63
Camshaft timing exhaust gear x No. 2 camshaft	85	867	63
No. 1 chain vibration damper x Cylinder head, Cylinder block	21	214	15
Chain tensioner slipper x Cylinder head	21	214	15
No. 1 chain tensioner x Cylinder block	10	102	7
Timing chain guide x Camshaft housing	21	214	15

CYLINDER HEAD GASKET

CYLINDER HEAD GASKET - TORQUE SPECIFICATIONS

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Part Tightened		N*m	kgf*cm	ft.*lbf
Cylinder head x Cylinder block	1st	36	367	27
	2nd	36	367	27
	3rd	Turn 90°	Turn 90°	Turn 90°
	4th	Turn 90°	Turn 90°	Turn 90°

CYLINDER HEAD

CYLINDER HEAD - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Stud bolt x Cylinder head	9.5	97	84 in.*lbf
No. 1 straight screw plug x Cylinder head	44	449	32
No. 2 straight screw plug x Cylinder head	78	795	58

CYLINDER BLOCK

CYLINDER BLOCK - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Stud bolt x Cylinder block	Stud bolt A	9.5	97	84 in.*lbf
	Stud bolt B	21	214	15
No. 2 oil nozzle x Cylinder block		10	102	7
No. 1 oil nozzle x Cylinder block		10	102	7
Crankshaft bearing cap x Cylinder block	1st	20	204	15
	2nd	40	408	30
	3rd	Turn 90°	Turn 90°	Turn 90°
Connecting rod cap x Connecting rod	1st	40	408	30
	2nd	Turn 90°	Turn 90°	Turn 90°

ENGINE REAR OIL SEAL

ENGINE REAR OIL SEAL - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Derive plate and ring gear x Crankshaft	98	999	72

ENGINE ASSEMBLY

ENGINE ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
No. 1 and No. 2 engine hanger x Cylinder head	43	438	32
Engine mounting bracket RH x Cylinder block	54	551	40
Engine mounting insulator LH x Front flame	87	887	64
Engine mounting insulator RH x Front flame	87	887	64

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Front engine mounting insulator x Front flame		52	531	39
Engine mounting insulator LH x Automatic transaxle assembly		95	969	70
Engine mounting insulator RH x Engine mounting bracket RH		95	969	70
Front engine mounting insulator x Front engine mounting bracket		87	887	64
Drive shaft bearing bracket x Cylinder block		64	650	47
Frame side rail plates RH and LH x Body	Bolt A	85	867	63
	Bolt B	32	327	24
	Nut C	32	327	24
Front suspension member rear braces RH and LH x Body	Bolt A	85	867	63
	Bolt B	32	327	24
	Nut C	32	327	24
Torque converter setting bolt x Torque converter		41	418	30
Engine moving control rod x Engine mounting bracket RH		38	387	28
Engine moving control rod x Body		38	387	28
Transmission control cable x Control shaft lever		12	120	9
Reservoir bracket x Body		9.0	92	80 in.*lbf
Brake master cylinder reservoir assembly x Reservoir bracket		9.0	92	80 in.*lbf
No. 1 inlet air cleaner x Body		7.0	72	62 in.*lbf
Air cleaner bracket x Body		13	127	9
Air cleaner case sub-assembly x Air cleaner bracket		5.0	51	44 in.*lbf
No. 2 inlet air cleaner x Body		7.0	72	62 in.*lbf
Battery clamp x Body		5.4	55	47 in.*lbf

ENGINE UNIT

ENGINE UNIT - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Stud bolt x Stiffening crankcase	for stud bolt A	5.0	51	44 in.*lbf
	for stud bolt B	9.5	97	84 in.*lbf
Engine balancer x Stiffening crankcase		24	245	18
Stiffening crankcase x Cylinder block	for bolt A	24	245	18
	except bolt A	43	438	32
No. 1 oil pan baffle plate x Stiffening crankcase		10	102	7
Oil strainer x Stiffening crankcase		10	102	7
Oil pan x Stiffening crankcase		10	102	7
Stud bolt x Camshaft housing		9.5	97	84 in.*lbf
Timing chain cover plate x Timing chain cover		10	102	7
Timing chain cover tight plug x Timing Chain cover		20	204	15
Cylinder head cover sub-assembly x Camshaft housing		12	122	9
Crankshaft pulley x Crankshaft		260	2651	192
Inlet water housing x Cylinder 4 block		43	438	32

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V-ribbed belt tensioner x Inlet water housing	21	214	15
Water drain cock x Inlet water housing	20	204	15
Water drain cock plug x Water drain cock	13	130	9
No. 1 water by-pass pipe x Inlet water housing, Cylinder block	10	102	7
Separator case x Ventilation case	10	102	7
Ventilation case x Cylinder block	21	214	15
Engine cover joint x Cylinder head cover, Camshaft housing	10	102	7
Sensor wire x Cylinder block	21	214	15
No. 1 compressor mounting bracket x Cylinder block, Stiffening crankcase	21	214	15
Engine oil level dipstick guide x Inlet water housing	10	102	7

2GR-FE ENGINE MECHANICAL

SERVICE DATA

2GR-FE ENGINE MECHANICAL - SERVICE DATA

Ignition timing	Terminals TC and CG of DLC3 connected	8 to 12° BTDC at idle (Transmission in neutral)
	Terminals TC and CG of DLC3 disconnected	7 to 24° BTDC at idle (Transmission in neutral)
Idle speed		600 to 700 rpm (Transmission in neutral)
Compression	Compression pressure	1.3 MPa (13 kgf/cm^2 , 189 psi) or more
	Minimum pressure	0.98 MPa (10 kgf/cm^2 , 142 psi)
	Difference between each cylinder	0.1 MPa (1.0 kgf/cm^2 , 15 psi) or less
Cylinder head set bolt		
Outside diameter	Standard	10.85 to 11.00 mm (0.4272 to 0.4331 in.)
	Minimum	10.70 mm (0.4213 in.)
Chain		
Elongation	Maximum	136.9 mm (5.390 in.)
No. 2 chain		
Elongation	Maximum	137.6 mm (5.417 in.)
Crankshaft timing gear		
Diameter (with chain)	Minimum	61.4 mm (2.417 in.)
Idle sprocket		
Diameter (with chain)	Minimum	61.4 mm (2.417 in.)
Idle gear shaft		
Idle gear shaft diameter		22.987 to 23.000 mm (0.9050 to 0.9055 in.)

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Idle gear inside diameter		23.020 to 23.030 mm (0.9063 to 0.9067 in.)
Oil clearance	Standard	0.020 to 0.043 mm (0.0008 to 0.0017 in.)
	Maximum	0.093 mm (0.0037 in.)
Chain tensioner assembly No. 2		
Worn depth	Maximum	0.9 mm (0.035 in.)
Chain tensioner assembly No. 3		
Worn depth	Maximum	0.9 mm (0.035 in.)
Chain tensioner slipper		
Worn depth	Maximum	1.0 mm (0.039 in.)
Chain vibration damper No. 1		
Worn depth	Maximum	1.0 mm (0.039 in.)
Chain vibration damper No. 2		
Worn depth	Maximum	1.0 mm (0.039 in.)
Cylinder head sub-assembly		
	Cylinder head lower	0.05 mm (0.0020 in.)
	Intake	0.08 mm (0.0031 in.)
	Exhaust	0.08 mm (0.0031 in.)
Warpage	Maximum	0.10 mm (0.0039 in.)
Intake valve		
Valve stem diameter		5.470 to 5.485 mm (0.2154 to 0.2159 in.)
Margin thickness	Standard	1.0 mm (0.039 in.)
	Minimum	0.5 mm (0.0197 in.)
Overall length	Standard	105.85 mm (4.1673 in.)
	Minimum	105.35 mm (4.1476 in.)
Exhaust valve		
Valve stem diameter		5.465 to 5.480 mm (0.2151 to 0.2157 in.)
Margin thickness	Standard	1.0 mm (0.039 in.)
	Minimum	0.5 mm (0.0197 in.)
Overall length	Standard	110.40 mm (4.3464 in.)
	Minimum	109.90 mm (4.3268 in.)
Inner compression spring		
Free length		45.91 mm (1.8075 in.)
Deviation	Maximum	1.0 mm (0.039 in.)
Angle (reference)	Maximum	2°
Intake valve guide bush		
Inside diameter		5.510 to 5.530 mm (0.2169 to 0.2177 in.)
		0.025 to 0.060 mm (0.0010 to 0.0024

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Oil clearance	Standard	in.)
	Maximum	0.08 mm (0.0032 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.30 to 9.70 mm (0.3661 to 0.3819 in.)
Exhaust valve guide bush		
Inside diameter		5.510 to 5.530 mm (0.2169 to 0.2177 in.)
Oil clearance	Standard	0.030 to 0.065 mm (0.0012 to 0.0026 in.)
	Maximum	0.10 mm (0.0039 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.30 to 9.70 mm (0.3661 to 0.3819 in.)
No. 1 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)
Circuit runout	Maximum	0.04 mm (0.0016 in.)
Cam lobe height	Standard	44.316 to 44.416 mm (1.7447 to 1.7487 in.)
	Maximum	44.166 mm (1.7388 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.00098 to 0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm (0.006 in.)
No. 2 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)

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Circuit runout	Maximum	0.04 mm (0.0016 in.)
Cam lobe height	Standard	44.262 to 44.362 mm (1.7426 to 1.7465 in.)
	Maximum	44.112 mm (1.7367 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.00098 to 0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm (0.006 in.)
No. 3 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)
Circuit runout	Maximum	0.04 mm (0.0016 in.)
Cam lobe height	Standard	44.316 to 44.416 mm (1.7447 to 1.7487 in.)
	Maximum	44.166 mm (1.7388 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.00098 to 0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm (0.006 in.)
No. 4 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)
Circuit runout	Maximum	0.04 mm (0.0016 in.)
Cam lobe height	Standard	44.262 to 44.362 mm (1.7426 to 1.7465 in.)
	Maximum	44.112 mm (1.7367 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.00098 to

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		0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm (0.006 in.)
Ring pin for cylinder head sub-assembly		
Protrusion height		2.5 to 3.5 mm (0.098 to 0.138 in.)
Straight pin for cylinder head sub-assembly		
Protrusion height		17.5 to 19.5 mm (0.689 to 0.768 in.)
Connecting rod thrust clearance	Standard	0.15 to 0.40 mm (0.0059 to 0.0157 in.)
	Maximum	0.50 mm (0.020 in.)
Connecting rod oil clearance	Standard	0.045 to 0.067 mm (0.0018 to 0.0026 in.)
	Maximum	0.070 mm (0.0028 in.)
Crankshaft thrust clearance	Standard	0.04 to 0.24 mm (0.0016 to 0.0094 in.)
	Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness	2.43 to 2.48 mm (0.0957 to 0.0976 in.)
Cylinder block warpage	Maximum	0.07 mm (0.0028 in.)
Cylinder bore diameter	Standard	94.000 to 94.012 mm (3.7008 to 3.7013 in.)
	Maximum	94.200 mm (3.7087 in.)
Piston diameter		
	Distance	8.9 mm (0.3504 in.)
	Standard	93.960 to 93.980 mm (3.6992 to 3.7000 in.)
	Maximum	93.830 mm (3.6941 in.)
Oil clearance	Standard	0.020 to 0.052 mm (0.0008 to 0.0020 in.)
	Maximum	0.060 mm (0.0024 in.)
Connecting rod out-of alignment	Maximum	0.05 mm (0.0020 in.) per 100 mm (3.94 in.)
Connecting rod twist	Maximum	0.15 mm (0.0059 in.) per 100 mm (3.94 in.)
Piston pin hole inside diameter		22.001 to 22.010 mm (0.8662 to 0.8665 in.)
Piston pin diameter		21.997 to 22.006 mm (0.8660 to 0.8664 in.)
Oil clearance	Standard	0.001 to 0.007 mm (0.00004 to 0.00028 in.)

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	Maximum	0.015 mm (0.0006 in.)
Connecting rod bushing inside diameter		22.005 to 22.014 mm (0.8663 to 0.8667 in.)
Oil clearance	Standard	0.005 to 0.011 mm (0.0002 to 0.0004 in.)
	Maximum	0.030 mm (0.0012 in.)
Piston ring groove clearance	No. 1	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
	No. 2	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
	Oil	0.070 to 0.150 mm (0.0028 to 0.0059 in.)
Piston ring end gap	Standard No. 1	0.25 to 0.35 mm (0.0098 to 0.0138 in.)
	No. 2	0.50 to 0.60 mm (0.0197 to 0.0236 in.)
	Oil (Side rail)	0.10 to 0.40 mm (0.0039 to 0.0157 in.)
	Maximum No. 1	0.50 mm (0.0197 in.)
	No. 2	0.85 mm (0.0335 in.)
	Oil (Side rail)	0.60 mm (0.0236 in.)
Connecting rod bolt diameter	Standard	7.2 to 7.3 mm (0.284 to 0.287 in.)
	Minimum	7.0 mm (0.276 in.)
Crankshaft bearing cap set bolt diameter	Standard	10.8 to 11.0 mm (0.4252 to 0.4331 in.)
	Maximum	10.7 mm (0.4213 in.)
Crankshaft circle runout	Maximum	0.06 mm (0.0024 in.)
Main journal diameter		60.988 to 61.000 mm (2.4011 to 2.4016 in.)
Main journal taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
Crank pin diameter		52.992 to 53.000 mm (2.0863 to 2.0866 in.)
Crank pin taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
Crankshaft oil clearance	Standard	0.026 to 0.047 mm (0.0010 to 0.0019 in.)
	Maximum	0.050 mm (0.0020 in.)
Straight pin for cylinder block sub-assembly		
Protrusion height	Pin A	23 mm (0.906 in.)
	Pin B	6 mm (0.236 in.)
	Pin C	11 mm (0.433 in.)
	Pin D	9 mm (0.354 in.)

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TORQUE SPECIFICATIONS

2GR-FE ENGINE MECHANICAL - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Ignition coil assembly x Cylinder head cover sub-assembly		10	102	7
No. 1 engine hanger x Cylinder head sub-assembly		33	337	24
No. 2 engine hanger x Cylinder head sub-assembly		33	337	24
Transverse engine mounting bracket (RH side) x Cylinder block sub-assembly		54	551	40
No. 1 oil level dipstick guide x Cylinder head sub-assembly		21	214	15
No. 2 oil level dipstick guide x Cylinder block sub-assembly		21	214	15
No. 2 idler pulley sub-assembly x Timing chain cover sub-assembly		54	550	40
V-ribbed belt tensioner assembly x Cylinder block sub-assembly		43	438	32
Intake manifold x Cylinder head sub-assembly		21	214	15
Exhaust manifold sub-assembly RH x Cylinder head sub-assembly RH		21	214	15
Exhaust manifold sub-assembly LH x Cylinder head sub-assembly LH		21	214	15
Drive plate and ring gear sub-assembly x Crankshaft		83	850	61
Air cleaner case sub-assembly x Body		5.0	51	44 in.*lbf
Air cleaner case sub-assembly x Air cleaner bracket		5.0	51	44 in.*lbf
Engine coolant temperature x water by-pass joint RR		20	200	14
Manifold stay x Exhaust manifold sub-assembly RH		35	357	26
Manifold stay x Automatic transaxle assembly		34	347	25
No. 2 manifold stay x Exhaust manifold sub-assembly LH		34	347	25
No. 2 manifold stay x Cylinder block sub-assembly		34	347	25
No. 1 air cleaner inlet	Bolt A	7.0	72	62 in.*lbf
	Bolt B	5.0	51	44 in.*lbf
No. 2 air cleaner inlet x Body		7.0	72	62 in.*lbf
Reservoir bracket x Body		9.0	92	80 in.*lbf
Brake master cylinder reservoir assembly x Reservoir bracket		9.0	92	80 in.*lbf
Battery clamp x Body	Bolt	5.4	55	47 in.*lbf
	Nut	5.4	55	47 in.*lbf
Intake air surge tank x Intake manifold	Bolt	18	184	13
	Nut	16	163	12
Engine mounting control bracket x Body		32	388	28
Throttle body bracket x Intake air surge tank assembly		21	214	15

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Throttle body bracket x Cylinder head cover sub-assembly		21	214	15
No. 1 surge tank stay x Intake air surge tank assembly		21	214	15
No. 1 surge tank stay x Cylinder head cover sub-assembly		21	214	15
Outer cowl top panel sub-assembly x Body	Bolt	8.8	90	78 in.*lbf
	Nut A	8.8	90	78 in.*lbf
	Nut B	85	867	63
Radio setting condenser x Cylinder head cover sub-assembly RH		10	102	7
Knock control sensor x Cylinder block sub-assembly		20	204	15
Air cleaner bracket x Body		12	123	9
No. 1 vacuum switching valve assembly x Cylinder head cover sub-assembly		10	102	7
Transverse engine mounting bracket (rear side) x Cylinder head cover sub-assembly		64	650	47
Transverse engine mounting bracket (front side) x Automatic transaxle assembly		64	650	47
Stabilizer link x Shock absorber		74	755	55
Tie rod assembly x Steering gear		49	500	36
Front speed sensor x Front axle		8.0	85	71 in.*lbf
Front axle hub nut x Front drive shaft		294	2998	217
Cooler compressor assembly x V-ribbed belt tensioner		25	250	18
Cooler compressor assembly x Discharge hose sub-assembly		5.4	55	48 in.*lbf
Cooler compressor assembly x Suction hose sub-assembly		5.4	55	48 in.*lbf
Engine mounting control rod x No. 1 engine front mounting bracket LH		38	388	28
Transverse engine mounting insulator (front side) x Front frame assembly		52	531	39
Transverse engine mounting insulator (rear side) x Front frame assembly		52	531	39
Transverse engine mounting insulator (RH side) x Front frame assembly		87	887	65
Transverse engine mounting insulator (LH side) x Front frame assembly		87	887	65
Frame side plate RH x Body	Nut	32	327	24
	Bolt A	32	327	24
	Bolt B	85	867	63
Frame side plate LH x Body	Nut	32	327	24
	Bolt A	32	327	24
	Bolt B	85	867	63
Front suspension member rear brace RH x Body	Nut	32	327	24
	Bolt A	32	327	24
	Bolt B	85	867	63
Front suspension member rear brace LH x Body	Nut	32	327	24
	Bolt A	32	327	24

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	Bolt B	85	867	63
Engine assembly with Transaxle x Front frame assembly	Nut A	87	887	64
	Nut B	95	969	70
Engine assembly with transaxle x engine mounting insulator RR		78	795	58
No. 2 exhaust manifold heat insulator x Exhaust manifold sub-assembly LH		8.5	87	75 in.*lbf
Engine oil pressure switch assembly x Oil pan sub-assembly		15	153	11
No. 2 engine mounting stay RH x Intake manifold		21	214	15
No. 2 timing gear cover x Chain cover sub-assembly		6.0	61	53 in.*lbf
No. 1 engine front mounting bracket LH x Chain cover		54	551	40
Camshaft bearing cap x Camshaft housing	1st	10	102	7
	2nd	16	163	12
Camshaft housing x Cylinder head sub-assembly		28	286	21
No. 1 Chain tensioner x Cylinder head sub-assembly		10	102	7
No. 2 Chain tensioner x Cylinder head sub-assembly		21	214	15
No. 3 Chain tensioner x Cylinder head sub-assembly		21	214	15
Camshaft timing gear assembly x Camshaft		100	1020	74
Camshaft timing exhaust gear assembly x Camshaft		100	1020	74
Engine rear oil seal retainer x Cylinder block sub-assembly		10	102	7
Knock control sensor x Cylinder block sub-assembly		20	204	15
Water inlet pipe x Cylinder block sub-assembly		10	102	7
Cylinder head sub-assembly RH x Cylinder block sub-assembly	1st	36	367	27
	2nd	Turn 90°	Turn 90°	Turn 90°
	3nd	Turn 90°	Turn 90°	Turn 90°
Cylinder head sub-assembly LH x Cylinder block sub-assembly				
	Recessed head 1st	36	367	27
	2nd	Turn 90°	Turn 90°	Turn 90°
	3nd	Turn 90°	Turn 90°	Turn 90°
	14 mm (0.55 in.) head	30	306	22
No. 1 Chain vibration damper x Cylinder block sub-assembly		23	230	17
No. 2 Idle gear shaft x Cylinder block sub-assembly		60	612	44
Timing chain cover plate x Timing chain cover sub-assembly		9.1	93	81 in.*lbf
	Areas 1: Bolt	21	214	15

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Timing chain cover sub-assembly x Cylinder head and block	Areas 2: Bolt	21	214	15
	Areas 3: Bolt and Nut	21	214	15
	Areas 4: Bolt A	43	438	32
	Areas 4: Except Bolt A	21	214	15
Water pump assembly x Timing chain cover sub-assembly		11	112	8
No. 1 oil pan baffle plate x Cylinder block sub-assembly		10	102	7
Oil pan stud bolt x Cylinder block and timing chain cover sub-assembly		10	102	7
Oil pan stud bolt x No. 2 oil pan sub-assembly		4.0	41	35 in.*lbf
Oil cooler stud bolt x Oil pan sub-assembly		9.0	92	80 in.*lbf
Oil strainer stud bolt x Timing chain cover sub-assembly		4.0	41	35 in.*lbf
Oil strainer sub-assembly x Cylinder block and timing chain cover sub-assembly		10	102	7
Oil pan sub-assembly x Cylinder block and timing chain cover sub-assembly				
	bolt A	10	102	7
	except bolt A	21	214	15
No. 2 oil pan sub-assembly x Oil pan sub-assembly		10	102	7
Oil pan drain plug x No. 2 oil pan sub-assembly		40	408	30
Crankshaft pulley x Crankshaft		250	2550	184
Cylinder head cover sub-assembly x Cylinder head sub-assembly RH				
	bolt A	21	214	15
	except bolt A	10	102	7
Cylinder head cover sub-assembly LH x Cylinder head sub-assembly LH				
	bolt A	21	214	15
	except bolt A	10	102	7
Water outlet x Cylinder head sub-assembly	bolt	10	102	7
	nut	10	103	7
Water inlet housing set nut		10	102	7
Stud bolt x Water inlet housing		4.0	41	35 in.*lbf
Water inlet set bolt and nut		10	102	7
Stud bolt x No. 1 oil cooler bracket		10	102	7
Oil cooler pipe x No. 1 oil cooler bracket	bolt	21	214	16
	nut	21	214	16
No. 1 oil cooler bracket w/Oil cooler pipe x Oil pan sub-assembly and Cylinder block sub-assembly	bolt	21	214	16
	nut	21	214	16
No. 1 oil cooler bracket x Oil cooler assembly		68	693	50
Water by-pass hoses x Clamp		10	102	7

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Oil filter cap x Oil pan sub-assembly		25	255	18
Oil filter cap x Drain plug		13	127	9
Camshaft position sensor x Cylinder head cover sub-assembly		10	102	7
Ventilation valve x Cylinder head cover sub-assembly LH		27	275	20
Oil pipe union x Cylinder block sub-assembly		65	663	48
Oil pipe union x Cylinder head cover sub-assembly		65	663	48
Oil pipe x Cylinder head sub-assembly		10	102	7
Crankshaft position sensor x Cylinder block sub-assembly		10	102	7
Camshaft timing oil control valve assembly x Cylinder head cover sub-assembly		10	102	7
Cylinder block water drain cock sub-assembly x Cylinder block sub-assembly		25	255	18
Drain cock sub-assembly x Water inlet housing		30	306	22
Water drain cock plug x Water drain cock sub-assembly		13	130	9
Drain cock plug x Drain cock assembly		13	130	9
Spark plug x Cylinder head sub-assembly		18	184	13
Stud bolt x Cylinder head sub-assembly	For A and B bolts	10	102	7
	For C bolts	4.0	41	35 in.*lbf
No. 1 straight screw plug x Cylinder head sub-assembly		44	449	32
No. 2 straight screw plug x Cylinder head sub-assembly		80	816	59
Main bearing cap x Cylinder block sub-assembly	16 pointed head 1st	61	622	45
	2nd	Turn 90°	Turn 90°	Turn 90°
	14 mm head	52	525	38
Connecting rod cap x Connecting rod	1st	25	255	18
	2nd	Turn 90°	Turn 90°	Turn 90°
Stud bolt x Cylinder block sub-assembly	bolt A	10	102	7
	bolt B	17	173	13
No. 1 oil nozzle sub-assembly x Cylinder block sub-assembly		9.0	92	80 in.*lbf
Camshaft position sensor x Cylinder head cover sub-assembly		10	102	7

1AR-FE FUEL

SERVICE DATA

1AR-FE FUEL - SERVICE DATA

Fuel pressure	Standard fuel pressure	304 to 343 kPa (3.1 to 3.5 kgf*cm^2 , 44 to 50 psi)

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Fuel pressure : at fuel pressure remains for 5 minutes after engine has stopped	Standard fuel pressure	147 kPa (1.5 kgf*cm^2 , 21 psi) or more
Fuel injector assembly	Standard resistance	11.6 to 12.4 ohms at 20°C (68° F)
	Injection volume	88 to 106 cm^3 (5.4 to 6.5 cu in.) per 15 seconds
	Difference between each fuel injector	13 cm^3 (0.8 cu in.) or less
	Standard leakage	1 drop or less per 20 minutes
Fuel pump	Standard resistance	0.2 to 3.0 ohms at 20°C (68°F)
Fuel Sender gauge assembly	Standard resistance	3.0 to 5.0 ohms (Float level F)
		3.0 to 111.0 ohms (Float level E to F)
		109.0 to 111.0 ohms (Float level E)

TORQUE SPECIFICATIONS

1AR-FE FUEL - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Fuel delivery pipe sub-assembly x Intake manifold		21	214	15
Wire harness bracket x Intake manifold		10	102	7
Fuel pressure pulsation damper x Fuel delivery pipe sub-assembly		10	102	7
Fuel tank side plate x Fuel tank bracket		30	306	22
Fuel tank band sub-assembly No. 1 x Body		39	400	29
Fuel tank sub-assembly x Body	Nut	20	200	14
No. 1 fuel tank protector sub-assembly x Fuel tank band sub-assembly		5.5	56	49 in.*lbf
No. 4 exhaust pipe support bracket x Body		22	224	16

2GR-FE FUEL

SERVICE DATA

2GR-FE FUEL - SERVICE DATA

Fuel pressure		304 to 343 kPa (3.1 to 3.5 kgf/cm^2 , 44.1 to 49.7 psi)
Fuel pressure : at fuel pressure remains for 5 minutes after engine has stopped		147 kPa (1.5 kgf/cm^2 , 21 psi) or more
Fuel injector		
Resistance	at 20°C (68°F)	11.6 to 12.4ohms
Injection volume		84 to 100 cm^3 (5.1 to 6.0 cu in.) in 15 seconds

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Difference between each injector		16 cm^3 (0.98 cu in.) or less
Fuel drop		1 drop or less in 16 minutes
Fuel pump		
Resistance	at 20°C (68°F)	0.2 to 3.0 ohms
Fuel pump resistor		
Resistance		0.30 to 0.34 ohms

TORQUE SPECIFICATIONS

2GR-FE FUEL - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Fuel delivery pipe sub-assembly x Intake manifold		21	214	15
Intake air surge tank x Intake manifold	Bolt	18	184	13
	Nut	16	163	12
Throttle body bracket		21	214	15
No. 1 surge tank stay		21	214	15
Fuel tank side plate x Fuel tank bracket		30	306	22
Fuel tank band sub-assembly No. 1 x Body		39	400	29
Fuel tank sub-assembly x Body	Nut	20	200	14
No. 1 fuel tank protector sub-assembly x Fuel tank band sub-assembly		5.5	50	49 in.*lbf
Fuel pump resistor x Body		19	194	14

1AR-FE EMISSION CONTROL

SERVICE DATA

PURGE VALVE

1AR-FE EMISSION CONTROL - SERVICE DATA

Tester Connection	Specified Condition
1-2	23 to 26 ohms at 20°C (68°F)
1 - Body ground 2 - Body ground	10 Mohms or higher

TORQUE SPECIFICATIONS

1AR-FE EMISSION CONTROL - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Charcoal canister assembly x Body	5.5	56	49 in.*lbf
No. 3 front floor heat insulator x Charcoal canister assembly	4.9	50	43 in.*lbf
Ventilation valve sub-assembly x Ventilation case	27	275	20

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2GR-FE EMISSION CONTROL

SERVICE DATA

Purge VSV

2GR-FE EMISSION CONTROL - SERVICE DATA

Tester Connection	Specified Condition
1-2	23 to 26ohms at 20°C (68°F)
1 - Body ground	10 Mohms or higher
2 - Body ground	10 Mohms or higher

TORQUE SPECIFICATIONS

2GR-FE EMISSION CONTROL - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Charcoal canister assembly x body	5.5	56	27 in.*lbf
NO.3 Front floor heat insulator x Charcoal canister assembly	4.9	50	43 in.*lbf
Purge VSV x Cylinder head cover sub-assembly LH	10	102	7
PCV valve sub-assembly x Cylinder head cover sub-assembly LH	27	275	27

1AR-FE INTAKE

SERVICE DATA

Vacuum switching valve assembly (for ACIS)

VACUUM SWITCHING VALVE ASSEMBLY (FOR ACIS) - SERVICE DATA

Tester Connection	Specified Condition
1-2	37 to 44 ohms at 20°C (68°F)
1 - Body ground 2 - Body ground	1 Mohms or higher

Vacuum switching valve assembly (for Intake Air Control System)

VACUUM SWITCHING VALVE ASSEMBLY (FOR INTAKE AIR CONTROL SYSTEM) - SERVICE DATA

Tester Connection	Specified Condition
1-2	37 to 44 ohms at 20°C (68°F)
1 - Body ground 2 - Body ground	1 Mohms or higher

TORQUE SPECIFICATIONS

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1AR-FE INTAKE - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Engine mounting damper x Intake manifold	9.0	92	80 in.*lbf
Wiring harness clamp bracket x Intake manifold	10	102	7
Intake manifold x Cylinder head	21	214	15
Vacuum switching valve assembly (for ACIS) x Intake manifold	9.0	92	80 in.*lbf
Intake air control valve actuator (for TCV) x Intake manifold	6.0	61	53 in.*lbf

2GR-FE INTAKE

SERVICE DATA

2GR-FE INTAKE - SERVICE DATA

Vacuum switching valve		
Resistance	1-2	37 to 44 ohms at 20°C (68°F)
	1 - Body ground	10 kohms or higher
	2 - Body ground	10 kohms or higher

TORQUE SPECIFICATIONS

2GR-FE INTAKE - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Air cleaner cap sub-assembly x Air cleaner case sub-assembly	5.0	51	44 in.*lbf
Air cleaner bracket x Air cleaner case sub-assembly	5.0	51	44 in.*lbf
No. 1 Air cleaner inlet x Upper radiator support sub-assembly	7.0	71	62 in.*lbf
No. 1 Air cleaner inlet x Battery carrier	5.0	51	44 in.*lbf
No. 2 Air cleaner inlet x Upper radiator support sub-assembly	7.0	71	62 in.*lbf
Wiring harness protector x Cylinder head cover	8.3	84	73 in.*lbf
No. 1 surge tank stay x Intake air surge tank assembly	21	214	15
No. 1 surge tank stay x Cylinder head cover	21	214	15
Throttle body bracket x Intake air surge tank assembly	21	214	15
Throttle body bracket x Cylinder head cover	21	214	15
Intake manifold x Intake air surge tank assembly	6	163	12
	18	183	13
Fuel delivery pipe sub-assembly x Intake manifold	21	214	15
Cylinder head x Intake manifold	21	214	15
No. 2 engine mounting stay RH x Intake manifold	21	214	15
No. 2 engine mounting stay RH x Engine mounting rod sub-assembly	8	387	28
	23	234	17

1AR-FE EXHAUST

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SERVICE DATA

1AR-FE EXHAUST - SERVICE DATA

Compression spring	
(Front exhaust pipe assembly x Exhaust manifold)	Minimum length: 41.5 mm (1.64 in)
(Center exhaust pipe assembly x Tailpipe assembly)	Minimum length: 40.5 mm (1.60 in.)

TORQUE SPECIFICATIONS

1AR-FE EXHAUST - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
No. 2 exhaust manifold heat insulator x Exhaust manifold assembly	25	250	18
Exhaust manifold assembly x Cylinder head	35	357	26
Plate x Exhaust manifold assembly	25	250	18
No. 2 manifold stay x Exhaust manifold assembly	43	438	32
Wire harness bracket x No. 2 manifold stay	12	122	9
Manifold stay x Exhaust manifold assembly	43	438	32
Front exhaust pipe assembly x Exhaust manifold assembly	48	489	35
Center exhaust pipe assembly x Front exhaust pipe assembly	56	571	41
Exhaust pipe damper x Center exhaust pipe assembly	19	194	14
Tail exhaust pipe assembly x Center exhaust pipe assembly	48	489	35

2GR-FE EXHAUST

SERVICE DATA

2GR-FE EXHAUST - SERVICE DATA

Compression spring (Front No.3 exhaust pipe sub-assembly x Center exhaust pipe assembly)	Minimum length: 41.5 mm (1.63 in.)
Compression spring (Center exhaust pipe assembly x Tail exhaust pipe assembly)	Minimum length: 40.5 mm (1.59 in.)

TORQUE SPECIFICATIONS

Exhaust manifold

EXHAUST MANIFOLD - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Cylinder head sub-assembly RH x Exhaust manifold sub-assembly RH	21	214	15
Cylinder head sub-assembly LH x Exhaust manifold sub-assembly LH	21	214	15
No.2 manifold stay x Cylinder block	34	347	25
No.2 manifold stay x Exhaust manifold sub-assembly LH	34	347	25

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Manifold stay x Automatic transaxle assembly	34	347	25
Manifold stay x Exhaust manifold sub-assembly RH	35	357	26
No.2 exhaust manifold heat insulator x Exhaust manifold sub-assembly LH	8.5	87	75 in.*lbf
Radiator reserve tank assembly x Fan shroud with fan motor	5.4	55	48 in.*lbf

Exhaust pipe

EXHAUST PIPE - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front exhaust pipe assembly x Exhaust manifold sub-assembly LH	56	571	41
Front No.3 exhaust pipe sub-assembly x Exhaust manifold sub-assembly RH	56	571	41
Front No.3 exhaust pipe sub-assembly x Front exhaust pipe assembly	56	571	41
No.1 exhaust pipe support bracket x Front exhaust pipe assembly	21	214	15
Center exhaust pipe assembly x Front No.3 exhaust pipe sub-assembly	48	489	35
Center exhaust pipe assembly x Exhaust pipe damper	19	194	14
Tail exhaust pipe assembly x Center exhaust pipe assembly	48	489	35

1AR-FE COOLING

SERVICE DATA

Thermostat

THERMOSTAT - SERVICE DATA

Condition	Specified Condition
Standard valve opening temperature	80 to 84°C(176 to 183°F)
Standard valve lift	10 mm (0.39 in.) or more at 95°C (203°F)

Cooling fan motor

COOLING FAN MOTOR - SERVICE DATA

Standard current (w/o Towing package)		
Item	Condition	Specified Condition
No. 1 cooling fan motor	12V	5.3 to 11.3 A
No. 2 cooling fan motor	12V	5.3 to 11.3 A

Standard current (w/Towing package)

STANDARD CURRENT (W/TOWING PACKAGE) - SERVICE DATA

Item	Condition	Specified Condition
No. 1 cooling fan motor	12V	10.0 to 16.0 A
No. 2 cooling fan motor	12V	10.0 to 16.0 A

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Radiator cap

RADIATOR CAP - SERVICE DATA

Item	Condition	Specified Condition
Radiator reservoir cap	Standard value (for brand-new cap)	94 to 122 kPa (1.0 to 1.2 kgf/cm^2 , 13.6 to 17 psi)
	Minimum standard value (after using cap)	79 kPa (0.8 kgf/cm^2 , 11.4 psi)

TORQUE SPECIFICATIONS

Coolant

COOLANT - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Cylinder block drain cock plug	13	130	9
Air drain plug x Radiator	1.5	15	13 in.*lbf

Water pump

WATER PUMP - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Water pump x Inlet water housing	21	214	15

Thermostat

THERMOSTAT - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Water inlet x Inlet water housing	10	102	7

Cooling fan motor

COOLING FAN MOTOR - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Fan shroud x No. 1 cooling fan motor (w/o Towing package)	2.6	27	23 in.*lbf
Fan shroud x No. 2 cooling fan motor (w/o Towing package)	2.6	27	23 in.*lbf
Fan shroud x No. 1 cooling fan motor (w/Towing package)	3.9	40	35 in.*lbf
Fan shroud x No. 2 cooling fan motor (w/Towing package)	3.9	40	35 in.*lbf
Fan shroud x Cooling fan motor insulator	2.6	27	23 in.*lbf
Fan x No. 1 cooling fan motor	6.3	64	55 in.*lbf
Fan x No. 2 cooling fan motor	6.3	64	55 in.*lbf

Radiator

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RADIATOR - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Fan shroud with motor x Radiator sub-assembly	7.8	80	69 in.*lbf
Cooler condenser assembly x Radiator sub-assembly	6.0	61	53 in.*lbf
Upper radiator support sub-assembly x Body	12	122	9
Discharge hose sub-assembly x Upper radiator support sub-assembly	9.8	100	87 in.*lbf

2GR-FE COOLING

SERVICE DATA

THERMOSTAT

THERMOSTAT - SERVICE DATA

Condition	Specified Condition
Standard valve opening temperature	80 to 84°C (176 to 183°F)
Standard valve lift	10 mm (0.39 in.) or more at 95°C (203°F)

COOLING FAN MOTOR(w/Trailer Towing System)

COOLING FAN MOTOR(W/TRAILER TOWING SYSTEM) - SERVICE DATA

Item	Condition	Specified Condition
No. 1 cooling fan motor	12V	6.8 to 9.8 A
No. 2 cooling fan motor	12V	6.8 to 9.8 A

COOLING FAN MOTOR(w/o Trailer Towing System)

COOLING FAN MOTOR(W/O TRAILER TOWING SYSTEM) - SERVICE DATA

Item	Condition	Specified Condition
No. 1 cooling fan motor	12V	14.6 to 18.7 A
No. 2 cooling fan motor	12V	14.6 to 18.7 A

COOLING FAN ECU

COOLING FAN ECU - SERVICE DATA

Item	Condition	Specified Condition
Cooling fan ECU	Ignition switch on (IG)	11 to 14 V

COOLING FAN RELAY

COOLING FAN RELAY - SERVICE DATA

Item	Tester Connection	Specified Condition
	3-5	10 kohms or higher

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Fan main relay		(battery volltage is not applied between terminals 1 and 2)
	3-5	Below 1 ohms (apply battery voltage between terminals 1 and 2)

RADIATOR

RADIATOR - SERVICE DATA

Item	Condition	Specified Condition
Radiator cap	Standard value (for brand-new cap)	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2 , 13.5 to 17.8 psi)
	Minimum standard value (for used cap)	78.5 kPa (0.8 kgf/cm^2 , 11.4 psi)

TORQUE SPECIFICATIONS

COOLANT

COOLANT - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Cylinder block drain cock plug x Cylinder block	13	130	9
Air drain cock plug x Water inlet housing	13	130	9
Air drain plug x Radiator assembly	1.5	15	13 in.*lbf

WATER PUMP

WATER PUMP - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Water pump x Cylinder block	for bolt A	21	214	15
	for bolt B	11	112	8
	for bolt C	11	112	8
Water pump pulley x Water pump		21	214	16
V-ribbed belt tensioner assembly x Cylinder block		43	438	32
No. 2 idler pulley sub-assembly x Cylinder block		43	438	32
Water inlet housing x Cylinder block		10	102	7

THERMOSTAT

THERMOSTAT - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Water inlet x Water inlet housing	10	102	7
No. 2 idler pulley sub-assembly x Cylinder block	43	438	32

COOLING FAN MOTOR

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COOLING FAN MOTOR - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
No. 1 and No. 2 cooling fan motor x Fan shroud	3.9	40	35 in.*lbf
Fan x No. 1 and No. 2 cooling fan motor	6.3	64	56 in.*lbf

COOLING FAN ECU

COOLING FAN ECU - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Cooling fan ECU x Fan shroud	2.6	27	23 in.*lbf

RADIATOR

RADIATOR - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Fan assembly with motor x Radiator assembly	7.8	80	69 in.*lbf
Radiator assembly x Cooler condenser assembly	6.0	61	53 in.*lbf
Discharge hose sub-assembly x Upper radiator support sub-assembly	9.8	100	87 in.*lbf

1AR-FE LUBRICATION

SERVICE DATA

Oil pressure

OIL PRESSURE - SERVICE DATA

Condition	Specified Condition
Idle	30 kPa (0.3 kgf/cm^2 , 4.4 psi) or more
4000 rpm	260 kPa (2.7 kgf/cm^2 , 38 psi) or more

Oil pressure switch

OIL PRESSURE SWITCH - SERVICE DATA

Tester Condition	Condition	Specified Condition
1 - Body ground	Engine stopped	Below 1 ohms
	Engine idling	10 kohms or higher

TORQUE SPECIFICATIONS

1AR-FE LUBRICATION - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Oil pressure switch x Cylinder head	15	153	11
Oil filter cap x Stiffening crankcase	25	255	18

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Oil filter drain plug x Oil filter cap		13	127	10
Oil pan drain plug x Oil pan		40	408	30
Timing chain cover x Cylinder block, Cylinder head, Cam housing, Stiffening crankcase	Bolt A	21	214	15
	Bolt B	55	561	41
	Bolt C	21	214	15
	Nut	21	214	15
Engine mounting bracket RH x Timing chain cover	Bolt 1, 2,3	55	561	41
	Bolt 4	21	214	15
Engine oil cooler assembly x Inlet water housing	Union bolt	60	612	44
	Nut	10	102	7

2GR-FE LUBRICATION

SERVICE DATA

OIL PRESSURE

OIL PRESSURE - SERVICE DATA

Condition	Specified Condition
Idle	80 kPa (0.8 kgf/cm^2 , 11.6 psi) or more
3000 rpm	380 kPa (3.9 kgf/cm^2 , 55.1 psi) or more

OIL PUMP

OIL PUMP - SERVICE DATA

Item	Condition	Specified Condition
Oil pump rotor	Standard side clearance	0.030 to 0.090 mm (0.0012 to 0.0035 in.)
	Maximum side clearance	0.090 mm (0.0035 in.)
	Standard tip clearance	0.060 to 0.160 mm (0.0024 to 0.0063 in.)
	Maximum tip clearance	0.160 mm (0.0063 in.)
	Standard body clearance	0.250 to 0.325 mm (0.0098 to 0.0128 in.)
	Maximum body clearance	0.325 mm (0.0128 in.)

TORQUE SPECIFICATIONS

2GR-FE LUBRICATION - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Oil pressure switch x Oil pan	15	153	11
Oil filter cap x Oil pan	25	255	18
Oil filter drain plug x Oil filter cap	13	127	10

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Oil pan drain plug x No. 2 oil pan		40	408	30
Oil pump cover x Timing chain cover		9.1	93	81 in.*lbf
Plug X Oil pump cover		49	500	37
By-pass hose clamp x Cylinder block		10	102	7
Oil cooler assembly x Union bolt		68	693	50
Oil cooler pipe x Oil pan sub-assembly		21	214	16
Timing chain cover x Cylinder block, Cylinder head, Oil pan	Area 1,2 Bolt	21	214	15
	Area 3 bolt, nut	21	214	15
	Area 4 Bolt A	43	438	32
	Area 4 except bolt A	21	214	15

1AR-FE IGNITION

SERVICE DATA

1AR-FE IGNITION - SERVICE DATA

Spark plug	Standard resistance	10 Mohms or more
	Recommended spark plug	SK16HR11 DENSO made
	Maximum electrode gap	1.3 mm (0.0512 in.) for used spark plug
	Electrode gap	1.0 to 1.1 mm (0.0394 to 0.0433 in.) for new spark plug

TORQUE SPECIFICATIONS

1AR-FE IGNITION - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Spark plug x Cylinder head assembly	25	254	18
Ignition coil assembly x Cylinder head cover	10	102	7

2GR-FE IGNITION

SERVICE DATA

2GR-FE IGNITION - SERVICE DATA

Spark plug	Standard electrode gap	1.0 to 1.1 mm (0.039 to 0.043 in.) for new spark plug
	Maximum electrode gap	1.4 mm (0.055 in.) for used spark plug

TORQUE SPECIFICATIONS

2GR-FE IGNITION - TORQUE SPECIFICATIONS

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Part Tightened	N*m	kgf*cm	ft.*lbf
Spark plug x Cylinder head subassembly	18	184	13
Ignition coil assembly x Cylinder head cover	10	102	7
Wiring harness protector x Cylinder head cover	8.3	84	73 in.*lbf
No. 1 hose support bracket x Cylinder head cover	8.3	84	73 in.*lbf

1AR-FE STARTING

SERVICE DATA

1AR-FE STARTING - SERVICE DATA

Starter assembly	Standard current: 90 A or less at 11.5 V
Magnetic switch assembly	Standard resistance Terminal 50 - Terminal C: Below 1 ohms Terminal 50 - Switch body: Below 2 ohms
Starter armature assembly	Standard resistance Segment - Segment: Below 1 ohms Segment - Coil core: 10 kohms or higher
	Standard length: 3.1 to 3.8 mm (0.122 to 0.150 in.)
Starter commutator end frame	Standard length: 4.0 to 9.0 mm (0.158 to 0.354 in.)
	Standard resistance Positive (+) - Negative (-): 10 kohms or higher
Snap ring	Maximum length: 5.0 mm (0.197 in.)
Starter relay	3-5: 10 Mohms or higher 3-5: Below 1 ohms (when battery voltage is applied to terminals 1 and 2)
Ignition switch	LOCK: Between all terminals 10 kohms or higher
	ACC: 4 (AM1) - 2 (ACC) Below 1 ohms
	ON: 4 (AM1) - 2 (ACC) Below 1 ohms ON: 4 (AM1) - 1 (IG1) Below 1 ohms ON: 5 (AM2) - 6 (IG2) Below 1 ohms
	START: 4 (AM1) -1 (IG1) Below 1 ohms START: 4 (AM1) - 3 (ST1) Below 1 ohms START: 5 (AM2) - 6 (IG2) Below 1 ohms START: 5 (AM2) - 7 (ST2) Below 1 ohms

TORQUE SPECIFICATIONS

1AR-FE STARTING - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Starter assembly x Transaxle housing	37	377	27
Starter wire x Starter assembly	9.8	100	87 in.*lbf
Air cleaner bracket x Body	13	127	9
Air cleaner case sub-assembly x Air cleaner bracket	5.0	51	44 in.*lbf

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Air cleaner case sub-assembly x Body	5.0	51	44 in.*lbf
Air cleaner cap sub-assembly x Air cleaner case sub-assembly	5.0	51	44 in.*lbf
No. 1 air cleaner inlet x Body	7.0	71	62 in.*lbf
No. 2 air cleaner inlet x Body	7.0	71	62 in.*lbf
Battery clamp sub-assembly x Body	5.4	55	48 in.*lbf
Battery clamp sub-assembly x Battery clamp bolt	5.4	55	48 in.*lbf
Starter drive housing assembly x Starter commutator end frame assembly	6.0	61	53 in.*lbf
Repair service starter kit x Starter drive housing assembly	7.5	76	66 in.*lbf
Lead wire x Repair service starter kit	10	102	7

2GR-FE STARTING

SERVICE DATA

2GR-FE STARTING - SERVICE DATA

Starter assembly	Standard current: 90 A or less at 11.5 V
Repair service starter kit	Standard resistance Terminal 50 - Terminal C: Below 1 ohms Terminal 50 - Switch body: Below 2 ohms
Starter armature assembly	Standard resistance Segment - Segment: Below 1 ohms Segment - Coil core: 10 kohms or higher
	Standard length: 3.1 to 3.8 mm (0.122 to 0.150 in.)
Starter commutator end frame	Standard length: 4.0 to 9.0 mm (0.158 to 0.354 in.)
	Standard resistance Positive (+) - Negative (-): 10 kohms or higher
Snap ring	Maximum length: 5.0 mm (0.197 in.)
Starter relay	3-5: 10 Mohms or higher 3-5: Below 1 ohms (when battery voltage is applied to terminals 1 and 2)
Starter cut relay	3-5: 10 Mohms or higher 3-5: Below 1 ohms (when battery voltage is applied to terminals 1 and 2)
ACC relay	3-5: 10 kohms or higher 3-5: Below 1 ohms (when battery voltage is applied to terminals 1 and 2)
No.1 ignition relay	3-5: 10 kohms or higher 3-5: Below 1 ohms (when battery voltage is applied to terminals 1 and 2)
No.2 ignition relay	3-5: 10 kohms or higher 3-5: Below 1 ohms (when battery voltage is applied to terminals 1 and 2)
Ignition switch	LOCK: Between all terminals 10 kohms or higher ACC: 4 (AM1) - 2 (ACC) Below 1 ohms ON: 4 (AM1) - 2 (ACC) Below 1 ohms ON: 4 (AM1) - 1 (IG1) Below 1 ohms ON: 5 (AM2) - 6 (IG2) Below 1 ohms START: 4 (AM1) -1 (IG1) Below 1 ohms START: 4 (AM1) - 3 (ST1) Below 1 ohms

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	START: 5 (AM2) - 6 (IG2) Below 1 ohms START: 5 (AM2) - 7 (ST2) Below 1 ohms
Engine switch	7 (SS1) - 5 (GND)/2 (SS2) - 5 (GND) Specified resistance Not pushed: 10 kohms or higher Pushed: 15 ohms
	Standard condition: Illuminates Measurement condition Battery positive 11 (SWIL) - Battery negative 4 (COM) or 5 (GND) Battery positive 12 (INDS) - Battery negative 4 (COM) or 5 (GND) Battery positive 13 (INDW) - Battery negative 4 (COM) or 5 (GND)

TORQUE SPECIFICATIONS

2GR-FE STARTING - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Starter assembly x Transaxle housing	37	377	27
Starter wire x Starter assembly	9.8	100	87 in.*lbf
Air cleaner bracket x Body	12	120	9
Air cleaner case sub-assembly x Air cleaner bracket	5.0	51	44 in.*lbf
Air cleaner case sub-assembly x Body	5.0	51	44 in.*lbf
Air cleaner cap sub-assembly x Air cleaner case sub-assembly	5.0	51	44 in.*lbf
No. 1 air cleaner inlet x Body	5.0	51	44 in.*lbf
	7.0	71	62 in.*lbf
No. 2 air cleaner inlet x Body	7.0	71	62 in.*lbf
Battery clamp sub-assembly x Body	5.4	55	48 in.*lbf
Battery clamp sub-assembly x Battery clamp bolt	5.4	55	48 in.*lbf
Motor terminal starter kit x Starter commutator end frame assembly	6.0	61	53 in.*lbf
Repair service starter kit x Motor terminal starter kit	7.5	76	66 in.*lbf
Lead wire x Repair service starter kit	10	102	7

1AR-FE CHARGING

SERVICE DATA

1AR-FE CHARGING - SERVICE DATA

Battery	Standard voltage		12.6 to 12.8 V at 20°C (68°F)
Charging circuit without load	Standard amperage		10 A or less
	Standard voltage		13.2 to 14.8 V
Charging circuit with load	Standard amperage		30 A or more
Generator brush holder assembly	Brush length	Standard length	9.5 to 11.5 mm (0.374 to 0.453 in.)
		Minimum length	4.5 mm (0.177 in.)

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Generator rotor assembly	Standard resistance	Slip ring except 150 A	2.3 to 2.7 ohms at 20°C (68°F)
		Slip ring 150 A	1.5 to 1.9 ohms at 20°C (68°F)
		Slip ring - Rotor	10 kohms or higher
	Slip ring diameter	Standard diameter	14.2 to 14.4 mm (0.559 to 0.567 in.)
		Minimum diameter	14 mm (0.551 in.)

TORQUE SPECIFICATIONS

1AR-FE CHARGING - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Bearing retainer plate x Generator drive end frame	2.3	23	20 in.*lbf
Generator coil assembly x Generator drive end frame	5.9	60	52 in.*lbf
Generator brush holder assembly x Generator coil assembly	1.8	18	16 in.*lbf
Generator rear end cover x Generator coil assembly	4.6	47	41 in.*lbf
Generator pulley with clutch x Generator rotor assembly (): For use with SST	80 (58)	816 (591)	59 (43)
Generator assembly x Wire harness clamp bracket	8.4	86	74 in.*lbf
Generator assembly x Cylinder block	52	530	38
Generator Wire x Terminal B	9.8	100	87 in.*lbf

2GR-FE CHARGING

SERVICE DATA

2GR-FE CHARGING - SERVICE DATA

Battery	Standard voltage		12.5 to 12.9 V at 20°C(68°F)
Charging circuit without load	Standard amperage		10 A or less
	Standard voltage		12.1 to 15.4 V
Charging circuit with load	Standard amperage		30 A or more
Generator brush holder assembly	Brush length	Standard length	9.5 to 11.5 mm (0.374 to 0.453 in.)
		Minimum length	4.5 mm (0.177 in.)
Generator rotor	Standard resistance	Slip ring	1.5 to 1.9 ohms at 20°C (68°F) (w/Towing Package or Rear Heater Assembly) 2.3 to 2.7 ohms at 20°C (68°F) (w/o Towing Package and Rear Heater Assembly)
		Slip ring - Rotor	1 Mohms or higher

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assembly	Slip ring diameter	Standard diameter	14.2 to 14.4 mm (0.559 to 0.567 in.)
		Minimum diameter	14 mm (0.551 in.)

TORQUE SPECIFICATIONS

2GR-FE CHARGING - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Bearing retainer plate x Generator drive end frame	2.3	23	20 in.*lbf
Generator coil assembly x Generator drive end frame	5.9	60	52 in.*lbf
Generator brush holder assembly x Generator coil assembly	1.8	18	16 in.*lbf
Generator rear end cover x Generator coil assembly	4.6	47	41 in.*lbf
Generator pulley with clutch x Generator rotor assembly (): For use with SST	110 (84)	1125 (857)	81 (62)
Cylinder block x Wire harness clamp bracket	20	204	15
Generator assembly x Wire harness clamp bracket	20	204	15
Generator assembly x Cylinder block	43	438	32
Generator Wire x Terminal B	9.8	100	87 in.*lbf
No. 2 oil level dipstick guide x Cylinder block	21	214	15

U151E AUTOMATIC TRANSAXLE

SERVICE DATA

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

U151E		
Line pressure (Wheel locked)	Engine idling	-
	D position	372 to 412 kPa (3.8 to 4.2 kgf*cm^2 , 54 to 60 psi)
	R position	672 to 742 kPa (6.9 to 7.6 kgf*cm^2 , 97 to 108 psi)
	AT stall (Throttle valve fully opened)	-
	D position	931 to 1031 kPa (9.5 to 10.5 kgf*cm^2 , 135 to 150 psi)
	R position	1768 to 1968 kPa (18.0 to 20.1 kgf*cm^2 , 256 to 285 psi)
Engine stall revolution	D position	2180 +/- 150 rpm
Time lag	N --> D position	Less than 1.2 seconds
	N --> R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	Approx. 700 rpm

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Drive plate runout	Max.	0.20 mm (0.0079 in.)
Differential oil seal installation depth	LH side	-0.5 to 0.2 mm (-0.020 to 0.008 in.)
	RH side	-0.5 to 0.5 mm (-0.020 to 0.020 in.)
Shift schedule (Shift lever with multi-mode automatic transmission & gate shift type)		-
D position (Throttle valve fully opened)	1 --> 2	46 to 53 km/h (29 to 34 mph)
	2-->3	92 to 99 km/h (57 to 62 mph)
	3-->4	150 to 160 km/h (93 to 99 mph)
	4-->5	223 to 234 km/h (139 to 145 mph)
	5-->4	214 to 225 km/h (133 to 140 mph)
	4-->3	144 to 154 km/h (89 to 96 mph)
	3-->2	87 to 93 km/h (54 to 58 mph)
	2-->1	40 to 46 km/h (25 to 29 mph)
(Throttle valve fully closed)	4-->5	68 to 73 km/h (42 to 45 mph)
	5-->4	38 to 43 km/h (24 to 27 mph)
Lock-up point	Throttle valve opening 5 %	-
D position		-
5th gear	Lock-up ON	86 to 92 km/h (53 to 57 mph)
	Lock-up OFF	85 to 91 km/h (53 to 57 mph)
4th gear	Lock-up ON	106 to 112 km/h (66 to 70 mph)
	Lock-up OFF	103 to 109 km/h (64 to 68 mph)
3th gear	Lock-up ON	65 to 72 km/h (40 to 45 mph)
	Lock-up OFF	62 to 68 km/h (39 to 42 mph)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Oil Pump		
Body clearance	STD	0.10 to 0.17 mm (0.0039 to 0.0067 in.)
	Max.	0.17 mm (0.0067 in.)
Tip clearance	STD	0.07 to 0.15 mm (0.0028 to 0.0059 in.)
	Max.	0.15 mm (0.0059 in.)
Side clearance	STD	0.02 to 0.05 mm (0.0008 to 0.0020 in.)
	Max.	0.05 mm (0.0020 in.)
Drive gear thickness	Mark	-
	A	11.690 to 11.699 mm (0.4602 to 0.4606 in.)
	B	11.700 to 11.709 mm (0.4606 to 0.4610 in.)
	C	11.710 to 11.720 mm (0.4610 to 0.4614 in.)
	D	11.721 to 11.730 mm (0.4615 to 0.4618 in.)
	E	11.731 to 11.740 mm (0.4619 to 0.4622 in.)
Driven gear thickness	Mark	-
	A	11.690 to 11.699 mm (0.4602 to 0.4606 in.)
	B	11.700 to 11.709 mm (0.4606 to 0.4610 in.)

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	C	11.710 to 11.720 mm (0.4610 to 0.4614 in.)
	D	11.721 to 11.730 mm (0.4615 to 0.4618 in.)
	E	11.731 to 11.740 mm (0.4619 to 0.4622 in.)
Pump body bushing inside diameter	STD	38.113 to 38.138 mm (1.50050 to 1.50149 in.)
	Max.	38.188 mm (1.50346 in.)
Stator shaft bushing inside diameter	STD	21.500 to 21.526 mm (0.84646 to 0.84748 in.)
	Max.	21.57 mm (0.8492 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Multiple Disc Clutch		
Inside diameter	STD	23.025 to 23.046 mm (0.9065 to 0.9073 in.)
	Max.	23.09 mm (0.9091 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Forward Clutch		
Pack clearance		1.00 to 1.25 mm (0.0394 to 0.0492 in.)
Return spring free length		26.74 mm (1.0528 in.)
Flange thickness	Mark	-
	1	3.00 mm (0.1181 in.)
	2	3.15 mm (0.1240 in.)
	3	3.30 mm (0.1299 in.)
	4	3.45 mm (0.1358 in.)
	5	3.60 mm (0.1417 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Reverse Clutch		
Pack clearance		0.60 to 0.82 mm (0.02362 to 0.03228 in.)
Flange thickness	Mark	-
	1	3.0 mm (0.118 in.)
	2	3.1 mm (0.122 in.)
	3	3.2 mm (0.126 in.)
	4	3.3 mm (0.130 in.)
	5	3.4 mm (0.134 in.)
	6	3.5 mm (0.138 in.)
	7	3.6 mm (0.142 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Direct Clutch & 0/D Clutch		
Pack clearance		0.61 to 0.83 mm (0.02401 to 0.03268 in.)
Return spring free length		25.91 mm (1.0201 in.)
	Mark	-

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Flange thickness	0	2.5 mm (0.098 in.)
	1	2.6 mm (0.102 in.)
	2	2.7 mm (0.106 in.)
	3	2.8 mm (0.110 in.)
	4	2.9 mm (0.114 in.)
	5	3.0 mm (0.118 in.)
	6	3.1 mm (0.122 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

2nd Brake		
Pack clearance		0.62 to 0.91 mm (0.0244 to 0.0358 in.)
Return spring free length		16.61 mm (0.6539 in.)
Flange thickness	Mark	-
	1	3.0 mm (0.118 in.)
	2	3.1 mm (0.122 in.)
	3	3.2 mm (0.126 in.)
	4	3.3 mm (0.130 in.)
	5	3.4 mm (0.134 in.)
	6	3.5 mm (0.138 in.)
	7	3.6 mm (0.142 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

U/D Clutch		
Pack clearance		1.51 to 1.71 mm (0.0594 to 0.0673 in.)
U/D clutch drum bushing inside diameter	STD	37.06 to 37.08 mm (1.4591 to 1.4598 in.)
	Max.	37.13 mm (1.4618 in.)
Return spring free length		17.14 mm (0.6748 in.)
Flange thickness	Mark	-
	1	3.0 mm (0.118 in.)
	2	3.2 mm (0.126 in.)
	3	3.4 mm (0.134 in.)
	4	3.6 mm (0.141 in.)
	5	3.8 mm (0.150 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

U/D Brake		
Pack clearance		1.81 to 2.20 mm (0.0713 to 0.0866 in.)
Return spring free length		13.24 mm (0.5213 in.)
Flange thickness	Mark	-
	1	3.0 mm (0.118 in.)
	2	3.2 mm (0.126 in.)

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	3	3.4 mm (0.134 in.)
	4	3.1 mm (0.122 in.)
	5	3.3 mm (0.130 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

1st & Reverse Brake		
Pack clearance		1.16 to 1.35 mm (0.0457 to 0.0531 in.)
Return spring free length		17.61 mm (0.6933 in.)
Flange thickness	Mark	-
	1	1.8 mm (0.071 in.)
	2	1.9 mm (0.075 in.)
	3	2.0 mm (0.079 in.)
	4	2.1 mm (0.083 in.)
	5	2.2 mm (0.087 in.)
	6	2.3 mm (0.091 in.)
	7	2.4 mm (0.094 in.)
	8	2.5 mm (0.098 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

U/D Planetary Gear	
Preload (at 60 rpm)	0.50 to 1.42 N*m (5.1 to 14.5 kgf*cm, 4.4 to 12.6 in.*lbf)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Front Planetary Gear		
Turning torque (at 60 rpm)	New bearing	0.51 to 1.02 N*m (5.1 to 10.0 kgf*cm, 4.4 to 8.7 in.*lbf)
	Used bearing	0.26 to 0.51 N*m (2.7 to 5.2 kgf*cm, 2.3 to 4.5 in.*lbf)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Input Shaft	
End play	0.262 to 1.244 mm (0.0103 to 0.0490 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Transaxle Rear Cover	
Bearing press fit depth	20.55 to 21.25 mm (0.8091 to 0.8366 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Transmission Valve Body		
Valve body installation bolt length	A	25 mm (0.984 in.)
	B	57 mm (2.244 in.)
	C	41 mm (1.614 in.)

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

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Accumulator			
Spring		Free length/Outer diameter	Color
B_3	Inner	62.00 mm (2.4409 in.)/15.50 mm (0.610 in.)	Purple
	Outer	74.23 mm (2.9224 in.)/21.70 mm (0.854 in.)	Purple
C_2		60.96 mm (2.3999 in.)/14.10 mm (0.555 in.)	Yellow
C_3		72.20 mm (2.8425 in.)/19.0 mm (0.748 in.)	Colorless

U151E AUTOMATIC TRANSAXLE - SERVICE DATA

Front Differential (U151E)		
Backlash		0.05 to 0.20 mm (0.0020 to 0.0079 in.)
Thrust washer thickness	Mark	-
	-	1.625 mm (0.0640 in.)
	-	1.725 mm (0.0679 in.)
	-	1.825 mm (0.0719 in.)
Preload (at 60 rpm)	New bearing	0.20 to 0.69 N*m (2.0 to 7.0 kgf*cm, 1.8 to 6.1 in.*lbf)
	Used bearing	0.10 to 0.35 N*m (1.0 to 3.6 kgf*cm, 0.9 to 3.1 in.*lbf)
Flange thickness	Mark	-
	0	2.000 mm (0.0787 in.)
	J	2.025 mm (0.0797 in.)
	1	2.050 mm (0.0807 in.)
	K	2.075 mm (0.0817 in.)
	2	2.100 mm (0.0827 in.)
	L	2.125 mm (0.0837 in.)
	3	2.150 mm (0.0846 in.)
	M	2.175 mm (0.0857 in.)
	4	2.200 mm (0.0866 in.)
	N	2.225 mm (0.0876 in.)
	5	2.25 mm (0.0886 in.)
	P	2.275 mm (0.0896 in.)
	6	2.300 mm (0.0906 in.)
	Q	2.325 mm (0.0915 in.)
	7	2.350 mm (0.0925 in.)
	R	2.375 mm (0.0935 in.)
	8	2.400 mm (0.0945 in.)
	S	2.425 mm (0.0954 in.)
	9	2.450 mm (0.0965 in.)
	T	2.475 mm (0.0974 in.)
	A	2.500 mm (0.0984 in.)
	U	2.525 mm (0.0994 in.)
	B	2.550 mm (0.1004 in.)
	V	2.575 mm (0.1014 in.)

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	C	2.600 mm (0.1024 in.)
	W	2.625 mm (0.1034 in.)
	D	2.650 mm (0.1043 in.)
	X	2.675 mm (0.1053 in.)
	E	2.700 mm (0.1063 in.)
	Y	2.725 mm (0.1073 in.)
	F	2.750 mm (0.1083 in.)
	AA	2.775 mm (0.1093 in.)
	G	2.800 mm (0.1102 in.)
	AB	2.825 mm (0.1112 in.)
	H	2.850 mm (0.1122 in.)

TORQUE SPECIFICATIONS

U151E AUTOMATIC TRANSAXLE - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Park/neutral position switch	Nut	6.9	70	61 in.*lbf
	Bolt	5.4	55	48 in.*lbf
Control shaft lever x Control shaft		13	130	9
Transmission control cable x Control shaft lever		12	122	9
Transaxle housing x Engine block	Bolt A	64	650	47
	Bolt B	46	470	34
	Bolt C	43	438	32
Torque converter clutch x Drive plate		41	418	30
Flywheel housing under cover x Automatic transaxle		10	102	7
Oil filler tube x Transaxle		5.5	56	49 in.*lbf
No. 1 Transmission Control cable bracket x Transaxle		12	122	10
No. 2 Transmission Control cable bracket x Transaxle		12	122	10
Oil cooler tube clamp x Control cable bracket		5.4	56	49 in.*lbf
Oil cooler inlet tube x Transaxle		34	347	25
Oil cooler outlet tube x Transaxle		34	347	25
Wire harness x Transaxle		13	133	10
Wire harness clamp x Transaxle		8.4	86	74 in.*lbf
Speed sensor (NC) x Transaxle		11	112	8
Speed sensor (NT) x Transaxle		11	112	8
Drain plug x Oil pan		49	500	36
Transmission wire x Transaxle		5.4	55	48 in.*lbf
ATF temperature sensor x Valve body		6.6	67	58 in.*lbf
Oil pan x Transaxle		7.8	80	69 in.*lbf
Solenoid valve x Valve body	Except SL1 and SLT	11	110	8
	SL1 and SLT	6.6	67	58 in.*lbf

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Valve body x Transaxle		11	110	8
Oil strainer x Valve body		11	110	8
Shift lever assembly x Body		12	122	9
Control cable x Body		4.9	50	43 in.*lbf
Oil cooler assembly x Body	Nut	7.0	71	62 in.*lbf
	bolt			
Transaxle apply tube clamp x Transaxle housing		9.8	100	87 in.*lbf
Front planetary gear lock nut		280	2855	207
Brake apply tube clamp x Transaxle case		5.4	55	48 in.*lbf
Transaxle case No. 1 plug x Transaxle rear cover		7.4	75	65 in.*lbf
Transaxle rear cover x Transaxle case	Bolt A	19	190	14
	Other bolt	25	250	18
Pawl shaft clamp x Transaxle case		9.8	100	87 in.*lbf
Oil pump assembly x Transaxle case		22	226	16
Transaxle housing x Transaxle case	Bolt A	25	255	18
	Bolt B	33	337	24
	Bolt C	29	295	21
	Bolt D	28	286	21
Automatic transmission case plug x Transaxle housing		7.4	75	65 in.*lbf
Automatic transmission case plug x Transaxle case		7.4	75	65 in.*lbf
Parking lock pawl bracket x Transaxle case		20	205	15
Manual detent spring x Transaxle case	Bolt A	20	205	15
	Bolt B	12	120	9
Transmission wire x Transaxle housing		5.4	55	48 in.*lbf
Transmission valve body x Transaxle case		11	110	8
ATF temperature sensor clamp x Transmission valve body		6.6	67	58 in.*lbf
Valve body oil strainer assembly x Transmission valve body		11	110	8
Automatic transaxle oil pan sub-assembly x Transaxle case		7.8	80	69 in.*lbf
Drain plug x Automatic transaxle oil pan sub-assembly		49	500	36
Speed sensor x Transaxle case		11	112	8
Oil cooler tube union x Transaxle case	Inlet oil cooler union	34	347	25
	outlet oil cooler union	34	347	25
Park/neutral start switch x Nut		6.9	70	61 in.*lbf
Park/neutral start switch x Bolt		5.4	55	48 in.*lbf
Park/neutral start switch x Control shaft lever		13	130	9
Oil pump body x Stator shaft assembly		9.8	100	87 in.*lbf
Front differential case x Front differential ring gear		95	970	70

U151F AUTOMATIC TRANSAXLE

SERVICE DATA

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U151F AUTOMATIC TRANSAXLE - SERVICE DATA

U151F		
Line pressure (Wheel locked)	Engine idling	-
	D position	372 to 412 kPa (3.8 to 4.2 kgf*cm^2 , 54 to 60 psi)
	R position	672 to 742 kPa (6.9 to 7.6 kgf*cm^2 , 97 to 108 psi)
	AT stall (Throttle valve fully opened)	-
	D position	931 to 1031 kPa (9.5 to 10.5 kgf*cm^2 , 135 to 150 psi)
	R position	1768 to 1968 kPa (18.0 to 20.1 kgf*cm^2 , 256 to 285 psi)
Engine stall revolution	D position	2600 +/-150 rpm
Time lag	N --> D position	Less than 1.2 seconds
	N --> R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	Approx. 700 rpm
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Differential oil seal installation depth	LH side	-0.5 to 0.2 mm (-0.020 to 0.008 in.)
	RH side	5.5 to 6.5 mm (0.217 to 0.256 in.)
Shift schedule (Shift lever with multi-mode automatic transmission & gate shift type)		-
D position (Throttle valve fully opened)	1-->2	46 to 53 km/h (29 to 34 mph)
	2-->3	92 to 99 km/h (57 to 62 mph)
	3-->4	150 to 160 km/h (93 to 99 mph)
	4-->5	223 to 234 km/h (139 to 145 mph)
	5-->4	214 to 225 km/h (133 to 140 mph)
	4-->3	144 to 154 km/h (89 to 96 mph)
	3-->2	87 to 93 km/h (54 to 58 mph)
	2-->1	40 to 46 km/h (25 to 29 mph)
(Throttle valve fully closed)	4-->5	68 to 73 km/h (42 to 45 mph)
	5-->4	38 to 43 km/h (24 to 27 mph)
Lock-up point	Throttle valve opening 5 %	-
D position		-
5th gear	Lock-up ON	86 to 92 km/h (53 to 57 mph)
	Lock-up OFF	85 to 91 km/h (53 to 57 mph)
4th gear	Lock-up ON	106 to 112 km/h (66 to 70 mph)
	Lock-up OFF	103 to 109 km/h (64 to 68 mph)
3th gear	Lock-up ON	65 to 72 km/h (40 to 45 mph)
	Lock-up OFF	62 to 68 km/h (39 to 42 mph)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

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Oil Pump		
Body clearance	STD	0.10 to 0.17 mm (0.0039 to 0.0067 in.)
	Max.	0.17 mm (0.0067 in.)
Tip clearance	STD	0.07 to 0.15 mm (0.0028 to 0.0059 in.)
	Max.	0.15 mm (0.0059 in.)
Side clearance	STD	0.02 to 0.05 mm (0.0008 to 0.0020 in.)
	Max.	0.05 mm (0.0020 in.)
Drive gear thickness	Mark	-
	A	11.690 to 11.699 mm (0.4602 to 0.4606 in.)
	B	11.700 to 11.709 mm (0.4606 to 0.4610 in.)
	C	11.710 to 11.720 mm (0.4610 to 0.4614 in.)
	D	11.721 to 11.730 mm (0.4615 to 0.4618 in.)
	E	11.731 to 11.740 mm (0.4619 to 0.4622 in.)
Driven gear thickness	Mark	-
	A	11.690 to 11.699 mm (0.4602 to 0.4606 in.)
	B	11.700 to 11.709 mm (0.4606 to 0.4610 in.)
	C	11.710 to 11.720 mm (0.4610 to 0.4614 in.)
	D	11.721 to 11.730 mm (0.4615 to 0.4618 in.)
	E	11.731 to 11.740 mm (0.4619 to 0.4622 in.)
Pump body bushing inside diameter	STD	38.113 to 38.138 mm (1.50050 to 1.50149 in.)
	Max.	38.188 mm (1.50346 in.)
Stator shaft bushing inside diameter	STD	21.500 to 21.526 mm (0.84646 to 0.84748 in.)
	Max.	21.57 mm (0.8492 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

Multiple Disc Clutch		
Inside diameter	STD	23.025 to 23.046 mm (0.9065 to 0.9073 in.)
	Max.	23.09 mm (0.9091 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

Forward Clutch		
Pack clearance		1.00 to 1.25 mm (0.0394 to 0.0492 in.)
Return spring free length		26.74 mm (1.0528 in.)
Flange thickness	Mark	-
	1	3.00 mm (0.1181 in.)
	2	3.15 mm (0.1240 in.)
	3	3.30 mm (0.1299 in.)
	4	3.45 mm (0.1358 in.)
	5	3.60 mm (0.1417 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

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Reverse Clutch		
Pack clearance		0.60 to 0.82 mm (0.02362 to 0.03228 in.)
Flange thickness	Mark	-
	1	3.0 mm (0.118 in.)
	2	3.1 mm (0.122 in.)
	3	3.2 mm (0.126 in.)
	4	3.3 mm (0.130 in.)
	5	3.4 mm (0.134 in.)
	6	3.5 mm (0.138 in.)
	7	3.6 mm (0.142 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

Direct Clutch & O/D Clutch		
Pack clearance		0.61 to 0.83 mm (0.02401 to 0.03268 in.)
Return spring free length		25.91 mm (1.0201 in.)
Flange thickness	Mark	-
	0	2.5 mm (0.098 in.)
	1	2.6 mm (0.102 in.)
	2	2.7 mm (0.106 in.)
	3	2.8 mm (0.110 in.)
	4	2.9 mm (0.114 in.)
	5	3.0 mm (0.118 in.)
	6	3.1 mm (0.122 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

2nd Brake		
Pack clearance		0.62 to 0.91 mm (0.0244 to 0.0358 in.)
Return spring free length		16.61 mm (0.6539 in.)
Flange thickness	Mark	-
	1	3.0 mm (0.118 in.)
	2	3.1 mm (0.122 in.)
	3	3.2 mm (0.126 in.)
	4	3.3 mm (0.130 in.)
	5	3.4 mm (0.134 in.)
	6	3.5 mm (0.138 in.)
	7	3.6 mm (0.142 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

U/D Clutch		
Pack clearance		1.51 to 1.71 mm (0.0594 to 0.0673 in.)
U/D clutch drum bushing inside diameter	STD	37.06 to 37.08 mm (1.4591 to 1.4598 in.)

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	Max.	37.13 mm (1.4618 in.)
Return spring free length		17.14 mm (0.6748 in.)
Flange thickness	Mark	-
	1	3.0 mm (0.118 in.)
	2	3.2 mm (0.126 in.)
	3	3.4 mm (0.134 in.)
	4	3.6 mm (0.141 in.)
	5	3.8 mm (0.150 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

U/D Brake		
Pack clearance		1.81 to 2.20 mm (0.0713 to 0.0866 in.)
Return spring free length		13.24 mm (0.5213 in.)
Flange thickness	Mark	-
	1	3.0 mm (0.118 in.)
	2	3.2 mm (0.126 in.)
	3	3.4 mm (0.134 in.)
	4	3.1 mm (0.122 in.)
	5	3.3 mm (0.130 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

1st & Reverse Brake		
Pack clearance		1.16 to 1.35 mm (0.0457 to 0.0531 in.)
Return spring free length		17.61 mm (0.6933 in.)
Flange thickness	Mark	-
	1	1.8 mm (0.071 in.)
	2	1.9 mm (0.075 in.)
	3	2.0 mm (0.079 in.)
	4	2.1 mm (0.083 in.)
	5	2.2 mm (0.087 in.)
	6	2.3 mm (0.091 in.)
	7	2.4 mm (0.094 in.)
	8	2.5 mm (0.098 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

U/D Planetary Gear	
Preload (at 60 rpm)	0.50 to 1.42 N*m (5.1 to 14.5 kgf*cm, 4.4 to 12.6 in.*lbf)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

Front Planetary Gear		
Turning torque (at 60 rpm)	New bearing	0.51 to 1.02 N*m (5.1 to 10.0 kgf*cm, 4.4 to 8.7 in.*lbf)

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	Used bearing	0.26 to 0.51 N*m (2.7 to 5.2 kgf*cm, 2.3 to 4.5 in.*lbf)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

Input Shaft	
End play	0.262 to 1.244 mm (0.0103 to 0.0490 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

Transaxle Rear Cover	
Bearing press fit depth	20.55 to 21.25 mm (0.8091 to 0.8366 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

Transmission Valve Body		
Valve body installation bolt length	A	25 mm (0.984 in.)
	B	57 mm (2.244 in.)
	C	41 mm (1.614 in.)

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

Accumulator			
Spring		Free length/Outer diameter	Color
B_3	Inner	62.00 mm (2.4409 in.)/15.50 mm (0.610 in.)	Purple
	Outer	74.23 mm (2.9224 in.)/21.70 mm (0.854 in.)	Purple
C_2		60.96 mm (2.3999 in.)/14.10 mm (0.555 in.)	Yellow
C_3		72.20 mm (2.8425 in.)/19.0 mm (0.748 in.)	Colorless

U151F AUTOMATIC TRANSAXLE - SERVICE DATA

Front Differential (U151F)		
Side gear backlash		0.05 to 0.20 mm (0.0020 to 0.0079 in.)
Thrust washer thickness = Clearance - 0.162 to 0.265 mm (0.0064 to 0.0104 in.)	Mark	-
	A	0.95 mm (0.0373 in.)
	B	1.00 mm (0.0393 in.)
	C	1.05 mm (0.0413 in.)
	D	1.10 mm (0.0433 in.)
	E	1.15 mm (0.0453 in.)
	F	1.20 mm (0.0472 in.)
	G	1.25 mm (0.0492 in.)
	H	1.30 mm (0.0512 in.)
	J	1.35 mm (0.0532 in.)
	K	1.40 mm (0.0552 in.)
Pinion backlash		0.05 to 0.20 mm (0.0020 to 0.0079 in.)
	Mark	-
	MA	0.80 mm (0.0313 in.)

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Thrust washer thickness	MB	0.85 mm (0.0333 in.)
	MC	0.90 mm (0.0353 in.)
	MD	0.95 mm (0.0373 in.)
	ME	1.00 mm (0.0393 in.)
	MF	1.05 mm (0.0413 in.)
	MG	1.10 mm (0.0433 in.)
	MH	1.15 mm (0.0453 in.)
	MJ	1.20 mm (0.0472 in.)
	MK	1.25 mm (0.0492 in.)
	ML	1.30 mm (0.0512 in.)
	MM	1.35 mm (0.0532 in.)
	MN	1.40 mm (0.0552 in.)
Preload (at 60 rpm)	New bearing	0.20 to 0.69 N*m (2.0 to 7.0 kgf*cm, 1.8 to 6.1 in.*lbf)
	Used bearing	0.10 to 0.35 N*m (1.0 to 3.6 kgf*cm, 0.9 to 3.1 in.*lbf)
Flange thickness	Mark	-
	0	2.000 mm (0.0787 in.)
	J	2.025 mm (0.0797 in.)
	1	2.050 mm (0.0807 in.)
	K	2.075 mm (0.0817 in.)
	2	2.100 mm (0.0827 in.)
	L	2.125 mm (0.0837 in.)
	3	2.150 mm (0.0846 in.)
	M	2.175 mm (0.0857 in.)
	4	2.200 mm (0.0866 in.)
	N	2.225 mm (0.0876 in.)
	5	2.25 mm (0.0886 in.)
	P	2.275 mm (0.0896 in.)
	6	2.300 mm (0.0906 in.)
	Q	2.325 mm (0.0915 in.)
	7	2.350 mm (0.0925 in.)
	R	2.375 mm (0.0935 in.)
	8	2.400 mm (0.0945 in.)
	S	2.425 mm (0.0954 in.)
	9	2.450 mm (0.0965 in.)
	T	2.475 mm (0.0974 in.)
	A	2.500 mm (0.0984 in.)
	U	2.525 mm (0.0994 in.)
	B	2.550 mm (0.1004 in.)
	V	2.575 mm (0.1014 in.)

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	C	2.600 mm (0.1024 in.)
	W	2.625 mm (0.1034 in.)
	D	2.650 mm (0.1043 in.)
	X	2.675 mm (0.1053 in.)
	E	2.700 mm (0.1063 in.)
	Y	2.725 mm (0.1073 in.)
	F	2.750 mm (0.1083 in.)
	AA	2.775 mm (0.1093 in.)
	G	2.800 mm (0.1102 in.)
	AB	2.825 mm (0.1112 in.)
	H	2.850 mm (0.1122 in.)

TORQUE SPECIFICATIONS

U151F AUTOMATIC TRANSAXLE - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft*lbf
Park/neutral position switch	Nut	6.9	70	61 in.*lbf
	Bolt	5.4	55	48 in.*lbf
Control shaft lever x Control shaft		13	130	9
Transmission control cable x Control shaft lever		12	122	9
Transaxle housing x Engine block	Bolt A	64	650	47
	Bolt B	46	470	34
	Bolt C	43	438	32
Torque converter clutch x Drive plate		41	418	30
Flywheel housing under cover x Automatic transaxle		10	102	7
Oil filler tube x Transaxle		5.5	56	49 in.*lbf
No. 1 Transmission Control cable bracket x Transaxle		12	122	10
No. 2 Transmission Control cable bracket x Transaxle		12	122	10
Oil cooler tube clamp x Control cable bracket		5.4	56	49 in.*lbf
Oil cooler inlet tube x Transaxle		34	347	25
Oil cooler outlet tube x Transaxle		34	347	25
Wire harness x Transaxle		13	133	10
Wire harness clamp x Transaxle		8.4	86	74 in.*lbf
Speed sensor (NC) x Transaxle		11	112	8
Speed sensor (NT) x Transaxle		11	112	8
Drain plug x Oil pan		49	500	36
Transmission wire x Transaxle		5.4	55	48 in.*lbf
ATF temperature sensor x Valve body		6.6	67	58 in.*lbf
Oil pan x Transaxle		7.8	80	69 in.*lbf
Solenoid valve x Valve body	Except SL1 and SLT	11	110	8
	SL1 and SLT	6.6	67	58 in.*lbf

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2009 Toyota Highlander Limited

2009 GENERAL INFORMATION Service Specifications - Highlander

Valve body x Transaxle		11	110	8
Oil strainer x Valve body		11	110	8
Shift lever assembly x Body		12	122	10
Control cable x Body		4.9	50	43 in.*lbf
Transfer x Transaxle		69	700	51
Transfer x Transfer stiffener plate RH		34	350	25
Engine mount bracket RR x Transfer stiffener plate RH		78	796	58
Oil cooler assembly x Body	Nut	7.0	71	62 in.*lbf
	bolt			
Transaxle apply tube clamp x Transaxle housing		9.8	100	87 in.*lbf
Front planetary gear lock nut		280	2855	207
Brake apply tube clamp x Transaxle case		5.4	55	48 in.*lbf
Transaxle case No. 1 plug x Transaxle rear cover		7.4	75	65 in.*lbf
Transaxle rear cover x Transaxle case	Bolt A	19	190	14
	Other bolt	25	250	18
Pawl shaft clamp x Transaxle case		9.8	100	87 in.*lbf
Oil pump assembly x Transaxle case		22	226	16
Transaxle housing x Transaxle case	Bolt A	25	255	18
	Bolt B	33	337	24
	Bolt C	29	295	21
	Bolt D	28	286	21
Automatic transmission case plug x Transaxle housing		7.4	75	65 in.*lbf
Automatic transmission case plug x Transaxle case		7.4	75	65 in.*lbf
Parking lock pawl bracket x Transaxle case		20	205	15
Manual detent spring x Transaxle case	Bolt A	20	205	15
	Bolt B	12	120	9
Transmission wire x Transaxle housing		5.4	55	48 in.*lbf
Transmission valve body x Transaxle case		11	110	8
ATF temperature sensor clamp x Transmission valve body		6.6	67	58 in.*lbf
Valve body oil strainer assembly x Transmission valve body		11	110	8
Automatic transaxle oil pan sub-assembly x Transaxle case		7.8	80	69 in.*lbf
Drain plug x Automatic transaxle oil pan sub-assembly		49	500	36
Speed sensor x Transaxle case		11	112	8
Oil cooler tube union x Transaxle case	Inlet oil cooler union	34	347	25
	outlet oil cooler union	34	347	25
Park/neutral start switch x Nut		6.9	70	61 in.*lbf
Park/neutral start switch x Bolt		5.4	55	48 in.*lbf
Park/neutral start switch x Control shaft lever		13	130	9
Oil pump body x Stator shaft assembly		9.8	100	87 in.*lbf
Front differential case x Front differential ring gear		95	970	70

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U760E AUTOMATIC TRANSAXLE

SERVICE DATA

U760E AUTOMATIC TRANSAXLE - SERVICE DATA

Line pressure (Wheel locked)		
Engine idling	D position	360 to 430 kPa (3.7 to 4.4 kgf/cm^2 , 52 to 62 psi)
	R position	800 to 950 kPa (8.2 to 9.7 kgf/cm^2 , 116 to 138 psi)
At stall speed (Throttle valve fully open)	D position	1160 to 1350 kPa (11.8 to 13.8 kgf/cm^2 , 168 to 196 psi)
	R position	1900 to 2200 kPa (19.4 to 22.4 kgf/cm^2 , 276 to 319 psi)
Engine stall speed	D position	2810+200/-400 rpm
Time lag	N --> D position	Less than 1.2 seconds
	N --> R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	Approx. 650 rpm
Drive plate runout	Maximum	0.30 mm (0.0118 in.)
Shift schedule		
D position		
Throttle valve fully open (Normal)	1-->2	47 to 52 km/h (29 to 32 mph)
	2-->3	89 to 93 km/h (55 to 58 mph)
	3-->4	122 to 130 km/h (76 to 81 mph)
	4-->5	166 to 174 km/h (103 to 108 mph)
	5-->6	247 to 254 km/h (153 to 158 mph)(1)
Throttle valve opening 6% (Normal)	1-->2	12 to 17 km/h (7 to 11 mph)
	2-->3	21 to 25 km/h (13 to 16 mph)
	3-->4	32 to 37 km/h (20 to 23 mph)
	4-->5	49 to 53 km/h (30 to 33 mph)
	5-->6	62 to 66 km/h (39 to 41 mph)
	6L	Over 70 km/h (43 mph)
5, 4, 3, 2, 1 gear range		
Manual downshift speed	-->5	240 to 248 km/h (149 to 154 mph)
	-->4	158 to 166 km/h (98 to 103 mph)
	-->3	114 to 122 km/h (71 to 76 mph)
	-->2	77 to 81 km/h (48 to 50 mph)
	-->1	34 to 38 km/h (21 to 24 mph)
(1) Speed Limiter Active		

Park/Neutral Position Switch

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PARK/NEUTRAL POSITION SWITCH - SERVICE DATA

Park/Neutral position switch		
1 (RB) - 3 (PL) 4 (B) - 9(L)	P	Below 1 ohms
	Other than P	10 kohms or higher
1 (RB) - 2(RL)	R	Below 1 ohms
	Other than R	10 kohms or higher
1 (RB) - 8 (NL) 4 (B) - 9 (L)	N	Below 1 ohms
	Other than N	10 kohms or higher
1 (RB) - 7 (DL)	D, S "+" or "-"	Below 1 ohms
	Other than D, S "+" and "-"	10 kohms or higher

Automatic Transaxle Unit

AUTOMATIC TRANSAXLE UNIT - SERVICE DATA

Input shaft sub-assembly		
End play	0.020 to 1.242 mm (0.000787 to 0.0489 in.)	
Planetary sun gear sub-assembly		
Standard inside diameter	25.525 to 25.546 mm (1.0049 to 1.0057 in.)	
Maximum inside diameter	25.546 mm (1.0057 in.)	
Underdrive planetary gear assembly		
Standard clearance	0.18 to 0.54 mm (0.00709 to 0.0213 in.)	
Rear planetary sun gear assembly		
Standard inside diameter	25.580 to 25.601 mm (1.0071 to 1.0079 in.)	
Maximum inside diameter	25.601 mm (1.0079 in.)	
2nd brake piston return spring sub-assembly		
Standard free length	23.26 mm (0.916 in.)	
1st and reverse brake return spring sub-assembly		
Standard free length	15.79 mm (0.621 in.)	
Clearance of No. 2 brake		
Standard clearance	0.884 to 1.196 mm (0.0348 to 0.0471 in.)	
No. 2 brake flange thickness	Mark 40	4.0 mm (0.157 in.)
	Mark 41	4.1 mm (0.161 in.)
	Mark 42	4.2 mm (0.165 in.)
	Mark 43	4.3 mm (0.169 in.)
	Mark 44	4.4 mm (0.173 in.)
Clearance of No. 1 brake		
Standard clearance	0.601 to 0.819 mm (0.0237 to 0.0322 in.)	
No. 1 brake flange thickness	Mark 30	3.0 mm (0.118 in.)
	Mark 31	3.1 mm (0.122 in.)
	Mark 32	3.2 mm (0.126 in.)
	Mark 33	3.3 mm (0.130 in.)
	Mark 34	3.4 mm (0.134 in.)

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		Mark 35	3.5 mm (0.138 in.)
No. 3 brake piston return spring sub-assembly			
Standard free length		9.15 mm (0.360 in.)	
Clearance of No. 3 brake			
Standard clearance		0.599 to 0.799 mm (0.0236 to 0.0315 in.)	
No. 3 brake flange thickness		Mark 38	3.80 mm (0.150 in.)
		Mark 39	3.90 mm (0.154 in.)
		Mark 40	4.00 mm (0.157 in.)
		Mark 41	4.10 mm (0.161 in.)
		Mark 42	4.20 mm (0.165 in.)
		Mark 43	4.30 mm (0.169 in.)
Clearance of No. 1 clutch disc			
Pack clearance		0.601 to 0.819 mm (0.0237 to 0.0322 in.)	
Clearance of No. 2 clutch disc			
Pack clearance		0.394 to 0.605 mm (0.0155 to 0.0238 in.)	
Manual valve lever shaft oil seal			
Oil seal driven in depth		-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)	
One-way clutch assembly			
Bearing diameter		Inside	56.1 mm (2.21 in.)
		Outside	81.1 mm (3.19 in.)
Counter drive gear nut			
Turning torque (at 60 rpm)		0.1 to 0.8 N*m (1 to 8 kgf*cm, 1 to 7 in.*lbf)	
Underdrive planetary sun gear			
Bearing diameter		Inside	57.7 mm (2.27 in.)
		Outside	75.2 mm (2.96 in.)
Input shaft sub-assembly			
Bearing and race diameter	Bearing	Inside	29.1 mm (1.15 in.)
		Outside	48.6 mm (1.91 in.)
	Race	Inside	30.7 mm (1.21 in.)
		Outside	48.3 mm (1.90 in.)
No. 3 brake hub			
Bearing and race diameter	Bearing	Inside	62.6 mm (2.46 in.)
		Outside	82.9 mm (3.26 in.)
	Race	Inside	65.9 mm (2.59 in.)
		Outside	80.3 mm (3.16 in.)
Oil pump assembly			
Bearing and race diameter	Bearing	Inside	53.5 mm (2.11 in.)
		Outside	79 mm (3.11 in.)
	Race	Inside	59.4 mm (2.34 in.)
		Outside	76 mm (2.99 in.)
Counter driven gear preload			

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Turning torque (at 10 rpm)	Differential side bearing preload + 3.2 to 6.0 N*m (32 to 63 kgf*cm, 28 to 54 in.*lbf)
Shim thickness	2.000 mm (0.0787 in.)
	2.025 mm (0.0797 in.)
	2.050 mm (0.0807 in.)
	2.075 mm (0.0817 in.)
	2.100 mm (0.0827 in.)
	2.125 mm (0.0837 in.)
	2.150 mm (0.0846 in.)
	2.175 mm (0.0856 in.)
	2.200 mm (0.0866 in.)
	2.225 mm (0.0876 in.)
	2.250 mm (0.0866 in.)
	2.275 mm (0.0896 in.)
	2.300 mm (0.0906 in.)
	2.325 mm (0.0915 in.)
	2.350 mm (0.0925 in.)
	2.375 mm (0.0935 in.)
	2.400 mm (0.0945 in.)
	2.425 mm (0.0955 in.)
	2.450 mm (0.0965 in.)
	2.475 mm (0.0974 in.)
	2.500 mm (0.0984 in.)
	2.525 mm (0.0994 in.)
	2.550 mm (0.100 in.)
	2.575 mm (0.101 in.)
	2.600 mm (0.102 in.)
	2.625 mm (0.103 in.)
	2.650 mm (0.104 in.)
	2.675 mm (0.105 in.)
	2.700 mm (0.106 in.)
	2.725 mm (0.107 in.)
	2.750 mm (0.108 in.)
	2.775 mm (0.109 in.)
	2.800 mm (0.110 in.)
	2.825 mm (0.111 in.)
	2.850 mm (0.112 in.)
	2.875 mm (0.113 in.)
	2.900 mm (0.114 in.)
	2.925 mm (0.115 in.)
	2.950 mm (0.116 in.)

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		2.975 mm (0.117 in.)	
		3.000 mm (0.118 in.)	
Rear planetary sun gear thrust needle roller bearing			
Bearing and race diameter	Bearing	Inside	28 mm (1.10 in.)
		Outside	47.1 mm (1.85 in.)
	Race	Inside	26.1 mm (1.03 in.)
		Outside	44 mm (1.73 in.)
Rear No. 2 planetary sun gear thrust needle roller bearing			
Bearing diameter		Inside	61.2 mm (2.41 in.)
		Outside	79 mm (3.11 in.)
End play		0.022 to 1.099 mm (0.000866 to 0.0433 in.)	
Rear transaxle cover sub-assembly			
Installation depth		21.5 to 21.9 mm (0.846 to 0.862 in.)	
Bearing and race diameter	Bearing	Inside	48.9 mm (1.93 in.)
		Outside	72.0 mm (2.84 in.)
	Race	Inside	52.2 mm (2.06 in.)
		Outside	70.4 mm (2.77 in.)

Oil Pump

OIL PUMP - SERVICE DATA

Clearance of front oil pump and gear body sub-assembly		
Standard clearance		0.08 to 0.15 mm (0.00315 to 0.00591 in.)
Maximum clearance		0.15 mm (0.00591 in.)
Standard side clearance		0.025 to 0.04 mm (0.000984 to 0.00157 in.)
Maximum side clearance		0.04 mm (0.00157 in.)
Drive gear thickness	Mark1	11.547 to 11.555 mm (0.4546 to 0.4549 in.)
	Mark 2	11.555 to 11.563 mm (0.4549 to 0.4552 in.)
	Mark 3	11.564 to 11.571 mm (0.4553 to 0.4556 in.)
	Mark 4	11.572 to 11.579 mm (0.4556 to 0.4559 in.)
	Mark 5	11.580 to 11.587 mm (0.4559 to 0.4562 in.)
Driven gear thickness	Mark 1	11.547 to 11.555 mm (0.4546 to 0.4549 in.)
	Mark 2	11.555 to 11.563 mm (0.4549 to 0.4552 in.)
	Mark 3	11.564 to 11.571 mm (0.4553 to 0.4556 in.)
	Mark 4	11.572 to 11.579 mm (0.4556 to 0.4559 in.)
	Mark 5	11.580 to 11.587 mm (0.4559 to 0.4562 in.)
Front oil pump and gear body sub-assembly		
Standard inside diameter		43.122 to 43.138 mm (1.6977 to 1.6983 in.)
Maximum inside diameter		43.188 mm (1.7003 in.)
Stator shaft assembly		
Standard inside diameter		22.500 to 22.526 mm (0.8858 to 0.8868 in.)

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Maximum inside diameter	22.570 mm (0.8886 in.)

Shift Solenoid Valve

SHIFT SOLENOID VALVE - SERVICE DATA

Shift solenoid valve SL		
Solenoid connector (SL) - Solenoid body (SL)	20°C (68°F)	11 to 15 ohms
Shift solenoid valve SLT		
1-2	20°C (68°F)	5.0 to 5.6 ohms
Shift solenoid valve SLU		
1-2	20°C (68°F)	5.0 to 5.6 ohms
Shift solenoid valve SL1		
1-2	20°C (68°F)	5.0 to 5.6 ohms
Shift solenoid valve SL2		
1-2	20°C (68°F)	5.0 to 5.6 ohms
Shift solenoid valve SL3		
1-2	20°C (68°F)	5.0 to 5.6 ohms
Shift solenoid valve SL4		
1-2	20°C (68°F)	5.0 to 5.6 ohms

Differential Case

DIFFERENTIAL CASE - SERVICE DATA

Differential side gear backlash	
Standard backlash	0.05 to 0.2 mm (0.00197 to 0.00787 in.)
Thrust washer thickness	1.00 mm (0.0394 in.)
	1.10 mm (0.0433 in.)
	1.20 mm (0.0472 in.)
	1.30 mm (0.0512 in.)
Differential side bearing preload	
Turning torque (at 10 rpm)	0.9 to 1.3 N*m (9 to 13 kgf*cm, 8 to 11 in.*lbf)
	2.000 mm (0.0787 in.)
	2.025 mm (0.0797 in.)
	2.050 mm (0.0807 in.)
	2.075 mm (0.0817 in.)
	2.100 mm (0.0827 in.)
	2.125 mm (0.0837 in.)
	2.150 mm (0.0846 in.)
	2.175 mm (0.0856 in.)
	2.200 mm (0.0866 in.)
	2.225 mm (0.0876 in.)
	2.250 mm (0.0886 in.)

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Shim thickness	2.275 mm (0.0896 in.)
	2.300 mm (0.0906 in.)
	2.325 mm (0.0915 in.)
	2.350 mm (0.0925 in.)
	2.375 mm (0.0935 in.)
	2.400 mm (0.0945 in.)
	2.425 mm (0.0955 in.)
	2.450 mm (0.0965 in.)
	2.475 mm (0.0974 in.)
	2.500 mm (0.0984 in.)
	2.525 mm (0.0944 in.)
	2.550 mm (0.100 in.)
	2.575 mm (0.101 in.)
	2.600 mm (0.102 in.)
	2.625 mm (0.103 in.)
	2.650 mm (0.104 in.)
	2.675 mm (0.105 in.)
	2.700 mm (0.106 in.)
	2.725 mm (0.107 in.)
	2.750 mm (0.108 in.)
	2.775 mm (0.109 in.)
	2.800 mm (0.110 in.)
	2.825 mm (0.111 in.)
	2.850 mm (0.112 in.)
	2.875 mm (0.113 in.)
Transaxle case oil seal	
Oil seal drive in depth	-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)
Front transaxle case oil seal	
Oil seal drive in depth	-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

TORQUE SPECIFICATIONS

U760E AUTOMATIC TRANSAXLE - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
No. 1 transmission oil filler tube x Oil pan	0.8	8	7 in.*lbf
Overflow plug x Oil pan	40	408	30
Refill plug x Transaxle case	49	500	36
Speed sensor x Transmission valve body assembly	11	112	8
Lock plate x Transmission valve body assembly	11	112	8
Shift solenoid valve SL4 x Transmission valve body assembly	11	112	8
Shift solenoid valve SL3 x Transmission valve body assembly	11	112	8

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Shift solenoid valve SL1, SL2 x Transmission valve body assembly		11	112	8
Transmission valve body assembly x Transaxle case	Bolt A, B, C	11	112	8
	Bolt D	9.6	98	85 in.*lbf
Valve body oil strainer assembly x Transmission valve body assembly		9.6	98	85 in.*lbf
Automatic transaxle oil pan sub-assembly x Transaxle case	Uncoated Bolt	7.5	76	66 in.*lbf
	Precoated Bolt	7.0	71	62 in.*lbf
Oil with hose cooler assembly x Body		6.0	61	53 in.*lbf
Park/neutral position switch assembly x Transaxle case		5.4	55	48 in.*lbf
Control shaft lever x Control shaft		13	130	9
Transmission control cable assembly x Control shaft lever		12	122	9
Front engine mounting bracket x Transaxle case		64	653	47
Shift lever assembly x Body		12	122	9
Transmission control cable assembly x Body		4.9	50	43 in.*lbf
No. 1 transmission control cable bracket x Transaxle case		12	122	9
Automatic transaxle assembly x Engine assembly	Bolt A	64	653	47
	Bolt B	46	469	34
	Bolt C	44	449	32
Wire harness clamp bracket x Automatic transaxle assembly	Bolt A	21	214	15
	Bolt B	19	194	14
Flexible hose bracket sub-assembly x Transaxle housing		20	204	15
TCM x Transaxle case		11	112	8

Automatic Transaxle Unit

AUTOMATIC TRANSAXLE UNIT - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Manual detent spring sub-assembly x Transaxle case	23	234	17
Pawl stopper plate x Transaxle case	23	234	17
No. 1 transmission case plate x Transaxle case	23	234	17
Pawl shaft clamp x Transaxle case	23	234	17
Counter drive gear nut x Front planetary gear assembly	150	1530	110
Oil pump assembly x Transaxle case	23	234	17
Transmission housing oil separator x Transaxle case	23	234	17
Apply tube clamp x Transaxle case	23	234	17
Transaxle housing x Transaxle case	31	316	23
Transaxle housing x Transaxle case	23	234	17
Rear transaxle cover plate x Rear transaxle cover sub-assembly	7.5	76	66 in.*lbf
Rear transaxle cover sub-assembly x Transaxle case	23	234	17
Rear transaxle cover sub-assembly x Transaxle case	17	173	12
Refill plug x Rear transaxle cover sub-assembly	49	500	36
No. 1 automatic transaxle case plug x Rear transaxle cover sub-assembly	7.4	75	65 in.*lbf

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Transmission valve body assembly x Transaxle case	Bolt A	11	112	8
	Bolt B	11	112	8
	Bolt C	11	112	8
	Bolt D	9.6	98	85 in.*lbf
Oil strainer assembly x Transmission valve body assembly		9.6	98	85 in.*lbf
Automatic transaxle oil pan sub-assembly x Transaxle case		7.5	76	66 in.*lbf
Automatic transaxle oil pan sub-assembly x Transaxle case		7.0	71	62 in.*lbf
No. 1 oil filler tube x Automatic transaxle oil pan sub-assembly		0.8	8	7 in.*lbf
Overflow plug x Automatic transaxle oil pan sub-assembly		40	408	30
Hexagon bolt x Transaxle case		17	173	12
No. 1 transaxle case plug x Transaxle case		7.4	75	65 in.*lbf
Oil cooler tube union (inlet oil cooler union) x Transaxle case		27	275	20
Oil cooler tube union (outlet oil cooler union) x Transaxle case		27	275	20
Park/neutral position switch x Transaxle case		5.4	55	48 in.*lbf
control shaft lever x Park/neutral position switch		13	133	10

Oil Pump

OIL PUMP - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Stator shaft assembly x Oil pump	9.3	95	82 in.*lbf

Shift Solenoid Valve

SHIFT SOLENOID VALVE - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Shift solenoid valve SL4 x Transmission valve body assembly	11	112	8
Shift solenoid valve SL3 x Transmission valve body assembly	11	112	8
Shift solenoid valve SLU, SLT x Transmission valve body assembly	11	112	8
Shift solenoid valve SL1, SL2 x Transmission valve body assembly	11	112	8
Shift solenoid valve SL x Transmission valve body assembly	11	112	8

Differential Case

DIFFERENTIAL CASE - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front differential ring gear x Differential case	120	1223	88

TRANSFER

SERVICE DATA

TRANSFER - SERVICE DATA

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Driven pinion preload (For use with SST)	New bearing	1.1 to 1.6 N*m (11 to 16 kgf*cm, 9.7 to 14.2 in.*lbf)
	Used bearing	0.9 to 1.4 N*m (9 to 14 kgf*cm, 8.0 to 12.4 in.*lbf)
Total preload (For use with SST)	New bearing	1.30 to 1.98 N*m (13.3 to 20.2 kgf*cm, 11.5 to 17.5 in.*lbf)
	Used bearing	1.07 to 1.68 N*m (10.9 to 17.1 kgf*cm, 9.5 to 14.9 in.*lbf)
Ring gear	Backlash	0.10 to 0.15 mm (0.0039 to 0.0059 in.)
Ring gear runout	Maximum	0.1 mm (0.004 in.)
Transfer ring gear mounting case	Maximum	0.03 mm (0.0012 in.)
Washer thickness LH side	Mark	
	AA	2.07 mm (0.0814 in.)
	AB	2.10 mm (0.0826 in.)
	AC	2.13 mm (0.0838 in.)
	BA	2.16 mm (0.0850 in.)
	BB	2.19 mm (0.0862 in.)
	BC	2.22 mm (0.0874 in.)
	CA	2.25 mm (0.0885 in.)
	CB	2.28 mm (0.0897 in.)
	CC	2.31 mm (0.0909 in.)
	DA	2.34 mm (0.0921 in.)
	DB	2.37 mm (0.0933 in.)
	DC	2.40 mm (0.0944 in.)
	EA	2.43 mm (0.0956 in.)
	EB	2.46 mm (0.0968 in.)
	EC	2.49 mm (0.0980 in.)
	FA	2.52 mm (0.0992 in.)
	FB	2.55 mm (0.1003 in.)
	FC	2.58 mm (0.1015 in.)
	GA	2.61 mm (0.1027 in.)
	GB	2.64 mm (0.1039 in.)
	GC	2.67 mm (0.1051 in.)
	HA	2.70 mm (0.1062 in.)
	HB	2.73 mm (0.1074 in.)
	HC	2.76 mm (0.1086 in.)
	JA	2.79 mm (0.1098 in.)
	JB	2.82 mm (0.1110 in.)
	JC	2.85 mm (0.1122 in.)
	KA	2.88 mm (0.1133 in.)
	KB	2.91 mm (0.1145 in.)
	KC	2.94 mm (0.1157 in.)

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	LA	2.97 mm (0.1169 in.)
	LB	3.00 mm (0.1181 in.)
Driven pinion bearing washer thickness front side	Mark	
	AA	1.20 mm (0.0472 in.)
	AC	1.22 mm (0.0480 in.)
	BB	1.24 mm (0.0488 in.)
	CA	1.26 mm (0.0496 in.)
	CC	1.28 mm (0.0503 in.)
	DB	1.30 mm (0.0511 in.)
	EA	1.32 mm (0.0519 in.)
	EC	1.34 mm (0.0527 in.)
	FB	1.36 mm (0.0535 in.)
	GA	1.38 mm (0.0543 in.)
	GC	1.40 mm (0.0551 in.)
	HB	1.42 mm (0.0559 in.)
	JA	1.44 mm (0.0566 in.)
	JC	1.46 mm (0.0574 in.)
	KB	1.48 mm (0.0582 in.)
	LA	1.50 mm (0.0590 in.)
	LC	1.52 mm (0.0598 in.)
	MB	1.54 mm (0.0606 in.)
	NA	1.56 mm (0.0614 in.)
	NC	1.58 mm (0.0622 in.)
	PB	1.60 mm (0.0629 in.)
	QA	1.62 mm (0.0637 in.)
	QC	1.64 mm (0.0645 in.)
	Mark	
	AA	1.47 mm (0.0578 in.)
	AB	1.50 mm (0.0590 in.)
	AC	1.53 mm (0.0602 in.)
	BA	1.56 mm (0.0614 in.)
	BB	1.59 mm (0.0625 in.)
	BC	1.62 mm (0.0637 in.)
	CA	1.65 mm (0.0649 in.)
	CB	1.68 mm (0.0661 in.)
	CC	1.71 mm (0.0673 in.)
	DA	1.74 mm (0.0685 in.)
	DB	1.77 mm (0.0696 in.)
	DC	1.80 mm (0.0708 in.)
	EA	1.83 mm (0.0720 in.)
	EB	1.86 mm (0.0732 in.)

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Washer thickness RH side	EC	1.89 mm (0.0744 in.)
	FA	1.92 mm (0.0755 in.)
	FB	1.95 mm (0.0767 in.)
	FC	1.98 mm (0.0779 in.)
	GA	2.01 mm (0.0790 in.)
	GB	2.04 mm (0.0803 in.)
	GC	2.07 mm (0.0814 in.)
	HA	2.10 mm (0.0826 in.)
	HB	2.13 mm (0.0838 in.)
	HC	2.16 mm (0.0850 in.)
	JA	2.19 mm (0.0862 in.)
	JB	2.22 mm (0.0874 in.)
	JC	2.25 mm (0.0885 in.)
	KA	2.28 mm (0.0897 in.)
	KB	2.31 mm (0.0909 in.)
	KC	2.34 mm (0.0921 in.)
	LA	2.37 mm (0.0933 in.)
	LB	2.40 mm (0.0944 in.)
	LC	2.43 mm (0.0956 in.)
	MA	2.46 mm (0.0968 in.)
	MB	2.49 mm (0.0980 in.)
	MC	2.52 mm (0.0992 in.)
	NA	2.55 mm (0.1003 in.)
	NB	2.58 mm (0.1015 in.)

TORQUE SPECIFICATIONS

TRANSFER - TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Transfer gear nut (For use with SST)	STD	277	2,820	204
	Max.	378	3,855	279
Ring gear mount set bolt		78	790	57
Transfer case x Transfer RH bearing retainer sub-assembly		28	286	21
Transfer case x Transfer extension housing		26	260	19
Transfer case x Transfer & transaxle setting stud bolt		39	400	29
Transfer extension housing x Transfer dynamic damper		26	260	19
Transfer case cover No. 1 x Transfer case breather oil deflector		6.5	66	57 in.*lbf
Transfer case x Transfer case cover No. 1		20	200	14
Transaxle assembly x Transfer assembly		69	700	51
Transfer case No. 1 plug x Transfer case		49	500	36
Transfer case No. 2 plug x Transfer Case		49	500	36

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Transfer drain plug x Transfer case	49	500	36

PROPELLER SHAFT

SERVICE DATA

PROPELLER SHAFT - SERVICE DATA

Propeller shaft assembly swing	Maximum: 0.4 mm (0.016 in.)
Rear propeller shaft swing	Maximum: 0.4 mm (0.016 in.)
Intermediate shaft runout	Maximum: 0.4 mm (0.016 in.)
Intermediate shaft front flange runout	Maximum: 0.1 mm (0.004 in.)
Intermediate shaft rear flange runout (horizontal direction)	Maximum: 0.1 mm (0.004 in.)
Intermediate shaft rear flange runout (vertical direction)	Maximum: 0.1 mm (0.004 in.)

TORQUE SPECIFICATIONS

PROPELLER SHAFT - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Intermediate shaft x Center support bearing assembly No. 1 (front) 1st	182	1850	134
Intermediate shaft x Center support bearing assembly No. 1 (front) 2nd	69	700	51
Intermediate shaft x Center support bearing assembly No. 2(rear) 1st	182	1850	134
Intermediate shaft x Center support bearing assembly No. 2(rear) 2nd	69	700	51
Propeller shaft assembly x Front flange	74	750	54
Propeller shaft assembly rear x Rear differential	74	750	54
Intermediate shaft rear flange x rear propeller shaft	26	265	19
Center support bearing assembly No. 1 (front) x Body	37	375	27
Center support bearing assembly No. 1 (rear) x Body	37	375	27

DRIVE SHAFT

TORQUE SPECIFICATIONS

FRONT DRIVE SHAFT (for 2GR-FE)

FRONT DRIVE SHAFT (FOR 2GR-FE) - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front wheel	103	1050	76
Front axle hub nut	294	2996	216
Drive shaft bearing bracket bolt	32	326	24
No. 1 front suspension lower arm x Front lower ball joint	92	938	68

FRONT DRIVE SHAFT (for 1AR-FE)

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FRONT DRIVE SHAFT (FOR 1AR-FE) - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front wheel	103	1050	76
Front axle hub nut	294	2996	216
Drive shaft bearing bracket bolt	32	330	24
No. 1 front suspension lower arm x Front lower ball joint	92	938	68

REAR DRIVE SHAFT (for 2GR-FE)

REAR DRIVE SHAFT (FOR 2GR-FE) - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear wheel	103	1050	76
Rear axle hub nut	294	2996	216

DIFFERENTIAL

SERVICE DATA

DIFFERENTIAL - SERVICE DATA

Rear differential	Carrier oil seal drive in depth		2.0 +/- 0.3 mm (0.079 +/- 0.012 in.)
	Side gear shaft oil seal drive in depth		0 +/-0.5 mm (0+/-0.019 in.)
	Companion flange vertical runout		0.10 mm (0.0039 in.) or less
	Companion flange horizontal runout		0.10 mm (0.0039 in.) or less
	Ring gear runout		0.07 mm (0.0028 in.) or less
	Side gear backlash		0.05 to 0.20 mm (0.0020 to 0.0079 in.)
	Drive pinion to ring gear backlash		0.13 to 0.18 mm (0.0051 to 0.0071 in.)
	Drive pinion preload (Initial)	New bearing	1.1 to 1.7 N*m (11.2 to 17.3 kgf*cm, 9.6 to 14.8 in.*lbf)
		Reused bearing	0.6 to 0.9 N*m (6.1 to 9.2 kgf*cm, 5.3 to 8.0 in.*lbf)
	Total preload (Drive pinion preload plus)		0.3 to 0.5 N*m (3.1 to 5.1 kgf*cm, 2.7 to 4.4 in.*lbf)
Rear differential	Side gear thrust washer thickness (mm (in.))		0.87 to 0.93 (0.0343 to 0.0366)
			0.93 to 0.97 (0.0366 to 0.0382)
			0.98 to 1.02 (0.0386 to 0.0402)
			1.03 to 1.07 (0.0406 to 0.0421)
			1.08 to 1.12 (0.0425 to 0.0441)
			1.13 to 1.17 (0.0445 to 0.0461)
			1.18 to 1.22 (0.0465 to 0.0480)
			1 23 to 1.27 (0.0484 to 0.0500)
			1.28 to 1.32 (0.0504 to 0.0520)
			1.33 to 1.37 (0.0524 to 0.0539)

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		1.38 to 1.42 (0.0543 to 0.0559)
Rear differential	Drive pinion plate washer thickness (mm (in.))	2.26 to 2.28 (0.0890 to 0.0898)
		2.29 to 2.31 (0.0902 to 0.0909)
		2.32 to 2.34 (0.0913 to 0.0921)
		2.35 to 2.37 (0.0925 to 0.0933)
		2.38 to 2.40 (0.0937 to 0.0945)
		2.41 to 2.43 (0.0949 to 0.0957)
		2.44 to 2.46 (0.0961 to 0.0969)
		2.47 to 2.49 (0.0972 to 0.0980)
		2.50 to 2.52 (0.0984 to 0.0992)
		2.53 to 2.55 (0.0996 to 0.1004)
		2.56 to 2.58 (0.1008 to 0.1016)
		2.59 to 2.61 (0.1020 to 0.1028)
		2.62 to 2.64 (0.1031 to 0.1039)
		2.65 to 2.67 (0.1043 to 0.1051)
		2.68 to 2.70 (0.1055 to 0.1063)
Rear differential	Side gear shaft plate washer thickness (mm (in.))	2.21 to 2.23 (0.0870 to 0.0878)
		2.24 to 2.26 (0.0882 to 0.0890)
		2.27 to 2.29 (0.0894 to 0.0902)
		2.30 to 2.32 (0.0906 to 0.0913)
		2.33 to 2.35 (0.0917 to 0.0925)
		2.36 to 2.38 (0.0929 to 0.0937)
		2.39 to 2.41 (0.0941 to 0.0949)
		2.42 to 2.44 (0.0953 to 0.0961)
		2.45 to 2.47 (0.0965 to 0.0972)
		2.48 to 2.50 (0.0976 to 0.0984)
		2.51 to 2.53 (0.0988 to 0.0996)
		2.54 to 2.56 (0.1000 to 0.1008)
		2.57 to 2.59 (0.1012 to 0.1020)
		2.60 to 2.62 (0.1024 to 0.1031)
		2.63 to 2.65 (0.1035 to 0.1043)
		2.66 to 2.68 (0.1047 to 0.1055)
		2.69 to 2.71 (0.1059 to 0.1067)
		2.72 to 2.74 (0.1071 to 0.1079)
		2.75 to 2.77 (0.1083 to 0.1091)
		2.78 to 2.80 (0.1094 to 0.1102)
		2.81 to 2.83 (0.1106 to 0.1114)
		2.84 to 2.86 (0.1118 to 0.1126)
		2.87 to 2.89 (0.1130 to 0.1138)
		2.90 to 2.92 (0.1142 to 0.1150)
		2.93 to 2.95 (0.1154 to 0.1161)

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		2.96 to 2.98 (0.1165 to 0.1173)
		2.99 to 3.01 (0.1177 to 0.1185)
		3.02 to 3.04 (0.1189 to 0.1197)
		3.05 to 3.07 (0.1201 to 0.1209)
		3.08 to 3.10 (0.1213 to 0.1220)
		3.11 to 3.13 (0.1224 to 0.1232)
		3.14 to 3.16 (0.1236 to 0.1244)
		3.17 to 3.19 (0.1248 to 0.1256)
		3.20 to 3.22 (0.1260 to 0.1268)

TORQUE SPECIFICATIONS

DIFFERENTIAL - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft*lbf
Drain plug	49	500	36
Filler plug	49	500	36
Breather plug	21	210	15
Companion flange x Drive pinion	108	1100	80
Companion flange x Propeller shaft	74	750	54
Differential case x Ring gear	97	985	71
Differential carrier x Side bearing cap	79	800	58
Differential carrier x Differential carrier cover	47	475	34
Rear differential support No.1 x Differential carrier assembly	103	1050	76
Rear differential support No.1 x Rear suspension member sub-assembly	137	1400	101
Differential carrier assembly x Rear suspension member sub-assembly	95	970	70

AXLE

SERVICE DATA

AXLE - SERVICE DATA

Front axle hub bearing looseness		Maximum looseness: 0 mm (0 in.)
Front axle hub runout		Maximum runout: 0.05 mm (0.0020 in.)
Rear axle hub bearing looseness	for 2WD	Maximum looseness: 0 mm (0 in.)
Rear axle hub runout		Maximum runout: 0.08 mm (0.0031 in.)
Rear axle hub bearing looseness	for 4WD	Maximum looseness: 0 mm (0 in.)
Rear axle hub runout		Maximum runout: 0.08 mm (0.0031 in.)

TORQUE SPECIFICATIONS

AXLE - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf

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Front wheel	103	1050	76
Rear wheel	103	1050	76
Steering knuckle x Front shock absorber	290	2956	213
Steering knuckle x Front disc brake dust cover	8.3	85	73 in.*lbf
Steering knuckle x Front disc brake caliper assembly	104	1060	76
Front drive shaft assembly x Front axle hub nut	294	2996	216
Steering knuckle x Front speed sensor	8.0	82	71 in.*lbf
Front lower ball joint x Front lower suspension arm	92	938	68
Rear axle carrier sub-assembly x Rear disc brake caliper assembly	78	795	57
Rear axle carrier sub-assembly x Rear axle hub and bearing assembly	75	764	55
Rear axle carrier sub-assembly x Rear No. 1 suspension arm assembly	112	1141	82
Rear axle carrier sub-assembly x Rear No. 2 suspension arm assembly	112	1141	82
Rear axle carrier sub-assembly x Rear shock absorber with coil spring	290	2956	213
Rear speed sensor x Rear axle carrier sub-assembly (for 4WD)	8.0	82	71 in.*lbf
Rear drive shaft assembly x Rear axle shaft nut (for 4WD)	294	2996	216

SUSPENSION

SERVICE DATA

Vehicle Height (Unloaded Vehicle)

VEHICLE HEIGHT (UNLOADED VEHICLE) - SERVICE DATA

Engine	Model	Front A - B	Rear C - D
1AR-FE	2WD	118.2 mm (4.65 in.)	34.0 mm (1.34 in.)
2GR-FE	2WD	118.2 mm (4.65 in.)	34.9 mm (1.37 in.)
	4WD	118.3 mm (4.66 in.)	33.8 mm (1.33 in.)

Wheel turning Angle (Unloaded Vehicle)

WHEEL TURNING ANGLE (UNLOADED VEHICLE) - SERVICE DATA

Engine	Model	Inside Wheel	Outside Wheel Reference
1AR-FE	2WD	35°07' +/- 2° (35.12° +/- 2°)	31°20' (31.33°)
2GR-FE	2WD	35°07' +/- 2° (35.12°+/-2°)	31°20' (31.33°)
	4WD	35°07' +/- 2° (35.12°+/-2°)	31°20' (31.33°)

Toe-in

TOE-IN - SERVICE DATA

-	Item	Specified Condition
Front wheel alignment	Toe-in (total)	C + D: 0°02' +/-121 (0.04° +/- 0.2°) B - A: 0.9 +/- 2 mm (0.04 +/- 0.08 in.)

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Camber (Unloaded Vehicle)

CAMBER (UNLOADED VEHICLE) - SERVICE DATA

Engine	Model	Camber Inclination	Right-left difference
1AR-FE	2WD	-0°38' +/- 45' (-0.63° +/- 0.75°)	45' (0.75°) or less
2GR-FE	2WD	-0°38' +/- 45' (-0.63° +/- 0.75°)	
	4WD	-0°38' +/- 45' (-0.63° +/- 0.75°)	

Caster (Unloaded Vehicle)

CASTER (UNLOADED VEHICLE) - SERVICE DATA

Engine	Model	Caster Inclination	Right-left difference
1AR-FE	2WD	2°357' +/- 45' (2.58° +/- 0.75°)	45' (0.75°) or less
2GR-FE	2WD	2°37' +/- 45' (2.62° +/- 0.75°)	
	4WD	2°37' +/- 45' (2.62° +/- 0.75°)	

Steering Axis Inclination (Unloaded Vehicle)

STEERING AXIS INCLINATION (UNLOADED VEHICLE) - SERVICE DATA

Engine	Model	Steering Axis Inclination	Right-left difference
1AR-FE	2WD	11°01' +/- 45' (11.02° +/- 0.75°)	45' (0.75°) or less
2GR-FE	2WD	11°01' +/- 45' (11.02° +/- 0.75°)	
	4WD	11°01' +/- 45' (11.02° +/- 0.75°)	

Toe-in (Unloaded Vehicle)

TOE-IN (UNLOADED VEHICLE) - SERVICE DATA

-	Item	Engine	Model	Specified Condition
Rear wheel alignment	Toe-in (total)	1AR-FE	2WD	C + D: 0°21' +/- 0°12' (0.35° +/- 0.2°) B - A: 4.4 +/- 2.0 mm (0.17 +/- 0.08 in.)
		2GR-FE	2WD	C + D: 0°20' +/- 0°12' (0.34° +/- 0.2°) B - A: 4.3 +/- 2.0 mm (0.17 +/- 0.08 in.)
			4WD	C + D: 0°17' +/- 0°12' (0.29° +/- 0.2°) B - A: 3.6 +/- 2.0 mm (0.14 +/- 0.08 in.)

Camber (Unloaded Vehicle)

CAMBER (UNLOADED VEHICLE) - SERVICE DATA

-	Engine	Model	Specified Condition	Right-left difference
Rear wheel alignment	1AR-FE	2WD	-1°02' +/- 45' (-1.03° +/- 0.75°)	45' (0.75°) or less
	2GR-FE	2WD	-1°00' +/- 45' (-1.00° +/- 0.75°)	
		4WD	-0°36' +/- 451 (- 0.60° +/- 0.75°)	

Turning torque

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TURNING TORQUE - SERVICE DATA

Turning torque	
Front lower ball joint turning torque	0.7 to 4.5 N*m (7 to 46 kgf*cm, 6.2 to 40 in.*lbf)
Front stabilizer link ball joint turning torque	0.05 to 1.96 N*m (0.5 to 20 kgf*cm, 0.4 to 17 in.*lbf)
Rear stabilizer link ball joint turning torque	1.0 N*m (10 kgf*cm, 8.9 in.*lbf) or less

TORQUE SPECIFICATIONS

SUSPENSION - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front tie rod end lock nut	88	897	65
Rear No. 2 suspension arm assembly (toe adjust lock nut) (for 2WD)	56	571	41
Rear No. 2 suspension arm assembly x Toe-adjust cam set nut (for 4WD)	100	1019	74
Front shock absorber with coil spring x Body	85	866	63
Front shock absorber with coil spring x Steering knuckle	290	2956	214
Front support to shock absorber nut x Piston rod	70	714	52
Front flexible hose x Steering knuckle	19	194	14
Front speed sensor wire x Front shock absorber	19	194	14
Front shock absorber with coil spring x Front stabilizer link	74	755	55
Outer cowl top panel sub-assembly x Body	Nut A: 85 Bolt B: 8.8 Nut C: 8.8	Nut A: 866 Bolt B: 90 Nut C: 90	Nut A: 63 Bolt B: 78 in.*lbf Nut C: 78 in.*lbf
Front suspension member dynamic damper x Front frame assembly	29	296	21
Front lower suspension arm x Front frame assembly	Bolt 1,2: 200 Bolt 3: 206	Bolt 1,2:2039 Bolt 3: 2100	Bolt 1,2: 147 Bolt 3: 152
Front lower ball joint x Steering knuckle	123	1254	91
Front lower suspension arm x Front lower ball joint	92	938	68
Front disc brake caliper assembly x Steering knuckle	104	1060	77
Front speed sensor x Steering knuckle	8.0	82	71 in.*lbf
No. 1 front stabilizer bracket x Front frame assembly	29	296	21
Front stabilizer link assembly x Front stabilizer bar	74	755	55
Rear shock absorber with coil spring x Body	58	591	43
Rear shock absorber with coil spring x Rear axle assembly	290	2956	213
Rear support to rear shock absorber nut x Piston rod	55	561	40
Rear shock absorber with coil spring x Rear stabilizer link assembly	39	400	29
Rear shock absorber with coil spring x Rear speed sensor wire (for 2WD)	5.0	51	44 in.*lbf

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Rear shock absorber with coil spring x Rear speed sensor (for 4WD)	5.0	51	44 in.*lbf
Rear shock absorber with coil spring x Rear flexible hose	19	194	14
Stud bolt x Body (for 2WD)	17	173	12
Stud bolt x Body (for 4WD)	180	1840	133
Rear lower suspension member stopper x Body (for 2WD)	Nut A: 55 Nut B: 38	Nut A: 561 Nut B: 387	Nut A: 40 Nut B: 28
Rear suspension member x Body (for 2WD)	55	561	40
Rear suspension member x Body (for 4WD)	115	1170	85
Rear No. 2 body mounting bracket sub-assembly x Body (for 4WD)	90	920	66
Rear No. 2 body mounting bracket sub-assembly x Rear suspension member (for 4WD)	without SST: 181 with SST: 134	without SST: 1850 with SST: 1366	without SST: 133 with SST: 98
Rear No. 1 suspension arm assembly x Rear suspension member (for 2WD)	without SST: 120 with SST: 89	without SST: 1223 with SST: 904	without SST: 88 with SST: 65
Rear No. 1 suspension arm assembly x Rear axle assembly (for 2WD)	112	1141	82
Rear No. 2 suspension arm assembly x Rear suspension member (for 2WD)	120	1223	88
Rear No. 2 suspension arm assembly x Rear axle assembly (for 2WD)	112	1141	82
Rear No. 1 suspension arm assembly x Rear suspension member (for 4WD)	80	815	59
Rear No. 1 suspension arm assembly x Rear axle assembly (for 4WD)	112	1141	82
Rear No. 2 suspension arm assembly x Rear suspension member (toe adjust cam set nut) (for 4WD)	100	1019	74
Rear No. 2 suspension arm assembly x Rear axle assembly (for 4WD)	112	1141	82
Rear strut rod assembly x Body	80	815	59
Rear strut rod assembly x Rear axle assembly	80	815	59
No. 3 parking brake cable assembly x Body	Bolt: 39 Nut: 6.0	Bolt: 397 Nut: 61	Bolt: 29 Nut: 53 in.*lbf
Rear stabilizer bar x Body (for 2WD)	19	194	14
Rear stabilizer bar bracket (front side) x Rear stabilizer bar bracket (rear side) (for 4WD)	19	194	14
Rear stabilizer bar bracket LH (front side) x Body (for 4WD)	54	550	40
Rear stabilizer bar bracket RH (front side) x Body (for 4WD)	19	194	14

TIRE AND WHEEL

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SERVICE DATA

Cold tire inflation pressure for USA, CANADA

COLD TIRE INFLATION PRESSURE (FOR USA, CANADA) - SERVICE DATA

Tire size	Front kPa (kgf/cm^2 , psi)	Rear kPa (kgf/cm^2 , psi)
P245/55R19 103S	210(2.1,30)	210(2.1,30)
P245/65R17 105S	210(2.1,30)	210(2.1,30)

Cold tire inflation pressure for MEXICO

COLD TIRE INFLATION PRESSURE (FOR MEXICO) - SERVICE DATA

Tire size		Front kPa (kgf/cm^2 , psi)	Rear kPa (kgf/cm^2 , psi)
P245/55R19 103S P245/65R17 105S	4 passengers or less	210 (2.1, 30)	210(2.1,30)
	5 passengers or more	210(2.1,30)	230 (2.3, 33)

TIRE AND WHEEL - SERVICE DATA

Tire runout	1.4 mm (0.055 in.) or less

TIRE AND WHEEL - SERVICE DATA

Imbalance after adjustment	8.0 g (0.0181b) or less

TORQUE SPECIFICATIONS

TIRE PRESSURE WARNING RECEIVER

TIRE PRESSURE WARNING RECEIVER - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Tire pressure warning receiver set bolt	5,0	51	44 in.*lbf

TIRE PRESSURE WARNING VALVE AND TRANSMITTER

TIRE PRESSURE WARNING VALVE AND TRANSMITTER - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Tire pressure warning valve and transmitter set nut	4.0	41	35 in.*lbf
Front wheel set nuts	103	1050	76
Rear wheel set nuts	103	1050	76

TIRE PRESSURE WARNING ECU

TIRE PRESSURE WARNING ECU - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Tire pressure warning ECU set nut	8,5	87	75 in.*lbf

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BRAKE CONTROL

SERVICE DATA

STOP LIGHT CONTROL RELAY

STOP LIGHT CONTROL RELAY - SERVICE DATA

Tester Connection	Switch Condition	Specified Condition
3-4	Voltage is not applied between terminals 1 and 2	Below 1 ohms
3-5	Voltage is not applied between terminals 1 and 2	10 kohms or higher
3-4	Voltage is applied between terminals 1 and 2	Below 1 ohms
3-5	Voltage is applied between terminals 1 and 2	10 kohms or higher

VSC OFF SWITCH

VSC OFF SWITCH - SERVICE DATA

Tester Connection	Switch Condition	Specified Condition
3-6	Switch is not pushed in	10 kohms or higher
3-6	Switch is pushed in	Below 25 ohms
4-5	Battery's positive (+) lead connected to terminal 5 and negative (-) lead to terminal 4	LED illuminates

BRAKE PEDAL LOAD SENSING SWITCH

BRAKE PEDAL LOAD SENSING SWITCH - SERVICE DATA

Tester Connection	Switch Condition	Specified Condition
2(FSW+) - 1(GND)	Brake pedal load sensing switch OFF (Brake pedal depressed)	950 to 1050 ohms
2(FSW+) - 1(GND)	Brake pedal load sensing switch ON (Brake pedal released)	203 to 223 ohms

DOWNHILL ASSIST CONTROL SWITCH

DOWNHILL ASSIST CONTROL SWITCH - SERVICE DATA

Tester Connection	Switch Condition	Specified Condition
1-4	Switch is not pushed in	10 kohms or higher
1-4	Switch is pushed in	Below 1 ohms

TORQUE SPECIFICATIONS

BRAKE CONTROL - TORQUE SPECIFICATIONS

Part tightened		N*m	kgf*cm	ft.*lbf
Brake actuator x Brake actuator bracket		5.4	55	48 in.*lbf
Brake actuator bracket x Body		19	194	14

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Brake actuator x Brake line	Nut A	14(15)	143(155)	10(11)
	Nut B	18(20)	184(204)	13(15)
Front speed sensor x Knuckle		8.0	82	71 in.*lbf
Front speed sensor x Body		5.0	51	44 in.*lbf
Front speed sensor x Absorber		19	194	14
Rear speed sensor x Knuckle	for 4WD	8.0	82	71 in.*lbf
Rear speed sensor x Body	for 4WD	5.0	51	44 in.*lbf
Rear speed sensor x Absorber	for 4WD	5.0	51	44 in.*lbf
Yaw rate and acceleration sensor with bracket x Body		15	153	11

() For use without union nut wrench

BRAKE

SERVICE DATA

BRAKE - SERVICE DATA

Brake pedal height from tibia pad		148.8 to 158.8 mm (5.858 to 6.252 in.)
Brake pedal free play		1.0 to 6.0 mm (0.039 to 0.236 in.)
Brake pedal reserve distance from tibia pad at 500 N (51 kgf, 112 lbf)		84.4 mm (3.32 in.)
Front brake pad lining thickness	Standard	12.0 mm (0.472 in.)
	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	Standard	28.0 mm (1.102 in.)
	Minimum	25.0 mm (0.983 in.)
Front brake disc runout		0.05 mm (0.0020 in.)
Rear brake pad lining thickness	Standard	10.0 mm (0.390 in.)
	Minimum	1.0 mm (0.039 in.)
Rear brake disc thickness	Standard	10.0 mm (0.390 in.)
	Minimum	8.5 mm (0.334 in.)
Rear disc brake runout		0.15 mm (0.0059 in.)

TORQUE SPECIFICATIONS

BRAKE - TORQUE SPECIFICATIONS

Parts tightened	N*m	kgf*cm	ft.*lbf
Brake pedal sub-assembly x Brake pedal support sub-assembly	37	377	27
Brake pedal support sub-assembly x Brake booster assembly	13	132	10
Brake pedal support sub-assembly x Instrument panel reinforcement	35	357	26
Push rod clevis lock nut	26	265	19
Brake master cylinder to way tube x Brake master cylinder sub-assembly	20(18)	204(184)	15(13)

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Ejector tube set nut	9.0	92	80 in.*lbf
Brake master cylinder sub-assembly x Brake booster assembly	13	132	10
Brake line x Brake master cylinder sub-assembly	20(18)	204(184)	15(13)
Engine wire x Body	8.4	86	74 in.*lbf
Vacuum hose assembly set nut	5.4	55	48 in.*lbf
Front disc brake cylinder mounting x Steering knuckle	104	1060	76
No. 1 vacuum switching valve set bolt	10	102	7
Front disc brake cylinder assembly x Front disc brake cylinder mounting	34	347	25
Front flexible hose x Front disc brake cylinder assembly	30	306	22
Front wheel	103	1050	76
Brake line x Front brake flexible hose	14(15)	143(155)	10(11)
Front brake flexible hose x Absorber bracket	19	194	14
Rear disc brake cylinder mounting x Rear axle	78	795	57
Rear disc brake cylinder assembly x Rear disc brake cylinder mounting	34	347	25
Rear flexible hose x Rear disc brake cylinder assembly	33	336	24
Rear wheel	103	1050	76
Brake line x Rear flexible hose	14(15)	143(155)	10(11)
Rear flexible hose x Absorber bracket	19	194	14

(): For use without union nut wrench

PARKING BRAKE

SERVICE DATA

PARKING BRAKE SYSTEM

PARKING BRAKE SYSTEM - SERVICE DATA

Parking brake pedal travel	8 to 10 notches at 300 N (31 kgf, 67 lbf)

PARKING BRAKE ASSEMBLY

PARKING BRAKE ASSEMBLY - SERVICE DATA

	Standard	Maximum
Inside diameter of the brake disc	190 mm (7.48 in.)	191 mm (7.52 in.)

PARKING BRAKE - SERVICE DATA

	Standard	Minimum
Thickness of the parking brake shoe lining	2.5 mm (0.098 in.)	1.0 mm (0.039 in.)

TORQUE SPECIFICATIONS

PARKING BRAKE SYSTEM

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PARKING BRAKE SYSTEM - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
No. 1 parking brake cable assembly lock nut	7.0	71	62 in.*lbf

PARKING BRAKE PEDAL

PARKING BRAKE PEDAL - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Parking brake switch assembly set screw	0.9	9	8 in.*lbf
Parking brake control pedal assembly set nuts	21	214	15
No. 1 parking brake cable assembly set bolts	8.5	87	75 in.*lbf
No. 1 parking brake cable assembly set nuts	6.0	61	53 in.*lbf

PARKING BRAKE CABLE

PARKING BRAKE CABLE - TORQUE SPECIFICATIONS

Part tightened		N*m	kgf*cm	ft.*lbf
No. 3 parking brake cable assembly set bolt	Bolt A	8.5	87	75 in.*lbf
	Bolt B	39	397	29
No. 3 parking brake cable assembly set nuts		6.0	61	53 in.*lbf
No. 3 parking brake cable assembly x Backing plate		8.0	82	71 in.*lbf
No. 2 parking brake cable assembly set bolt	Bolt A	8.5	87	75 in.*lbf
	Bolt B	39	397	29
No. 2 parking brake cable assembly set nuts		6.0	61	53 in.*lbf
No. 2 parking brake cable assembly x Backing plate		8.0	82	71 in.*lbf

PARKING BRAKE ASSEMBLY

PARKING BRAKE ASSEMBLY - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Parking brake shoe guide plate set bolt	18	184	13

STEERING COLUMN

SERVICE DATA

STEERING SYSTEM

STEERING SYSTEM - SERVICE DATA

Steering free play (Maximum)	30 mm (1.18 in.)

TORQUE SPECIFICATIONS

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STEERING COLUMN ASSEMBLY

STEERING COLUMN ASSEMBLY - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Steering intermediate shaft sub-assembly x Steering column assembly	35	360	26
Steering column assembly set bolt	25	255	18
Steering column assembly set nuts	25	255	18
Steering intermediate shaft sub-assembly x Power steering link assembly	35	360	26
Steering column cover set screws	2.0	20	18 in.*lbf

STEERING WHEEL

STEERING WHEEL - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
No. 2 steering wheel ornament set screws	2.4	25	21 in.*lbf
No. 1 steering wheel ornament set screws	2.4	25	21 in.*lbf
Steering wheel set nut	50	510	37

POWER STEERING

SERVICE DATA

POWER STEERING - SERVICE DATA

Steering effort (Reference)	6.5 N*m (66 kgf*cm, 58 in.*lbf) or less
Power steering gear assembly total preload (Turning)	1.1 to 1.5 N*m (11.3 to 15.3 kgf*cm, 9.8 to 13.3 in.*lbf)
Tie rod end assembly ball joint turning torque	0.49 to 3.43 N*m (5.0 to 35.0 kgf*cm, 4.3 to 30.3 in.*lbf)

TORQUE SPECIFICATIONS

STEERING GEAR

STEERING GEAR - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Steering wheel set nut	50	510	37
Steering link assembly set bolts	70	713	51
Steering intermediate shaft assembly x Steering link assembly	35	357	26
Tie rod sub-assembly x Steering knuckle	49	500	36
Tie rod sub-assembly lock nuts	74	755	55

POWER STEERING ECU

POWER STEERING ECU - TORQUE SPECIFICATIONS

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Part tightened	N*m	kgf*cm	ft.*lbf
Instrument panel junction block assembly set nuts	8.4	86	74 in.*lbf
Power steering ECU assembly set nuts	14	143	10

AIR CONDITIONING

SERVICE DATA

AIR CONDITIONING - SERVICE DATA

Refrigerant charge volume (w/o Rear Air Conditioning System:)	550 to 650g (19.4 to 22.9 oz.)
Refrigerant charge volume (w/Rear Air Conditioning System:)	720 to 820g (25.4 to 28.9 oz.)

AIR CONDITIONING - SERVICE DATA

Magnetic clutch clearance (for 2GR-FE:)	0.26 to 0.60 mm (0.010 to 0.024 in.)

TORQUE SPECIFICATIONS

AIR CONDITIONING - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
AIR CONDITIONING UNIT			
Cooler expansion valve x Air conditioning unit	3.5	36	31 in.*lbf
Air conditioning unit x Instrument panel reinforcement assembly	9.8	100	87 in.*lbf
Air conditioning unit x Body	9.8	100	87 in.*lbf
Instrument panel reinforcement assembly x Body (Collar)	6.0	61	53 in.*lbf
Instrument panel reinforcement assembly x Body (Passenger side)	20	204	15
Instrument panel reinforcement assembly x Body (Driver side)	17	175	13
Instrument panel reinforcement assembly x Body (Engine compartment side)	20	204	15
Earth wire x Instrument panel reinforcement assembly	8.4	86	74 in.*lbf
No. 1 instrument panel brace sub-assembly x Air conditioning unit (Screw)	9.8	100	87 in.*lbf
No. 2 instrument panel brace sub-assembly x Air conditioning unit (Screw)	9.8	100	87 in.*lbf
Earth wire x No. 1 instrument panel brace sub-assembly	8.4	86	74 in.*lbf
Earth wire x No. 2 instrument panel brace sub-assembly	8.4	86	74 in.*lbf
Instrument panel junction block assembly x Instrument panel reinforcement assembly	8.4	86	74 in.*lbf

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No. 1 cooler refrigerant suction pipe x Air conditioning unit	9.8	100	87 in.*lbf
REAR COOLING UNIT			
Rear cooling unit expansion valve x Rear cooling unit assembly	3.5	36	31 in.*lbf
Heater water pipe and hose sub-assembly x Rear cooling unit assembly	9.8	100	87 in.*lbf
Rear air conditioning tube and accessory assembly x Rear cooling unit assembly	9.8	100	87 in.*lbf
Rear cooling unit assembly x Body	9.8	100	87 in.*lbf
cooler refrigerant suction hose x Rear cooling unit assembly	9.8	100	87 in.*lbf
COMPRESSOR (for 2GR-FE:)			
Compressor and magnetic clutch x Body	25	255	18
Magnet clutch hub x Cooler compressor assembly	18	184	13
Discharge hose sub-assembly x Compressor and magnetic clutch	9.8	100	87 in.*lbf
Suction hose sub-assembly x Compressor and magnetic clutch	9.8	100	87 in.*lbf
COMPRESSOR (for 1AR-FE:)			
Compressor assembly with pulley x Body	25	255	18
Compressor assembly with pulley (stud bolt) x Body	10	102	7
Discharge hose sub-assembly x Compressor assembly with pulley	9.8	100	87 in.*lbf
Suction hose sub-assembly x Compressor assembly with pulley	9.8	100	87 in.*lbf
CONDENSER			
Discharge tube sub-assembly x Cooler condenser assembly	9.8	100	87 in.*lbf
Cooler refrigerant liquid pipe A x Cooler condenser assembly	9.8	100	87 in.*lbf
Cap x Cooler condenser assembly	2.9	30	26 in.*lbf

SUPPLEMENTAL RESTRAINT SYSTEM

TORQUE SPECIFICATIONS

SUPPLEMENTAL RESTRAINT SYSTEM - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Steering pad x Steering wheel assembly	8.8	90	78 in.*lbf
Driver side knee airbag assembly x Instrument panel reinforcement	10	102	7

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Curtain shield airbag assembly x Body	9.8	100	87 in.*lbf
Center airbag sensor assembly x Body	18	184	13
Front airbag sensor x Body	9.0	92	80 in.*lbf
Side airbag sensor x Body	9.0	92	80 in.*lbf
Rear airbag sensor x Body	9.0	92	80 in.*lbf
Seat position sensor x Front seat assembly	8.0	82	71 in.*lbf

SEAT BELT

TORQUE SPECIFICATIONS

FRONT SEAT INNER BELT ASSEMBLY

FRONT SEAT INNER BELT ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front seat inner belt assembly x Front seat assembly	42	428	31

FRONT SEAT OUTER BELT ASSEMBLY

FRONT SEAT OUTER BELT ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front seat outer belt assembly (Floor anchor) x Body	42	428	31
Front seat outer belt assembly (Shoulder anchor) x Front shoulder belt anchor adjuster assembly	42	428	31
Front shoulder belt anchor adjuster assembly x Body	42	428	31
Front seat outer belt assembly (for Upper bolt) x Body	7.5	77	66 in.*lbf
Front seat outer belt assembly (for Lower bolt) x Body	42	428	31

REAR NO. 1 SEAT INNER BELT ASSEMBLY (for LH Side)

REAR NO. 1 SEAT INNER BELT ASSEMBLY (FOR LH SIDE) - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear No. 1 seat inner belt assembly x Rear No. 1 seat assembly	42	428	31

REAR NO. 1 SEAT INNER BELT ASSEMBLY (for RH Side)

REAR NO. 1 SEAT INNER BELT ASSEMBLY (FOR RH SIDE) - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear No. 1 seat inner belt assembly x Rear No. 1 seat assembly	42	428	31

REAR NO. 2 SEAT INNER BELT ASSEMBLY

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REAR NO. 2 SEAT INNER BELT ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear No. 2 seat inner belt assembly x Rear No. 2 seat assembly	42	428	31

REAR NO. 1 SEAT OUTER BELT ASSEMBLY

REAR NO. 1 SEAT OUTER BELT ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear No. 1 seat outer belt assembly x Body	42	428	31
Rear No. 1 seat outer belt assembly (Shoulder anchor) x Body	42	428	31
Rear No. 1 seat outer belt assembly (Floor anchor) x Body	42	428	31

REAR NO. 2 SEAT OUTER BELT ASSEMBLY

REAR NO. 2 SEAT OUTER BELT ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear No. 2 seat outer belt assembly (for Upper bolt) x Body	7.5	77	66 in.*lbf
Rear No. 2 seat outer belt assembly (for Lower bolt) x Body	42	428	31
Rear No. 2 seat outer belt assembly (Shoulder anchor) x Body	42	428	31
Rear No. 2 seat outer belt assembly (Floor anchor) x Body	42	428	31

REAR CENTER SEAT INNER BELT ASSEMBLY

REAR CENTER SEAT INNER BELT ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear center seat inner belt assembly x Body	42	428	31

REAR CENTER SEAT OUTER BELT ASSEMBLY

REAR CENTER SEAT OUTER BELT ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear center seat outer belt assembly (for Upper bolt) x Rear No. 1 seat assembly	7.5	77	66 in.*lbf
Rear center seat outer belt assembly (for Lower bolt) x Rear No. 1 seat assembly	42	428	31
Rear center seat outer belt assembly (Floor anchor) x Rear No. 1 seat assembly	42	428	31

THEFT DETERRENT SYSTEM

TORQUE SPECIFICATIONS

THEFT DETERRENT SYSTEM - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Security horn assembly x Body	8.0	82	71 in.*lbf

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ENGINE IMMOBILISER

TORQUE SPECIFICATIONS

ENGINE IMMOBILISER - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Certification ECU (Smart Key ECU Assembly) x Instrument panel reinforcement	5.5	56	49 in.*lbf

CRUISE CONTROL

TORQUE SPECIFICATIONS

CRUISE CONTROL - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Cruise control main switch x Steering wheel	2.4	24	21 in.*lbf

LIGHTING

TORQUE SPECIFICATIONS

LIGHTING - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
HEADLIGHT ASSEMBLY			
Headlight assembly x Body	5.4	55	48 in.*lbf
REAR COMBINATION LIGHT ASSEMBLY			
Rear combination light assembly x Body	3.0	31	27 in.*lbf
STOP LIGHT SWITCH			
Stop light switch assembly x Brake pedal support sub-assembly	17	173	12
FRONT DOOR COURTESY SWITCH			
Front door courtesy switch assembly x Body	8.0	82	71 in.*lbf
REAR DOOR COURTESY SWITCH			
Rear door courtesy switch assembly x Body	8.0	82	71 in.*lbf
TURN SIGNAL FLASHER ASSEMBLY			
Instrument panel junction block assembly x Instrument panel reinforcement assembly	8.4	86	74 in.*lbf

WIPER AND WASHER

TORQUE SPECIFICATIONS

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WIPER AND WASHER - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
FRONT WIPER MOTOR			
Front wiper arm and blade assembly LH x Windshield wiper motor and link assembly	24	245	18
Front wiper arm and blade assembly RH x Windshield wiper motor and link assembly	24	245	18
Windshield wiper motor and link assembly x Body	7.0	71	62 in.*lbf
Windshield wiper link assembly x Windshield wiper motor assembly	5.4	55	48 in.*lbf
Windshield wiper motor assembly x Crank arm assembly	17	173	13
REAR WIPER MOTOR			
Rear wiper arm and blade assembly x Rear wiper motor assembly	5.5	56	49 in.*lbf
Rear wiper link pivot x Rear wiper motor assembly	7.0	71	62 in.*lbf
Rear wiper motor assembly x Glass hatch	8.0	82	71 in.*lbf
Rear wiper motor assembly x Back door	5.5	56	49 in.*lbf
Steering column cover set screws	2.0	20	18 in.*lbf

DOOR LOCK

TORQUE SPECIFICATIONS

FRONT DOOR LOCK

FRONT DOOR LOCK - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft*lbf
Front door lock assembly x Door panel	5.0	51	44 in.*lbf

REAR DOOR LOCK

REAR DOOR LOCK - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft*lbf
Rear door lock assembly x Door panel	5.0	51	44 in.*lbf

BACK DOOR LOCK

BACK DOOR LOCK - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft*lbf

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Back door lock assembly x Door panel	13	133	9.6 in.*lbf

METER

TORQUE SPECIFICATIONS

METER - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
STEERING PAD SWITCH			
Steering pad switch assembly x Steering wheel assembly	2.4	24	21 in.*lbf

AUDIO/VISUAL

TORQUE SPECIFICATIONS

AUDIO/VISUAL - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Stereo Component Amplifier Assembly x Body	12	122	9
Stereo Component Speaker Assembly x Back Door Panel	16	163	12
Fender Antenna Assembly x Body	12	122	9
Steering pad switch x Steering wheel	2.4	24	21 in.*lbf

HORN

TORQUE SPECIFICATIONS

HORN - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Low pitched horn assembly x Body	20	204	15
High pitched horn assembly x Body	20	204	15

OTHER SYSTEM

TORQUE SPECIFICATIONS

OTHER SYSTEM - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Voltage inverter assembly x Body	19	194	14

WINDSHIELD/WINDOW GLASS

TORQUE SPECIFICATIONS

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POWER WINDOW REGULATOR MOTOR

POWER WINDOW REGULATOR MOTOR - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
FRONT DOOR			
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf
REAR DOOR			
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf

BACK DOOR GLASS

BACK DOOR GLASS - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Back door glass x Back door hinge	8.0	82	71 in.*lbf

BACK WINDOW LOCK

BACK WINDOW LOCK - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Back window lock assembly x Back door panel	8.0	82	71 in.*lbf

MIRROR

TORQUE SPECIFICATIONS

INNER REAR VIEW MIRROR

INNER REAR VIEW MIRROR - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Inner rear view mirror x Windshield glass	3.5	36	31 in.*lbf

OUTER REAR VIEW MIRROR

OUTER REAR VIEW MIRROR - TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Outer rear view mirror assembly with cover x Door panel	8.0	82	71 in.*lbf

INSTRUMENT PANEL TORQUE

SPECIFICATIONS

INSTRUMENT PANEL TORQUE - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf

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Instrument panel reinforcement x Passenger airbag	20	204	15

SEAT

TORQUE SPECIFICATIONS

FRONT SEAT ASSEMBLY (for Manual Seat)

FRONT SEAT ASSEMBLY (FOR MANUAL SEAT) - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front seat assembly x Body	37	377	27
Front seatback cover x Front seat frame assembly with adjuster	5.5	56	49 in.*lbf
Active headrest upper unit x Front seat frame assembly with adjuster	20	204	15
Active headrest lower unit x Front seat frame assembly with adjuster	8.5	87	75 in.*lbf

FRONT SEAT ASSEMBLY (for Power Seat)

FRONT SEAT ASSEMBLY (FOR POWER SEAT) - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front seat assembly x Body	37	377	27
Front seatback cover x Front seat frame assembly with adjuster	5.5	56	49 in.*lbf
Active headrest upper unit x Front seat frame assembly with adjuster	20	204	15
Active headrest lower unit x Front seat frame assembly with adjuster	8.5	87	75 in.*lbf

REAR NO. 1 SEAT ASSEMBLY (for LH Side)

REAR NO. 1 SEAT ASSEMBLY (FOR LH SIDE) - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear No. 1 seat assembly x Body	37	377	27
Rear seat lock assembly x Rear No. 1 seat cushion frame sub-assembly	21	214	16
Rear seatback lock assembly x Rear No. 1 seat cushion frame sub-assembly	21	214	16
Rear seat armrest assembly x Rear No. 1 seat cushion frame sub-assembly	33	337	24
Rear seat cushion spring assembly x Rear No. 1 seat cushion frame sub-assembly	21	214	16

REAR NO. 1 SEAT ASSEMBLY (for RH Side)

REAR NO. 1 SEAT ASSEMBLY (FOR RH SIDE) - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear No. 1 seat assembly x Body	37	377	27
Rear seat armrest assembly x Rear No. 1 seat cushion frame sub-assembly	33	337	24
Rear seat cushion spring assembly x Rear No. 1 seat cushion frame sub-assembly	21	214	16
Rear seatback stopper sub-assembly x Rear No. 1 seat cushion frame sub-assembly	18	184	13
Rear seatback lock control lever sub-assembly x Rear No. 1 seat cushion frame sub-			

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assembly	18	184	13

REAR NO. 2 SEAT ASSEMBLY

REAR NO. 2 SEAT ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear No. 2 seat assembly x Body	37	377	27
Rear No. 2 seat headrest assembly LH x Rear No. 2 seatback frame sub-assembly	14	143	10
Rear No. 2 seat headrest assembly RH x Rear No. 2 seatback frame sub-assembly	14	143	10
No. 2 seat cushion frame sub-assembly x No. 2 seatback frame sub-assembly (for Bolt)	21	214	16
No. 2 seat cushion frame sub-assembly x No. 2 seatback frame sub-assembly (for Nut)	18	184	13

REAR CENTER SEAT ASSEMBLY

REAR CENTER SEAT ASSEMBLY - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear center seatback frame assembly x Rear center seat cushion frame assembly	21	214	16
Rear seat turn cable assembly x rear center seatback frame assembly	6.5	66	58 in.*lbf
Rear seat lock striker x Rear center seat cushion frame assembly	21	214	16

ENGINE HOOD/DOOR

TORQUE SPECIFICATIONS

ENGINE HOOD/DOOR - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
HOOD			
Hood hinge x Hood panel	13	133	10
Hood lock x Body	8.0	82	71 in.*lbf
FRONT DOOR			
Door check x Body	27	275	20
Door check x Door panel	8.0	82	71 in.*lbf
Door hinge x Body	26	265	19
Door hinge x Door panel	27	275	20
Door lock x Door panel	5.0	51	44 in.*lbf
Door lock striker x Body	23	235	17
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf
Window regulator x Door panel	8.0	82	71 in.*lbf
Door glass x Window regulator	8.0	82	71 in.*lbf
Outer rear view mirror x Door panel	8.0	82	71 in.*lbf

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Door outside handle frame x Door panel	4.0	41	35 in.*lbf
Door outside handle cover x Door panel	4.0	41	35 in.*lbf
Door trim board x Door panel	3.5	36	31 in.*lbf
REAR DOOR			
Door check x Body	27	275	20
Door check x Door panel	8.0	82	71 in.*lbf
Door hinge x Body	26	265	19
Door hinge x Door panel	27	275	20
Door lock x Door panel	5.0	51	44 in.*lbf
Door lock striker x Body	23	235	17
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf
Window regulator x Door panel	8.0	82	71 in.*lbf
Door outside handle frame x Door panel	4.0	41	35 in.*lbf
Door outside handle cover x Door panel	4.0	41	35 in.*lbf
BACK DOOR			
Back door hinge x Door panel	20	204	15
Back door lock striker x Body	23	235	17
Back door lock x Door panel	13	133	10
Back door glass guide bracket (for Fixed Glass Type) x Back door panel	8.0	82	71 in.*lbf
Back door glass guide bracket (for Fixed Glass Type) x Back door glass	5.5	56	49 in.*lbf
POWER BACK DOOR TOUCH SENSOR			
Power back door sensor x Back door panel	1.2	12	11 in.*lbf
POWER BACK DOOR DRIVE UNIT			
Back door motor unit x Body	14	143	10
Back door stay bolt x Back door panel	18	184	13
BACK DOOR SUPPORT			
Back door stay x Back door panel	8.0	82	71 in.*lbf
Back door stay x Body	8.0	82	71 in.*lbf
BACK WINDOW SUPPORT			
Back window stay bolt x Body	22	224	16

EXTERIOR

TORQUE SPECIFICATIONS

EXTERIOR - TORQUE SPECIFICATIONS

Part tightened		N*m	kgf*cm	ft.*lbf
Front bumper assembly x Body		3.0	31	27 in.*lbf
Front bumper stay x Body	Bolt	5.4	55	48 in.*lbf
	Screw	3.0	31	27 in.*lbf
Front bumper reinforcement x Body		64	653	47

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No. 2 rear bumper side support x Body	3.0	31	27 in.*lbf
Rear bumper side retainer x Body	3.0	31	27 in.*lbf
Rear bumper reinforcement x Body	64	653	47
Rear spoiler sub-assembly x Body	6.5	66	58 in.*lbf
Rear spoiler sub-assembly x Back door glass	5.0	51	44 in.*lbf
Roof rack assembly x Body	32	326	24
Center roof rack bracket x Body	10	102	7.4
Front door outside moulding sub-assembly x Body	5.0	51	44 in.*lbf
Rear door outside moulding sub-assembly x Body	5.0	51	44 in.*lbf

INTERIOR

TORQUE SPECIFICATIONS

INTERIOR - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Rope hook assembly x body	6.5	66	58 in.*lbf

SLIDING ROOF

TORQUE SPECIFICATIONS

SLIDING ROOF - TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Sliding roof glass sub-assembly x Sliding roof housing sub-assembly	5.5	56	49 in.*lbf
Sliding roof housing sub-assembly (Bolt) x Body	8.0	82	71 in.*lbf
Sliding roof housing sub-assembly (Nut) x Body	5.5	56	49 in.*lbf
Sliding roof drive gear sub-assembly x Sliding roof housing sub-assembly	5.4	55	48 in.*lbf
Sliding roof piece sub-assembly LH x Sliding roof housing sub-assembly	2.0	20	18 in.*lbf
Sliding roof piece sub-assembly RH x Sliding roof housing sub-assembly	2.0	20	18 in.*lbf
Sliding roof side stopper x Sliding roof housing sub-assembly	2.0	20	18 in.*lbf

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