

MAJOR TECHNICAL SPECIFICATIONS

Item			U.S.A.			
Body Type			5-door Wagon			
Vehicle Grade			Standard (4WD)	Limited (4WD)	Sport (4WD)	Standard (2WD)
Model Code			ACA33L-ANPXKA	ACA33L-ANPGKA	ACA33L-ANPSKA	ACA38L-ANPXKA
Major Dimensions & Vehicle Weights	Overall	Length mm (in.)	4570 (180.0)* ² , 4575 (180.1)* ³	4600 (181.1)	4580 (180.3)	4570 (180.0)* ² , 4575 (180.1)* ³
		Width mm (in.)	1815 (71.5)	1815 (71.5), 1855 (73.0)* ⁴	1855 (73.0)	1815 (71.5)
		Height* ¹ mm (in.)	1685 (66.3), 1745 (68.7)* ⁵ , 1690 (66.5)* ⁶ , 1755 (69.1)* ^{5, 6}	1745 (68.7), 1755 (69.1)* ⁶	1745 (68.7)	1685 (66.3), 1745 (68.7)* ⁵ , 1690 (66.5)* ⁶ , 1755 (69.1)* ^{5, 6}
	Wheel Base	mm (in.)	2660 (104.7)	2660 (104.7)	2660 (104.7)	2660 (104.7)
	Tread	Front mm (in.)	1560 (61.4)	1560 (61.4)	1560 (61.4)	1560 (61.4)
		Rear mm (in.)	1560 (61.4)	1560 (61.4)	1560 (61.4)	1561 (61.4)
	Effective Head Room	Front mm (in.)	1037 (40.8)	1037 (40.8), 1002 (39.4)* ⁷	1037 (40.8), 1002 (39.4)* ⁷	1037 (40.8)
		Rear mm (in.)	1009 (39.7)	1009 (39.7)	1009 (39.7)	1009 (39.7)
	Effective Leg Room	Front mm (in.)	1075 (42.3)	1075 (42.3)	1075 (42.3)	1075 (42.3)
		Rear mm (in.)	940 (37.0)	940 (37.0)	940 (37.0)	940 (37.0)
	Shoulder Room	Front mm (in.)	1450 (57.1)	1450 (57.1)	1450 (57.1)	1450 (57.1)
		Rear mm (in.)	1405 (55.3)	1405 (55.3)	1405 (55.3)	1405 (55.3)
	Overhang	Front mm (in.)	855 (33.7)	855 (33.7)	855 (33.7)	855 (33.7)
		Rear mm (in.)	1085 (42.7)	1085 (42.7)	1085 (42.7)	1085 (42.7)
	Min. Running Ground Clearance	mm (in.)	190 (7.5)	190 (7.5)	190 (7.5)	190 (7.5)
	Angle of Approach	degrees	29	29	29	29
	Angle of Departure	degrees	25	25	25	25
	Curb Weight	Front kg (lb)	892 (1967)	898 (1980)	903 (1991)	868 (1914)
		Rear kg (lb)	670 (1477)	695 (1532)	691 (1523)	629 (1387)
		Total kg (lb)	1562 (3444)	1593 (3512)	1594 (3514)	1497 (3300)
	Gross Vehicle Weight	Front kg (lb)	—	—	—	—
		Rear kg (lb)	—	—	—	—
		Total (2nd / 3rd) kg (lb)	2057 (4535) / 2207 (4865)	2057 (4535) / 2207 (4865)	2057 (4535) / —	2009 (4430) / 2145 (4730)
Performance	Fuel Tank Capacity	ℓ (US.gal., Imp.gal.)	60 (13.2)	60 (13.2)	60 (13.2)	60 (13.2)
	Luggage Compartment Capacity	m ³ (cu.ft.)	—	—	—	—
	Max. Speed	km / h (mph)	185 (115)	185 (115)	185 (115)	190 (118)
	Max. Cruising Speed	km / h (mph)	145 (90)	145 (90)	145 (90)	150 (93)
	Acceleration	0 to 60 mph sec.	10.2	10.2	10.2	10.0
		0 to 400 m sec.	—	—	—	—
	Max. Permissible Speed	1st Gear km / h (mph)	67 (41)	67 (41)	67 (41)	70 (43)
		2nd Gear km / h (mph)	120 (74)	120 (74)	120 (74)	126 (78)
		3rd Gear km / h (mph)	—	—	—	—
		4th Gear km / h (mph)	—	—	—	—
	Turning Diameter (Outside Front)	Wall to Wall m (ft.)	5.7 (18.7)	5.7 (18.7)	6.0 (19.7)	5.7 (18.7)
		Curb to Curb m (ft.)	5.3 (17.4)	5.3 (17.4)	5.6 (18.4)	5.3 (17.4)
Engine	Engine Type		2AZ-FE	2AZ-FE	2AZ-FE	2AZ-FE
	Valve Mechanism		16-Valve, DOHC	16-Valve, DOHC	16-Valve, DOHC	16-Valve, DOHC
	Bore x Stroke	mm (in.)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)
	Displacement	cm ³ (cu.in.)	2362 (144.2)	2362 (144.2)	2362 (144.2)	2362 (144.2)
	Compression Ratio		9.6 : 1	9.6 : 1	9.6 : 1	9.6 : 1
	Fuel System		SFI	SFI	SFI	SFI
	Octane Rating		87 or higher	87 or higher	87 or higher	87 or higher
	Max. Output (SAE-NET)* ⁸	kW / rpm (HP@rpm)	124 / 6000 (166@6000)	124 / 6000 (166@6000)	124 / 6000 (166@6000)	124 / 6000 (166@6000)
Engine Electrical	Max. Torque (SAE-NET)* ⁸	N·m / rpm (lb-ft@rpm)	224 / 4000 (165@4000)	224 / 4000 (165@4000)	224 / 4000 (165@4000)	224 / 4000 (165@4000)
	Battery Capacity (5HR)	Voltage & Amp. hr.	12-55	12-55	12-55	12-55
	Generator Output	Watts	1200	1200	1200	1200
Chassis	Starter Output	kW	1.7	1.7	1.7	1.7
	Clutch Type		—	—	—	—
	Transmission Type		U140F	U140F	U140F	U241E
	Gear Ratio (Counter Gear Ratio Included)	In First	3.938	3.938	3.938	3.943
		In Second	2.194	2.194	2.194	2.197
		In Third	1.411	1.411	1.411	1.413
		In Fourth	1.019	1.019	1.019	1.020
		In Fifth	—	—	—	—
		In Reverse	3.141	3.141	3.141	3.145
	Differential Gear Ratio (Final)		3.080	3.080	3.080	2.923
	Transfer / Rear Differential Gear Ratio		0.439 / 2.277	0.439 / 2.277	0.439 / 2.277	—
	Rear Differential Gear Size	mm (in.)	135 (5.3)	135 (5.3)	135 (5.3)	—
	Brake Type	Front	Ventilated Disc	Ventilated Disc	Ventilated Disc	Ventilated Disc
		Rear	Solid Disc	Solid Disc	Solid Disc	Solid Disc
	Parking Brake Type		Duo Servo Drum	Duo Servo Drum	Duo Servo Drum	Duo Servo Drum
	Brake Booster Type and Size	in.	Single, 10"	Single, 10"	Single, 10"	Single, 10"
	Proportioning Valve Type		—	—	—	—
	Suspension Type	Front	MacPherson Strut	MacPherson Strut	MacPherson Strut	MacPherson Strut
		Rear	Double Wishbone	Double Wishbone	Double Wishbone	Double Wishbone
	Stabilizer Bar	Front	Standard	Standard	Standard	Standard
		Rear	Standard	Standard	Standard	—, Option* ⁶
	Steering Gear Type		Rack and Pinion	Rack and Pinion	Rack and Pinion	Rack and Pinion
	Steering Gear Ratio (Overall)		14.4	14.4	14.6	14.4
	Power Steering Type		Electric Motor	Electric Motor	Electric Motor	Electric Motor

*1: Unladen Vehicle

*3: With 225/65R17 Tire

*5: With Roof Rail

*7: With Roof Rail

*2: With 215/70R16 Tire

*4: With Over-fender

*6: With Rear No.2 Seat

*8: Maximum output and torque rating is determined by revised SAE J1349 standard.

U. S. A.					
5-door Wagon					
Limited (2WD)	Sport (2WD)	Standard (4WD)	Limited (4WD)	Sport (4WD)	Standard (2WD)
ACA38L-ANPGKA	ACA38L-ANPSKA	GSA33L-ANAXKA	GSA33L-ANAGKA	GSA33L-ANASKA	GSA33L-ANAXKA
5	4600 (181.1)	4580 (180.3)	4570 (180.0)*2, 4575 (180.1)*3	4600 (181.1)	4580 (180.3)
	1815 (71.5), 1855 (73.0)*4	1855 (73.0)	1815 (71.5), 1855 (73.0)*4	1855 (73.0)	1815 (71.5)
	1745 (68.7), 1755 (69.1)*6	1745 (68.7)	1745 (68.7), 1755 (69.1)*6	1745 (68.7)	1745 (68.7)
	2660 (104.7)	2660 (104.7)	2660 (104.7)	2660 (104.7)	2660 (104.7)
	1560 (61.4)	1560 (61.4)	1560 (61.4)	1560 (61.4)	1560 (61.4)
10	1560 (61.4)	1560 (61.4)	1560 (61.4)	1560 (61.4)	1560 (61.4)
	1037 (40.8), 1002 (39.4)*7	1037 (40.8), 1002 (39.4)*7	1037 (40.8), 1002 (39.4)*7	1037 (40.8), 1002 (39.4)*7	1037 (40.8)
	1009 (39.7)	1009 (39.7)	1009 (39.7)	1009 (39.7)	1009 (39.7)
	1075 (42.3)	1075 (42.3)	1075 (42.3)	1075 (42.3)	1075 (42.3)
	940 (37.0)	940 (37.0)	940 (37.0)	940 (37.0)	940 (37.0)
15	1450 (57.1)	1450 (57.1)	1450 (57.1)	1450 (57.1)	1450 (57.1)
	1405 (55.3)	1405 (55.3)	1405 (55.3)	1405 (55.3)	1405 (55.3)
	855 (33.7)	855 (33.7)	855 (33.7)	855 (33.7)	855 (33.7)
	1085 (42.7)	1085 (42.7)	1085 (42.7)	1085 (42.7)	1085 (42.7)
	190 (7.5)	190 (7.5)	190 (7.5)	190 (7.5)	190 (7.5)
20	29	29	29	29	29
	25	25	25	25	25
	874 (1927)	879 (1938)	977 (2154)	976 (2152)	981 (2163)
	655 (1444)	651 (1435)	681 (1501)	691 (1523)	687 (1515)
	1529 (3371)	1530 (3373)	1667 (3675)	1667 (3675)	1668 (3677)
25	—	—	—	—	—
	—	—	—	—	—
	2009 (4430)/2145 (4730)	2009 (4430)/—	2141 (4720)/2275 (5015)	2141 (4720)/2275 (5015)	2141 (4720)/—
	60 (13.2)	60 (13.2)	60 (13.2)	60 (13.2)	60 (13.2)
	—	—	—	—	—
30	190 (118)	190 (118)	210 (130)	210 (130)	210 (130)
	150 (93)	150 (93)	165 (102)	165 (102)	165 (102)
	10.0	10.0	6.7	6.7	6.9
	—	—	—	—	—
	70 (43)	70 (43)	63 (39)	63 (39)	63 (39)
35	126 (78)	126 (78)	113 (70)	113 (70)	113 (70)
	—	—	175 (109)	175 (109)	175 (109)
	—	—	—	—	—
	5.7 (18.7)	6.0 (19.7)	6.0 (19.7)	6.0 (19.7)	6.0 (19.7)
	5.3 (17.4)	5.6 (18.4)	5.6 (18.4)	5.6 (18.4)	5.6 (18.4)
40	2AZ-FE	2AZ-FE	2GR-FE	2GR-FE	2GR-FE
	16-Valve, DOHC, Chain Drive	16-Valve, DOHC, Chain Drive	24-Valve, DOHC, Chain Drive	24-Valve, DOHC, Chain Drive	24-Valve, DOHC, Chain Drive
	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)	94.0 x 83.0 (3.70 x 3.27)	94.0 x 83.0 (3.70 x 3.27)	94.0 x 83.0 (3.70 x 3.27)
	2362 (144.2)	2362 (144.2)	3456 (210.9)	3456 (210.9)	3456 (210.9)
	9.8 : 1	9.8 : 1	10.8 : 1	10.8 : 1	10.8 : 1
45	SFI	SFI	SFI	SFI	SFI
	87 or higher	87 or higher	91 or higher	91 or higher	91 or higher
	124 / 6000 (166@6000)	124 / 6000 (166@6000)	200 / 6200 (268@6200)	200 / 6200 (268@6200)	200 / 6200 (268@6200)
	224 / 4000 (165@4000)	224 / 4000 (165@4000)	336 / 4700 (248@4700)	336 / 4700 (248@4700)	336 / 4700 (248@4700)
	12-55	12-55	12-55	12-55	12-55
50	1200	1200	1200, 1800*9	1200, 1800*9	1200, 1800*9
	1.7	1.7	1.7	1.7	1.7
	—	—	—	—	—
	U241E	U241E	U151F	U151F	U151E
	3.943	3.943	4.235	4.235	4.235
55	2.197	2.197	2.360	2.360	2.360
	1.413	1.413	1.517	1.517	1.517
	1.020	1.020	1.047	1.047	1.047
	—	—	0.756	0.756	0.756
	3.145	3.145	3.378	3.378	3.378
60	2.923	2.923	3.080	3.080	3.080
	—	—	0.439 / 2.277	0.439 / 2.277	0.439 / 2.277
	—	—	135 (5.3)	135 (5.3)	135 (5.3)
	Ventilated Disc	Ventilated Disc	Ventilated Disc	Ventilated Disc	Ventilated Disc
	Solid Disc	Solid Disc	Solid Disc	Solid Disc	Solid Disc
65	Duo Servo Drum	Duo Servo Drum	Duo Servo Drum	Duo Servo Drum	Duo Servo Drum
	Single, 10"	Single, 10"	Single, 10"	Single, 10"	Single, 10"
	—	—	—	—	—
	MacPherson Strut	MacPherson Strut	MacPherson Strut	MacPherson Strut	MacPherson Strut
	Double Wishbone	Double Wishbone	Double Wishbone	Double Wishbone	Double Wishbone
70	Standard	Standard	Standard	Standard	Standard
	—, Option*6	—	Standard	Standard	Standard
	Rack and Pinion	Rack and Pinion	Rack and Pinion	Rack and Pinion	Rack and Pinion
	14.4	14.6	14.4	14.6	14.4
	Electric Motor	Electric Motor	Electric Motor	Electric Motor	Electric Motor

*9: Option

Item			Area	U.S.A.		Canada	
Body Type				5-door Wagon			
Vehicle Grade				Limited (2WD)	Sport (2WD)	Standard (4WD)	Limited (4WD)
Model Code				GSA38L-ANAGKA	GSA38L-ANASKA	ACA33L-ANPXKK	ACA33L-ANPGKK
Major Dimensions & Vehicle Weights	Overall	Length	mm (in.)	4600 (181.1)	4580 (180.3)	4570 (180.0)* ² , 4575 (180.1)* ³	4600 (181.1)
		Width	mm (in.)	1815 (71.5), 1855 (73.0)* ⁴	1855 (73.0)	1815 (71.5)	1815 (71.5), 1855 (73.0)* ⁴
		Height* ¹	mm (in.)	1745 (68.7), 1755 (69.1)* ⁶	1745 (68.7)	1685 (66.3), 1745 (68.7)* ³ 1690 (66.5)* ⁶ , 1755 (69.1)* ^{5, 6}	1745 (68.7), 1755 (69.1)* ⁶
	Wheel Base		mm (in.)	2660 (104.7)	2660 (104.7)	2660 (104.7)	2660 (104.7)
	Tread	Front	mm (in.)	1560 (61.4)	1560 (61.4)	1560 (61.4)	1560 (61.4)
		Rear	mm (in.)	1560 (61.4)	1560 (61.4)	1560 (61.4)	1560 (61.4)
	Effective Head Room	Front	mm (in.)	1037 (40.8), 1002 (39.4)* ⁷	1037 (40.8), 1002 (39.4)* ⁷	1037 (40.8)	1037 (40.8), 1002 (39.4)* ⁷
		Rear	mm (in.)	1009 (39.7)	1009 (39.7)	1009 (39.7)	1009 (39.7)
	Effective Leg Room	Front	mm (in.)	1075 (42.3)	1075 (42.3)	1075 (42.3)	1075 (42.3)
		Rear	mm (in.)	940 (37.0)	940 (37.0)	940 (37.0)	940 (37.0)
	Shoulder Room	Front	mm (in.)	1450 (57.1)	1450 (57.1)	1450 (57.1)	1450 (57.1)
		Rear	mm (in.)	1405 (55.3)	1405 (55.3)	1405 (55.3)	1405 (55.3)
	Overhang	Front	mm (in.)	855 (33.7)	855 (33.7)	855 (33.7)	855 (33.7)
		Rear	mm (in.)	1085 (42.7)	1085 (42.7)	1085 (42.7)	1085 (42.7)
	Min. Running Ground Clearance		mm (in.)	190 (7.5)	190 (7.5)	190 (7.5)	190 (7.5)
	Angle of Approach		degrees	29	29	29	29
	Angle of Departure		degrees	25	25	25	25
	Curb Weight	Front	kg (lb)	960 (2116)	964 (2125)	892 (1967)	898 (1980)
		Rear	kg (lb)	649 (1431)	646 (1424)	670 (1477)	695 (1532)
		Total	kg (lb)	1609 (3547)	1610 (3549)	1562 (3444)	1593 (3512)
	Gross Vehicle Weight	Front	kg (lb)	—	—	—	—
		Rear	kg (lb)	—	—	—	—
		Total (2nd / 3rd)	kg (lb)	2087 (4600) / 2220 (4895)	2087 (4600) / —	2057 (4535) / 2207 (4865)	2057 (4535) / 2207 (4865)
	Fuel Tank Capacity		ℓ(US.gal., Imp.gal.)	60 (13.2)	60 (13.2)	60 (13.2)	60 (13.2)
	Luggage Compartment Capacity		m ³ (cu.ft.)	—	—	—	—
Performance	Max. Speed		km / h (mph)	210 (130)	210 (130)	185 (115)	185 (115)
	Max. Cruising Speed		km / h (mph)	165 (102)	165 (102)	145 (90)	145 (90)
	Acceleration	0 to 60 mph	sec.	6.9	6.9	10.2	10.2
		0 to 400 m	sec.	—	—	—	—
	Max. Permissible Speed	1st Gear	km / h (mph)	63 (39)	63 (39)	67 (41)	67 (41)
		2nd Gear	km / h (mph)	113 (70)	113 (70)	120 (74)	120 (74)
		3rd Gear	km / h (mph)	175 (109)	175 (109)	—	—
		4th Gear	km / h (mph)	—	—	—	—
	Turning Diameter (Outside Front)	Wall to Wall	m (ft.)	6.0 (19.7)	6.0 (19.7)	5.7 (18.7)	5.7 (18.7)
		Curb to Curb	m (ft.)	5.6 (18.4)	5.6 (18.4)	5.3 (17.4)	5.3 (17.4)
Engine	Engine Type			2GR-FE	2GR-FE	2AZ-FE	2AZ-FE
	Valve Mechanism			24-Valve, DOHC, Chain Drive	24-Valve, DOHC, Chain Drive	16-Valve, DOHC, Chain Drive	16-Valve, DOHC, Chain Drive
	Bore x Stroke		mm (in.)	94.0 x 83.0 (3.70 x 3.27)	94.0 x 83.0 (3.70 x 3.27)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)
	Displacement		cm ³ (cu.in.)	3456 (210.9)	3456 (210.9)	2362 (144.2)	2362 (144.2)
	Compression Ratio			10.8 : 1	10.8 : 1	9.8 : 1	9.8 : 1
	Fuel System			SFI	SFI	SFI	SFI
	Octane Rating			91 or higher	91 or higher	87 or higher	87 or higher
	Max. Output (SAE-NET)* ⁸		kW / rpm (HP@rpm)	200 / 6200 (268@6200)	200 / 6200 (268@6200)	124 / 6000 (166@6000)	124 / 6000 (166@6000)
Engine Electrical	Max. Torque (SAE-NET)* ⁸		N·m / rpm (lb-ft@rpm)	336 / 4700 (248@4700)	336 / 4700 (248@4700)	224 / 4000 (165@4000)	224 / 4000 (165@4000)
	Battery Capacity (5HR)	Voltage & Amp. hr.		12-55	12-55	12-55	12-55
	Generator Output	Watts		1200, 1800* ⁹	1200, 1800* ⁹	1200	1200
Starter Output		kW		1.7	1.7	1.7	
Chassis	Clutch Type			—	—	—	—
	Transmission Type			U151E	U151E	U140F	U140F
	Gear Ratio (Counter Gear Ratio Included)	In First		4.235	4.235	3.938	3.938
		In Second		2.360	2.360	2.194	2.194
		In Third		1.517	1.517	1.411	1.411
		In Fourth		1.047	1.047	1.019	1.019
		In Fifth		0.576	0.576	—	—
		In Reverse		3.378	3.378	3.141	3.141
	Differential Gear Ratio (Final)			3.080	3.080	3.080	3.080
	Transfer / Rear Differential Gear Ratio			—	—	0.439 / 2.277	0.439 / 2.277
	Rear Differential Gear Size		mm (in.)	—	—	135 (5.3)	135 (5.3)
	Brake Type	Front		Ventilated Disc	Ventilated Disc	Ventilated Disc	Ventilated Disc
		Rear		Solid Disc	Solid Disc	Solid Disc	Solid Disc
	Parking Brake Type			Duo Servo Drum	Duo Servo Drum	Duo Servo Drum	Duo Servo Drum
	Brake Booster Type and Size		in.	Single, 10"	Single, 10"	Single, 10"	Single, 10"
	Proportioning Valve Type			—	—	—	—
	Suspension Type	Front		MacPherson Strut	MacPherson Strut	MacPherson Strut	MacPherson Strut
		Rear		Double Wishbone	Double Wishbone	Double Wishbone	Double Wishbone
	Stabilizer Bar	Front		Standard	Standard	Standard	Standard
Rear			Standard	Standard	Standard	Standard	
Steering Gear Type			Rack and Pinion	Rack and Pinion	Rack and Pinion	Rack and Pinion	
Steering Gear Ratio (Overall)			14.4	14.6	14.4	14.4	
Power Steering Type			Electric Motor	Electric Motor	Electric Motor	Electric Motor	

*1: Unladen Vehicle

*3: With 225/65R17 Tire

*2: With 215/70R16 Tire

*4: With Over-fender

*5: With Roof Rail

*6: With Rear No.2 Seat

*7: With Roof Rail

*8: Maximum output and torque rating is determined by revised SAE J1349 standard.

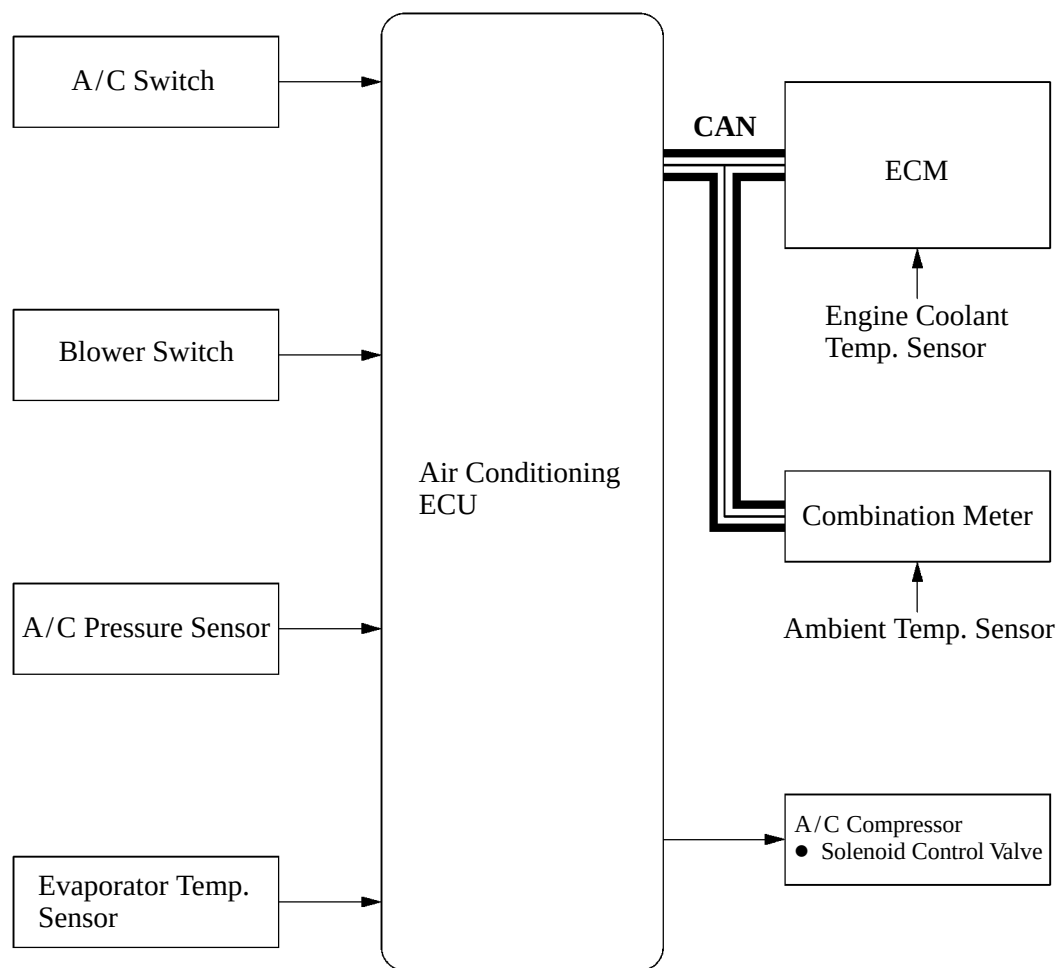
Canada				
5-door Wagon				
	Sport (4WD)	Standard (4WD)	Limited (4WD)	Sport (4WD)
	ACA33L-ANPSKK	GSA33L-ANAXKK	GSA33L-ANAGKK	GSA33L-ANASKK
5	4580 (180.3)	4570 (180.0)*2, 4575 (180.1)*3	4600 (181.1)	4580 (180.3)
	1855 (73.0)	1815 (71.5)	1815 (71.5), 1855 (73.0)*4	1855 (73.0)
	1745 (68.7)	1685 (66.3), 1745 (68.7)*5 1690 (66.5)*6, 1755 (69.1)*5, 6	1745 (68.7), 1755 (69.1)*6	1745 (68.7)
	2660 (104.7)	2660 (104.7)	2660 (104.7)	2660 (104.7)
	1560 (61.4)	1560 (61.4)	1560 (61.4)	1560 (61.4)
10	1560 (61.4)	1560 (61.4)	1560 (61.4)	1560 (61.4)
	1037 (40.8), 1002 (39.4)*7	1037 (40.8)	1037 (40.8), 1002 (39.4)*7	1037 (40.8), 1002 (39.4)*7
	1009 (39.7)	1009 (39.7)	1009 (39.7)	1009 (39.7)
	1075 (42.3)	1075 (42.3)	1075 (42.3)	1075 (42.3)
	940 (37.0)	940 (37.0)	940 (37.0)	940 (37.0)
15	1450 (57.1)	1450 (57.1)	1450 (57.1)	1450 (57.1)
	1405 (55.3)	1405 (55.3)	1405 (55.3)	1405 (55.3)
	855 (33.7)	855 (33.7)	855 (33.7)	855 (33.7)
	1085 (42.7)	1085 (42.7)	1085 (42.7)	1085 (42.7)
	190 (7.5)	190 (7.5)	190 (7.5)	190 (7.5)
20	29	29	29	29
	25	25	25	25
	903 (1991)	977 (2154)	976 (2152)	981 (2163)
	691 (1523)	681 (1501)	691 (1523)	687 (1515)
	1594 (3514)	1658 (3655)	1667 (3675)	1667 (3675)
25	—	—	—	—
	—	—	—	—
	2057 (4535) / —	2141 (4720) / 2275 (5015)	2141 (4720) / 2275 (5015)	2141 (4720) / —
	60 (13.2)	60 (13.2)	60 (13.2)	60 (13.2)
	—	—	—	—
30	185 (115)	210 (130)	210 (130)	210 (130)
	145 (90)	165 (102)	165 (102)	165 (102)
	10.2	6.7	6.7	6.7
	—	—	—	—
	67 (41)	63 (39)	63 (39)	63 (39)
35	120 (74)	113 (70)	113 (70)	113 (70)
	—	175 (109)	175 (109)	175 (109)
	—	—	—	—
	6.0 (19.7)	6.0 (19.7)	6.0 (19.7)	6.0 (19.7)
	5.6 (18.4)	5.6 (18.4)	5.6 (18.4)	5.6 (18.4)
40	2AZ-FE	2GR-FE	2GR-FE	2GR-FE
	16-Valve, DOHC, Chain Drive	24-Valve, DOHC, Chain Drive	24-Valve, DOHC, Chain Drive	24-Valve, DOHC, Chain Drive
	88.5 x 96.0 (3.48 x 3.78)	94.0 x 83.0 (3.70 x 3.27)	94.0 x 83.0 (3.70 x 3.27)	94.0 x 83.0 (3.70 x 3.27)
	2362 (144.2)	3456 (210.9)	3456 (210.9)	3456 (210.9)
	9.8 : 1	10.8 : 1	10.8 : 1	10.8 : 1
45	SFI	SFI	SFI	SFI
	87 or higher	91 or higher	91 or higher	91 or higher
	124 / 6000 (166@6000)	200 / 6200 (268@6200)	200 / 6200 (268@6200)	200 / 6200 (268@6200)
	224 / 4000 (165@4000)	336 / 4700 (248@4700)	336 / 4700 (248@4700)	336 / 4700 (248@4700)
	12-55	12-55	12-55	12-55
50	1200	1200, 1800*9	1200, 1800*9	1200, 1800*9
	1.7	1.7	1.7	1.7
	—	—	—	—
	U140F	U151F	U151F	U151F
	3.938	4.235	4.235	4.235
55	2.194	2.360	2.360	2.360
	1.411	1.517	1.517	1.517
	1.019	1.047	1.047	1.047
	—	0.576	0.576	0.576
	3.141	3.378	3.378	3.378
60	3.080	3.080	3.080	3.080
	0.439 / 2.277	0.439 / 2.277	0.439 / 2.277	0.439 / 2.277
	135 (5.3)	135 (5.3)	135 (5.3)	135 (5.3)
	Ventilated Disc	Ventilated Disc	Ventilated Disc	Ventilated Disc
	Solid Disc	Solid Disc	Solid Disc	Solid Disc
65	Duo Servo Drum	Duo Servo Drum	Duo Servo Drum	Duo Servo Drum
	Single, 10"	Single, 10"	Single, 10"	Single, 10"
	—	—	—	—
	MacPherson Strut	MacPherson Strut	MacPherson Strut	MacPherson Strut
	Double Wishbone	Double Wishbone	Double Wishbone	Double Wishbone
70	Standard	Standard	Standard	Standard
	Standard	Standard	Standard	Standard
	Rack and Pinion	Rack and Pinion	Rack and Pinion	Rack and Pinion
	14.6	14.4	14.4	14.6
	Electric Motor	Electric Motor	Electric Motor	Electric Motor

*9: Option

- MEMO -

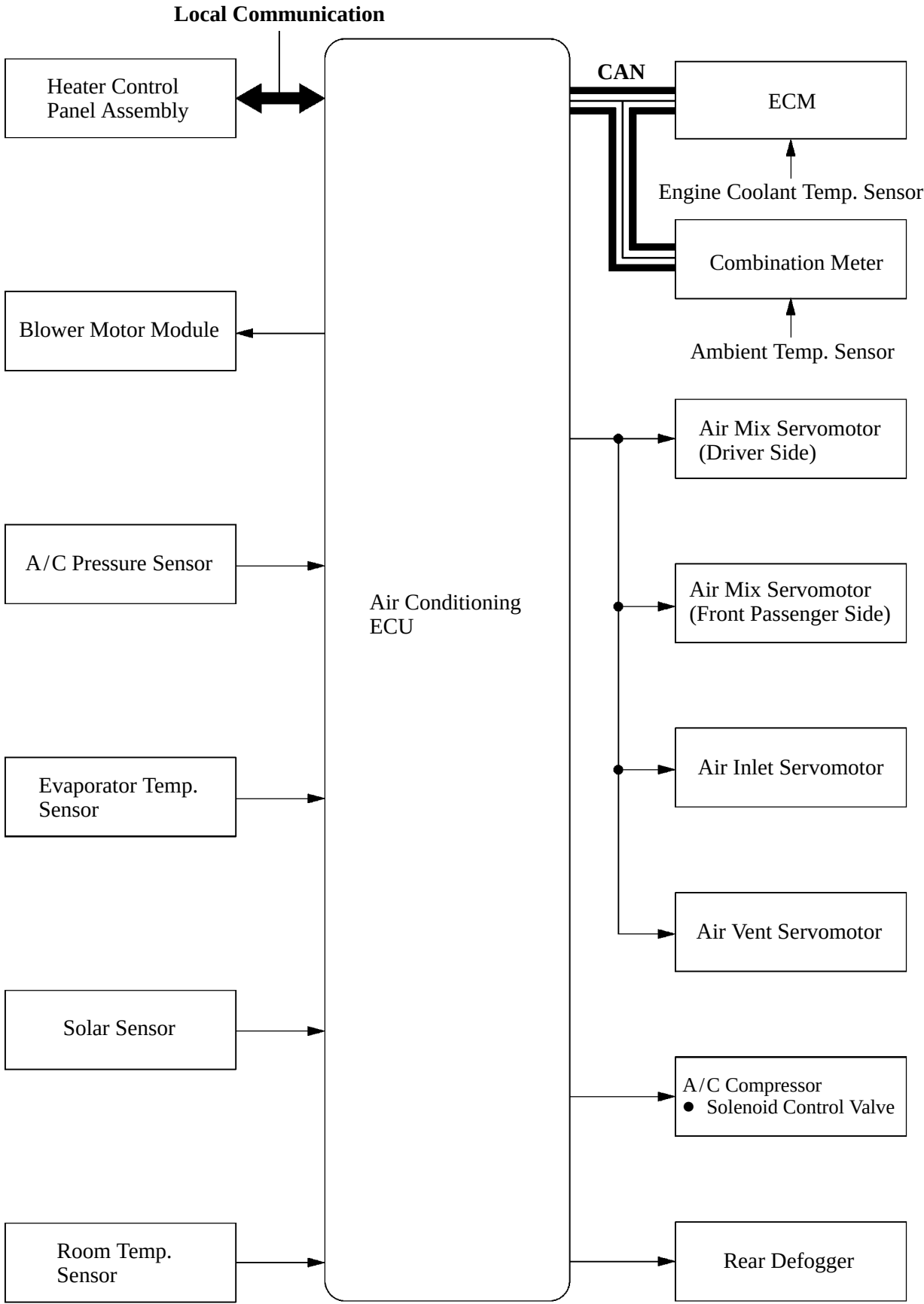
■ SYSTEM DIAGRAM

► Manual Air Conditioning ◀

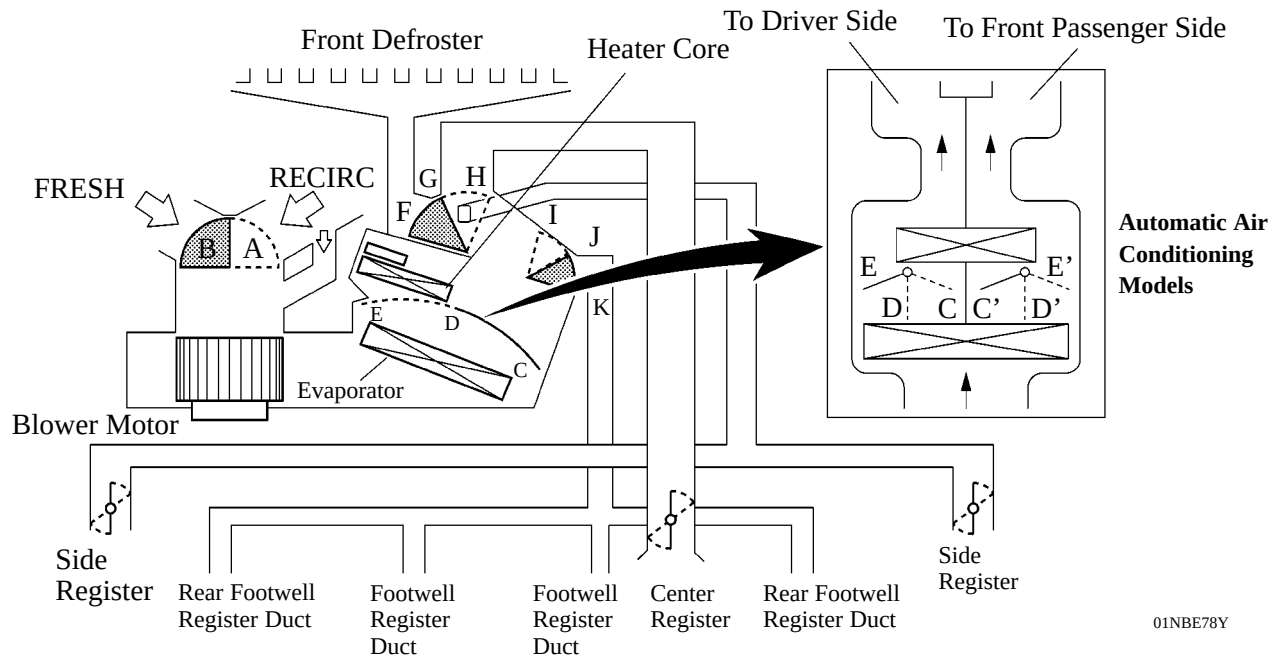


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► Automatic Air Conditioning ◀



■ MODE POSITION AND DAMPER OPERATION



01NBE78Y

► Function of Main Damper ◀

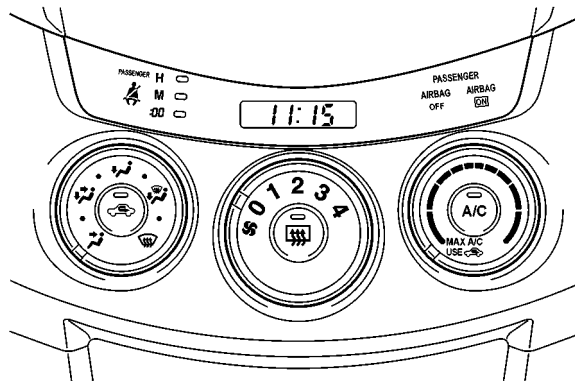
Control Damper	Operation Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A	Brings in fresh air.
	RECIRC	B	Recirculates internal air.
Air Mix Control Damper	MAX COLD - MAX HOT Temp. Setting (Auto A/C): 16°C (61°F) - 30°C (86°F)	C - D - E (C' - D' - E')	Varies the mixture ratio of the fresh air and the recirculation air in order to regulate the temperature continuously from HOT to COLD.
Mode Control Damper	DEF 187BE28	H, K	Defrosts the windshield through the front defroster and side register.
	FOOT/DEF 187BE27	H, J	Defrosts the windshield through the front defroster and side register, while air is also blown out from the footwell register duct and rear footwell register duct.
	FOOT 187BE26	H, I	Air blows out of the footwell register dust, rear footwell register duct, and side register. In addition, air blows out slightly from the front defroster.
	BI-LEVEL 187BE25	F, I	Air blows out of the center register, side register, footwell register duct and rear footwell register duct.
	FACE 187BE24	F, K	Air blows out of the center register and side register.

■ CONSTRUCTION AND OPERATION

1. Heater Control Panel

Heater Control Panel (Manual Control Type)

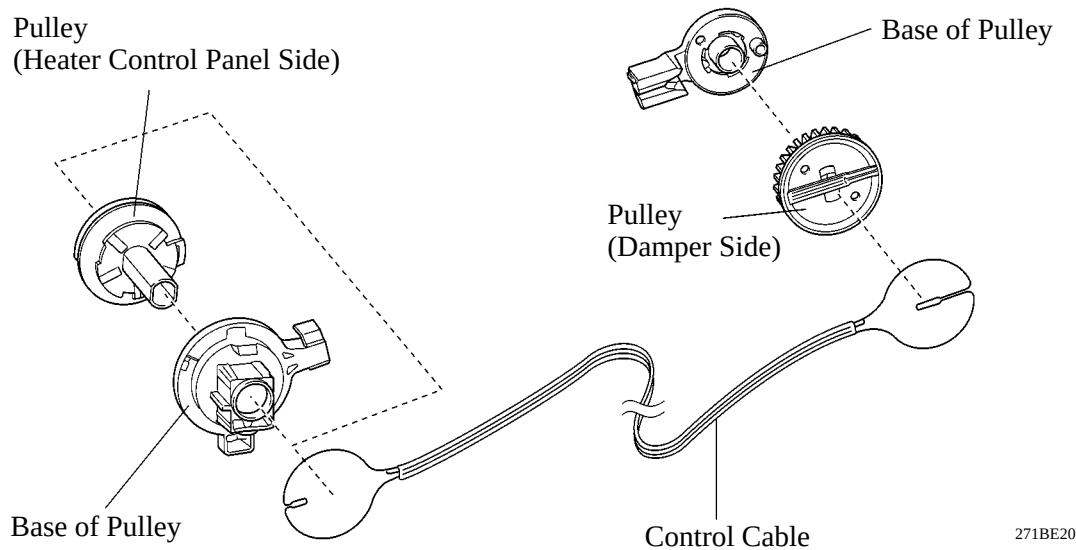
- The rotary switch type heater control panel is used.
- The '06 models use two cables on pulleys to operate the heater control panel and damper.
- Five air outlet modes are provided on the control panel on the models with air conditioning. To realize finer mode settings, a positive feel is provided between the positions of these modes, thus realizing the high comfort level.
- When the FOOT/DEF or DEF mode is selected, the A/C compressor turns ON and the air conditioning switches to the fresh mode. As a result, the fogging of the window glass is eliminated quickly.



01MMO36Y

Heater Control Cable

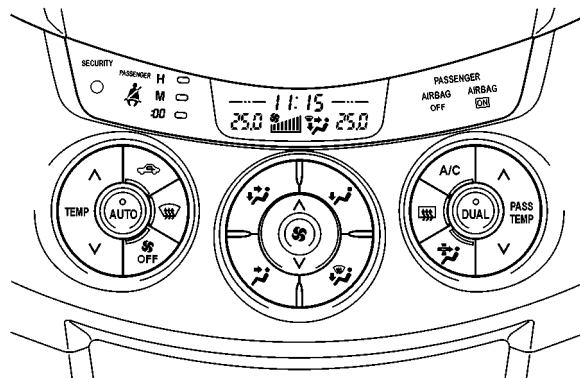
- The '06 models use two cables on pulleys that are always operated in the pulling direction to operate the heater control panel and damper.
- This cable is circular, and is placed around the cable pulleys that are provided at the heater control panel and the damper.
- The operation of the heater control panel is transmitted to the damper via the control cable, which always moves in the pulling direction. Due to the consistent action point of the pulleys, the fluctuation of the operating effort has been minimized through the use of the pulleys. These measures have improved the ease of use and reduced the operating effort.



271BE20

Heater Control Panel (Automatic Control Type)

- The push switch type heater control panel with LCD (Liquid Crystal Display) is used to ensure excellent visibility.
- The temperature control switches for the driver and front passenger are provided on the heater control panel to enhance their ease of use.

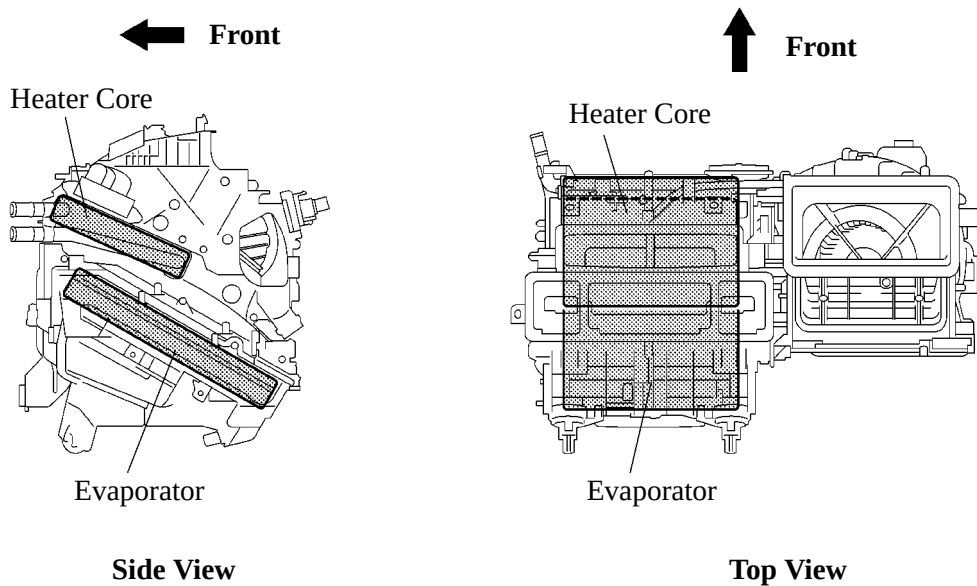


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2. Air Conditioning and Blower Units

General

A semi-center location air conditioning unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, is used.

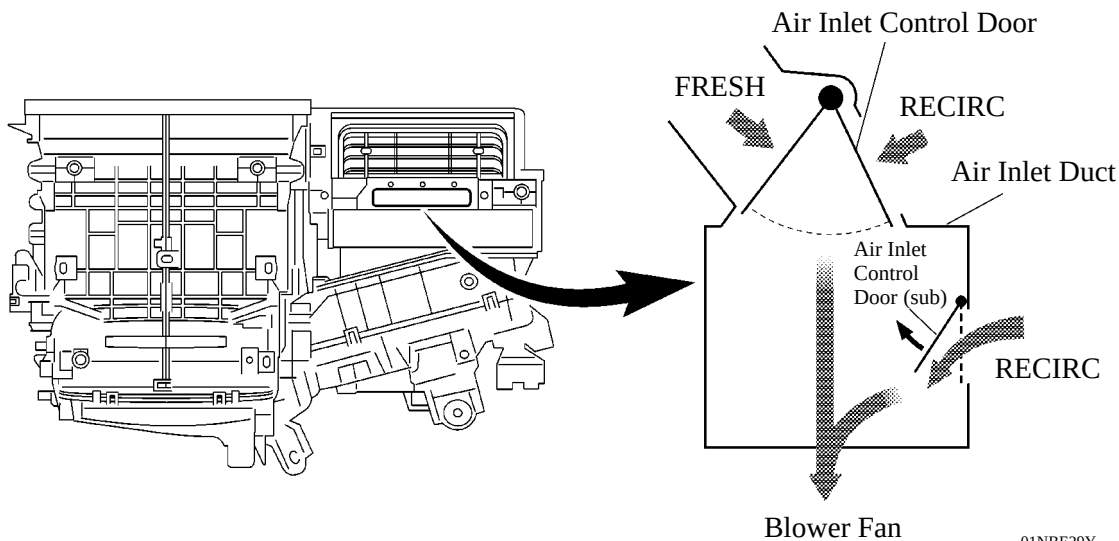


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Partial Recirculation System

The partial recirculation system is used.

This system has an air inlet control door (sub) in the cabin side of the air inlet duct. Thus, it is able to cycle a small volume of recirculated air even in the FRESH mode, thus enhancing heating and air conditioning performance. When the blower switch is ON, the suction force of the blower fan opens this air inlet control door (sub).

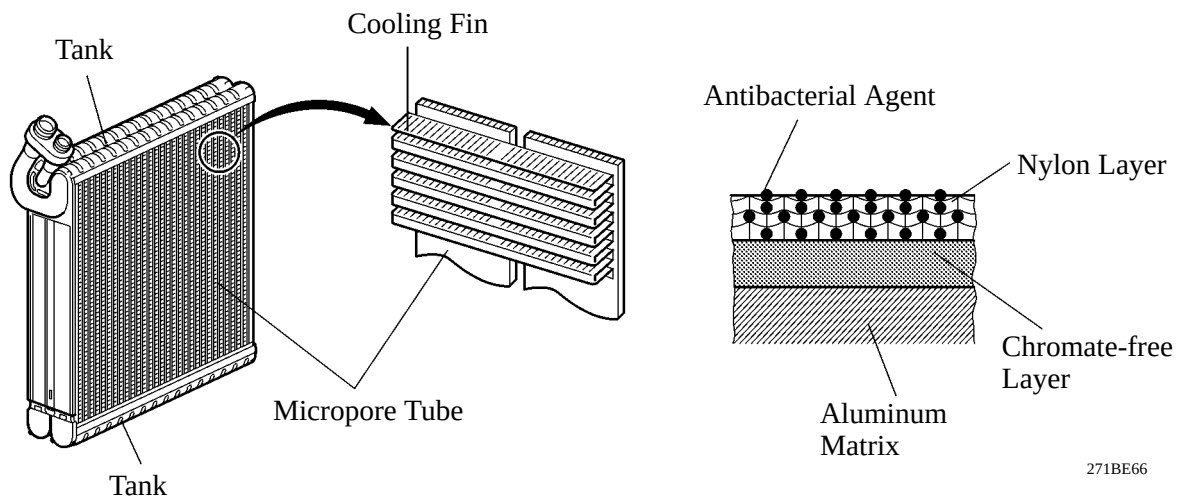


01NBE29Y

Evaporator

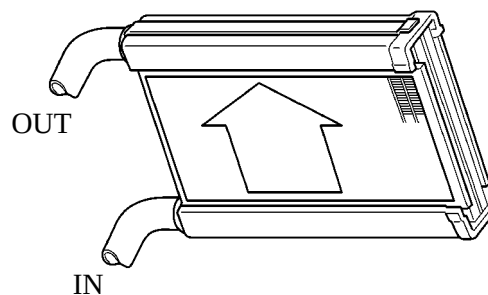
A revolutionary super-slim structure evaporator is used. Placing the tanks at the top and the bottom of the evaporator and adopting a micropore tube construction have realized the following effects:

- The heat exchanging efficiency is improved.
- The temperature distribution is made more uniform.
- The evaporator is made thinner: 58 mm (2.3 in.) → 38 mm (1.5 in.)
- The evaporator body has been coated with a type of resin that contains an antibacterial agent in order to minimize the source of foul odor and the propagation of bacteria. The substrate below this coating consists of a chromate-free layer to help protect the environment.



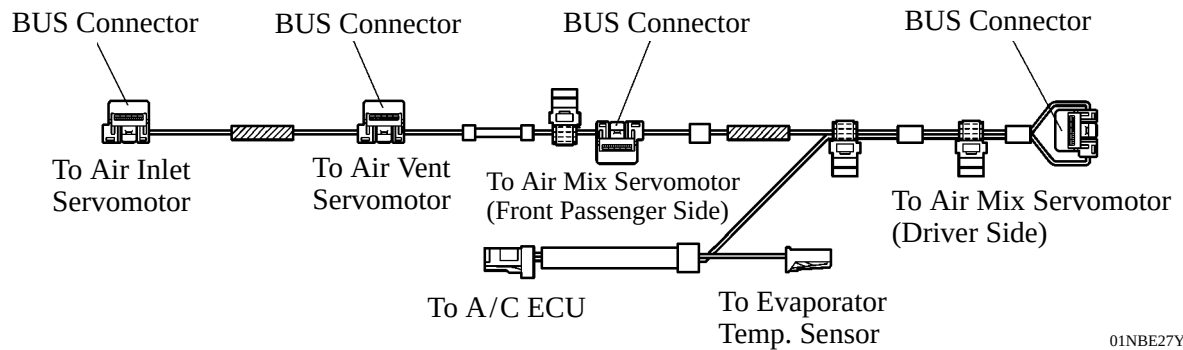
SFA-II Heater Core (SFA-II: Straight Flow Aluminum-II)

This heater core has been made more compact and higher performance by making the core section finer and improving the shapes of the tank section and flow section. Also, the environment is considered. By using aluminum as the material, the amount of the environmental burden disposal (lead) is reduced.

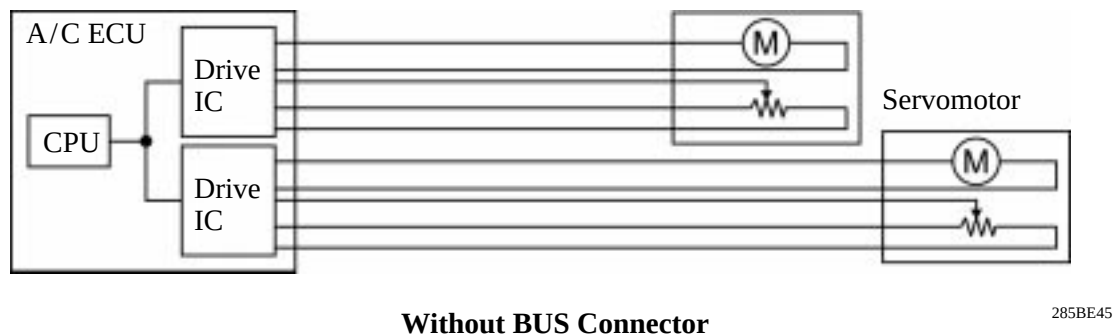
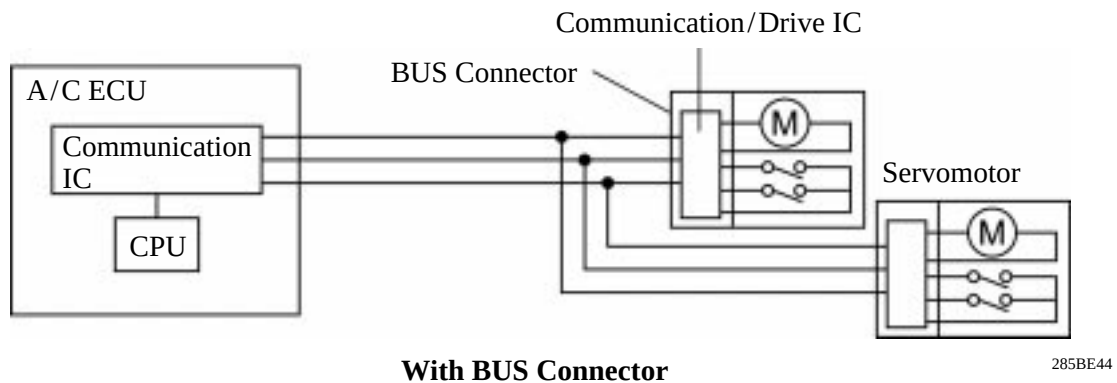


BUS Connector (Only for Models with Automatic Air Conditioning)

A BUS connector is used in the wire harness connection that connects the servomotor from the air conditioning ECU.



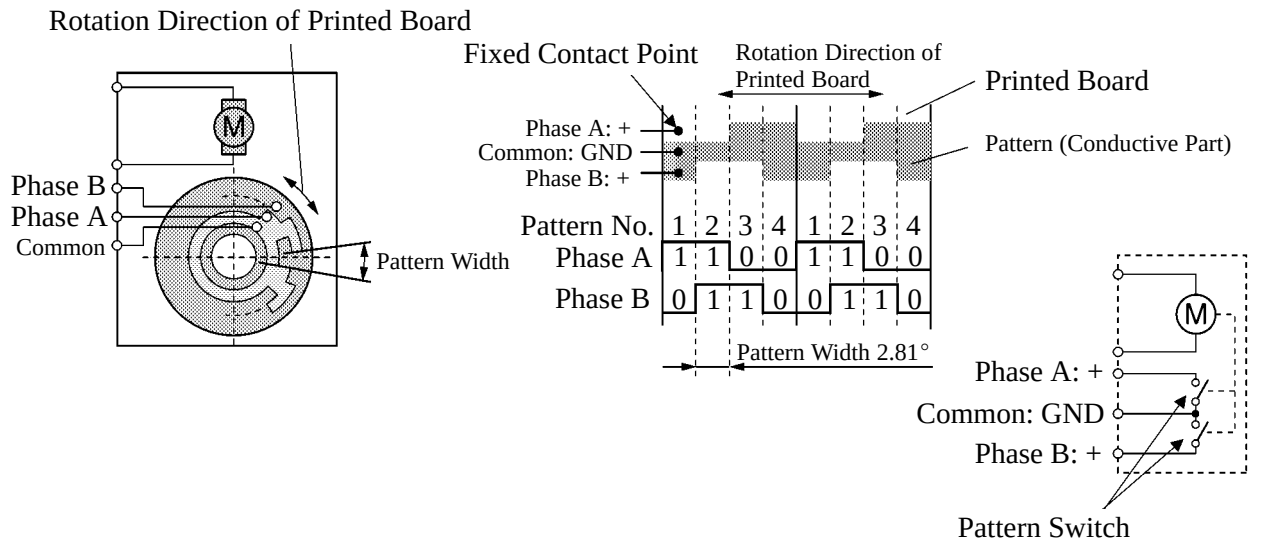
The BUS connector has a built-in communication/drive IC, which communicates with each servomotor connector, actuates the servomotor, and has a position detection function. This enables bus communication for the servomotor wire harness to realize a more lightweight construction and the reduced number of wires.



Servomotor (Only for Models with Automatic Air Conditioning)

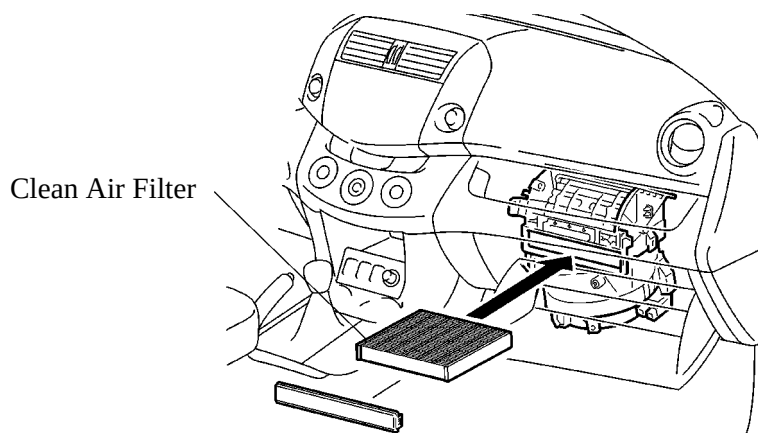
In contrast to the previous type that detects the position by way of a potentiometer voltage, the pulse pattern type servomotor detects the relative position by way of the 2-bit ON/OFF signals.

The forward and reverse revolutions of this motor are detected by way of two phases, A and B, which output four types of patterns. The air conditioning ECU counts the number of pulse patterns in order to determine the stopped position.



Clean Air Filter

A clean air filter (high efficiency type) is used to remove dust, pollen, and other micron particles from air entering from outside the vehicle to provide a comfortable cabin of clean air. The clean air filter is installed in the upper section of the blower fan for easy replacement of the clean air filter without the need for tools by removing the one-touch clip in the glove box, making this easy to service.



01NBE76Y

Service Tip

The clean air filter on the U.S.A models should be changed at 30,000 miles. On the Canada models, it should be changed at 16,000 km. However, it varies with the conditions or environment.

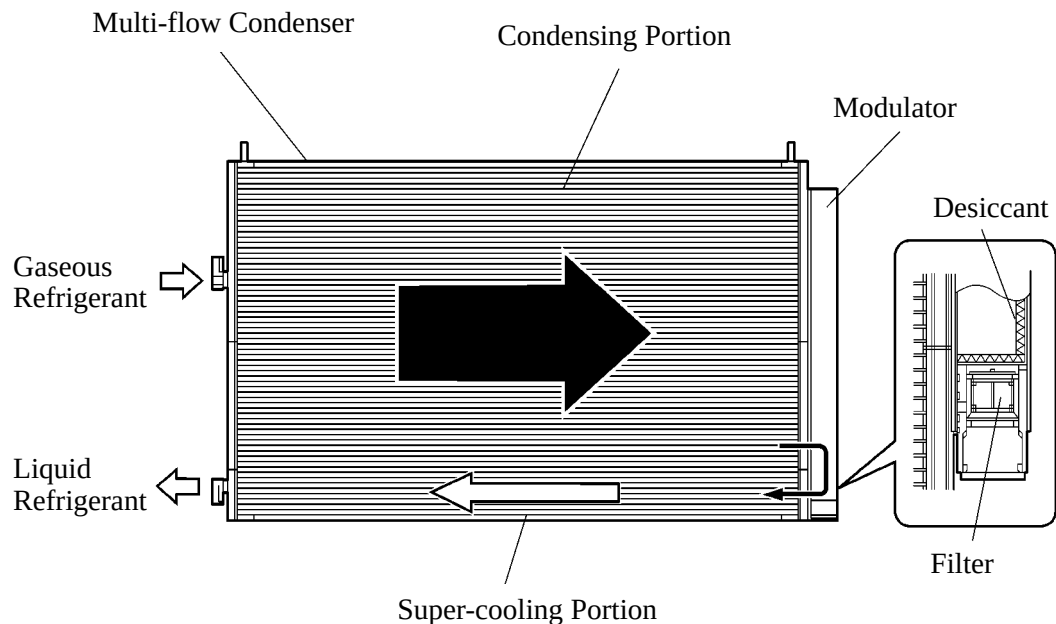
3. Condenser

General

The '06 models use a sub-cool condenser. This is a multi-flow condenser consisting of three portions: a condensing portion, a super-cooling portion and a gas-liquid separator (modulator) all integrated together. This condenser uses a sub-cool cycle for its cooling cycle system to improve heat-exchanging efficiency.

Sub-cool Cycle

In the sub-cool cycle, after the refrigerant passes through the condensing portion of the condenser, both the liquid refrigerant and the gaseous refrigerant that could not be liquefied are cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.

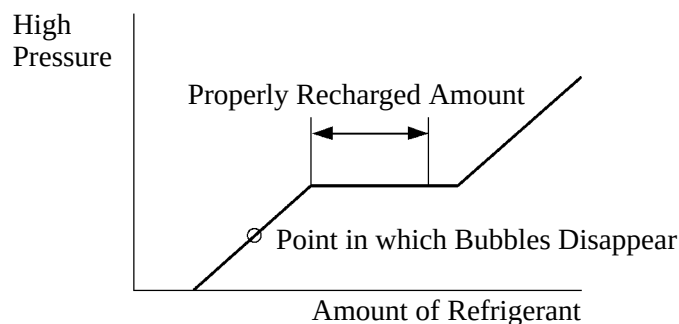


01NBE23Y

NOTE:

The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system is recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system will be affected. If the system is overcharged with refrigerant, this will also lead to a reduced performance.

For the proper method of verifying the amount of the refrigerant and to recharge the system with refrigerant, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).



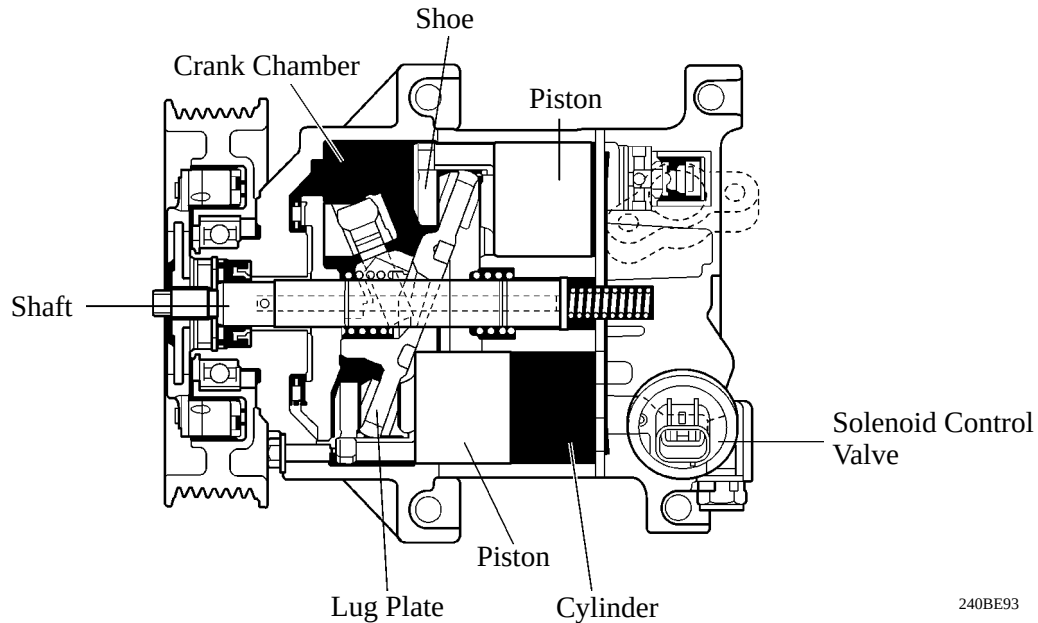
152BE40

4. A/C Compressor

General

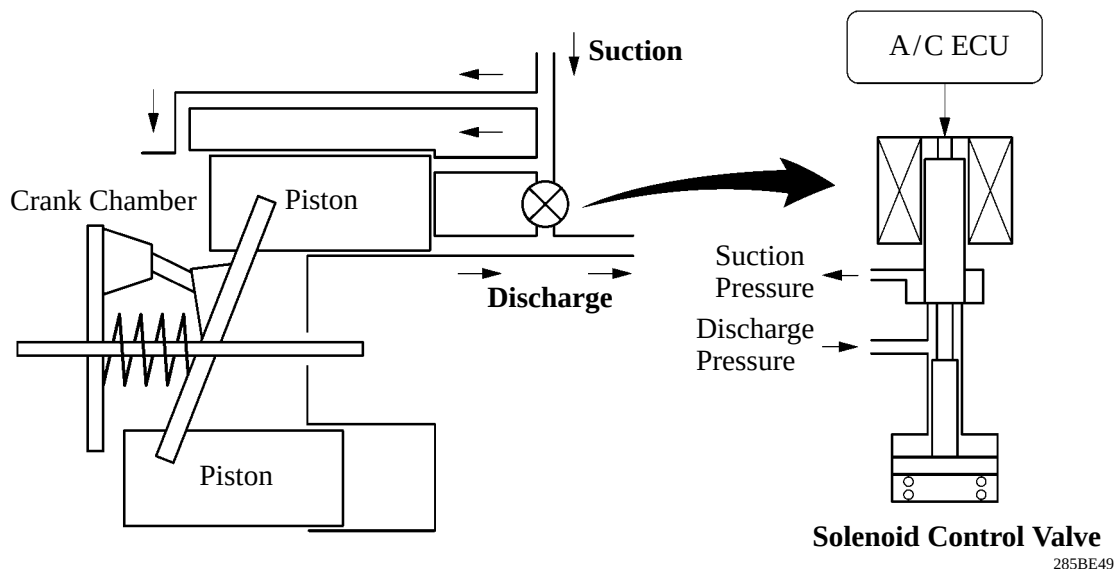
A/C compressor is continuously variable capacity type in which its capacity varies in accordance with the cooling load of the air conditioning.

- This compressor consists of the shaft, lug plate, piston, shoe, crank chamber, cylinder, and solenoid control valve.
- A solenoid control valve that adjusts the suction pressure so that the suction pressure can be controlled as desired is provided.
- The plastic DL (Damper Limiter) type A/C pulley is used.

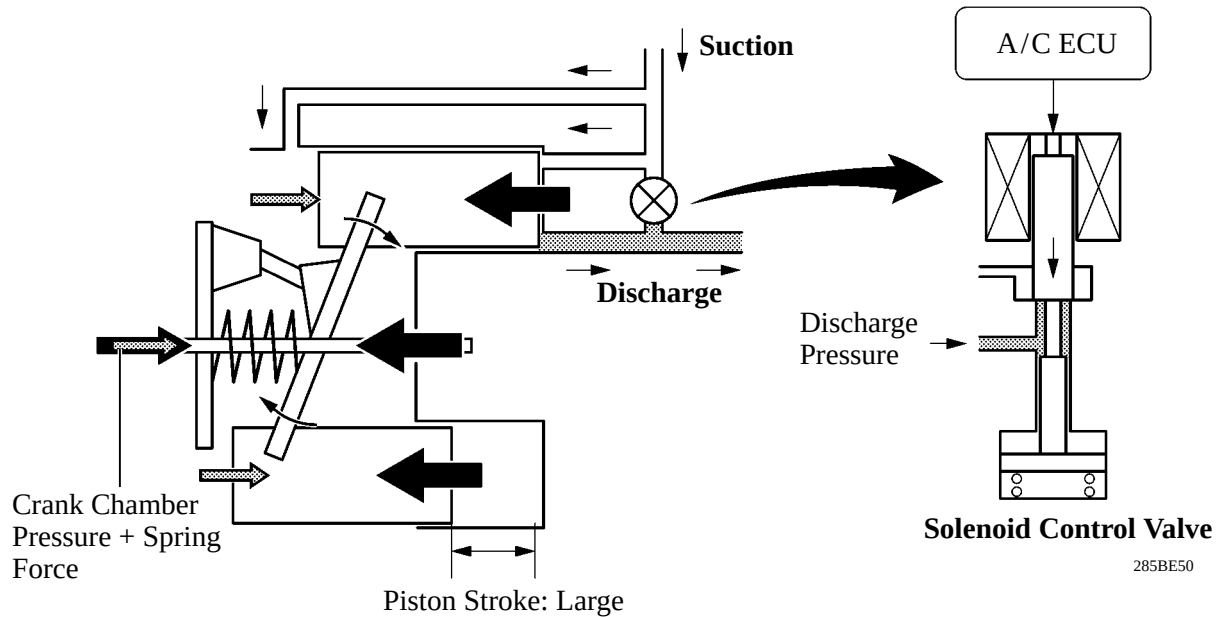


Operation

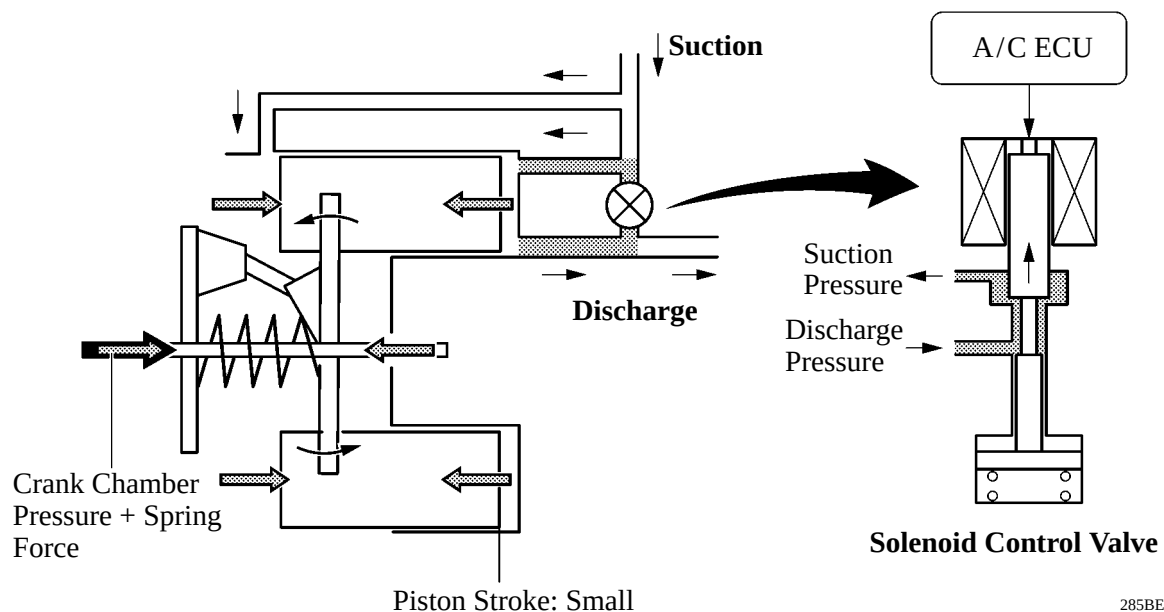
- The crank chamber is connected to the suction passage. A solenoid control valve is provided between the suction passage (low pressure) and the discharge passage (high pressure).
- The solenoid control valve operates under duty cycle control in accordance with the signals from the A/C ECU.



- When the solenoid control valve closes (solenoid coil is energized), a difference in pressure is created and the pressure in the crank chamber decreases. Then, the pressure that is applied to the right side of the piston becomes greater than the pressure that is applied to the left side of the piston. This compresses the spring and tilts the lug plate. As a result, the piston stroke increases and the discharge capacity increases.

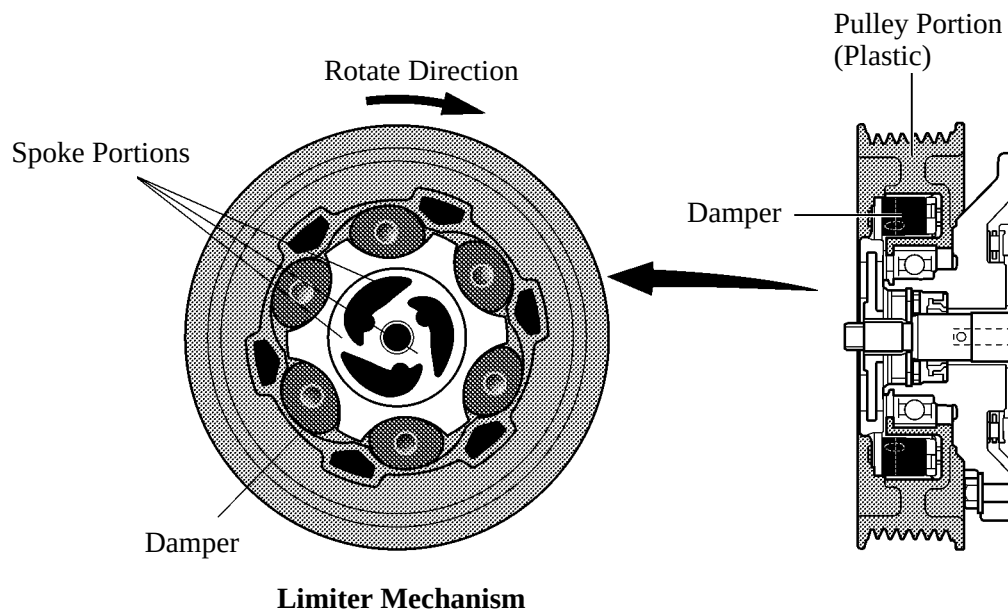


- When the solenoid control valve opens (solenoid coil is not energized), the difference in pressure disappears. Then, the pressure that is applied to the left side of the piston becomes the same as the pressure that is applied to the right side of the piston. Thus, the spring elongates and eliminates the tilt of the lag plate. As a result, there is no piston stroke and the discharge capacity decreases.



Plastic DL Type A/C Pulley

This pulley contains a damper to absorb the torque fluctuations of the engine and a limiter mechanism to protect the drive belt in case the compressor locks. In the event that the compressor locks, the limiter mechanism causes the spoke portion of the pulley to break, thus separating the pulley from the compressor. To reduce weight, the pulley portion is made of plastic.



240BE92

■ AIR CONDITIONING CONTROL

1. Air Conditioning ECU

The air conditioning ECU has following controls.

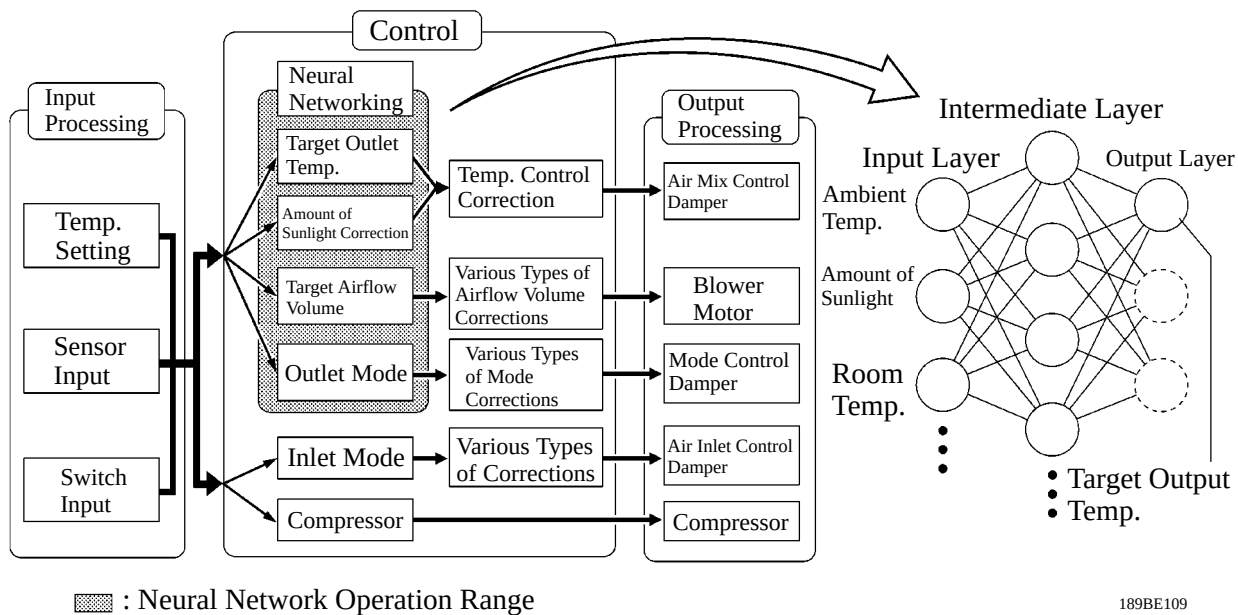
Control	Outline	Automatic	Manual
Neural Network Control [See next page]	This control is capable of effecting complex control by artificially simulating the information processing method of the nervous system of living organisms in order to establish a complex input/output relationship that is similar to a human brain.	○	—
Outlet Air Temperature Control	In compliance with the temperature setting at the temperature control switch, the neural network control calculates the outlet temperature based on the input signals from various sensors. In addition, corrections in accordance with the signals from the evaporative temperature sensor and the water temperature sensor are added to control the outlet air temperature.	○	—
Blower Control	Controls the blower motor in accordance with the airflow volume that has been calculated by the neural network control based on the input signals from various sensors.	○	—
Air Outlet Control	Automatically switches the outlets in accordance with the outlet mode ratio that has been calculated by the neural network control based on the input signals from various sensors.	○	—
Air Inlet Control	Automatically controls the air inlet control damper in accordance with the airflow volume that has been calculated by the neural network control.	○	—
Variable Capacity Compressor Control	Controls the compressor to turn ON/OFF and the discharge capacity based on the signals from various sensors.	○	○
Outer Temperature Indication Control	Based on the signals from the ambient temperature sensor, this control calculates the outside temperature, which is then corrected in the air conditioning ECU, and shown in the multi-information display in the combination meter and air conditioning panel.	○	—
Rear Window Defogger Control	Switches the rear defogger on for 15 minutes when the rear defogger switch is switched on. Switches it off if the switch is pressed while it is operating.	○	—
Micro Dust and Pollen Filter Control [See page BE-37]	Quickly removes pollen from the face areas of the driver and front passenger when the micro dust and pollen filter switch is pressed.	○	—
Self-diagnosis	Checks the sensors in accordance with operation of air conditioning switches, then clock displays a DTC (Diagnosis Trouble Code) to indicate if there is a malfunction or not (sensor check function).	○	○
	Drives the actuators through a predetermined sequence in accordance with the operation of the air conditioning switches (actuator check function).	○	—

2. Neural Network Control

- In the previous automatic air conditioning system, the ECU determined the required outlet air temperature and blower air volume in accordance with the calculation formula that has been obtained based on information received from the sensors.

However, because the sensors of a person are rather complex, a given temperature is sensed differently, depending on the environment in which the person is situated. For example, a given amount of solar radiation can feel comfortably warm in a cold climate, but extremely uncomfortable in a hot climate. Therefore, as a technique for effecting a higher level of control, a neural network is used in the automatic air conditioning system. With this technique, the data that has been collected under varying environmental conditions is stored in the ECU, which effects control to provide enhanced air conditioning comfort.

- The neural network control consists of neurons in the input layer, intermediate layer, and output layer. The input layer neurons process the input data of the outside temperature, the amount of sunlight, and the room temperature based on the outputs of the switches and sensors, and output them to the intermediate layer neurons. Based on this data, the intermediate layer neurons adjust the strength of the links among the neurons. The sum of these is then calculated by the output layer neurons in the form of the required outlet temperature, solar correction, target airflow volume, and outlet mode control volume. Accordingly, air conditioning ECU controls the servomotors and blower motor in accordance with the control volumes that have been calculated by the neural network control.

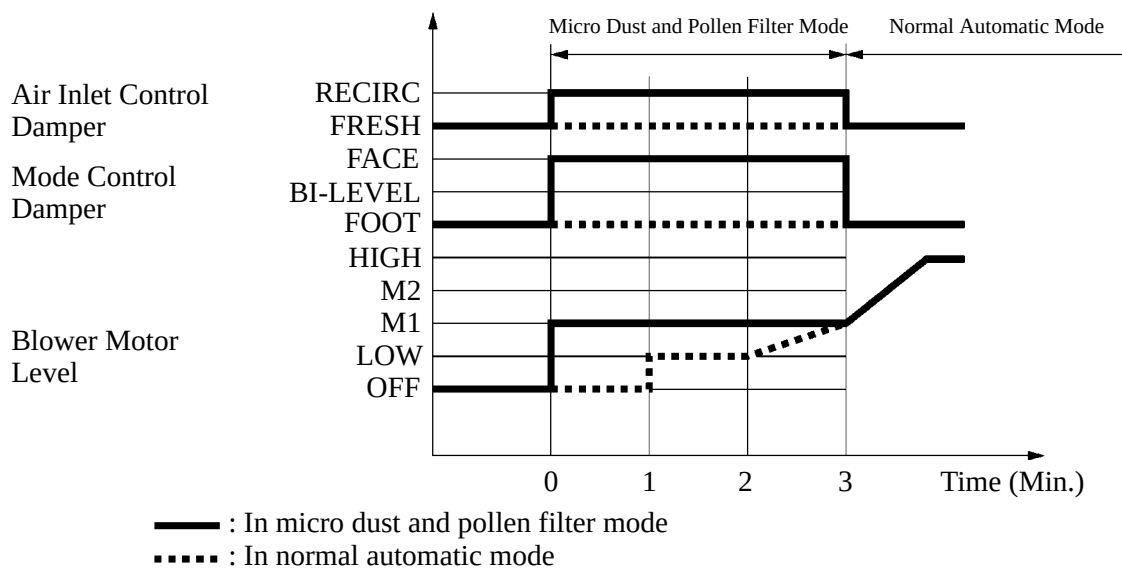


3. Micro Dust and Pollen Filter Control

Operation

- When the micro dust and pollen filter switch is pressed, the air conditioning ECU changes to the recirculation mode and face mode. This allows the air conditioning to direct clean air, which has passed through the clean air filter, to the face areas. Thus, the air conditioning removes pollen and captures it in the clean air filter.
- From the micro dust and pollen filter control, the air conditioning automatically resumes normal automatic mode control after 3 minutes at normal temperatures, or after 1 minute when the outside temperature is low (5°C maximum).

► Example of Operation in Warm-up ◀



01NBE02Y

4. Self-diagnosis

The air conditioning ECU has a self-diagnosis function. It stores any operation failures in the air conditioning system memory in the form of DTC (Diagnostic Trouble Code).

For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

AIR CONDITIONING

■ DESCRIPTION

The '06 models have an air conditioning system with the following equipments.

●: Standard —: Not Available

Destination		U.S.A./CANADA	
Grade		Standard/Sport	Limited
Air Conditioning	Manual	●	—
	Automatic	—	●
Heater	Standard	●	●

- On the Limited grade, the automatic air conditioning has right-left independent control and micro dust and pollen filter function as standard equipment.
- The partial recirculation system and rear footwell register duct are provided on all models, achieving a faster heating effect in cold areas.

► Performance ◀

Heater	Heater Output	W (Kcal/h)	5200 (4471)
	Air Flow Volume	m ³ /h	330
	Power Consumption	W	190/205*
Air Conditioning	Cooling Capacity	W (Kcal/h)	5100 (4385)
	Air Flow Volume	m ³ /h	475
	Power Consumption	W	240/250*

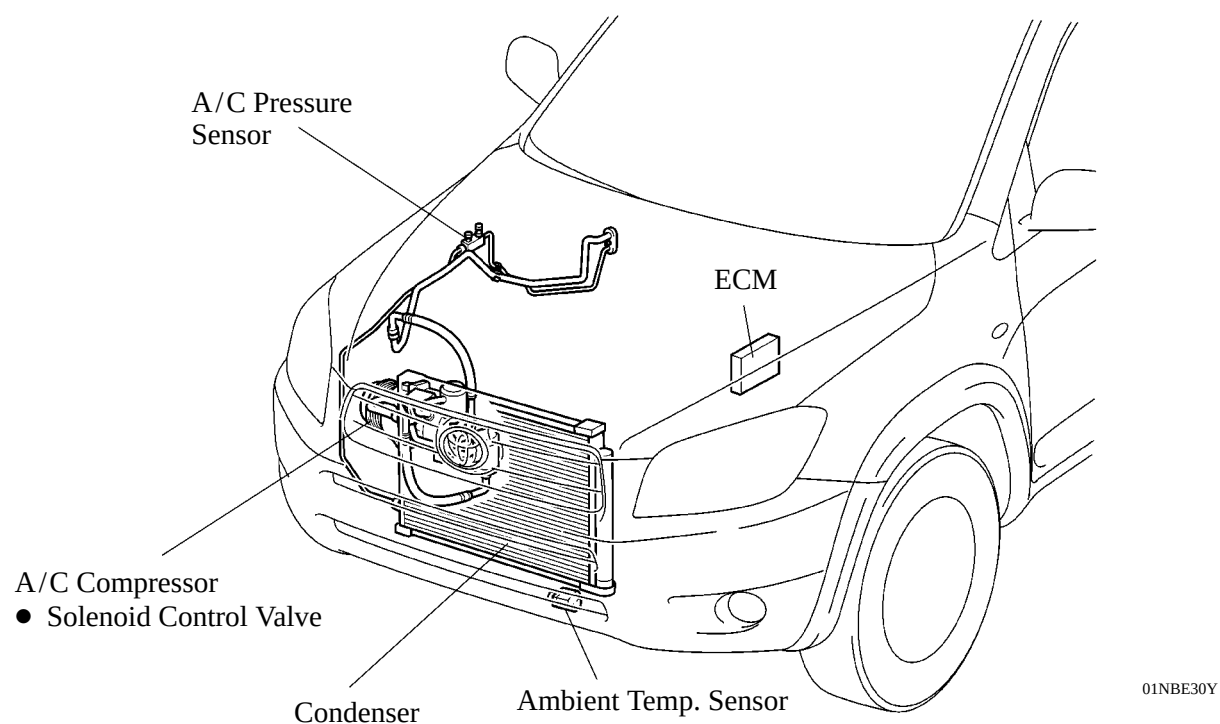
*: Only for Automatic A/C Models

► Specifications ◀

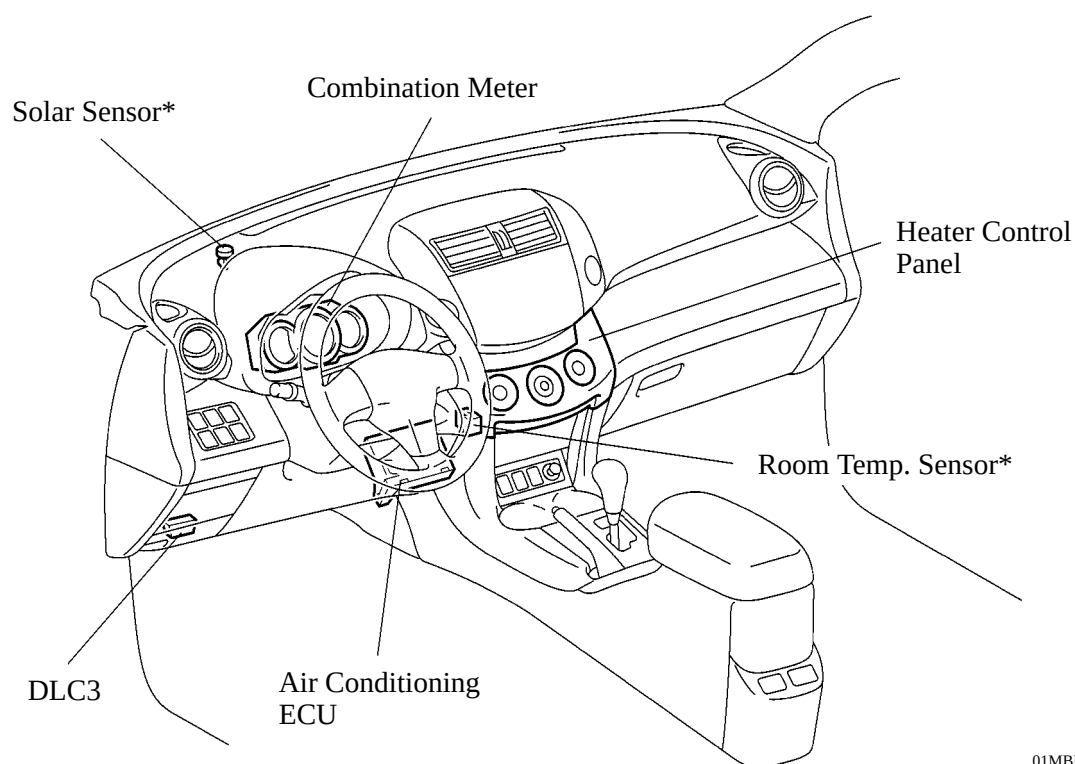
Ventilation and Heater Core	Heater Core	Type	SFA-II (Straight Flow Aluminum-II)
		Size W x H x L mm (in.)	201.5 x 150 x 27 (7.9 x 5.9 x 1.1)
		Fin Pitch mm (in.)	1.8 (0.07)
	Blower	Motor Type	K70-10T/K70-9.5T* ¹
		Fan Type	Semi Sirocco
		Fan Size Dia. x H mm (in.)	155 x 70 (6.1 x 2.8)
Air Conditioning	Condenser	Type	Multi-flow IV (Sub Cool)
		Size W x H x L mm (in.)	415 x 680 x 16 (16.3 x 26.8 x 0.6)
		Fin Pitch mm (in.)	2.75 (0.11)
	Evaporator	Type	Revolutionary & Super Slim
		Size W x H x L mm (in.)	241 x 226.1 x 38 (9.5 x 8.9 x 1.5)
		Fin Pitch mm (in.)	3.0 (0.12)
	Compressor	Type	5SE12
		Pulley	Plastic DL (without Magnetic Clutch)
	Refrigerant	Type	R134a
		Charge Volume g	490 ± 30/450 ± 30* ²
Clean Air Filter			High Efficiency
Low Heat Source Countermeasure			Partial Recirculation System

*¹: Only for Automatic A/C Models*²: Only for 2AZ-FE Engine Models

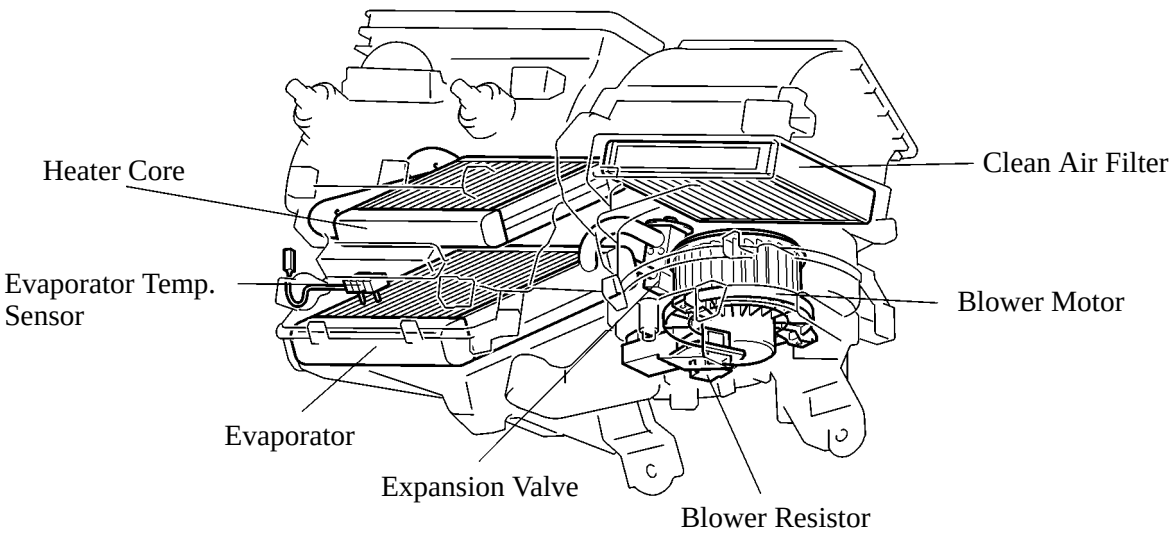
■ LAYOUT OF MAIN COMPONENTS



With Air Conditioning Models

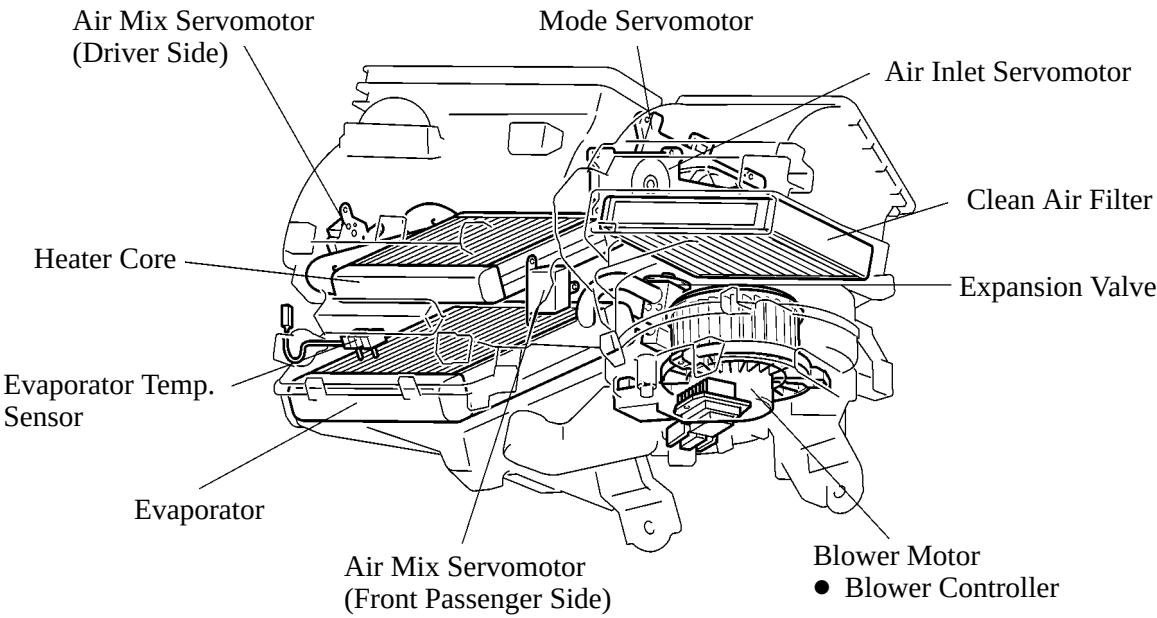


*: Only for Models with Automatic Air Conditioning



Manual Air Conditioning Models

01NBE19Y



Automatic Air Conditioning Models

01NBE20Y

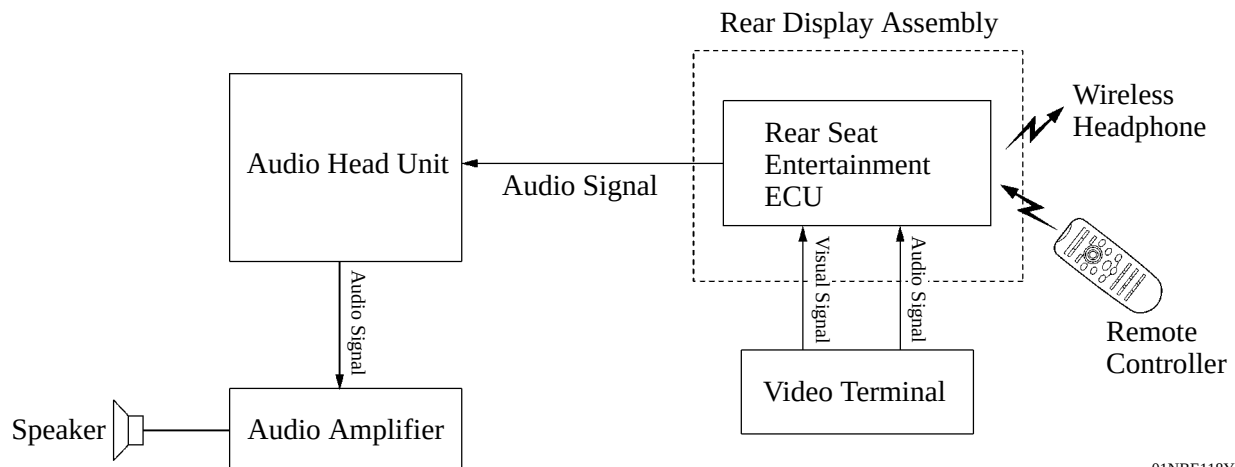
AUDIO SYSTEM

■ RSES (Rear Seat Entertainment System)

General

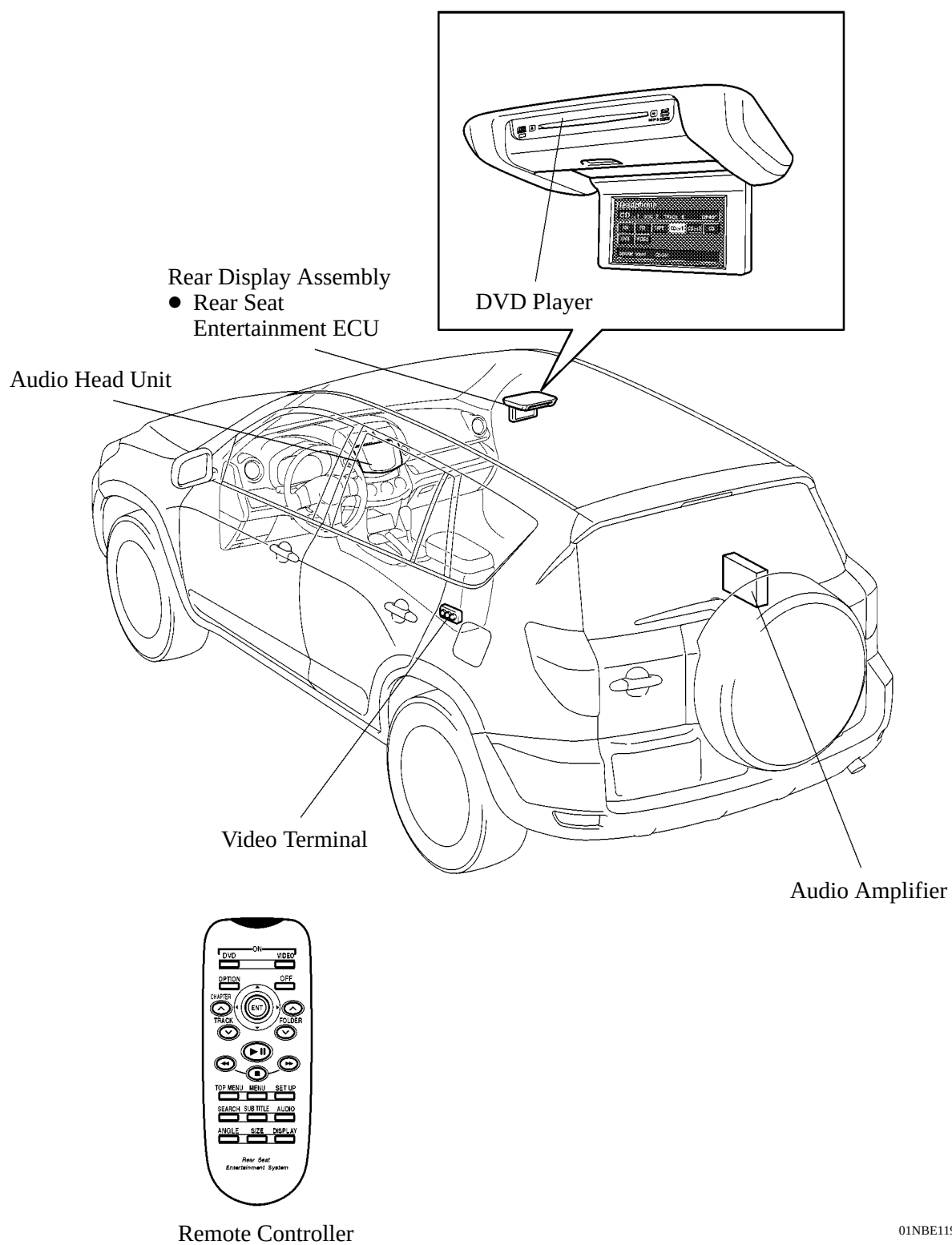
- The RSES (Rear Seat Entertainment System) is available as optional equipment on the Limited grade for U.S.A. models.
- It uses a 9-inch rear display to provide impressive video images to the rear seat occupants.
- It supports the MP3 (MPEG Audio Layer-3) system.
- The maximum opening angle of the rear display is 125°, which dramatically increases the viewing range in the downward direction.
- The rear display can be set at any position. Thus, the users can set the rear display to a position that gives them the best view.
- When the RSES is on, and the ignition switch is turned OFF, the RSES will also turn off. When the ignition switch is turned back ON, the RSES will automatically turn on. At this time, the RSES can resume playing the video image from the point the ignition switch was turned OFF.
- A child lock function is provided to disable the operation of the RSES through the remote controller. This function is activated by turning on the RSE LOCK at the audio head unit.
- The rear seat entertainment ECU is built into the rear display assembly.
- The RSES can be operated only through the remote controller.
- The RSES is controlled by the rear seat entertainment ECU.

System Diagram



01NBE118Y

Layout of Main Components



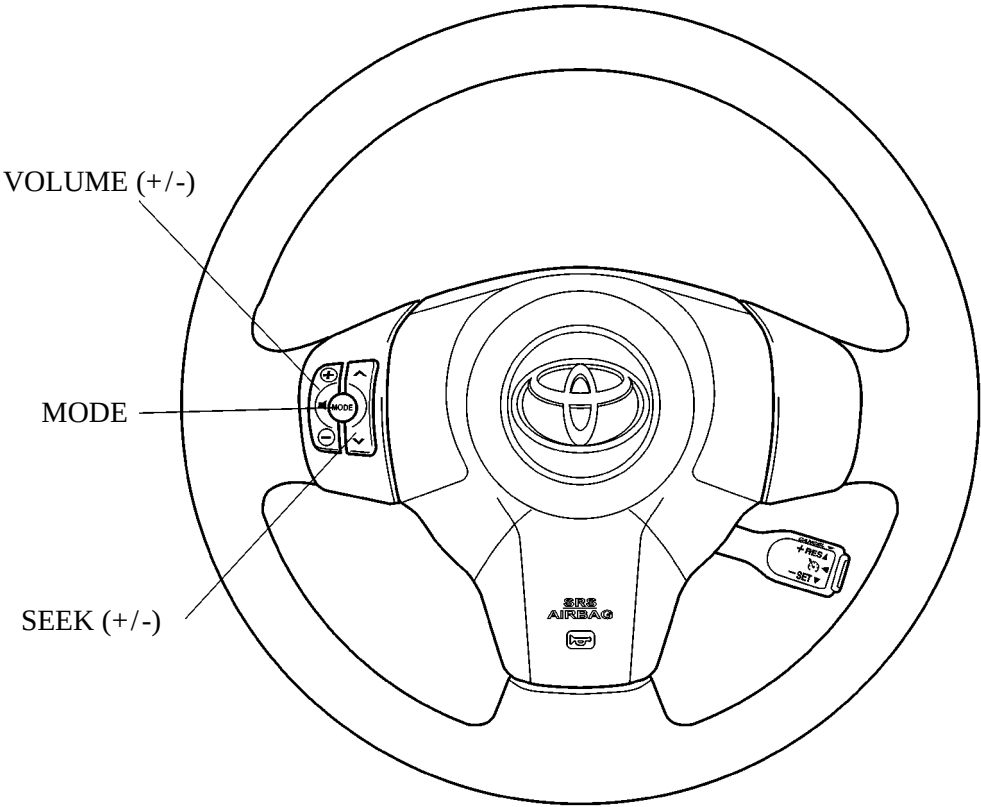
Function of Main Components

Component	Function
Rear Display Assembly	● Displays DVD and video images. ● Receives signals from the remote controller. ● Outputs audio signals to the wireless headphones in the form of infrared signals. ● Controls the distribution of the audio-visual mode to the front (audio head unit) and rear (RSES). ● Processes visual and audio signals from the DVD player and video player, and outputs them to the rear display assembly and headphone terminals. ● Displays the audio-visual control screen. ● Displays the adjustment screen. ● Displays the diagnosis screen. ● The diagnosis screen appears when the diagnosis mode is started on the audio head unit. For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).
Audio Head Unit	● Outputs audio signals to the audio amplifier. ● Outputs a request to the rear display assembly to start the diagnosis mode.
Remote Controller	Outputs various control signals of the RSES to the rear display assembly in the form of infrared signals.
Wireless Headphone	● Receives the audio signals from the rear display assembly in the form of infrared signals. ● Volume adjustment of the wireless headphone can be done by using the volume switch equipped on the wireless headphone.
Video Terminal	This terminal is for connecting the video player's video and audio output terminals.

■ STEERING PAD SWITCH

- A steering wheel with steering pad switches is standard equipment on the Limited grade and optional equipment on the Sport grade. The switches used frequently are located on the steering pad for easy use.
- Listed below are the other main functions of the steering pad switch.

Function			Short Push	Long Push
Steering Pad Switch	VOLUME (+/-)		Volume up/down	Continuous vol. up/down
	SEEK (+/-)	AM/ FM	Channel up/down	Seek up/down
		CD	Track up/down	Disc up/down
	MODE		Switching AM/FM, CD	OFF



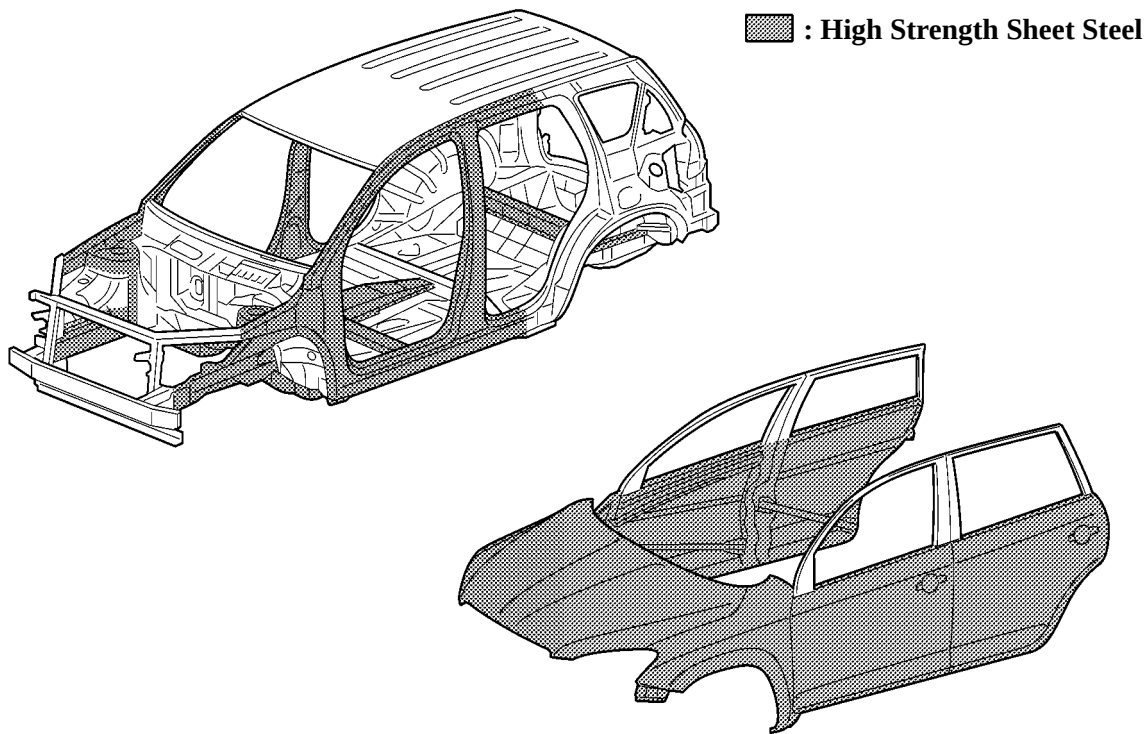
BODY

BODY STRUCTURE

■ LIGHTWEIGHT AND HIGHLY RIGID BODY

1. High Strength Sheet Steel

High strength sheet steel is used in order to realize excellent body rigidity and a lightweight body.



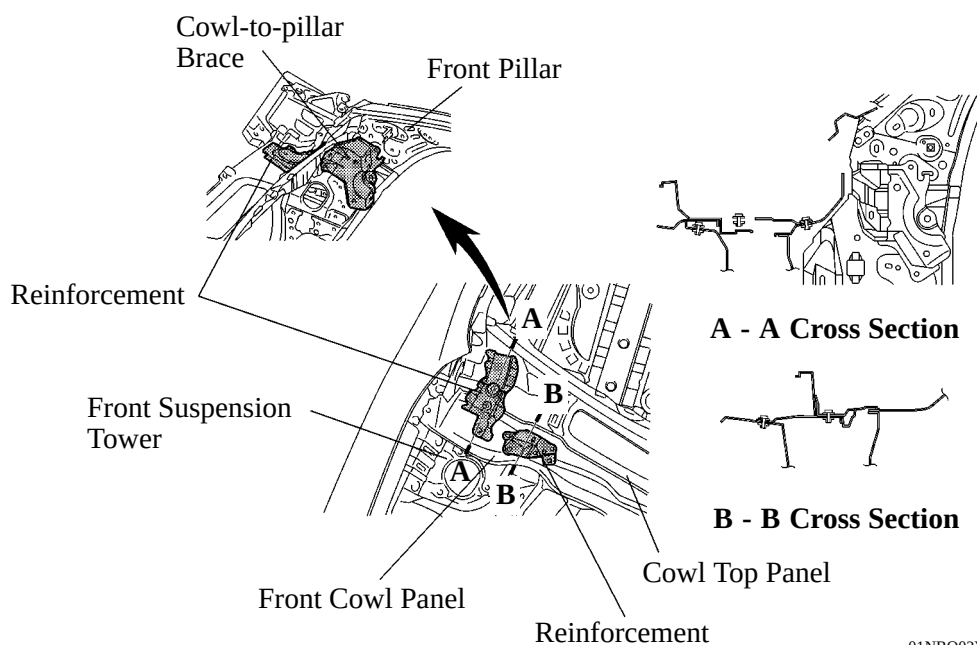
Long Body Model

01MBO05Y

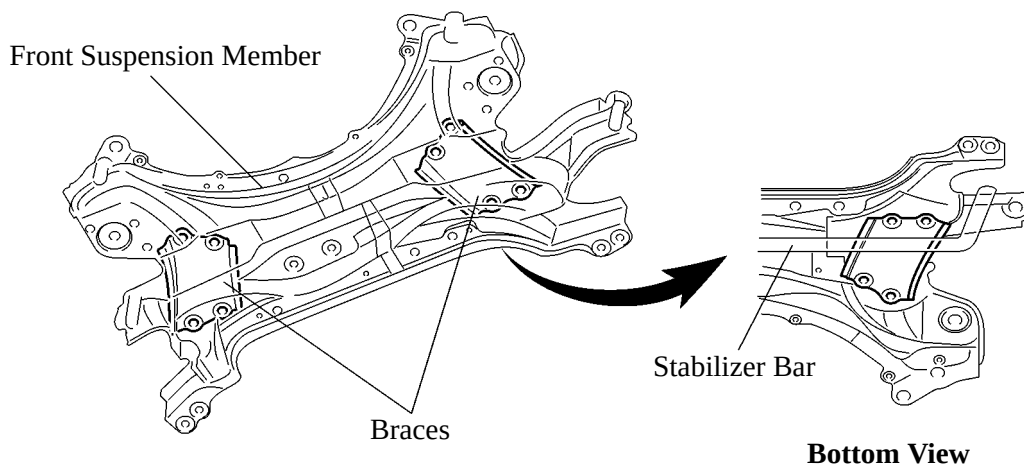
2. Body Shell Construction

Front Portion

- The front suspension tower, the cowl top panel, and the front pillar are joined with reinforcements to help ensure the rigidity of the body.
- The right and left front suspension towers are joined at the front cowl panel to help ensure the rigidity of the body.
- A cowl-to-pillar brace has been provided at the area where the instrument panel reinforcement is mounted, in order to suppress steering vibration.

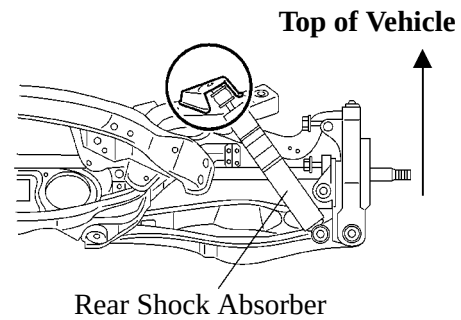
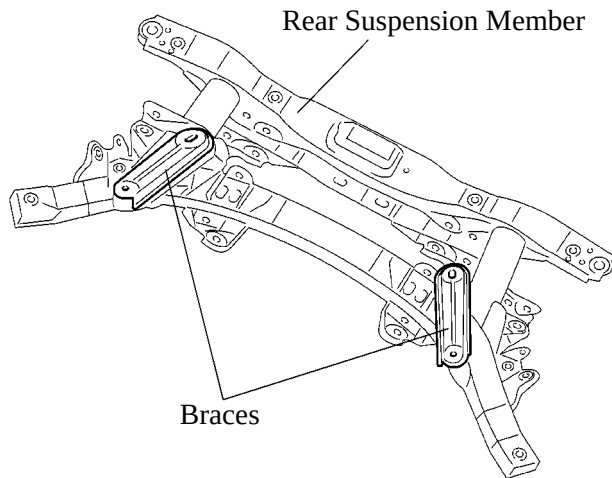


- Braces have been provided at the bottom of the front suspension member to help ensure the rigidity of the front suspension member in the longitudinal direction.



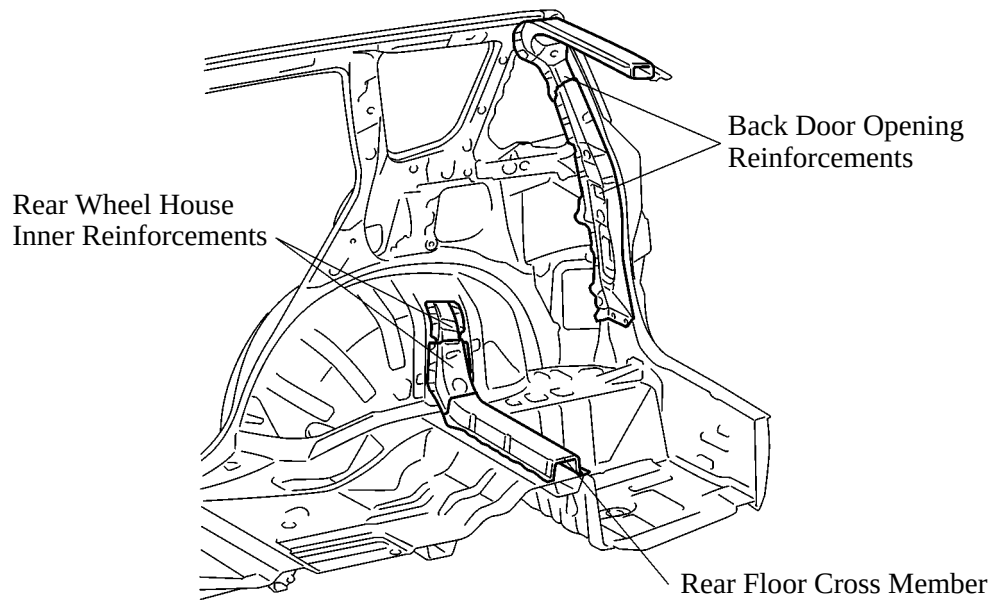
Rear Portion

- The area for mounting the rear shock absorber has been changed from the inside of the rear wheel housing to the rear suspension member, in order to enlarge the space of the vehicle interior.
- Braces have been provided at the rear suspension member to help ensure rigidity and driving stability.

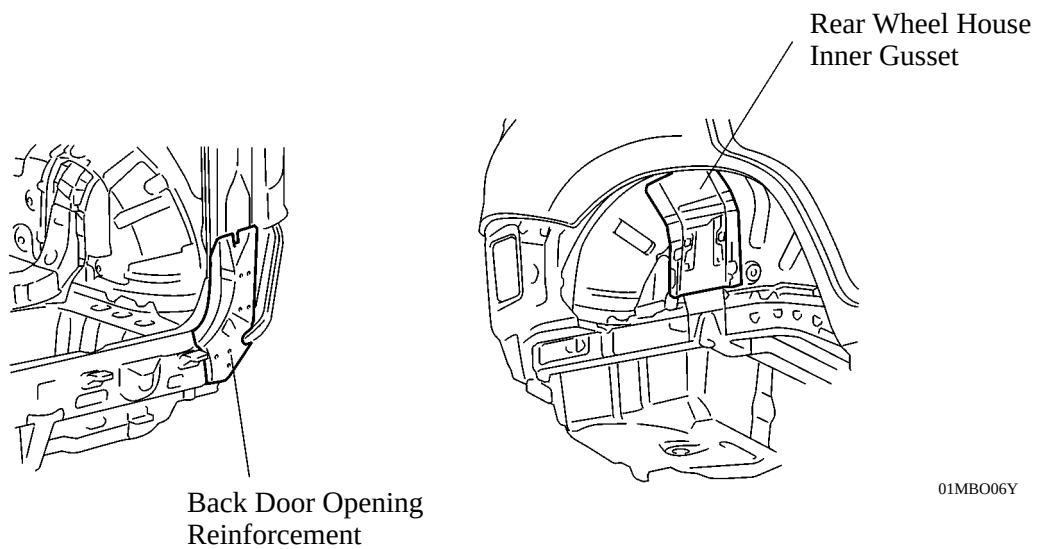
**Back View**

01NBO05Y

- Reinforcements have been located effectively around the back door opening and around the area to which the rear suspension is mounted, in order to help ensure the torsional rigidity of the body.



Long Body Model



01MBO06Y

METER

■ COMBINATION METER

1. General

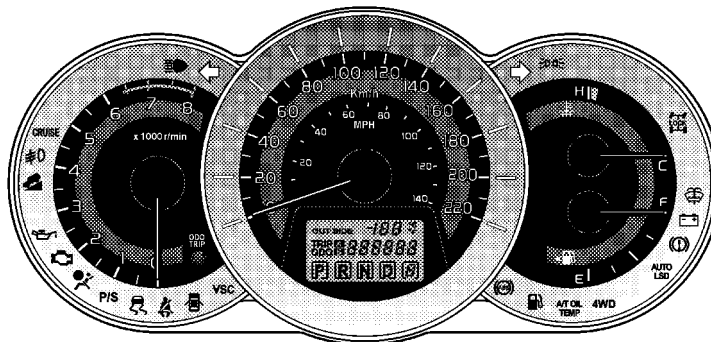
The combination meter in the '06 models has the following features:

- The Optitron display type combination meter is used.
- The Optitron display type combination meter realizes excellent visibility through the use of smoke acrylic in the protective panel, and LEDs (Light Emitting Diodes) that are very bright and have high contrast for illuminating the indicator and dial.
- The step-motor is used to actuate the indicator of the speedometer, the tachometer, the fuel gauge and the water temperature gauge.
- LCDs (Liquid Crystal Displays) are used for the odometer, trip meter, and shift position indicator light.
- A meter ECU and multi buzzer are enclosed in the combination meter. This ECU maintains communication with other ECUs through the CAN (Controller Area Network).
- An oil replacement reminder light has been established in the combination meter, which will light or flash to remind the driver to change the engine oil. (Only for the U.S.A. models)



U.S.A. Model

01MMO15Y



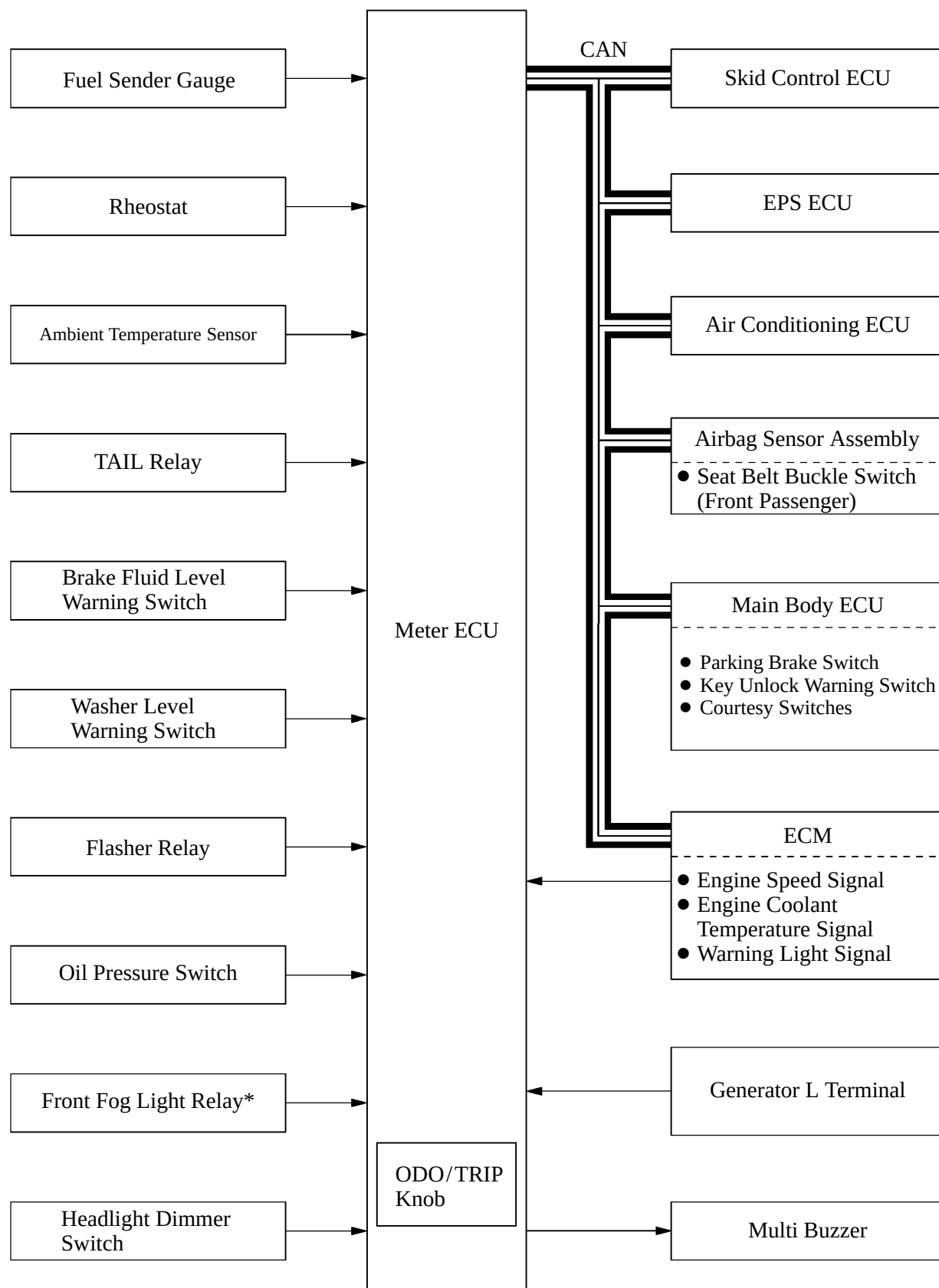
CANADA Model

00MBE27Y

Service Tip

If the LEDs have a malfunction, it must be replaced as a combination meter assembly. Refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

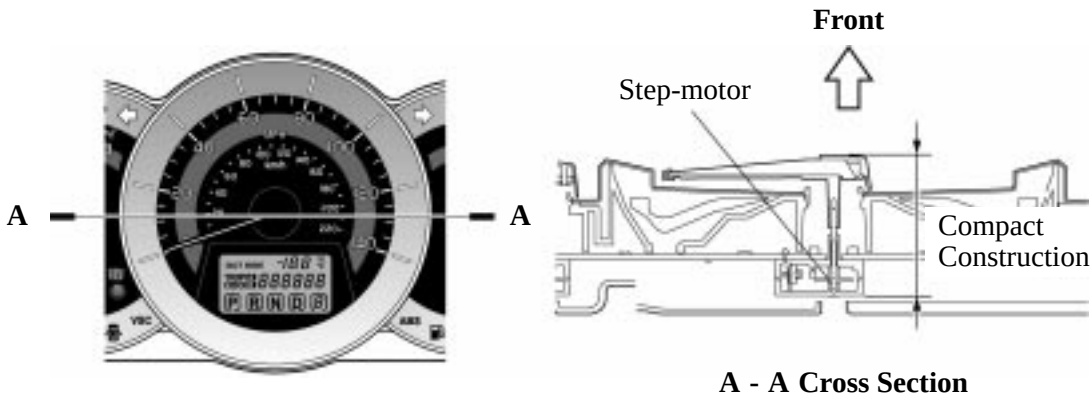
2. System Diagram



*: Models with Front Fog Light

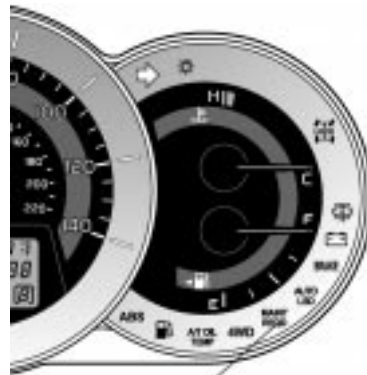
3. Construction

- The step-motor is used to actuate the indicator of the speedometer, the tachometer, the fuel gauge and the water temperature gauge.
- This has resulted in a thinner pointer movement, thus achieving a lightweight and compact construction.
- In the step-motor type, when the power to the combination meter is turned on through the reconnection of the battery terminal, the step-motor initializes once to recognize the zero point of the indicator in relation to the step-motor. However, if the ignition switch is turned ON after 60 seconds or more have elapsed after the initialization, the step-motor initializes again.



4. Oil Replacement Reminder Light (U.S.A. Models)

- An oil replacement reminder light will illuminate or flash to remind the driver to change the engine oil depending on the vehicle driving distance.
- Illuminating and flashing of the oil replacement reminder light are operated based on the accumulated vehicle driving distance memorized in the combination meter (meter ECU).
- The meter ECU calculates the vehicle driving distance based on the signals from the skid control ECU.
- This light has a bulb check function and an oil replacement reminder function.
- When turning the ignition switch ON, the meter ECU will turn on the oil replacement reminder light for 3 seconds for the bulb check.
- When the accumulated vehicle driving distance memorized in the meter ECU exceeds 4500 miles (7200 km) after being reset, the meter ECU will flash the oil replacement reminder light for 15 seconds after the bulb check and remind the driver that the engine oil needs to be changed shortly.
- When the accumulated vehicle driving distance memorized in the meter ECU exceeds 5000 miles (8000 km) after being reset, the meter ECU will keep the oil replacement reminder light on immediately and remind the driver to change the engine oil.



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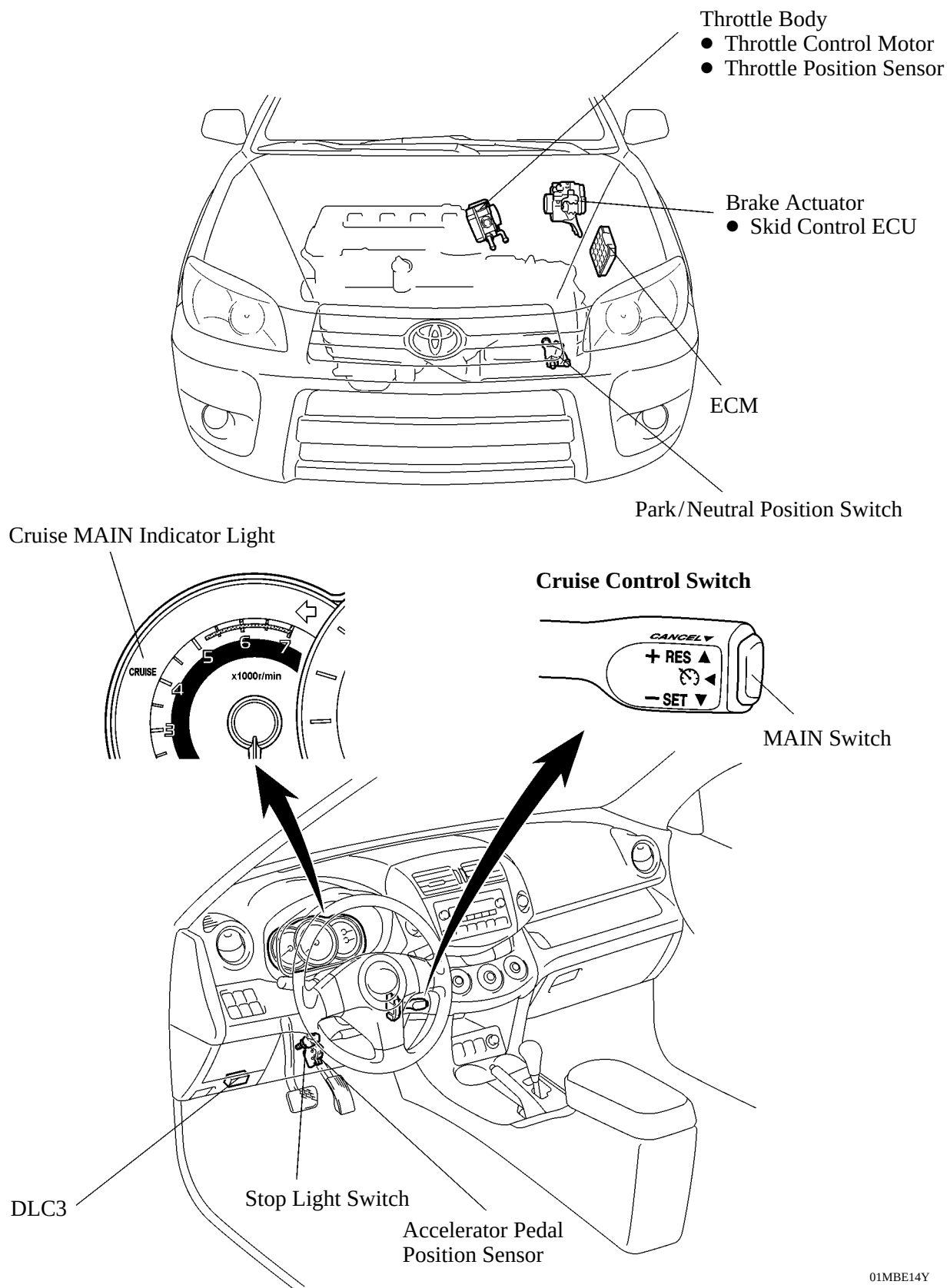
Oil Replacement
Reminder Light

Service Tip

The accumulated vehicle driving distance memorized in the meter ECU can be reset by the following procedures.

- 1) Turn the ignition switch ON and make sure that the odo/trip display screen is in the Trip A mode.
- 2) Turn the ignition switch OFF. Then, while pressing the ODO/TRIP knob, turn the ignition switch ON again. (Note: hold down the knob throughout the entire reset procedure.)
- 3) The odometer indicates “000000” and then the oil replacement reminder light goes off.
- 4) When the light goes off, release the ODO/TRIP knob. The mode should change to Trip A.
- 5) Turn the ignition switch OFF. Turn the ignition switch ON again and confirm that the oil replacement reminder light goes on for 3 seconds and then goes off.
- 6) This completes the reset procedure.

■ LAYOUT OF MAIN COMPONENTS



CRUISE CONTROL SYSTEM

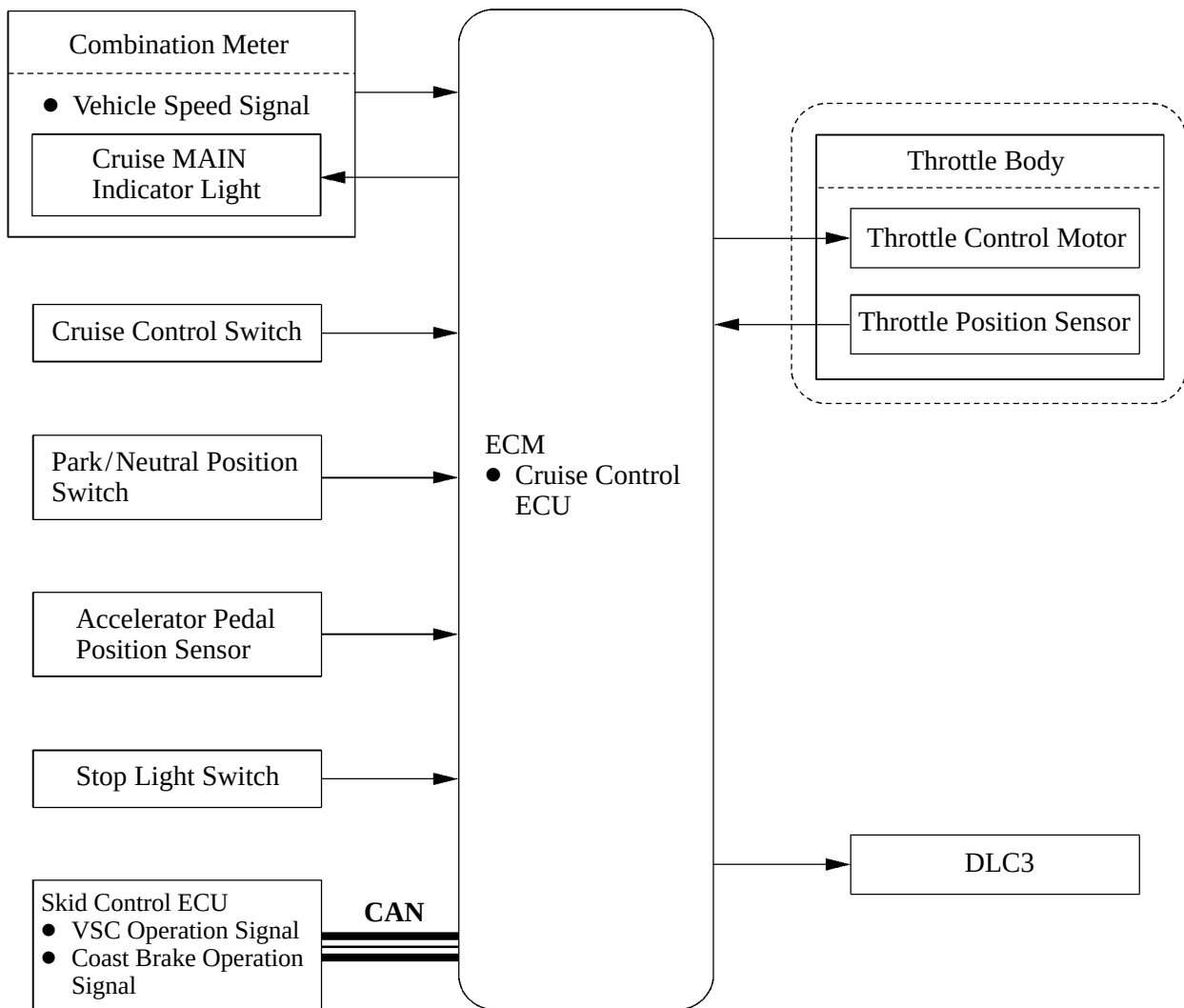
DESCRIPTION

Once the system is set to a desired vehicle speed, the throttle valve position is adjusted automatically to maintain the vehicle speed without depressing the accelerator pedal.

- This system effects control through the ETCS-i system.
- The cruise control ECU is integrated in the ECM.

The cruise control system with coast brake function is standard equipment on all the '06 models.

► System Diagram ◀



■ SYSTEM CONTROL

1. General

The cruise control system has the following functions:

Function	Outline
Constant Speed Control	The ECM compares the actual vehicle speed and the set speed. If the vehicle speed is higher than the set speed, the ECM activates the throttle control motor in the throttle closing direction. If the vehicle speed is lower than the set speed, the ECM activates the throttle motor in the throttle opening direction.
Set Control	When the MAIN switch is turned on and the cruise control switch is pressed to the SET/-side and released, the engine ECU stores the vehicle speed in the memory and continues to control the vehicle at that speed.
Coast Control	When the cruise control switch is kept pushed to the SET/-side while running in the cruise control mode, the throttle control motor is energized in the throttle closing direction, and the vehicle keeps decelerating. The ECM stores the vehicle speed when the cruise control switch is released. From then on, the ECM controls the vehicle speed at that speed constantly.
Coast Brake	In addition to the abovementioned coast control, the skid control ECU applies slight braking of approximately 0.1G upon receiving a deceleration request from the ECM, in order to quickly decelerate the vehicle to the set speed.
Tap-down Control	When the difference between the actual vehicle speed and the set speed is less than 5 km/h (3 mph), the set speed can be lowered approx. 1.6 km/h (1 mph) each time by operating the SET/-switch quickly within approx. 0.6 seconds.
Accelerator Control	When the cruise control switch is kept pushed to the RES/+ side while running in the cruise control mode, the throttle control motor is energized in the throttle opening direction. The vehicle keeps accelerating and the ECM stores the vehicle speed when the cruise control switch is released. From then on, the ECM controls the vehicle speed at that speed constantly.
Tap-up Control	When the difference between the actual vehicle speed and the set speed is less than 5 km/h (3 mph), the set speed can be increased approx. 1.6 km/h (1 mph) each time by operating the RES/+ switch quickly within approx. 0.6 seconds.
Low Speed Limit Control	The low speed limit is the lowest speed that cruise control can be set and is designed at approx. 40 km/h (25 mph). The cruise control cannot be set below that speed. If the vehicle speed drops below that speed while running in the cruise control mode, the cruise control is cancelled automatically but the set speed in the memory is maintained.
High Speed Limit Control	The high speed limit is the highest speed that cruise control can be set and is designed at approx. 200 km/h (124 mph). ● The cruise control cannot be set if the vehicle speed exceeds the high speed limit. ● The vehicle will not accelerate when the RES/+ switch is operated if the vehicle speed exceeds the high speed limit.
Manual Cancel Control	If any of the following signals is sent to the ECM while the vehicle is running in the cruise control mode, the cruise control mode is cancelled accordingly. ● Stop light switch ON signal (Depress the brake pedal) ● CANCEL switch ON signal ● MAIN switch OFF signal

(Continued)

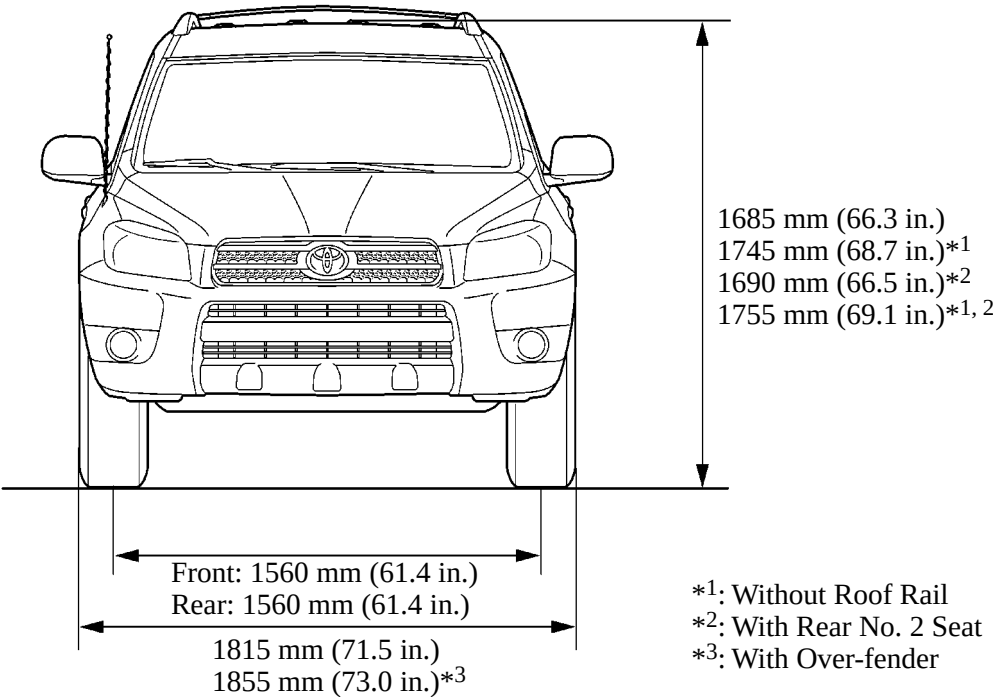
Function	Outline
Resume Control	After the cruise control mode is cancelled by any of the cancel switches, the mode can be resumed and controlled at the set speed by operating the cruise control switch in the RES/+ direction when the vehicle speed returns above the low speed limit [approx. 40 km/h (25 mph)].
Automatic Transmission Control	When the vehicle is cruising uphill, there is a case where the overdrive function turns off depending on the ECT (Electronic Control Transmission) control. After that the ECM judges the end of cruising up from the throttle valve angle, the overdrive function will turn on again. There is a case where the overdrive function turns off during ACC or RES switch control.
Automatic Cancel Control	When any of the following conditions occurs during cruise control driving, the set speed in the memory is cleared to cancel the cruise control mode. Furthermore, the cruise MAIN indicator light blinks until the MAIN switch is turned off, and the operation of the cruise control is disabled until the MAIN switch is turned on again. ● Stop light switch open or short circuit. ● The vehicle speed signal abnormal. ● ETCS-i malfunction. ● VSC malfunction ● VSC communication malfunction
	When any of the following conditions occurs during the cruise control driving, the set speed in the memory is cleared to cancel the cruise control mode. Furthermore, the cruise MAIN indicator light blinks until the MAIN switch is turned off, and the operation of the cruise control is disabled until the ignition switch is turned off again. ● Stop light switch input signal abnormal ● Cancel circuit malfunction
	When any of the following conditions occurs during the cruise control driving, the cruise control mode is cancelled. Cruise control can be resumed at the set speed by operating the SET or RESUME switch providing that the vehicle speed is above the lower speed limit [approx. 40 km/h (25 mph)]. ● The vehicle speed falls below the low speed limit [approx. 40 km/h (25 mph)]. (The set speed in the memory is maintained.) ● The vehicle speed drops more than 16 km/h (10 mph) below the set speed as uphill driving. (The set speed in the memory is cleared.)
Other Cancellation Items	While the vehicle is being driven under cruise control, cruise control will be canceled if the VSC is activated. (The set speed in the memory is maintained.)

2. Diagnosis

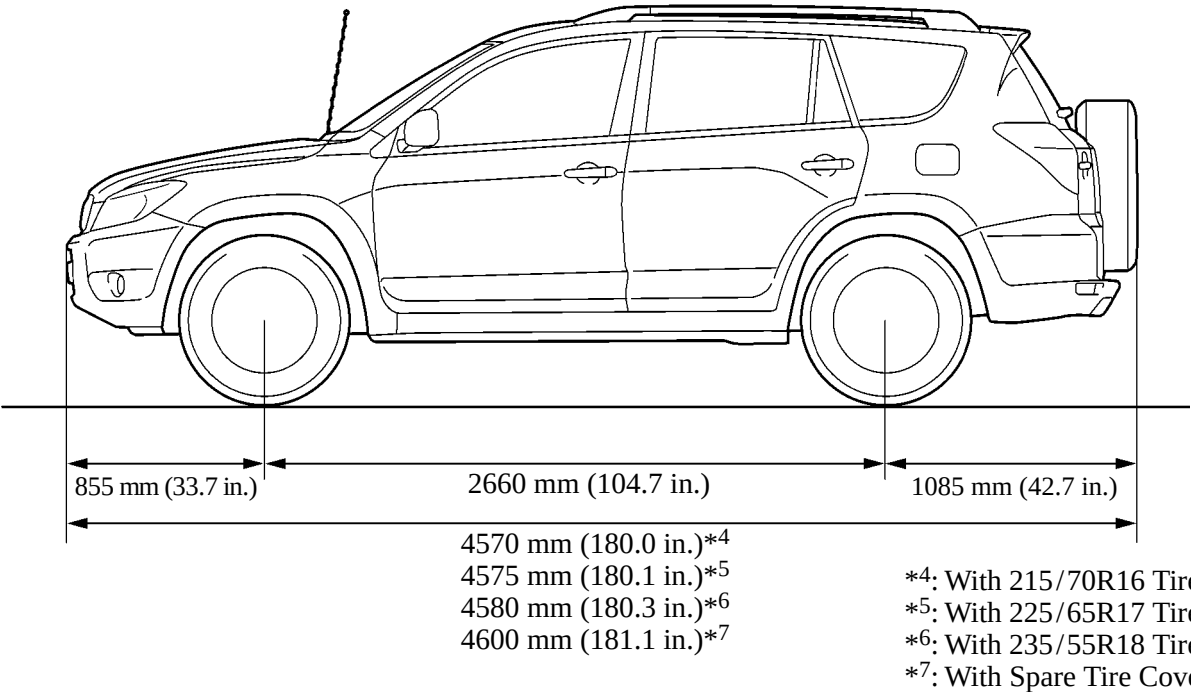
If a malfunction occurs in the cruise control system during cruise control, the ECM actuates the automatic cancel control and blinks the cruise MAIN indicator light to inform the driver of a malfunction. At this time, the ECM memorizes the malfunction in the form of 5-digit and 2-digit DTCs (Diagnostic Trouble Codes).

- The 5-digit DTCs can be read by connecting a hand-held tester to the DLC3.
- The 2-digit DTCs are output to the cruise MAIN indicator light when the TC and CG terminals of the DLC3 are connected through the use of the SST (09843-18040). Thus, these DTCs can be obtained by counting the number of blinks of the cruise MAIN indicator light.

DIMENSIONS



01MMO41Y



01MMO42Y

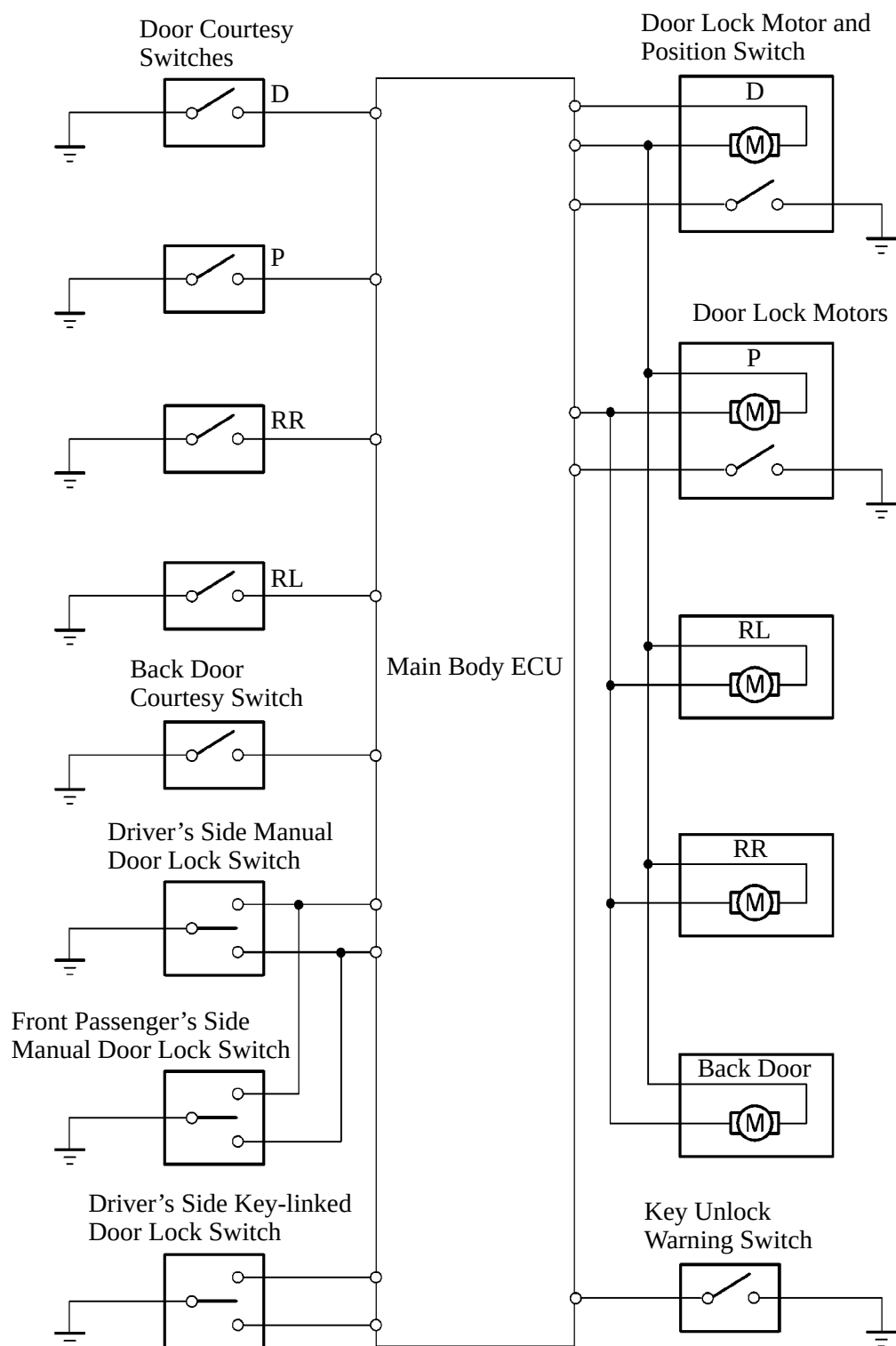
DOOR LOCK CONTROL SYSTEM

■ DESCRIPTION

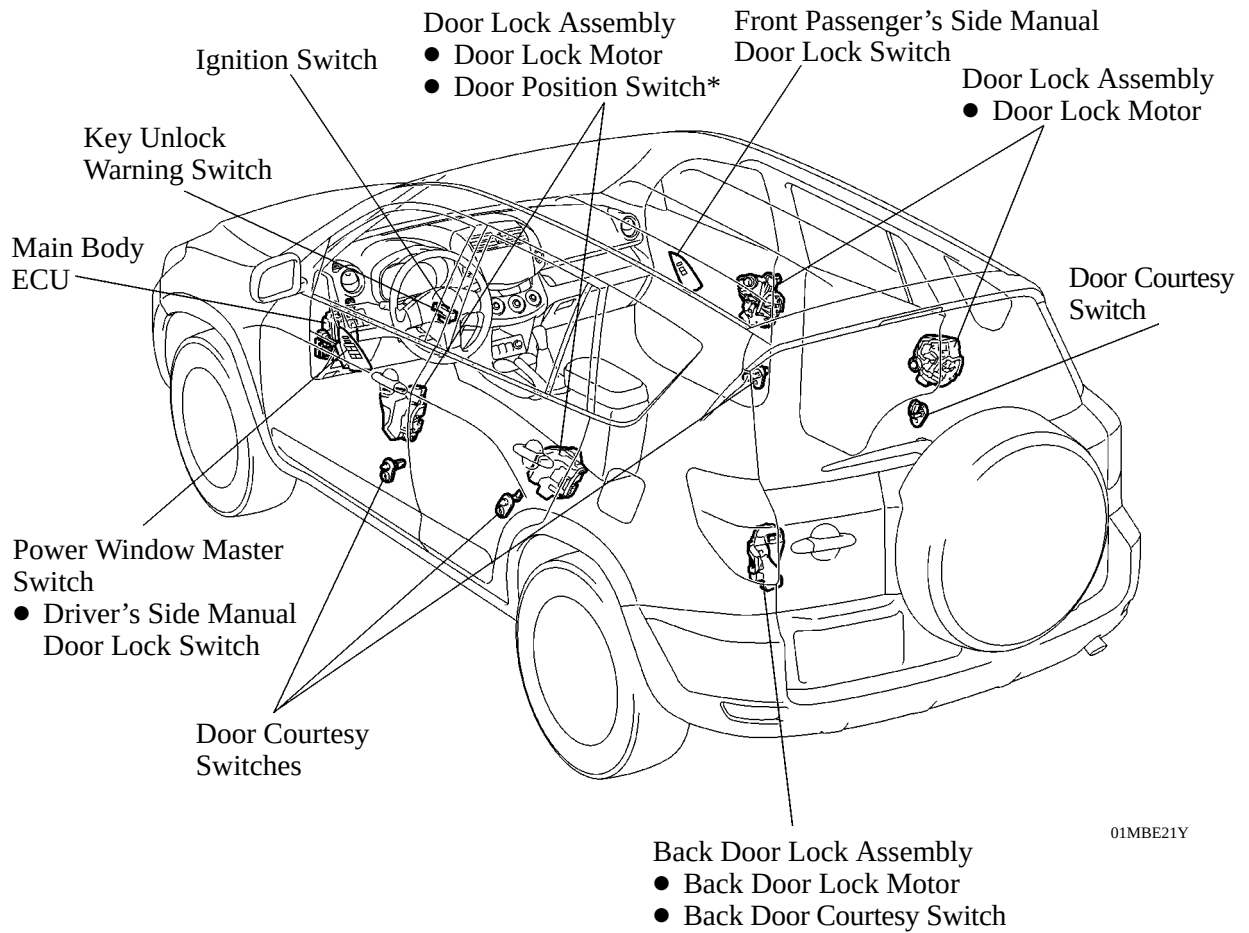
- The door lock control system is provided as standard equipment on all models.
- This system is controlled by the main body ECU. The main body ECU outputs signals to the respective door lock motors.
- The door lock system in the '06 model has the following functions:

Function	Outline
Manual Lock and Unlock	This function can lock or unlock all doors by the door lock control switch operation.
Key-linked Lock and Unlock Function	This function which is linked with the key cylinder can lock or unlock all the doors when a lock or unlock operation is effected.
Key Confine Prevention Function	When the key is inserted in the ignition key cylinder with the driver's and front passenger's door open and if you perform the door lock operation, all the doors will be unlocked.
2-step Unlock Function	This function is provided to unlock the driver's door by turning the key cylinder first and to unlock remaining doors by the door turning it the second time.
Door Lock with Transmitter Function (see page BE-48)	Pressing the door lock button of the transmitter locks all doors.
Door Unlock with Transmitter Function (see page BE-48)	Pressing the door unlock button of the transmitter unlocks all doors.
Customized Body Electronics	For details, see page BE-7

► System Diagram ◀



■ LAYOUT OF MAIN COMPONENTS



01MBE21Y

*: Only for Driver's Side

ENGINE IMMOBILIZER SYSTEM

■ DESCRIPTION

The engine immobilizer system compares the ID code that is registered in the transponder key ECU with the ID code of the transponder chip that is embedded in the ignition key. The system unsets if these ID codes match. Thus, the transponder key ECU and ECM communicate with each other to authorize fuel injection and ignition, enabling the engine to start.

The system is standard equipment on the Canada models and the Limited grade for the U.S.A. models.

Service Tip

When replacing the transponder key ECU or adding a new ignition key, the key's recognition code must be registered.

- When the transponder key ECU has been replaced, the hand-held tester is necessary for the key registration. At this time, the total number of keys that can be registered is three (master key: two, sub key: one).
- The recognition codes of additional keys must be registered. At this time, the total number of keys that can be registered is eight (master key: five, sub key: three).

For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

EQUIPMENT LIST

► U.S.A. ◀

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE				
Grade				—	Limited	Sport	—	Limited	Sport		
Exterior	Bumper	Colored		●	●	●	●	●	●		
		Radiator Grille	Material	●	—	●	●	—	●		
			Material Partially Plated	—	●	—	—	●	—		
	Outside Door Handle	Material		●	—	—	●	—	—		
		Colored		—	●	●	—	●	●		
	Back Door Handle	Colored		●	●	●	●	●	●		
	Outside Rear View Mirror	Material / Remote Control		●	—	—	●	—	—		
		Color / Remote Control / Heater		—	●	●	—	●	●		
	Roof Rail			OP	●	●	OP	●	●		
	Rear Spoiler			●	●	●	●	●	●		
Spats	Front & Rear			OP	●	●	●	●	●		
	Rear			●	—	—	—	—	—		
Chassis	Tire	215/70R16		●	—	—	—	—	—		
		225/65R17		OP	●	—	●	●	—		
		235/55R18		—	—	●	—	—	●		
	Disc Wheel	16 x 6 1/2 J Steel		●	—	—	—	—	—		
		17 x 6 1/2 J Steel		OP	—	—	●	—	—		
		17 x 7 J Aluminum		OP	●	—	OP	●	—		
		18 x 7 1/2 J Aluminum		—	—	●	—	—	●		
	Tire Pressure Warning System			●	●	●	●	●	●		
	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & VSC (Vehicle Stability Control) *1			●	●	●	●	●	●		
	Hill-start Assist Control			OP*2	OP*2	—	●	●	●		
	DAC (Downhill Assist Control)			OP*2	OP*2	—	●	●	●		
	Steering	Wheel	3-spoke Urethane	●	—	●	●	—	●		
			3-spoke Urethane with Steering Pad Switch (Audio)	—	—	OP	—	—	OP		
			3-spoke Leather with Steering Pad Switch (Audio)	—	●	—	—	●	—		
		Column	Manual Tilt &Telescopic	●	●	●	●	●	●		
	EPS (Electrical Power Steering)		●	●	●	●	●	●			
	Shift Knob	PVC (Polyvinyl Chloride)		●	—	●	●	—	●		
Leather		—	●	—	—	●	—				
Body	Seat	Cover	Fabric		●	●	●	●	●	●	
			Leather		—	OP*3	—	—	OP*3	—	
		Front	Driver	6-way Manual	●	—	●	●	—	●	
				8-way Power	—	●	—	—	●	—	
			Passenger	4-way Manual	●	●	●	●	●	●	
		Rear	No. 1	60/40 Split Retractable*4		●	●	●	●	●	●
			No. 2			OP	OP	—	OP	OP	—
		Seat Heater			—	OP*5	—	—	OP*5	—	
	Seat Belt	Front	Driver	3-point, Pretensioner & Force Limiter	●	●	●	●	●	●	
			Passenger	3-point, Pretensioner & Force Limiter & ALR*6	●	●	●	●	●	●	
		Rear	Rear No.1	3-point ELR*7, ALR*6	●	●	●	●	●	●	
			Rear No.2		OP*2	OP*2	—	OP*2	OP*2	—	

*1: 2WD models have been provided with Automatic LSD (Limited Slip Differential).

(Continued)

*2: Only for Models with Rear No. 2 Seat

*3: Except Models with Rear No.2 Seat

*4: Models with rear No. 2 seat have been provided with walk-in function.

*5: Models with Leather Seat

*6: Automatic Locking Retractor

*7: Emergency Locking Retractor

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE			
Grade				—	Limited	Sport	—	Limited	Sport	
Body Electrical	Headlight		Halogen		●	●	●	●	●	●
	Light Auto Turn-OFF System				●	●	●	●	●	●
	Front Fog Light				—	●	●	—	●	●
	Daytime Running Lighting System				OP	OP	OP	OP	OP	OP
	Windshield Wiper		Intermittent Type		●	●	●	●	●	●
	Rear Wiper		Intermittent Type		●	●	●	●	●	●
	Audio System		Radio/CD, 6 Speakers		●	—	●	●	—	●
			Radio/In-dash CD Changer, 6 Speakers		OP	●	OP	OP	●	OP
			Radio/In-dash CD Changer, 9 Speakers		—	OP	OP	—	OP	OP
			Rear Seat Entertainment System		—	—	—	—	OP	—
	Air Conditioning		Manual Type		●	—	●	●	—	●
			Automatic Type		—	●	—	—	●	—
			Clean Air Filter		●	●	●	●	●	●
	Heater		Conventional Type		●	●	●	●	●	●
	Cruise Control System				●	●	●	●	●	●
	Illuminated Entry System		Key Illumination & Room Light & Front Personal Light		●	—	●	●	—	●
			Key Illumination & Room Light & Front Personal Light & Foot Light		—	●	—	—	●	—
	Power Window System		All Door Power Type Only for Driver's Seat: One Motion Auto Up-and-down, Jam Protection Function		●	●	●	●	●	●
	Door Lock Control		Power Door Lock Control System		●	●	●	●	●	●
			Wireless Door Lock Remote Control System		●	●	●	●	●	●
	Engine Immobilizer System				—	●	—	—	●	—
	Sliding Roof				—	OP	OP	—	OP	OP
	SRS* ⁸ Airbag System		Driver	Dual-stage	●	●	●	●	●	●
			Front Passenger	Dual-stage with Occupant Classification System	●	●	●	●	●	●
			Side & Roll Sensing Type Curtain Shield		OP	OP	OP	OP	OP	OP

*⁸: Supplemental Restraint System

► Canada ◀

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE					
Grade				—	Limited	Sport	—	Limited	Sport			
Exterior	Bumper		Colored		●	●	●	●	●	●		
	Radiator Grille		Material		●	—	●	●	—	●		
			Material Partially Plated		—	●	—	—	●	—		
	Outside Door Handle		Material		●	—	—	●	—	—		
			Colored		—	●	●	—	●	●		
	Back Door Handle		Colored		●	●	●	●	●	●		
	Outside Rear View Mirror		Color/Remote Control/Heater		●	●	●	●	●	●		
	Roof Rail			OP	●	●	OP	●	●			
	Rear Spoiler			●	●	●	●	●	●			
Spats		Front & Rear		OP	●	●	OP	●	●			
Chassis	Tire		215/70R16		●	—	—	—	—	—		
			225/65R17		OP	●	—	●	●	—		
			235/55R18		—	—	●	—	—	●		
	Disc Wheel		16 x 6 1/2 J Steel		●	—	—	—	—	—		
			17 x 6 1/2 J Steel		OP	—	—	●	—	—		
			17 x 7 J Aluminum		OP	●	—	OP	●	—		
			18 x 7 1/2 J Aluminum		—	—	●	—	—	●		
	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & VSC (Vehicle Stability Control) *1			●	●	●	●	●	●			
	Hill-start Assist Control			OP*1	OP*1	—	●	●	●			
	DAC (Downhill Assist Control)			OP*1	OP*1	—	●	●	●			
	Steering		Wheel	3-spoke Urethane		●	—	●	●	—	●	
				3-spoke Urethane with Steering Pad Switch (Audio)		—	—	OP	—	—	OP	
				3-spoke Leather with Steering Pad Switch (Audio)		—	●	—	—	●	—	
			Column	Manual Tilt &Telescopic		●	●	●	●	●	●	
			EPS (Electrical Power Steering)		●	●	●	●	●	●		
	Shift Knob		PVC (Polyvinyl Chloride)		●	—	●	●	—	●		
			Leather		—	●	—	—	●	—		
Body	Seat		Cover	Fabric		●	●	●	●	●	●	
				Leather		—	OP*2	—	—	OP*2	—	
			Front	Driver	6-way Manual		●	—	●	●	—	●
					8-way Power		—	●	—	—	●	—
				Passenger	4-way Manual		●	●	●	●	●	●
			Rear	No. 1	60/40 Split Retractable*3		●	●	●	●	●	●
				No. 2			OP	OP	—	OP	OP	—
			Seat Heater			—	OP*4	—	—	OP*4	—	
	Seat Belt		Front	Driver	3-point, Pretensioner & Force Limiter		●	●	●	●	●	●
				Passenger	3-point, Pretensioner & Force Limiter & ALR*5		●	●	●	●	●	●
			Rear	Rear No. 1	3-point ELR*6, ALR*5		●	●	●	●	●	●
				Rear No. 2			OP*1	OP*1	—	OP*1	OP*1	—

*1: Only for Models with Rear No. 2 Seat

*2: Except Models with Rear No.2 Seat

*3: Models with rear No. 2 seat have been provided with walk-in function.

*4: Models with Leather Seat

*5: Automatic Locking Retractor

*6: Emergency Locking Retractor

(Continued)

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE			
Grade				—	Limited	Sport	—	Limited	Sport	
Body Electrical	Headlight	Halogen		●	●	●	●	●	●	
	Light Auto Turn-OFF System			●	●	●	●	●	●	
	Front Fog Light			—	●	●	—	●	●	
	Daytime Running Lighting System			●	●	●	●	●	●	
	Windshield Wiper	Intermittent Type		●	●	●	●	●	●	
	Windshield Deicer			●	●	●	●	●	●	
	Rear Wiper	Intermittent Type		●	●	●	●	●	●	
	Audio System	Radio/CD, 6 Speakers		●	—	●	●	—	●	
		Radio/In-dash CD Changer, 6 Speakers		OP	●	OP	OP	●	OP	
		Radio/In-dash CD Changer, 9 Speakers		—	OP	OP	—	OP	OP	
		Rear Seat Entertainment System		—	—	—	—	OP	—	
	Air Conditioning	Manual Type		●	—	●	●	—	●	
		Automatic Type		—	●	—	—	●	—	
		Clean Air Filter		●	●	●	●	●	●	
	Heater	Conventional Type		●	●	●	●	●	●	
	Cruise Control System			●	●	●	●	●	●	
	Illuminated Entry System	Key Illumination & Room Light & Front Personal Light		●	—	●	●	—	●	
		Key Illumination & Room Light & Front Personal Light & Foot Light		—	●	—	—	●	—	
	Power Window System	All Door Power Type Only for Driver's Seat: One Motion Auto Up-and-down, Jam Protection Function		●	●	●	●	●	●	
	Door Lock Control	Power Door Lock Control System		●	●	●	●	●	●	
		Wireless Door Lock Remote Control System		●	●	●	●	●	●	
	Engine Immobilizer System			●	●	●	●	●	●	
	Sliding Roof			—	OP	OP	—	OP	OP	
	SRS* ⁷ Airbag System	Driver	Dual-stage		●	●	●	●	●	●
		Front Passenger	Dual-stage with Occupant Classification System		●	●	●	●	●	●
		Side & Roll Sensing Type Curtain Shield		OP	OP	OP	OP	OP	OP	

*⁷: Supplemental Restraint System

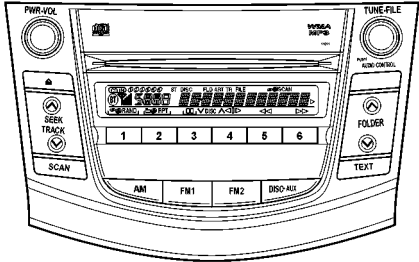
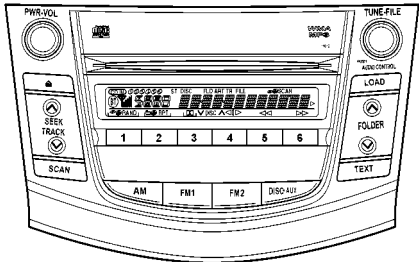
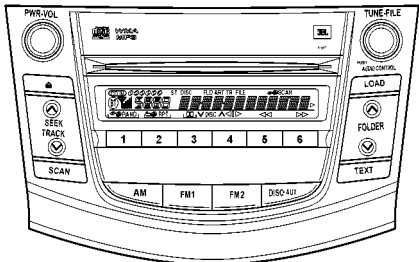
EQUIPMENT

Audio System

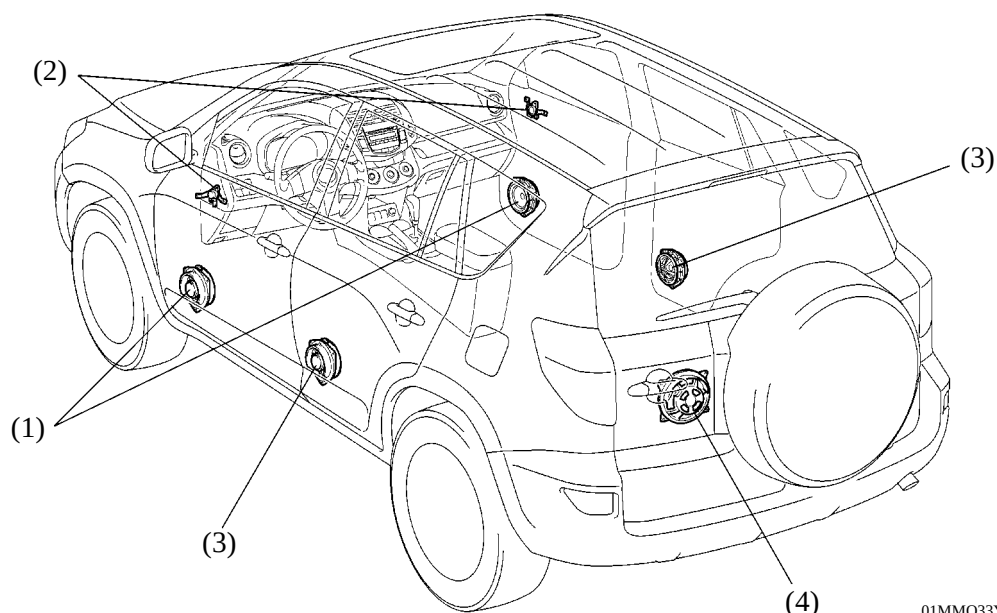
- Three types of audio systems are provided, as detailed below.
- The CD player has a CD-TEXT display function that displays the text information when playing CDs that contain CD text.
- The CD player on the all models has MP3 (MPEG Audio Layer-3) and WMA (Windows Media Audio) format playback functions.

► Head Unit Specifications ◀

●: Standard OP: Option —: None

Design	Specification	Provided		
		Standard	Limited	Sport
 01MMO30Y	• AM/FM Tuner • CD Player • CD-TEXT Display Function • MP3 and WMA Playback Function • 6-speaker System • Manufacturer: Fujitsu TEN	●	—	●
 01MMO31Y	• AM/FM Tuner • In-dash-6-CD Changer • CD-TEXT Display Function • MP3 and WMA Playback Function • 6-speaker System • Manufacturer: Fujitsu TEN	OP	●	OP
 01MMO32Y	• AM/FM Tuner • In-dash-6-CD Changer • CD-TEXT Display Function • MP3 and WMA Playback Function • 9-speaker System • Manufacturer: Fujitsu TEN	—	OP	OP

► Speaker Location ◀



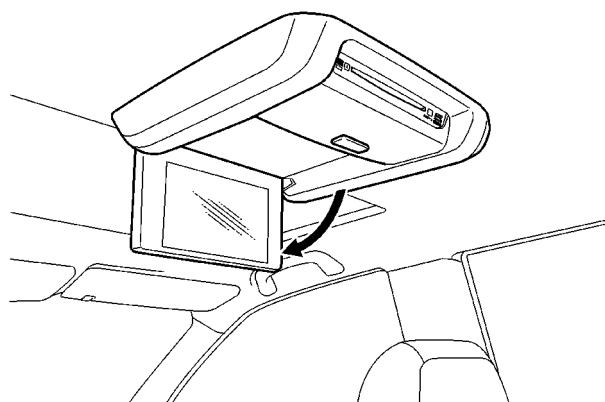
01MMO33Y

► Speaker Specification ◀

Type		Caliber	Impedance	Input Range
(1)	Front Door	JBL	16.0 cm	2.2 Ω
		Standard	16.0 cm	4 Ω
(2)	Tweeter	JBL	6.5 cm	2 Ω
		Standard	6.5 cm	4 Ω
(3)	Rear Door	JBL	16.0 cm/2.0 cm	2.6 Ω
		Standard	16.0 cm	4 Ω
(4)	Woofer	JBL	20.0 cm	2.0 Ω

RSES (Rear Seat Entertainment System)

- The RSES with which the rear seat occupants can enjoy a video DVD (Digital Versatile Disc) has been made available as optional equipment on the Limited grade for the 2GR-FE engine model.
- The RSES consists of a 9-inch wide LCD (Liquid Crystal Display), a DVD player that are located under the roof, and a remote controller.
- The RSES is operated by the remote controller.



Remote Controller

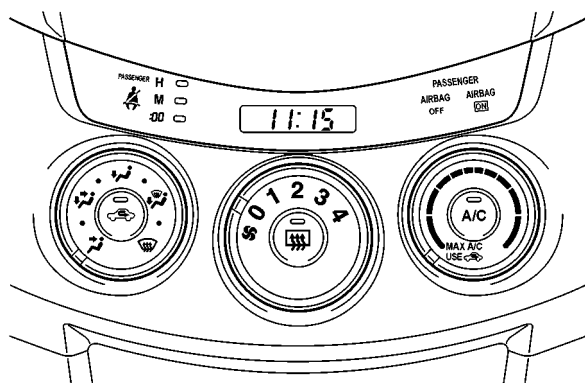


01MMO34Y

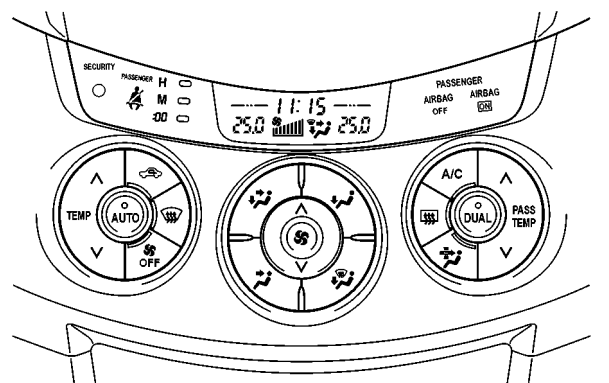
01MMO35Y

Air Conditioning System

- Manual air conditioning is provided as standard equipment for the Standard and Sport grades.
- An automatic air conditioning that can set the temperature independently for the driver and front passenger areas is provided as standard equipment for the Limited grade.
- The automatic air conditioning is provided with the micro dust and pollen filter control.



Manual A/C Model

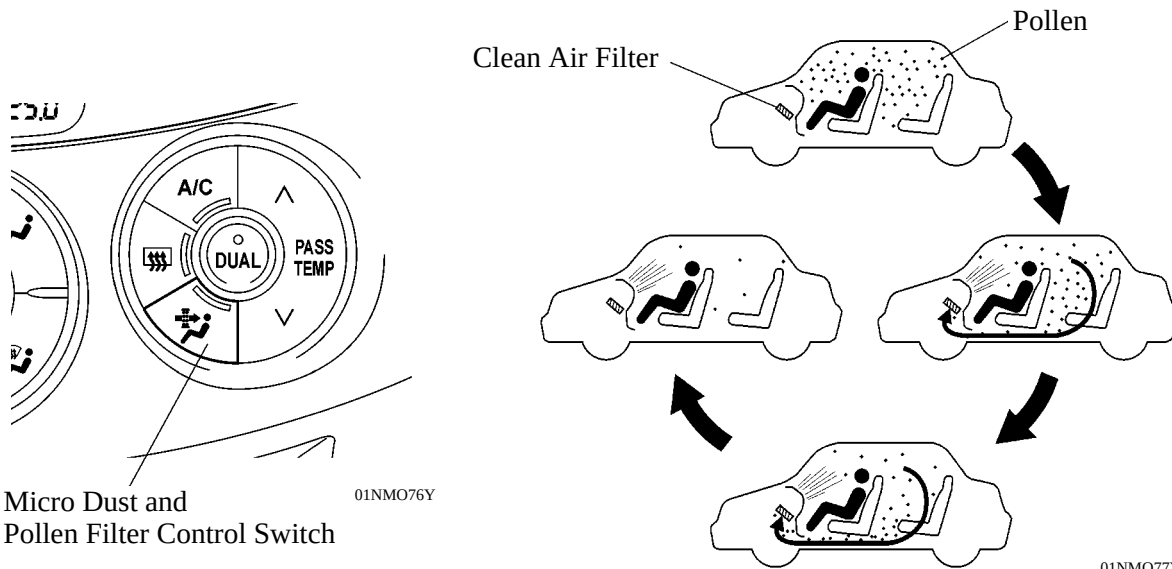


Automatic A/C Model

Micro Dust and Pollen Filter Control

- The micro dust and pollen filter control quickly removes pollen from the front seat occupant area with the pressing of the micro dust and pollen filter control switch on the heater control panel, without requiring any complex air conditioning operation.
- When the user pushes the micro dust and pollen filter control switch, the air conditioning operates in the recirculation mode. The clean air that has passed through the clean air filter blows out from the face outlet to the occupant area.

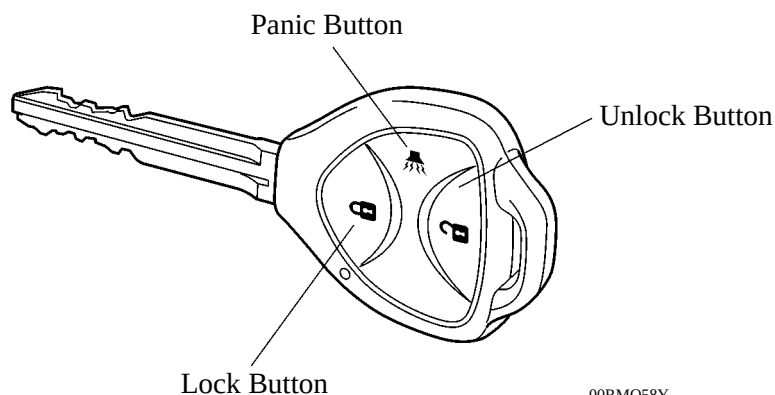
The filtered clean air quickly removes pollen from the occupant area. After that, the air in the cabin recirculates and continues to remove pollen in the air by allowing the clean air filter to capture the pollen. When the amount of pollen in the cabin as a whole diminishes to a certain level, the air conditioning automatically resumes operating in the auto mode.



Conceptual Image of Pollen Removal

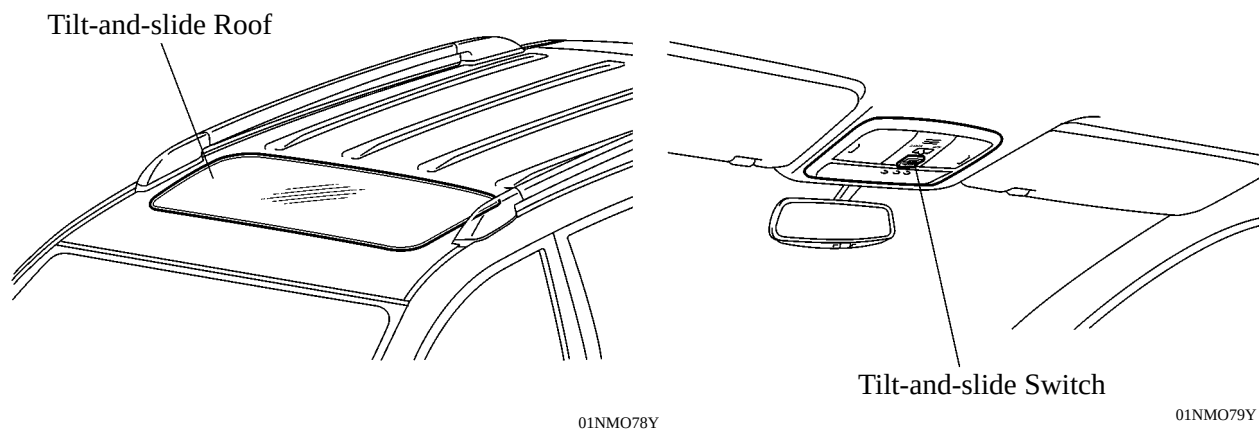
Wireless Door Lock Remote Control System

A wireless door lock remote control system with a panic button and answer back function which blinks the hazard warning lights when locking or unlocking is available as standard equipment.



Sliding Roof System

- A tilt-and-slide roof, which is provided with a one-touch function (slide open/close and tilt up/down) and a jam protection function, is available as optional equipment on the Sport and Limited grades.
- A tilt-and-slide switch is provided at the overhead console.

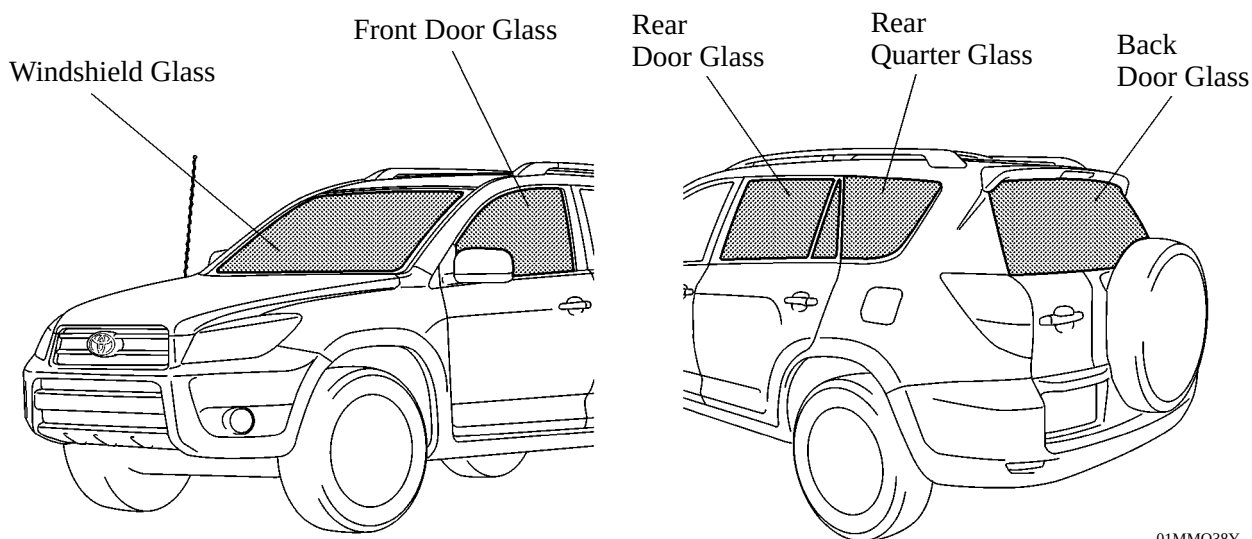


Windshield and Door Glass

The windshield and door glasses are provided as follows:

Glass Portion	Windshield	Front Door Glass	Rear Door Glass		Rear Quarter Glass		Back Door Glass	
Grade	—	—	Standard	Sport and Limited	Standard	Sport and Limited	Standard	Sport and Limited
Glass	Green	UV Reduction Green	UV Reduction Green	Dark Gray*	UV Reduction Green	Dark Gray*	UV Reduction Green	Dark Gray*

*: Optional equipment on Standard grade

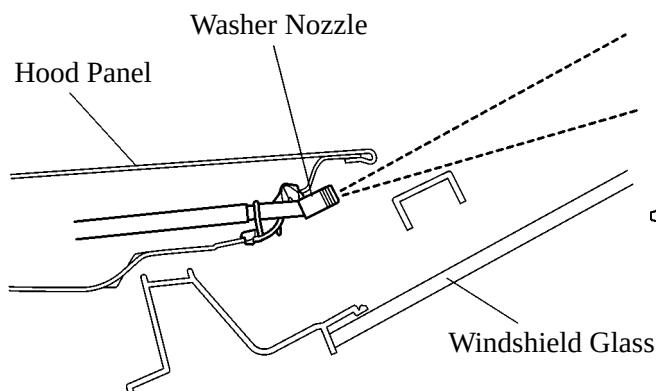


01MMO38Y

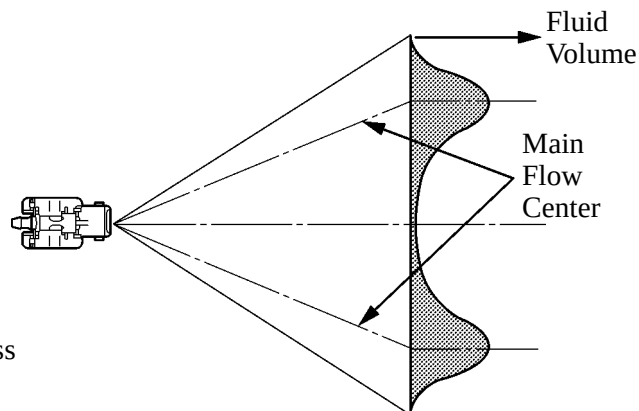
Washer System

Front

- Spray type washer nozzles are provided under the hood panel for improved appearance.
- The spray type washer nozzle sprays the washer fluid over a wide area by spraying it in a fan shape. The washer fluid volume sprayed in the center of the spray area has been reduced so as not to hinder the driver's view when the washer system is operated.



281MO41



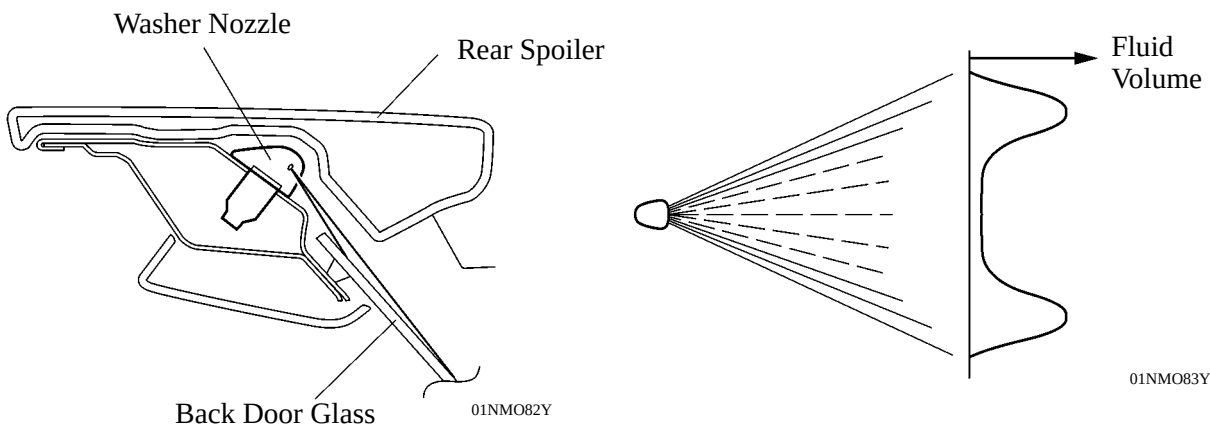
281MO42Y

NOTICE:

The construction of the spray type washer nozzle does not allow adjustment of the spray angle. Do not adjust the spray angle as this could damage the washer nozzle. To change the spray angle, replace the nozzle by a nozzle with a different spray angle. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

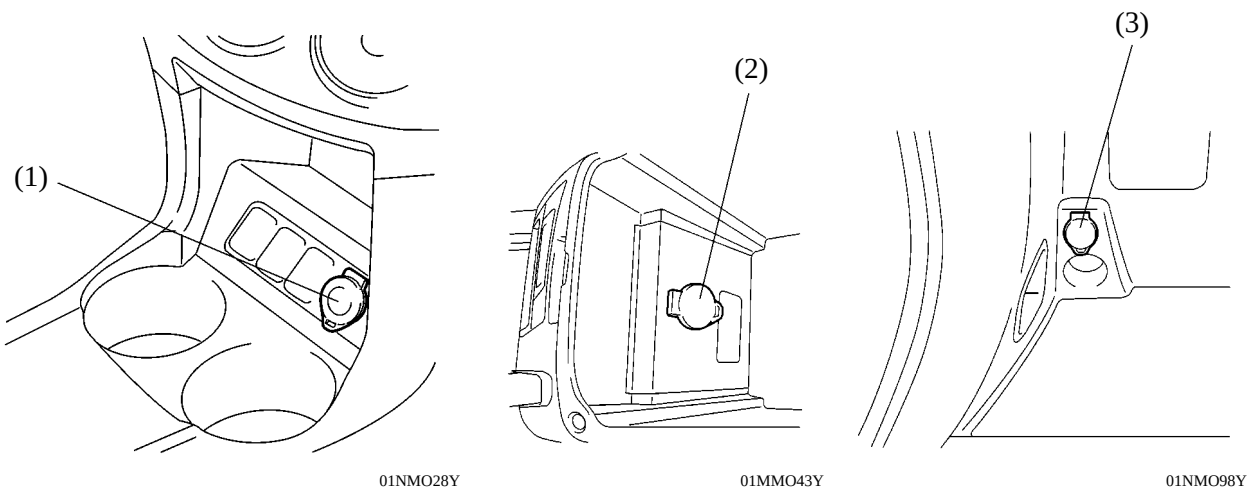
Rear

- A flat-spray type washer nozzle is used on all models.
- The washer nozzle is located below the rear spoiler for an enhanced appearance.
- The flat-spray type washer nozzle sprays washer fluid in a fan shape over a wide area for enhanced wiping performance.

**Power Outlet**

Three power outlets are provided:

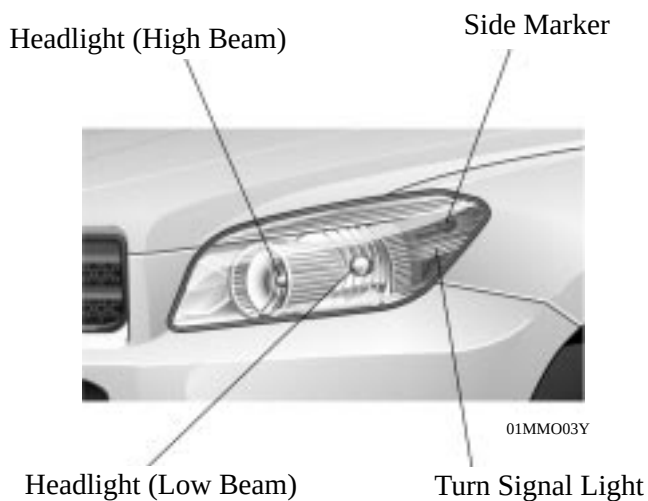
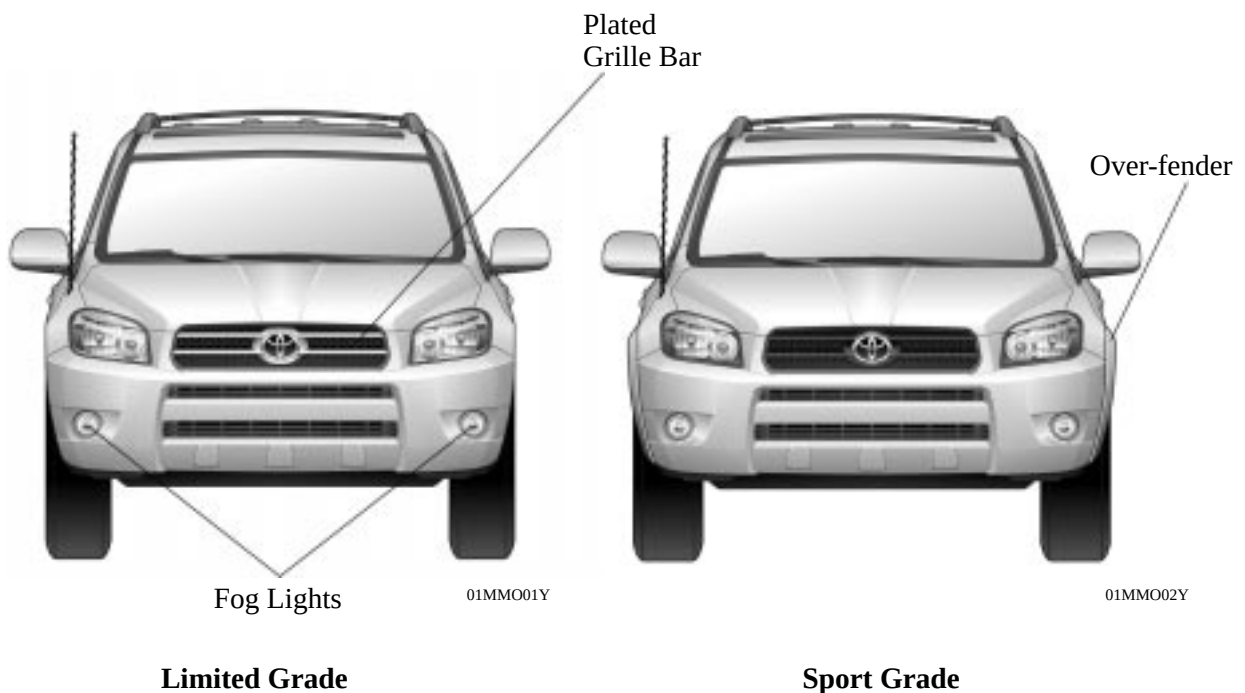
- (1) Under the center console
- (2) Inside console box
- (3) Under the left deck side trim



EXTERIOR

Front Design

- The front of the vehicle has been designed with a powerful look that emphasizes the large-diameter tires.
- The four-beam headlight that accommodates clearance light and turn signal light is used.
- The combination of the multi-reflector type reflectors and the see-through outer lenses is used in the headlight create a crystal appearance. Furthermore, smoke-painted extensions are used for the headlights of the Sport grade to achieve a sporty design.
- The radiator grille consists of a mesh portion and two grille bars to express powerfulness. The Limited grade uses plated grille bars to achieve an elegant design.
- The round front fog lights in the sides of the front bumper are available as standard equipment for the Limited and Sport grades.

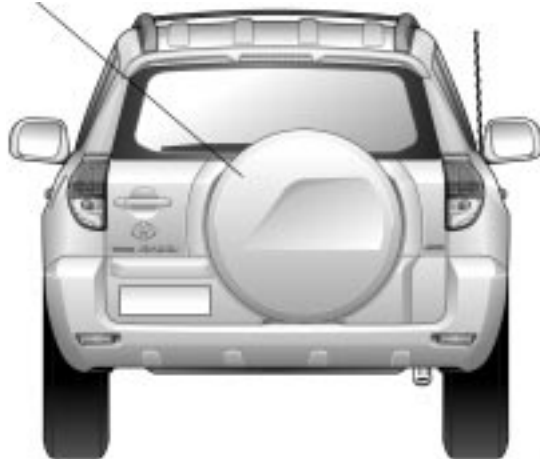


For Sport Grade

Rear Design

- The rear of the vehicle has been shaped to integrate with the spare tire cover, realizing a design that emphasizes its SUV-ness.
- The spare tire cover is standard equipment for the Limited grade.
- The combination lights are arranged vertically. LEDs (Light Emitting Diodes) are used for the stop light and taillight, for enhanced visibility and an elegant look.

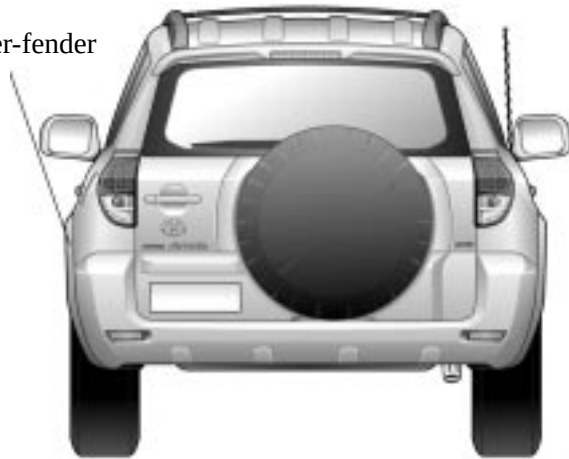
Spare Tire Cover



01MMO05Y

Limited Grade

Over-fender



01MMO06Y

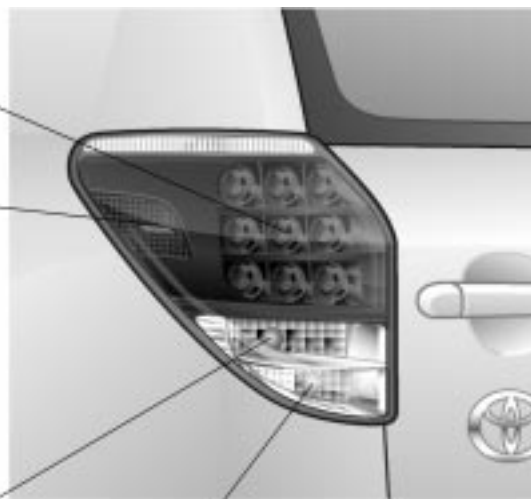
Sport Grade

Stop Light and Taillight

Side Marker

Turn Signal Light

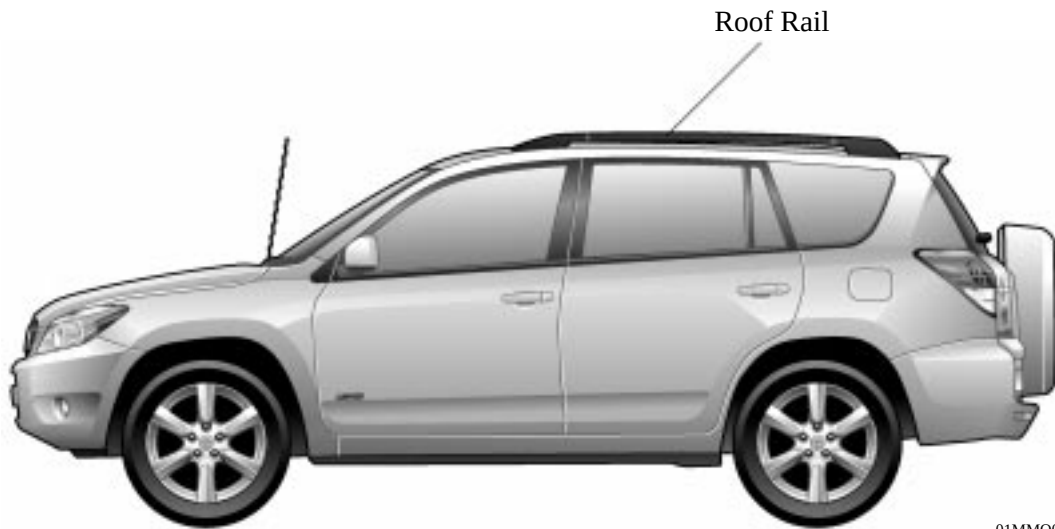
Back-up Light



01MMO07Y

Side Design

- The side of the vehicle portrays a unique cabin design consisting of a wedged surface composition and a dynamically drawn arc.
- Roof rails are available as optional equipment on the Standard grade, and provided as standard equipment on the Limited and Sport grades.
- Over-fenders are available as optional equipment on the Limited grade, and provided as standard equipment on the Sport grade.



01MMO08Y

Limited Grade

01MMO09Y

Over-fender**Sport Grade**

Exterior Color

Exterior colors for new model are as follows:

Color No.	Color Name
040	Super White II
070	White Pearl Crystal Shine
1F7	Silver Metallic
1E0	Dark Gray Mica
202	Black
3R3	Red Mica Metallic
4R4	Beige Metallic
6T6	Light Green Metallic
8R3	Grayish Blue Metallic
8S6	Dark Blue Mica

Exterior Parts Color

Exterior parts colors are provided as follows:

●: Standard OP: Option —: None

Destination	U.S.A. and Canada					
Grade	Standard		High		High	
Color Parts Name	Material	Exterior Color	Material	Exterior Color	Material	Exterior Color
Front/Rear Bumper	—	●	—	●	—	●
Radiator Grille	●	—	●*1	—	●	—
Rear Spoiler	—	●	—	●	—	●
Spare Tire Cover	—	—	—	●	—	—
Roof Rail	●	—	●	—	●	—
Outside Rear View Mirror	●*2	●*3	—	●	—	●
Outside Door Handle	●	—	—	●	—	●
Back Door Handle	—	●	—	●	—	●
Over-fender	—	—	—	OP	—	●

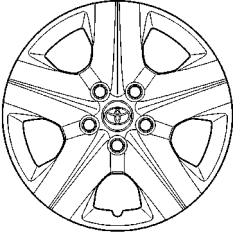
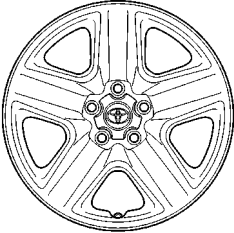
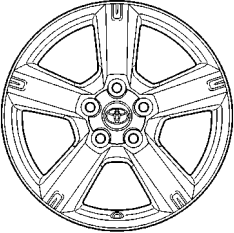
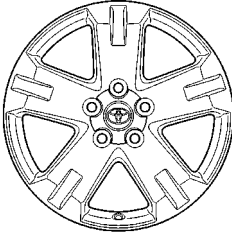
*1: Partially plated on the Limited Grade

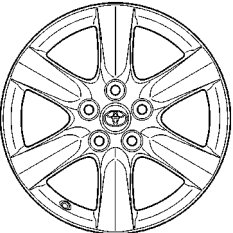
*2: U.S.A. Model

*3: Canada Model

Tire and Disc Wheel

Tires and disc wheels are provided as follows:

Destination	U.S.A and Canada				
Grade	Standard				Sport
Engine	2AZ-FE	2AZ-FE	2GR-FE	2AZ-FE & 2GR-FE	2AZ-FE & 2GR-FE
Provided	Standard	Option	Standard	Option	Standard
Tire Size	215/70R16	225/65R17		←	235/55R18
Disc Wheel Size	16 x 6 1/2 J	17 x 6 1/2 J		17 x 7 J	18 x 7 1/2 J
Disc Wheel Material	Steel	←		Aluminum	←
P.C.D.* mm (in.)	114.3 (4.5)	←		←	←
Offset mm (in.)	45 (1.8)	←		←	←
Wheel Design	Full Wheel Cap	Center Cap		Aluminum Wheel	Aluminum Wheel
	 01NMO10Y	 01NMO11Y		 01NMO12Y	 01NMO13Y

Destination	U.S.A and Canada
Grade	Limited
Engine	2AZ-FE & 2GR-FE
Provided	Standard
Tire Size	225/65R17
Disc Wheel Size	17 x 7 J
Disc Wheel Material	Aluminum
P.C.D.* mm (in.)	114.3 (4.5)
Offset mm (in.)	45 (1.8)
Wheel Design	Aluminum Wheel  01NMO14Y

*: Pitch Circle Diameter

EXTERIOR APPEARANCE

01MIN01Y



01MIN02Y

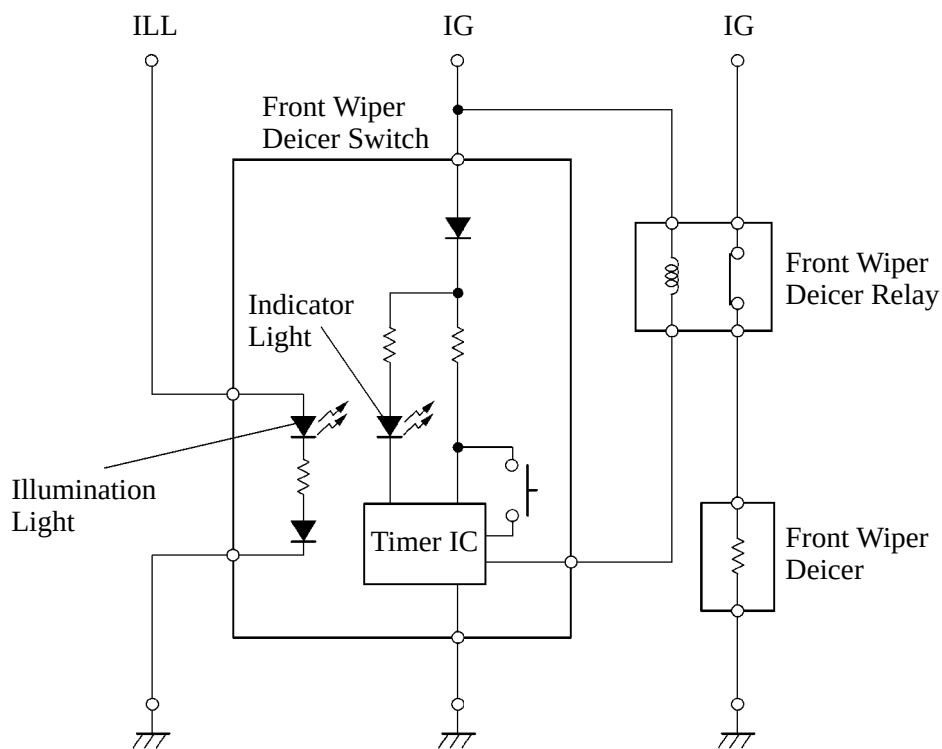
FRONT WIPER DEICER SYSTEM

■ DESCRIPTION

The front wiper deicer system uses the heater wire in the front windshield glass to deice frozen front wipers.

- The front wiper deicer system is provided as standard equipment on the Canada models.
- This system is activated when the ignition switch is turned ON, and front deicer switch is pushed. This switch is provided with a timer function to keep on the deicer for approx. 15 minutes.

► System Diagram ◀

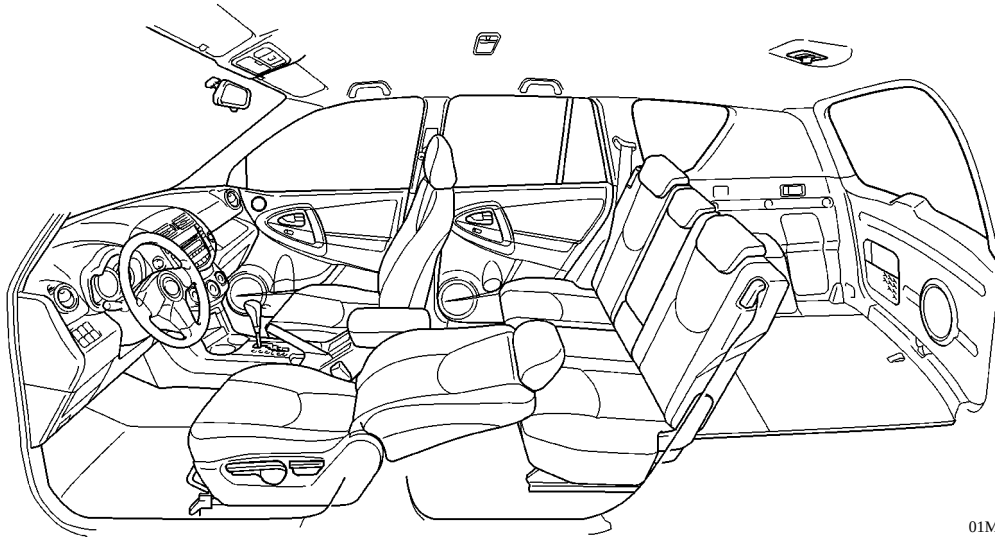


01NBE03Y

INTERIOR

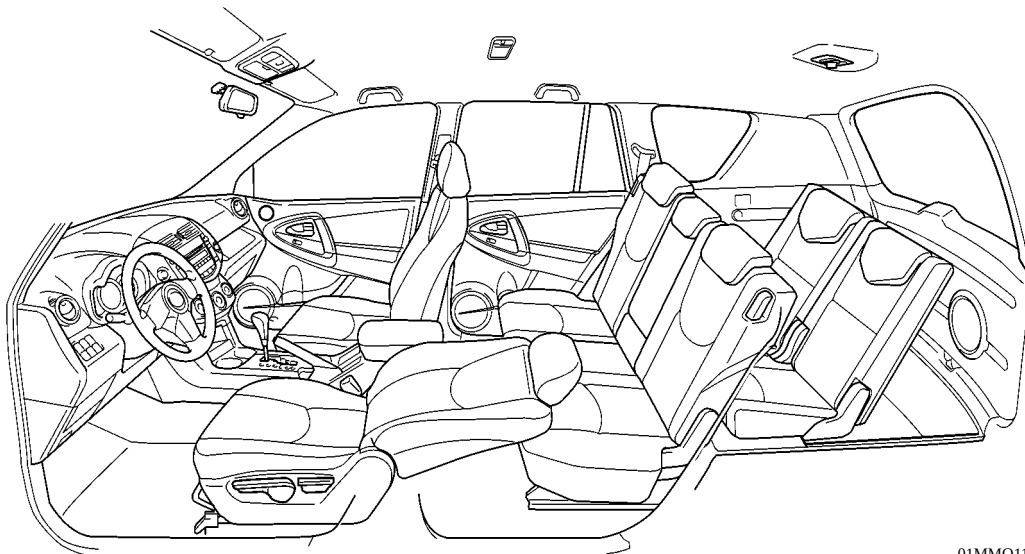
Interior Design

- The vehicle interior uses roundish, slim-shaped seats to make the interior more spacious, realizing an expansive and roomy space.
- A unique, boomerang-shaped ornament is placed on each door trim to express a sporty image.



01MMO10Y

Standard Model

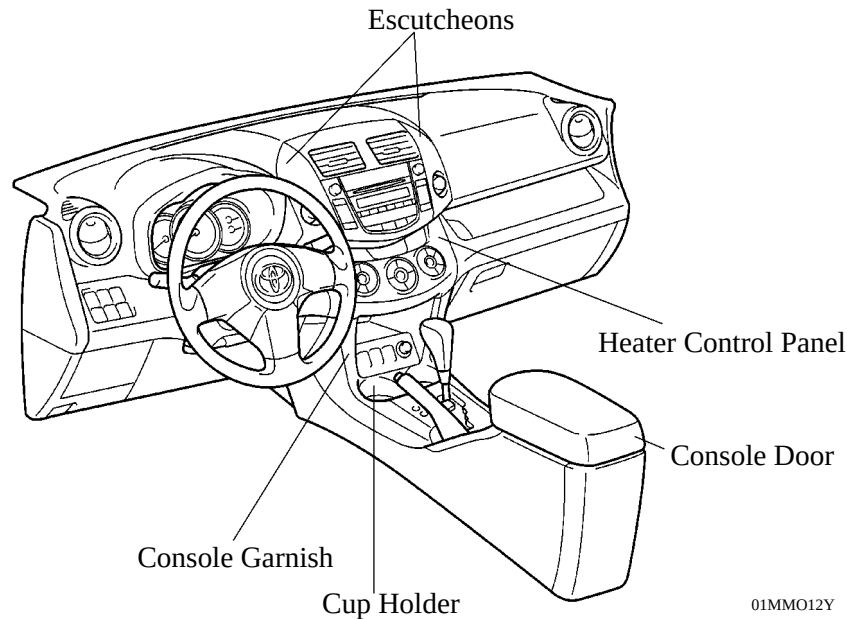


01MMO11Y

With Rear No. 2 Seat

Instrument Panel

- The instrument panel blends an arrangement that emphasizes a horizontal spaciousness with a vertical flow along its center area, in order to portray a sporty image.
- Metallic paint and hairline grain have been applied to the escutcheon, console garnish, and heater control panel in order to express a premium image.
- Shut-fin type side registers are used. Their surface becomes flush when they are closed, thus achieving a simple and streamlined design.
- An illumination is provided for the cup holder in the center console.
- The console door in the center console is covered with the urethane from in order to achieve a soft touch.

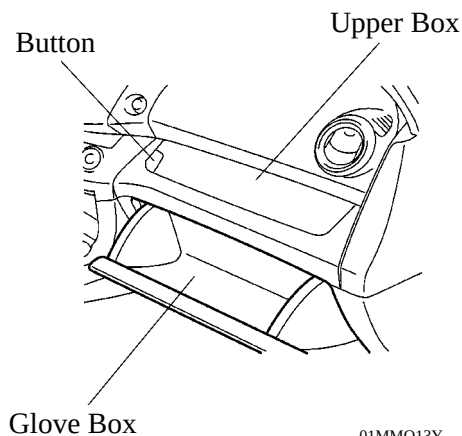


01MMO12Y

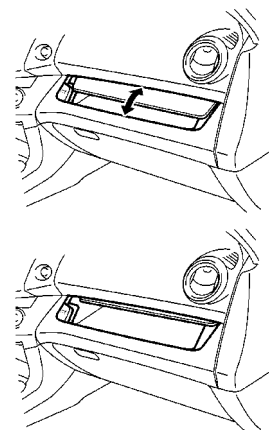
Storage Space

Instrument Panel

- A glove box that uses an air damper is provided on the front passenger side.
- An upper box, with a door that can be opened and closed by pushing a button located above the glove box, is provided.

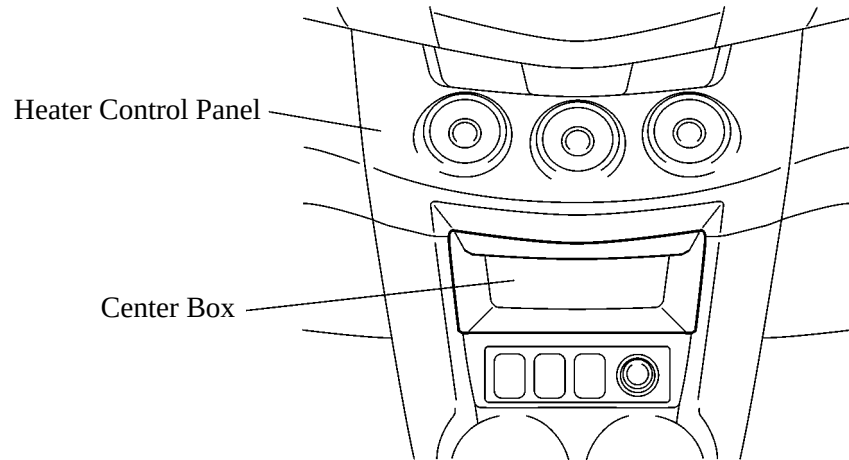


01MMO13Y



01NMO19Y

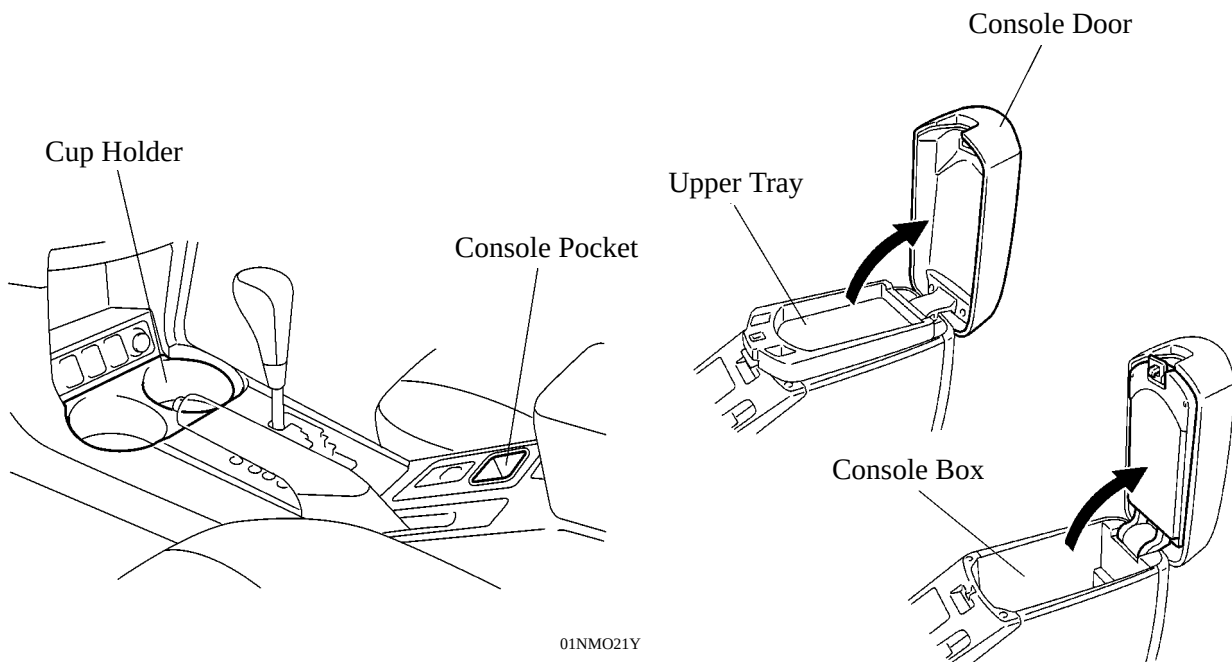
- A center box is provided below the heater control panel.



01NMO20Y

Center Console

- Console pocket, cup holder and console box are provided in the center console.
- The console has dual doors to provide storage space.



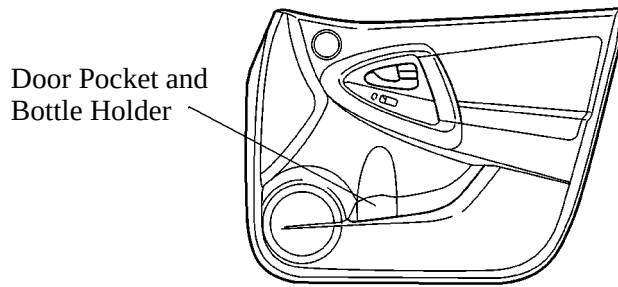
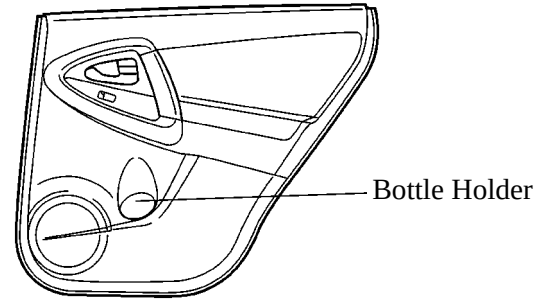
01NMO21Y

01NMO22Y

Console Box

Door Trim

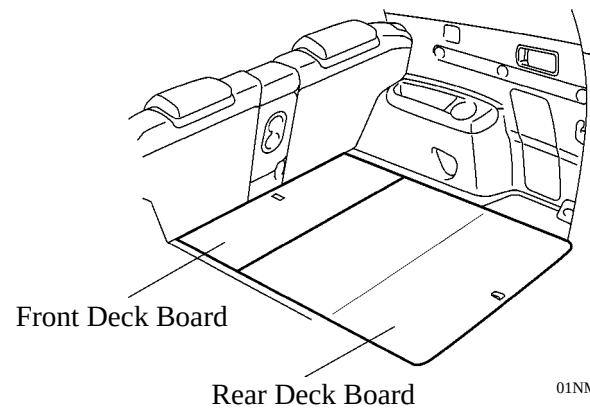
- A door pocket and bottle holder is provided in the front door trim.
- A bottle holder is provided in the rear door trim.

**Front Door Trim****Rear Door Trim**

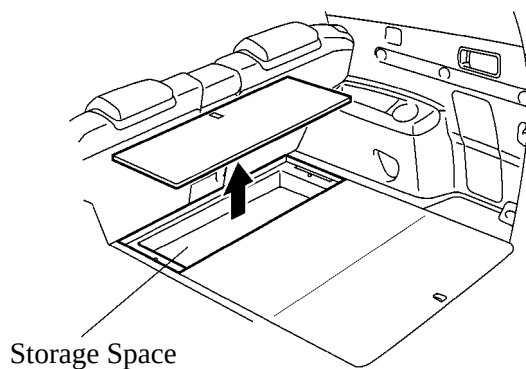
01MMO14Y

Luggage Space

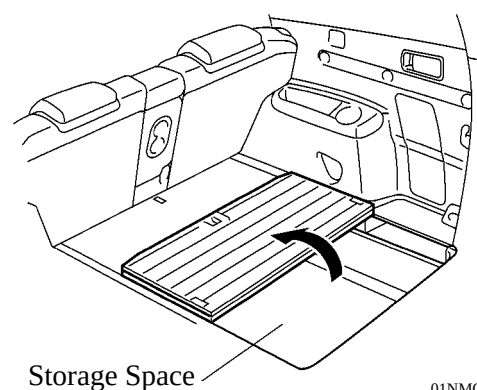
- Front and rear deck boards covered with water-repellent skin have been provided on the models without the rear No. 2 seat.
- The front deck board is a removable type, and a storage space is provided below it.
- The rear deck board is a type that folds in two, for ease of operation and the in-and-out access of cargo under the floor.



01NMO24Y

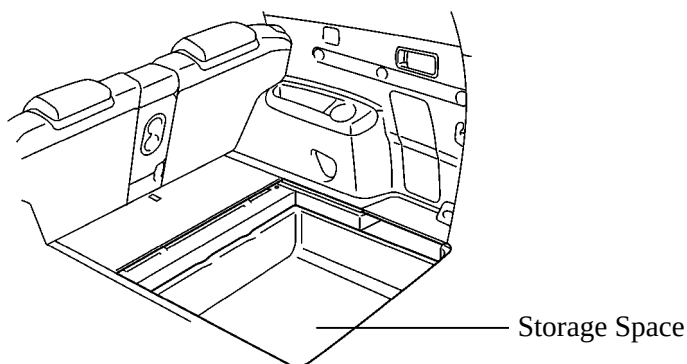
► Deck Board Arrangement ◀

01NMO25Y

Storage Below Front Deck Board

01NMO26Y

Semi-open Rear Deck Board

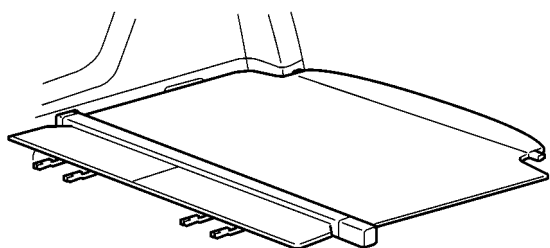


01NMO27Y

Fully Open Rear Deck Board

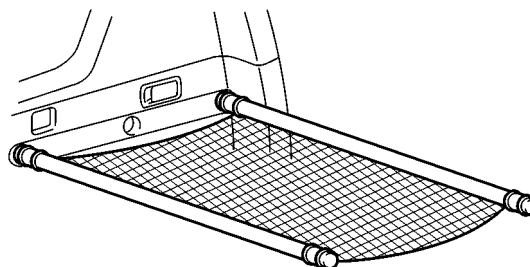
Tonneau Cover and Utility Pipes with Net

A tonneau cover to block the view of the cargo area from the outside of the vehicle, and utility pipes with a net, which can be arranged in various ways, are standard equipment on the Limited grade. They are available as optional equipment on the Standard and Sport grades.



01NMO29Y

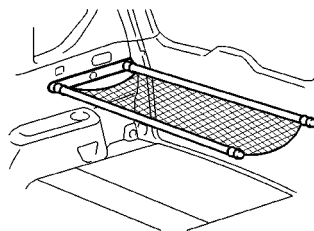
Tonneau Cover



01NMO30Y

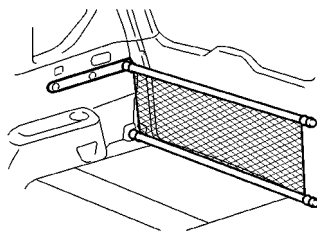
Utility Pipes with Net

► Utility Pipes with Net Arrangement ◀



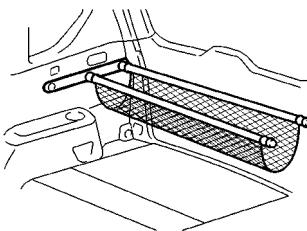
01NMO31Y

Partition



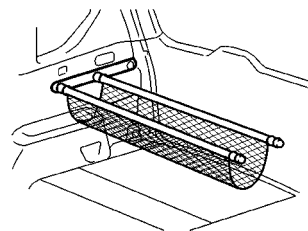
01NMO32Y

**Prevent items from
falling out**



01NMO33Y

Hammock A

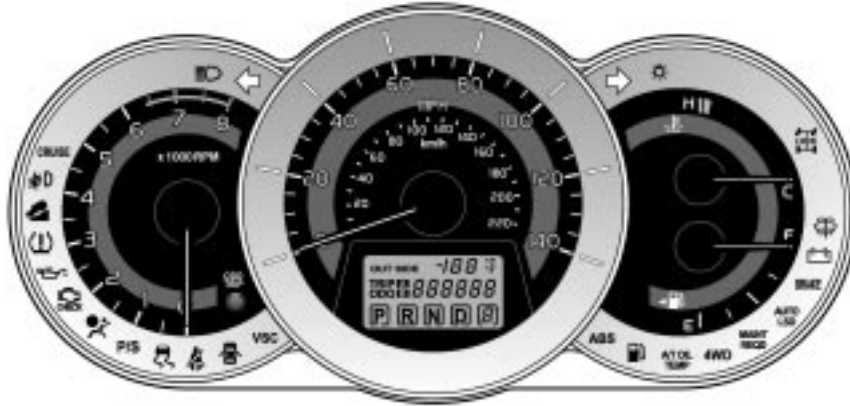


01NMO34Y

Hammock B

Combination Meter

An analog triple-dial type Optitron meter is provided in the combination meter as standard equipment on all models.

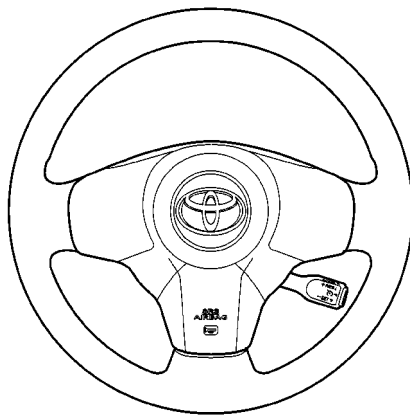


01MMO15Y

Steering Wheel

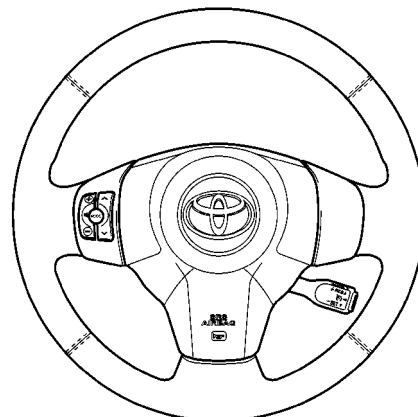
- A 3-spoke urethane steering wheel is provided as standard equipment on the Standard and Sport grades.
- A 3-spoke urethane steering wheel with steering pad switch* is provided as optional equipment on the Sport grade.
- A 3-spoke leather steering wheel with steering pad switch* is provided as standard equipment on the Limited grade.

*: Audio Switch



01MMO45Y

3-spoke Urethane Type

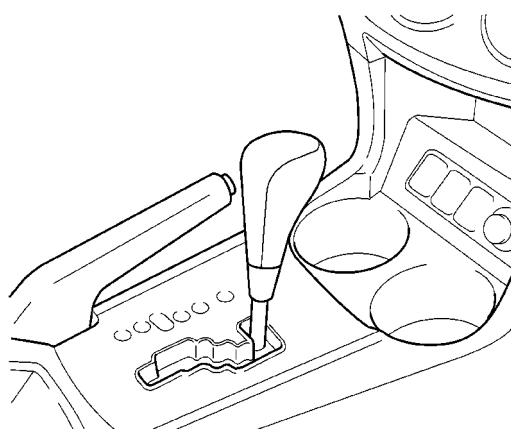


01MMO16Y

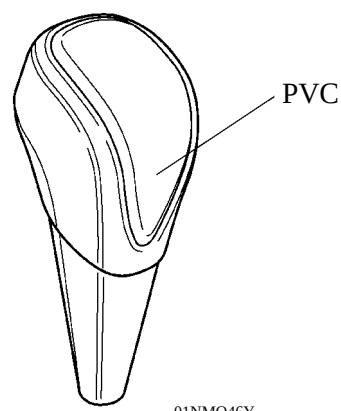
**3-spoke Leather Type with
Steering Pad Switch**

Shift Lever

- PVC (Polyvinyl Chloride) shift lever knob is provided as standard equipment on the Standard and Sport grades.
- Leather shift lever knob is provided as standard equipment on the Limited grade.
- A gate type shift lever is used on the automatic transaxle models for luxuriousness.

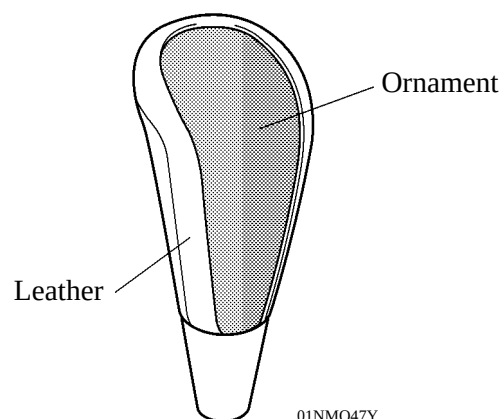


01NMO44Y



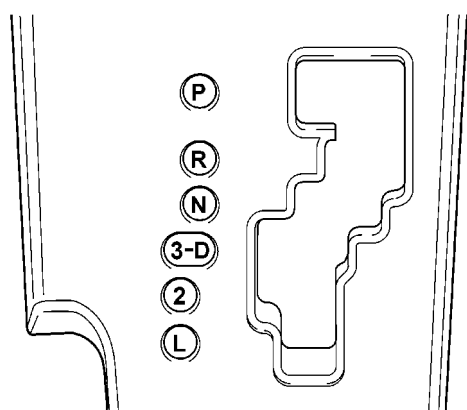
01NMO46Y

For Standard and Sport Grades



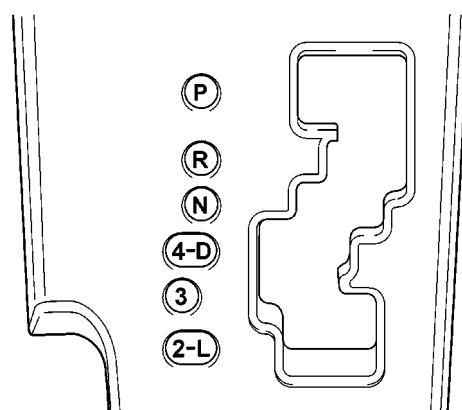
01NMO47Y

For Limited Grade



01NMO45Y

For 4-speed Automatic Transaxle



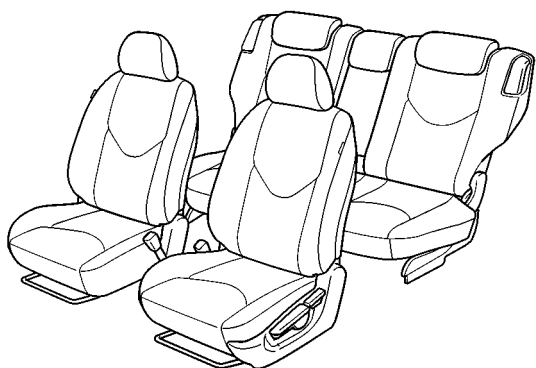
01MMO17Y

For 5-speed Automatic Transaxle

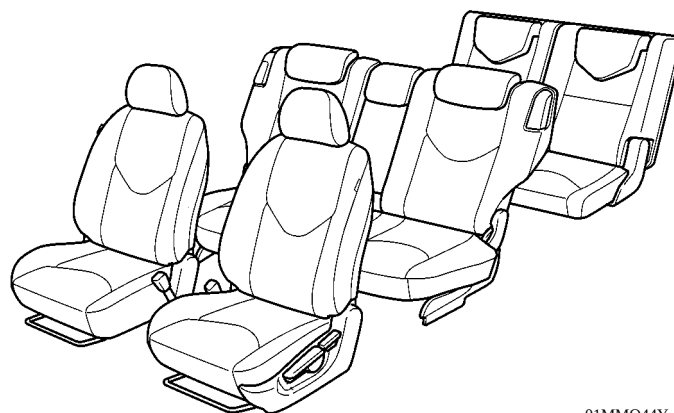
Seat

- Manual type front seats and 60/40 split retractable type rear seats are provided as standard equipment on the Standard and Sport grades.
- Power type front seats are provided as standard equipment on the Limited grade.
- A rear No. 2 seat is available as optional equipment on the Standard and Limited grades.
- Fabric seat covers are provided as standard equipment on all the models, and leather seat covers are available as optional equipment on the Limited grade*.

*: Except Models with Rear No.2 Seat



01NMO48Y

Standard

01MMO44Y

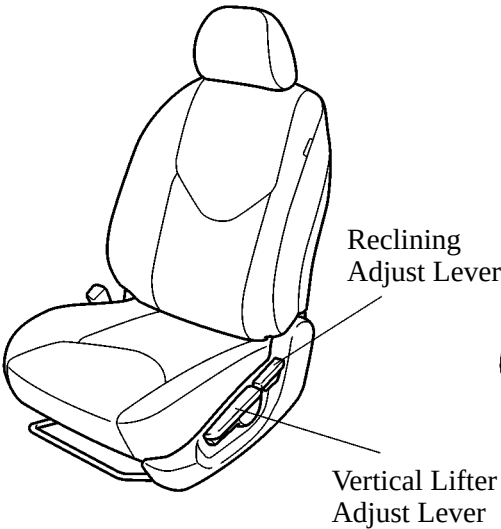
With Rear No. 2 Seat

Front Seat

- 6-way manual seat is provided for the driver seat, and 4-way manual seat is provided for the front passenger seat as standard equipment on the Standard and Sport grades.
- 8-way power seat is provided for the driver seat as standard equipment on the Limited grade.
- On both the driver and front passenger seats, seat back pockets are provided as standard equipment on the Standard grade, and net type seat back pockets are provided as standard equipment on the Limited and Sport grades.

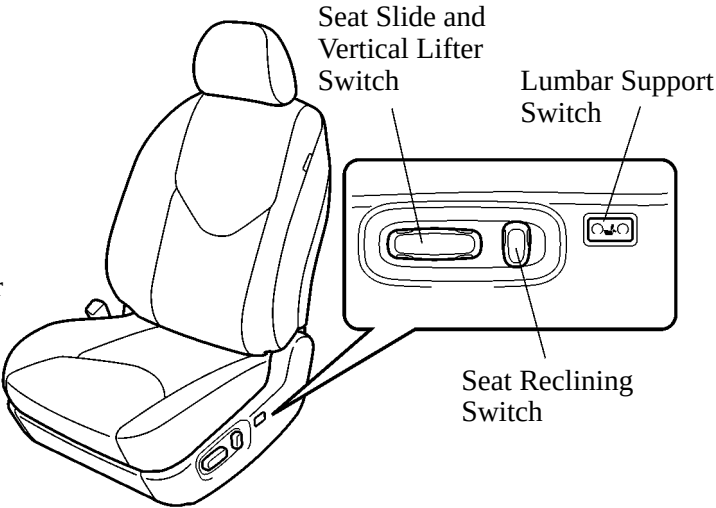
Model Item	New		Previous	
	Driver Seat	Front Passenger Seat	Driver Seat	Front Passenger Seat
Seat Slide	240 mm (9.4 in.) 15 mm (0.6 in.) x 16 Steps		240 mm (9.4 in.) 15 mm (0.6 in.) x 16 Steps	
Seat Reclining	82° (2° x 41 Steps), 78°*		76° (2° x 38 Steps)	
Vertical Lifter	45 mm (1.8 in.)	—	45 mm (1.8 in.)	—
Front Vertical*	10°	—	—	—
Front Tilt*	26 mm (1.0 in.)	—	—	—

*: Power Seat Only



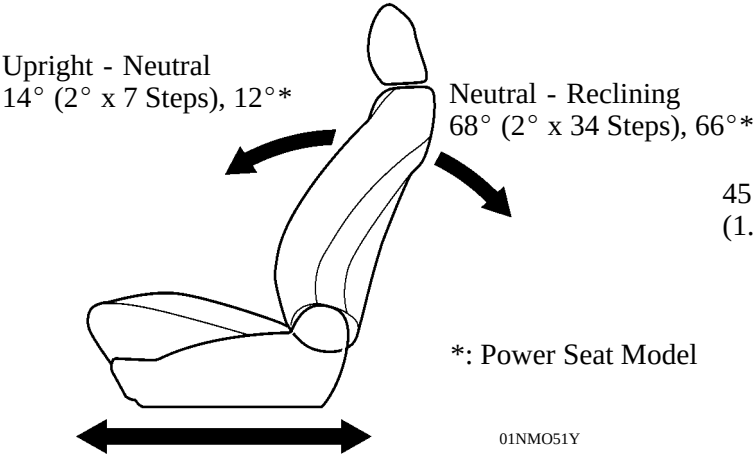
Manual Seat

01NMO49Y



Power Seat

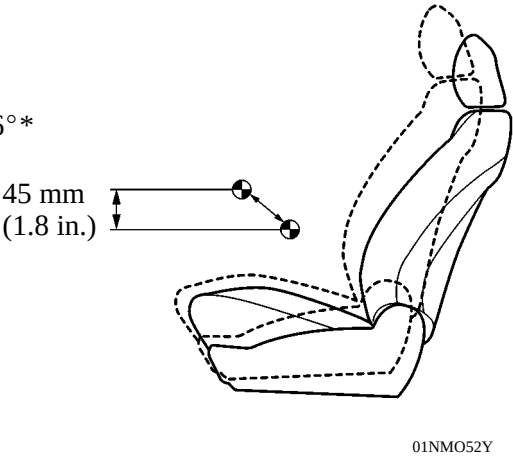
01NMO50Y



Seat Slide: 240 mm (9.4 in.)

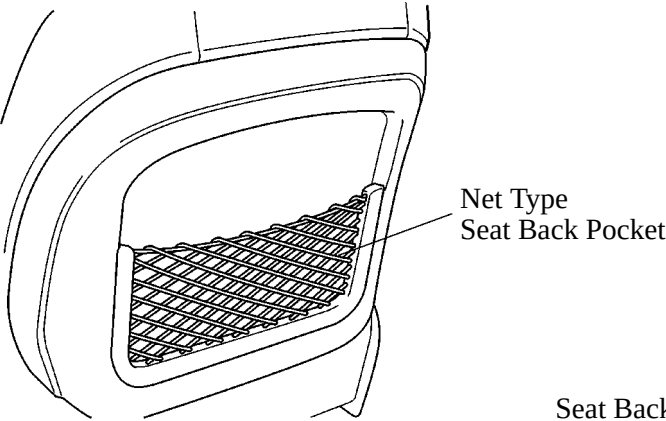
01NMO51Y

Seat Slide and Reclining



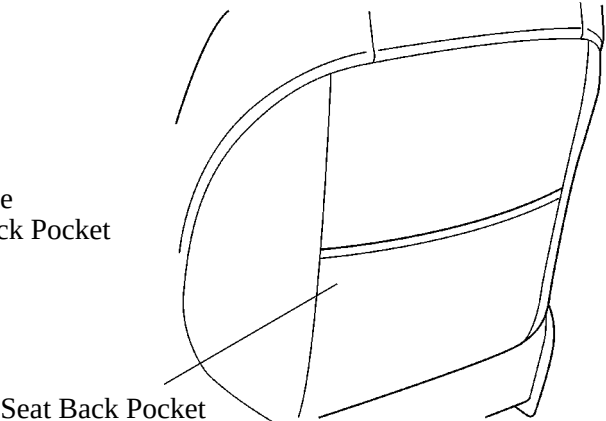
01NMO52Y

Vertical Lifter



01NMO53Y

For Limited and Sport Grades

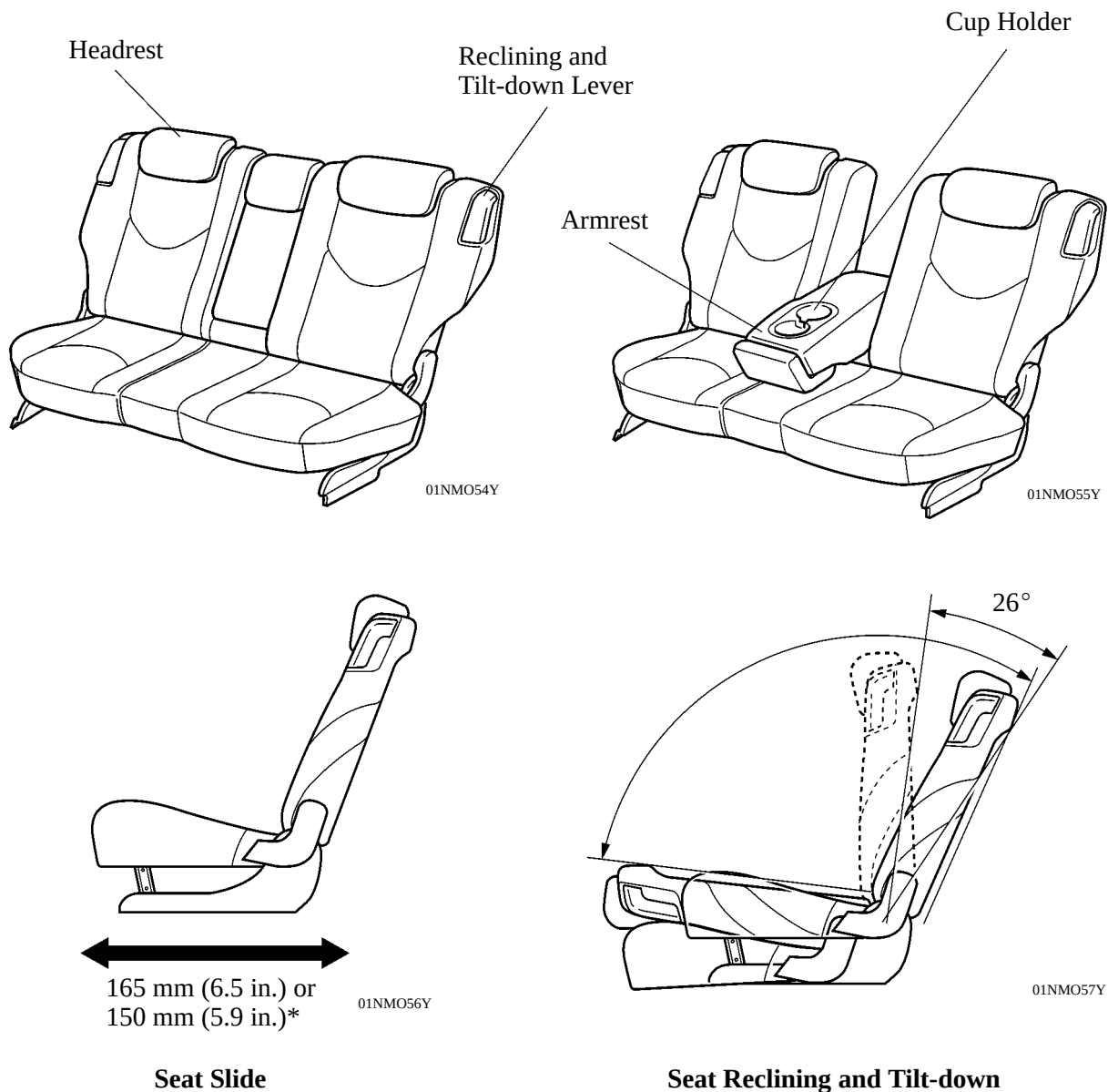


01NMO101Y

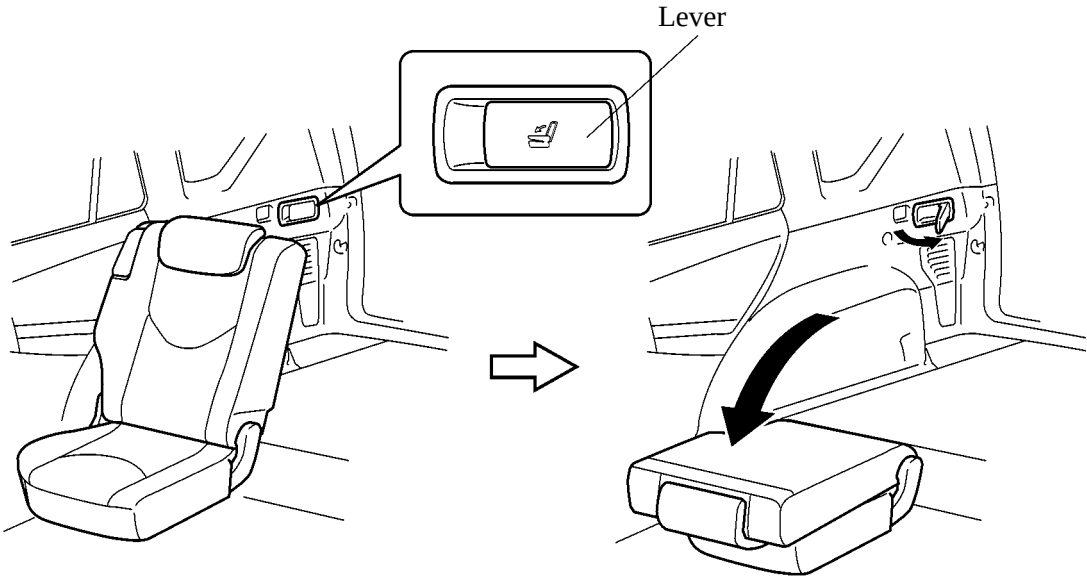
For Standard Grade

Rear Seat**Rear No. 1 Seat**

- A 60/40 split retractable type rear seat with tilt-down function is provided as standard equipment.
- An L-shaped headrest is used to achieve excellent rearward visibility.
- The seat slide movement is 165 mm (6.5 in.), and seat reclining angle is 26°.
- On the models with a rear No. 2 seat, the amount of seat slide is 150 mm (5.9 in.).
- An armrest with a cup holder is provided for the center seat.
- A remote operation mechanism is used to enable the user to operate a lever in the luggage compartment in order to tilt-down the rear seat.
- The models with a rear No. 2 seat have been provided with a walk-in function.

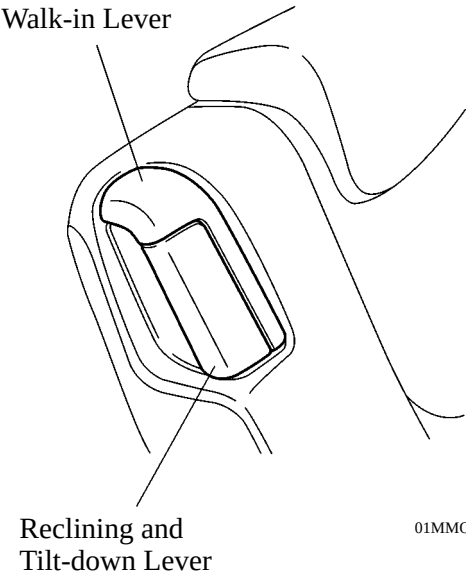


*: Models with a Rear No. 2 Seat

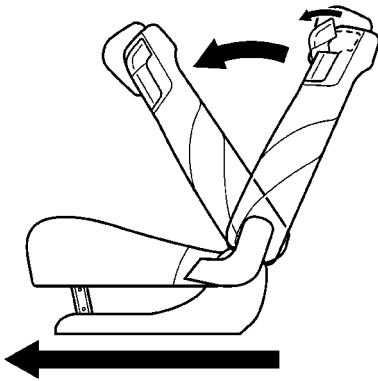


01NMO58Y

Remote Operation Mechanism



01MMO18Y



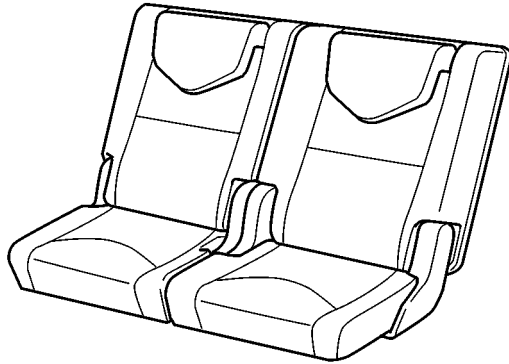
Passenger Side Slide Movement: 120 mm (4.7 in.)

01MMO19Y

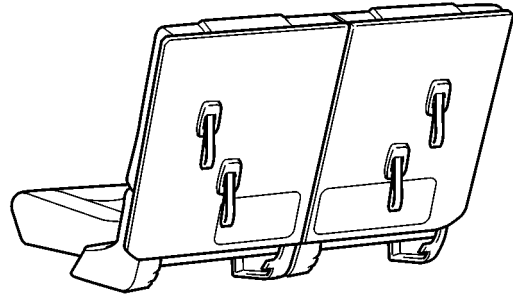
Walk-in Function

Rear No. 2 Seat

- A storable rear No. 2 seat is available as optional equipment on the Standard and Limited grades.
- An L-shaped headrest is used to achieve excellent rearward visibility.

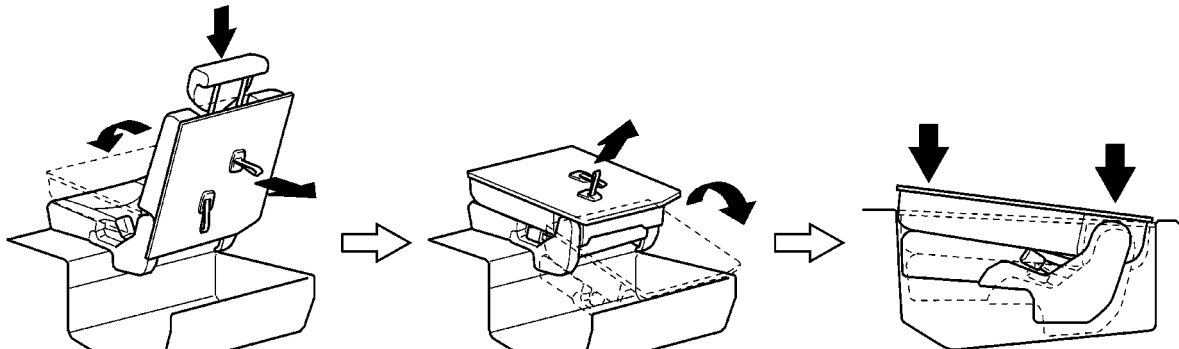


01MMO20Y



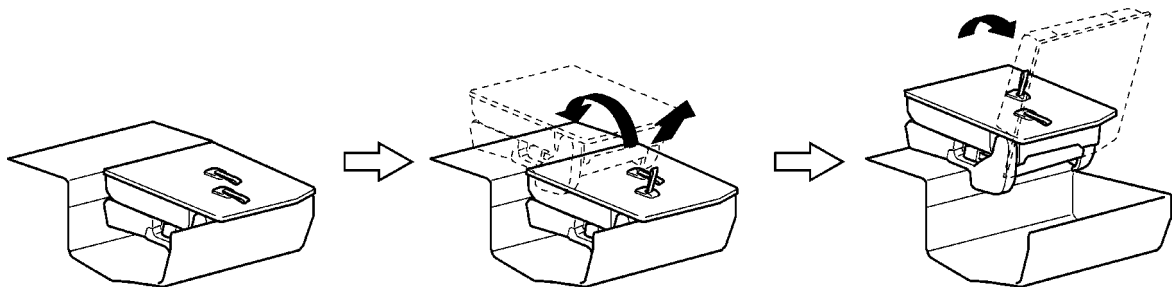
01MMO21Y

1) Storage Operation

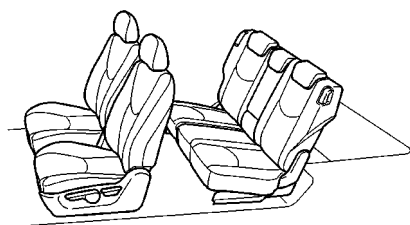


01MMO22Y

2) Set up Operation

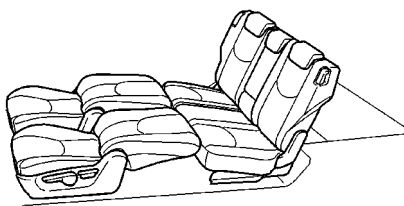


01MMO23Y

Seat Arrangement**Without Rear No. 2 Seat**

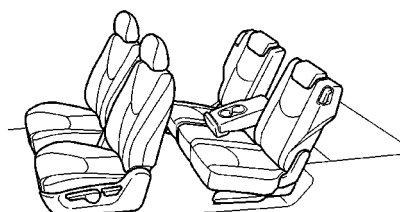
01NMO59Y

Default



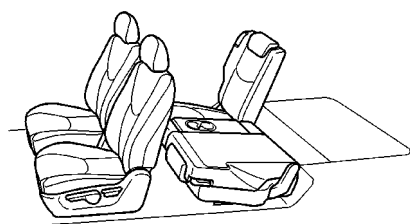
01NMO60Y

Front Seat: Full Flat



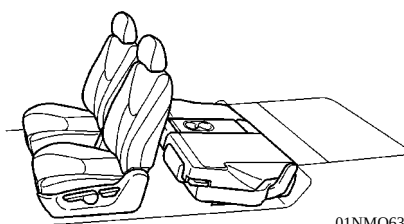
01NMO61Y

Rear Center Seat: Retracted



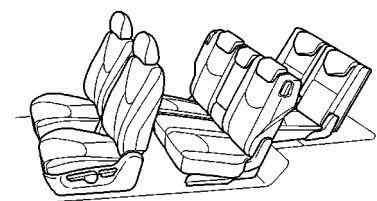
01NMO62Y

Rear Seat: One Side Tilt-down



01NMO63Y

Rear Seat: Tilt-down

With Rear No. 2 Seat

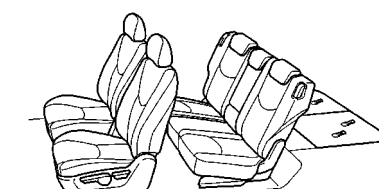
01MMO24Y

Default



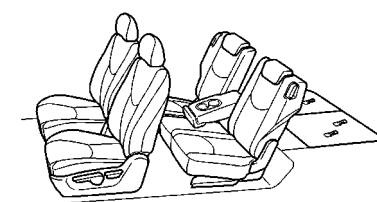
01MMO25Y

Front Seat: Full Flat



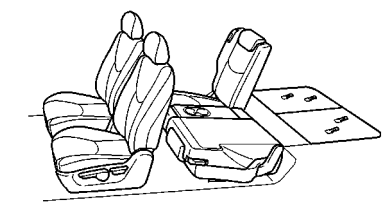
01MMO26Y

Rear No. 2 Seat: Stored



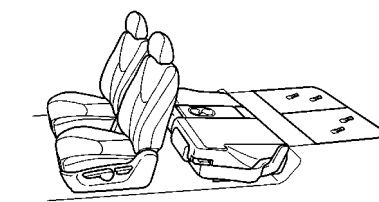
01MMO27Y

Rear No. 1 Center Seat: Retracted



01MMO28Y

Rear No. 1 Seat: One Side Tilt-down



01MMO29Y

Rear No. 1 Seat: Tilt-down

LIGHTING

■ DESCRIPTION

The new models have a lighting system with the following equipments:

●: Standard OP: Option —: Not Available

Destination	U. S. A.			Canada		
System \ Grade	Standard	Sport	Limited	Standard	Sport	Limited
Daytime Running Light System	OP	OP	OP	●	●	●
Illuminated Entry System (Key Illumination + Room Light + Front Personal Light)	●	●	—	●	●	—
Illuminated Entry System (Key Illumination + Room Light + Front Personal Light + Foot Light)	—	—	●	—	—	●
Light Auto Turn-off System	●	●	●	●	●	●
Front Fog Light	—	●	●	—	●	●

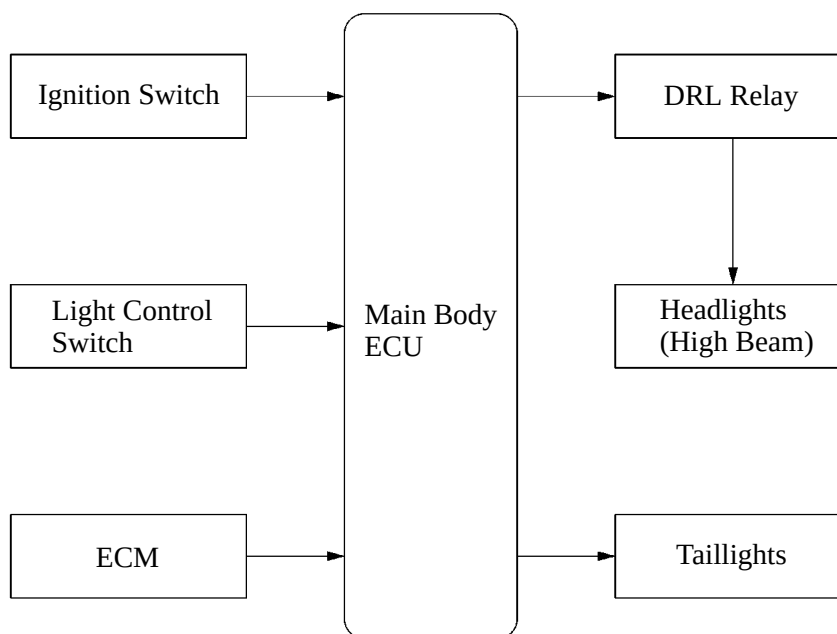


Multi-refractor Headlight

■ DAYTIME RUNNING LIGHT SYSTEM

- The daytime running light system is standard equipment on the Canada models and is available as optional equipment on the U.S.A. models.
- This system is designed to automatically activate the headlights at reduced brightness (high beam) during the daytime to keep the car highly visible to other vehicles.
- This system is controlled by the main body ECU.
- This system is enabled when the conditions given below are met:
 - 1) The ignition switch is ON.
 - 2) Engine running condition.
 - 3) Light control switch is OFF.

► System Diagram ◀

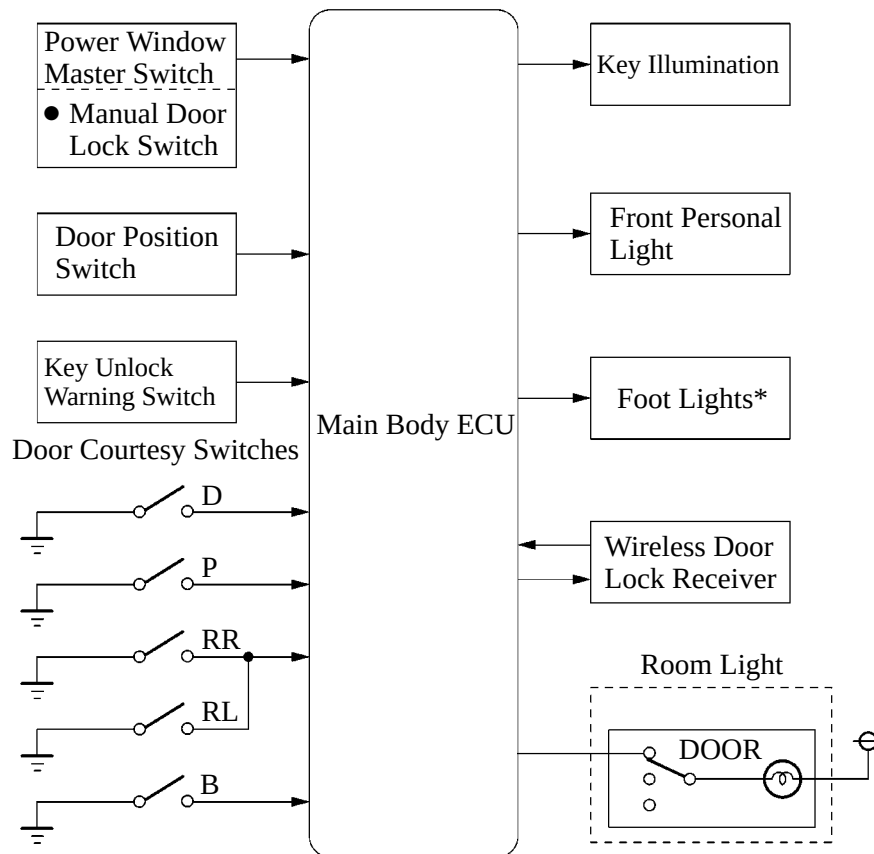


■ ILLUMINATED ENTRY SYSTEM

- This system is controlled by the main body ECU.
- When any one of the following conditions is satisfied, the illuminated entry system turns on the key illumination, room light, front personal light and foot light*.
 - 1) Any door is opened.
 - 2) A door is unlocked through a driver door key transmitter operation.
 - 3) All doors are closed and the ignition switch is turned from ON to OFF.
- When any one of the following conditions is satisfied, these lights will fade out (in approx. 1 sec.).
 - 1) After continuing to be on for approx. 15 sec. after all doors have been properly closed.
 - 2) All doors are closed and all doors are locked.
 - 3) All doors are closed and the ignition switch is turned to ACC or ON.
- A battery saving function is used to automatically turn the key illumination, room light, front personal light and foot light* OFF when the following condition occurs continuously for over 20 minutes: the key is not in the ignition key cylinder when any door is either ajar or open.

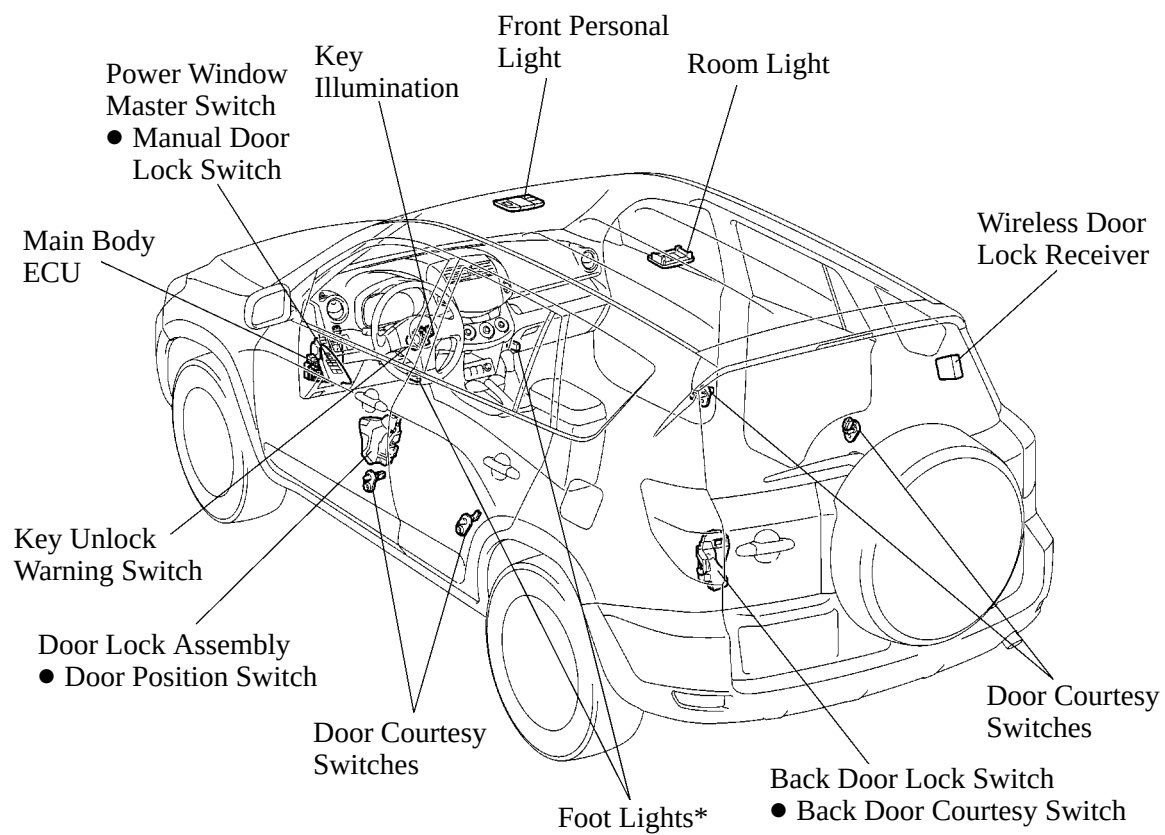
*: Models with Foot Lights

► System Diagram ◀



*: Models with Foot Lights

Layout of Main Components



01MBE20Y

*: Models with Foot Lights

■ LIGHT AUTO TURN-OFF SYSTEM

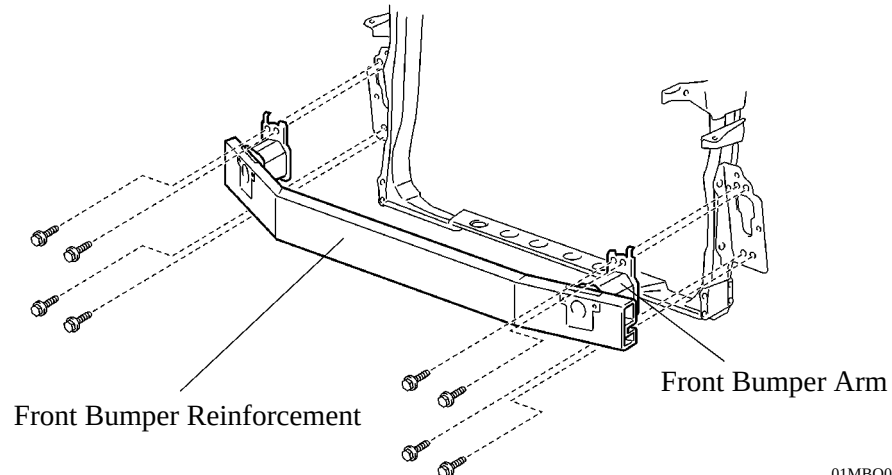
- The light auto turn-off system is standard equipment on all models.
- When the headlights and taillights are illuminated through the operation of the light control switch, if the ignition switch is turned OFF and all the doors are closed, this system continues to illuminate the headlights and taillights for approximately 30 seconds, and then turns OFF the headlights. However, with all the doors locked, when the lock button on the wireless remote control is pushed, the headlights and taillights are turned OFF immediately.
- When the ignition switch is turned OFF and the driver's door is opened with the taillights on, this system automatically turns them off.
- This system is controlled by the main body ECU.

ENHANCEMENT OF PRODUCT APPEAL

■ PARTS WITH LOW REPAIR COST

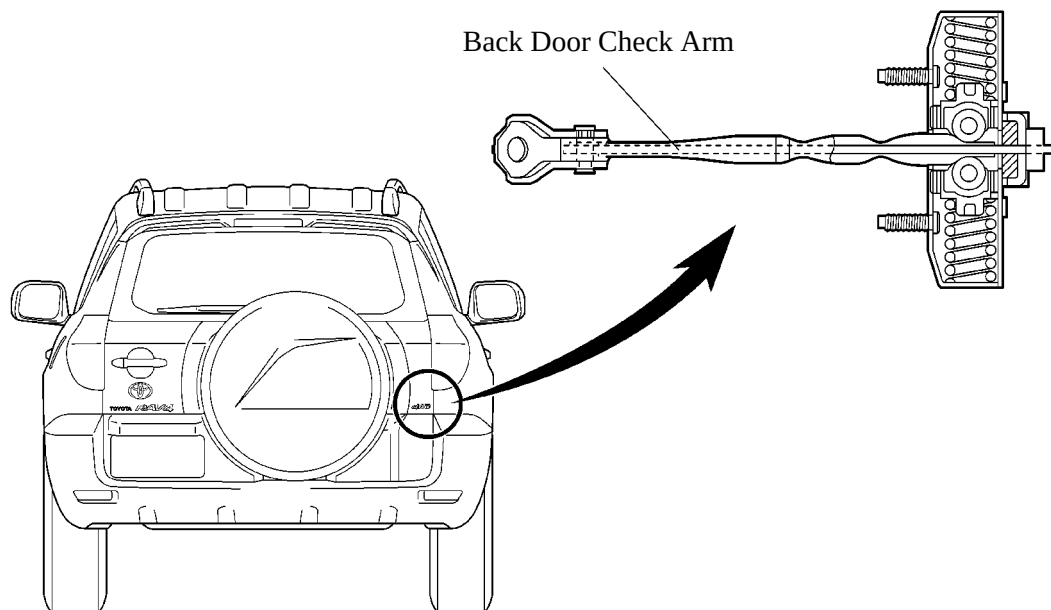
1. Front Bumper

A bolt-on type front bumper reinforcement and bumper arms are used to help ensure the effective absorption of the collision energy and facilitate repairs.



2. Back Door

A three-stage check arm construction is used on the back door, to hold the back door at a smaller opening angle than the semi-open position. This gives the user easy access to the items in case of a tight space behind the back door.



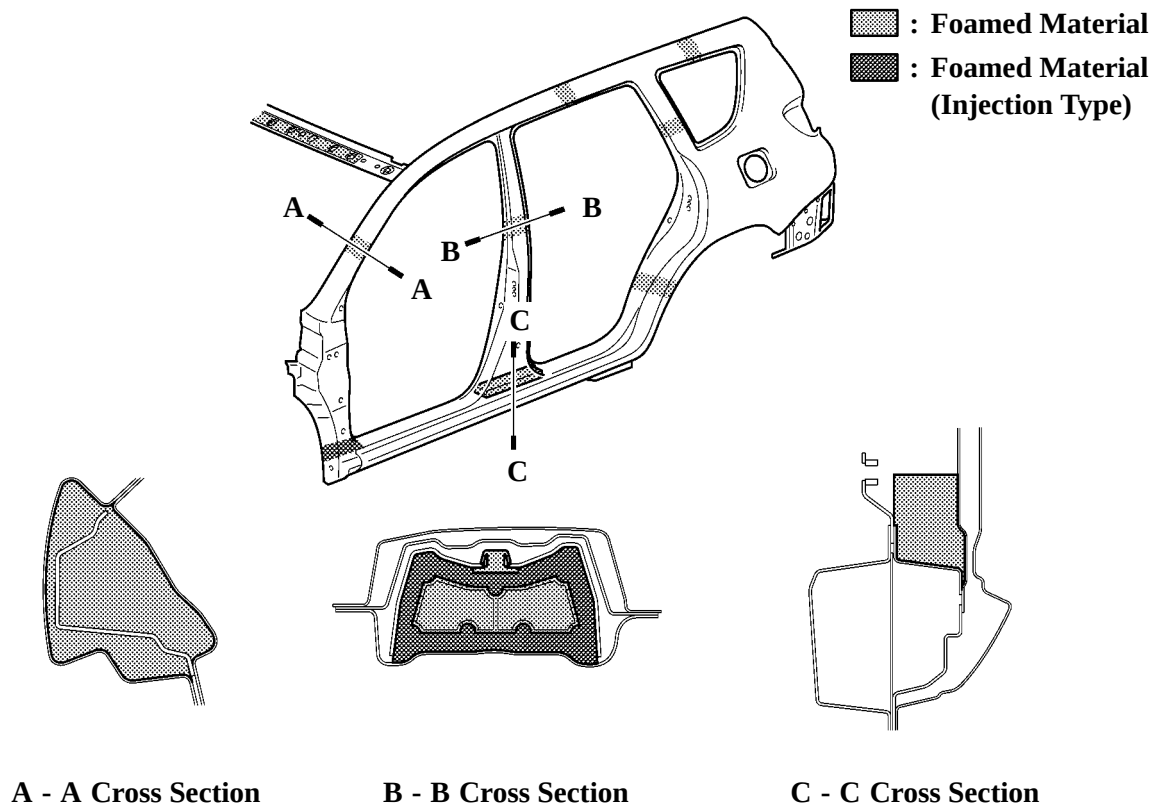
■ LOW VIBRATION AND LOW NOISE BODY

1. General

Effective application of vibration damping and noise suppressant materials reduce engine noise and road noise.

2. Sound Absorbing and Vibration Damping Materials

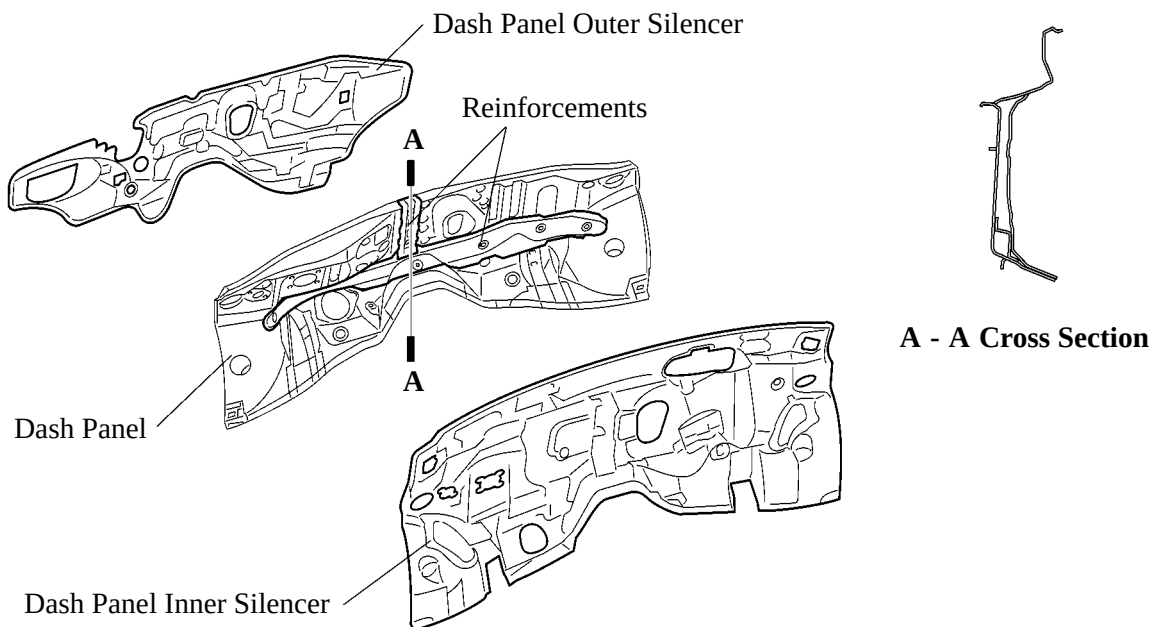
- Foamed sound insulation materials have been optimally located in the cross sections of the body frame parts.



Long Body Model

01NBO18Y

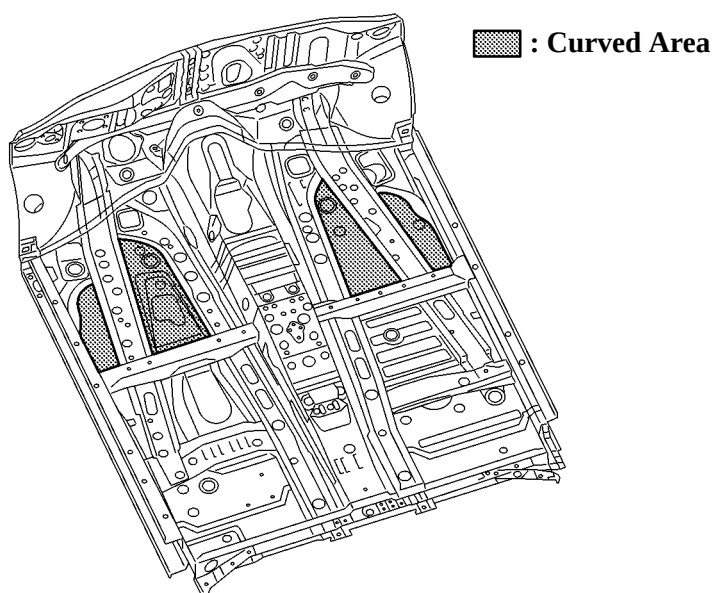
- The dash panel inner silencer has been changed from the silencing type to the sound absorption type to ensure quietness. At the same time, a dash panel outer silencer has been provided to reduce the entry of the engine noise into the cabin.
- Reinforcements have been effectively located inside the dash panel to reduce panel vibration and the entry of road noise.



LHD Model

01NBO19Y

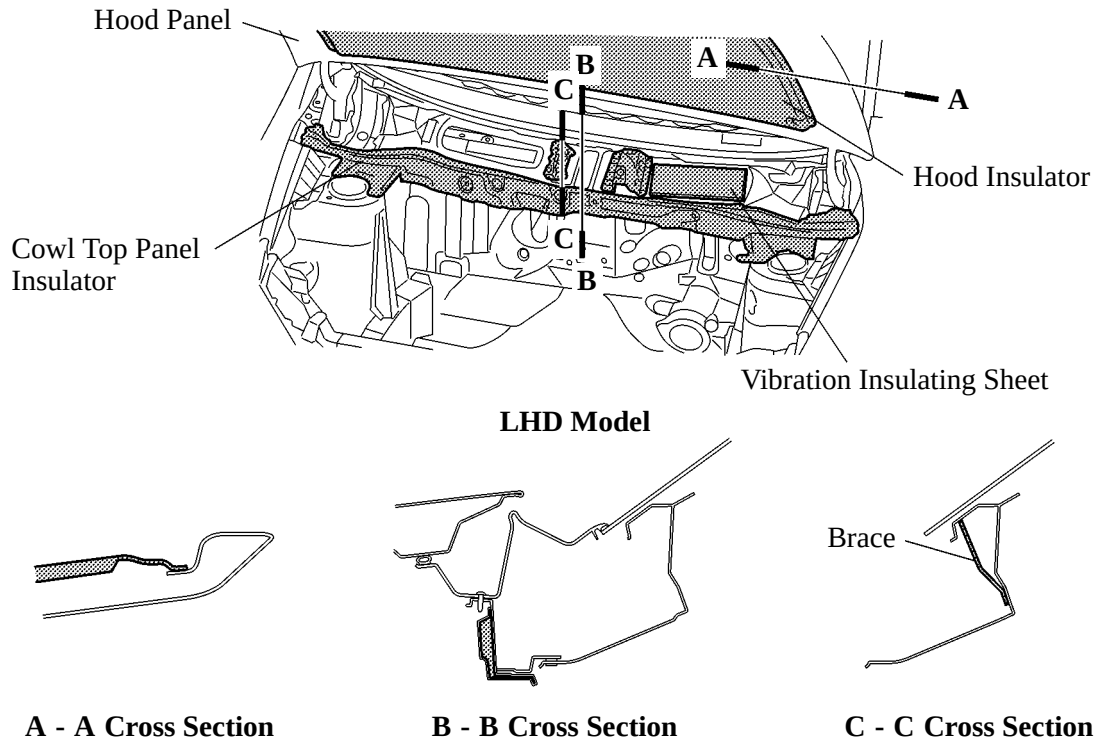
- Curved areas have been provided on the floor panel and the beads have been optimized to reduce the entry of road noise.



LHD Model

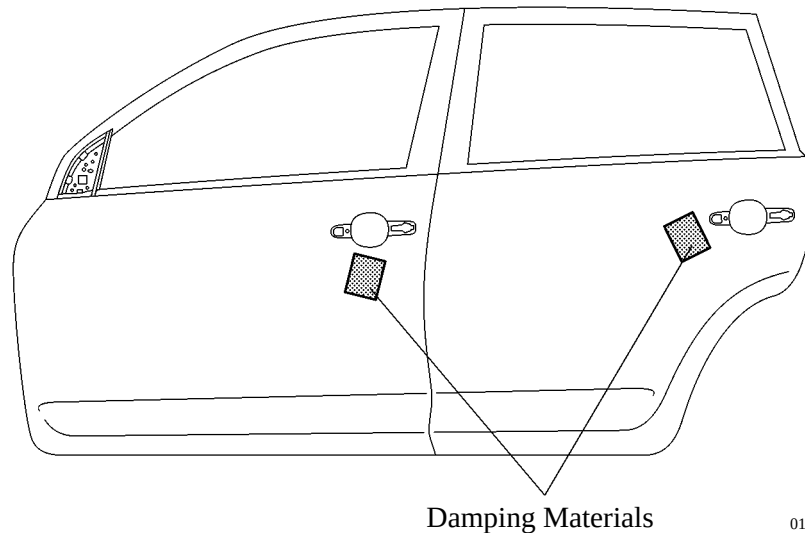
01NBO20Y

- Hood insulator has been provided on the 2GR-FE engine models. It has a dual construction with an air layer between the hood panel and the hood insulator to ensure the proper sound insulating performance.
- Braces have been optimally located on the cowl top panel to suppress the vibration of the windshield glass and ensure quietness.
- An insulator and a vibration insulating sheet have been provided forward of the front cowl panel in order to reduce the entry of engine noise from the engine compartment to the cabin.



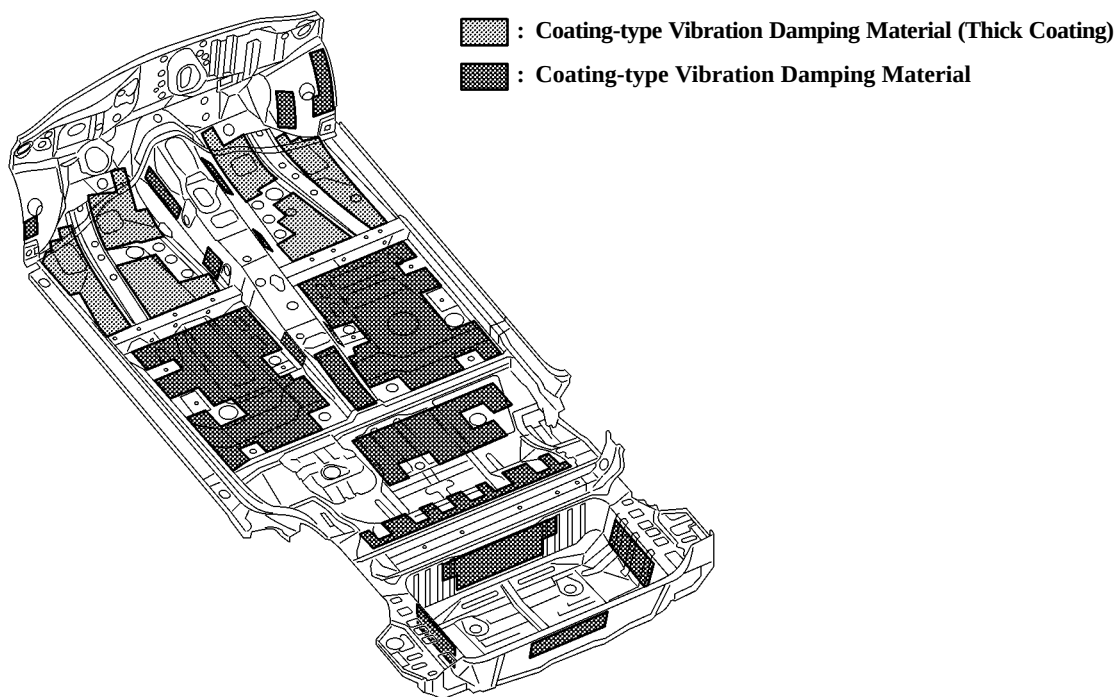
01NBO21Y

- A damping material has been provided in the side door outer panel to reduce the door closure sound.



01NBO23Y

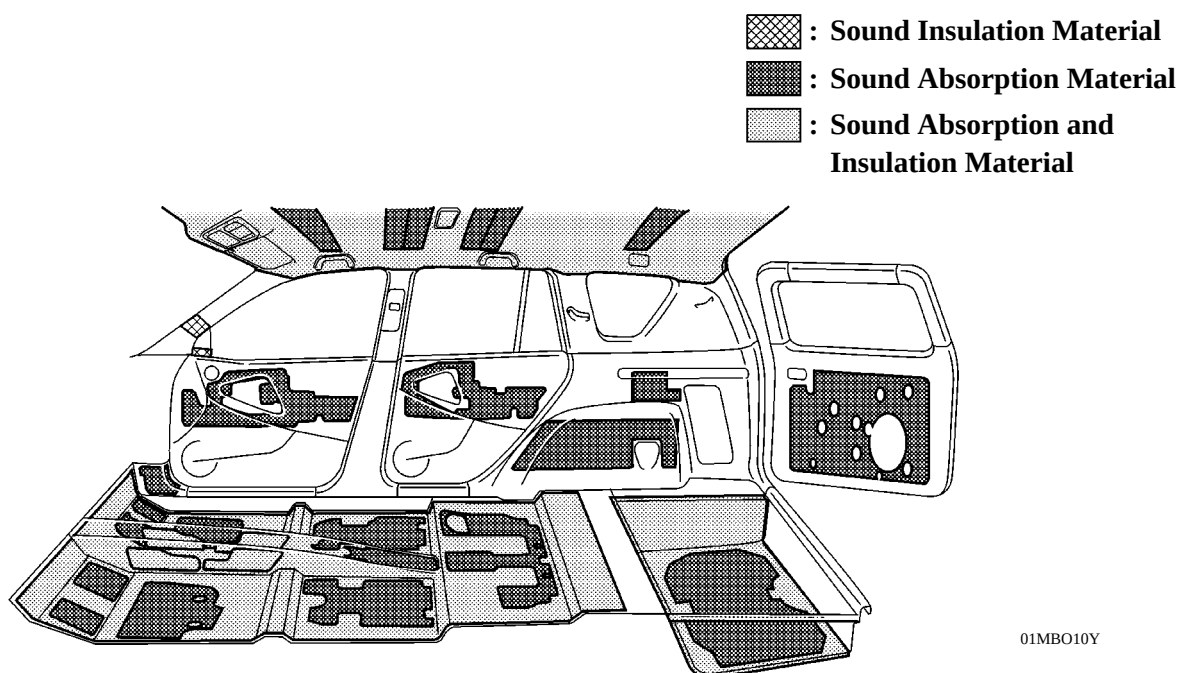
- Coating type vibration damping materials have been applied to the surfaces of the floor panel and the dash panel facing the interior (with a thicker coat applied to the forward area of the vehicle) to ensure sound insulation performance.



01NBO24Y

Long Body LHD Model

- Sound absorption and sound insulation materials have been located throughout the cabin to ensure quietness.



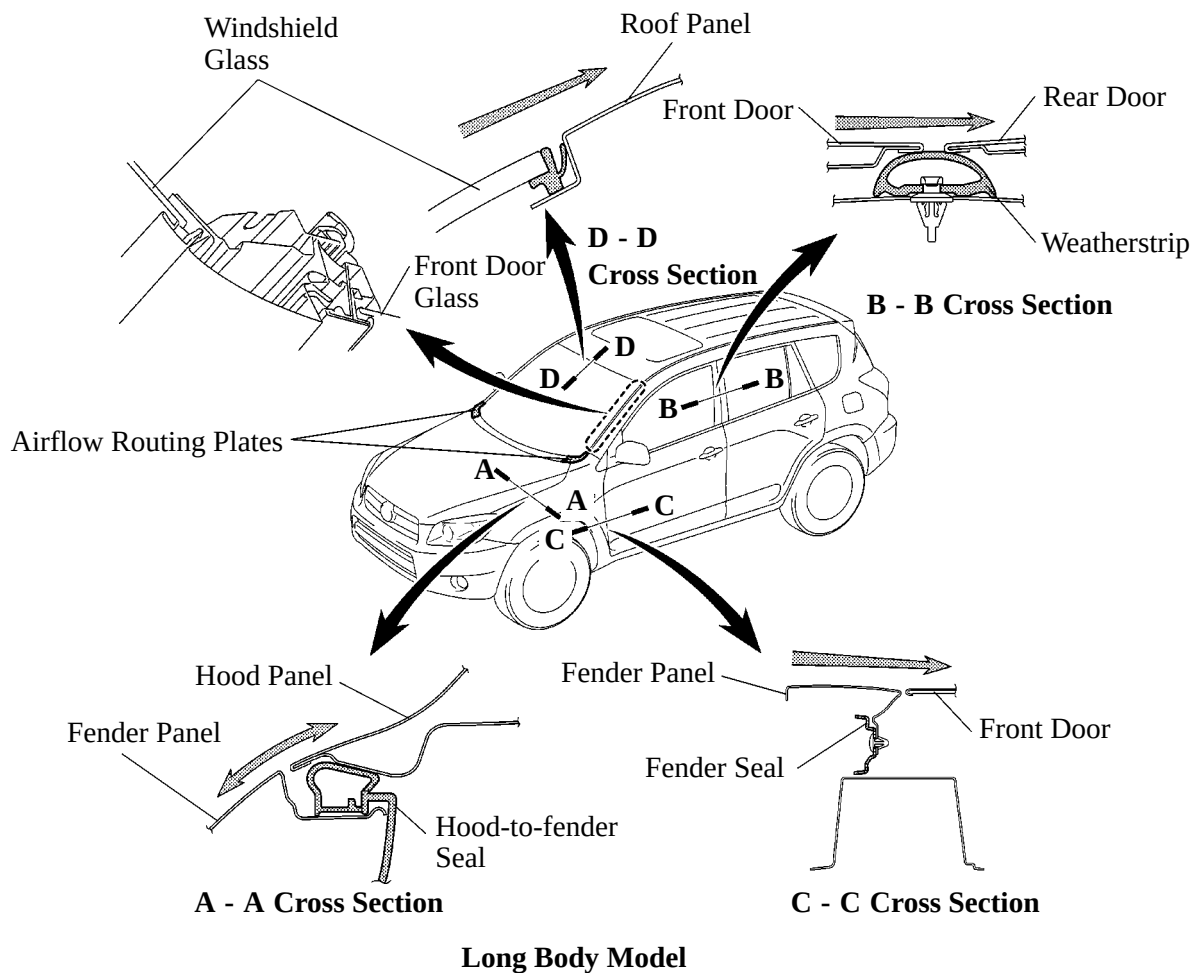
01MBO10Y

Long Body Model

3. Reducing Wind Noise

Wind noise has been reduce through the adoption of the following constructions:

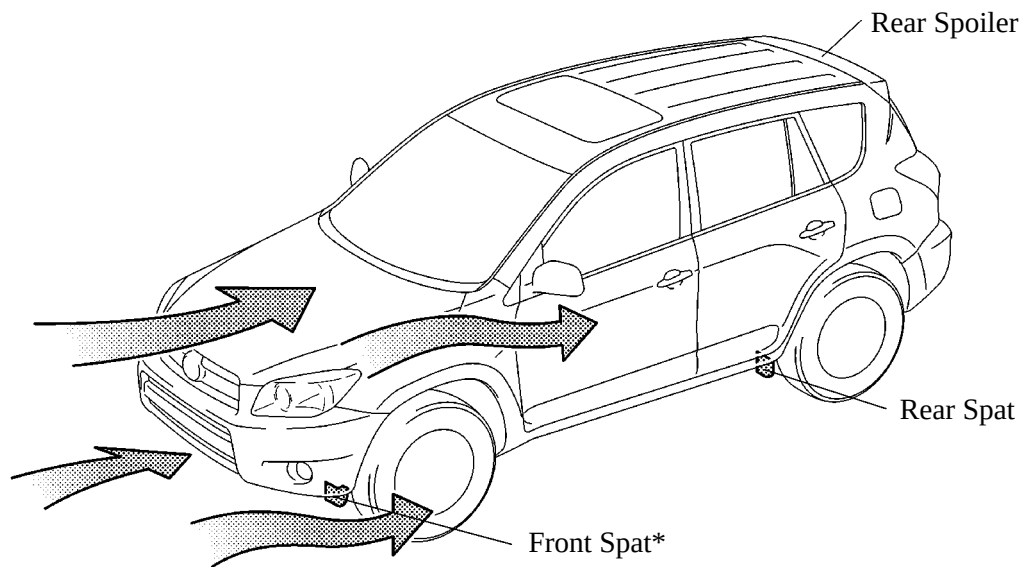
- The offset between various areas of the body and the glass surface has been reduced.
- A hood-to-fender seal has been provided along the parting line between the hood panel and the fender panel.
- A weatherstrip has been provided along the parting line between the front door and the rear door.
- Airflow routing plates have been provided to both sides of the cowl louver, in order to properly route the airflow.
- A fender seal has been provided to block the flow of sound towards the door.



■ AERODYNAMICS

Aero parts have been provided to the various areas to improve the vehicle's aerodynamic characteristics.

- A rear spoiler has been provided to smooth the airflow above the body.
- Spats have been provided forward of the front and rear wheels to smooth the airflow around the wheels.



01NBO27Y

Long Body Model

*: Standard Equipment on 2AZ-FE Engine Models (Except X Grade with 215/70 R16 Tire) and 2GR-FE Engine Models

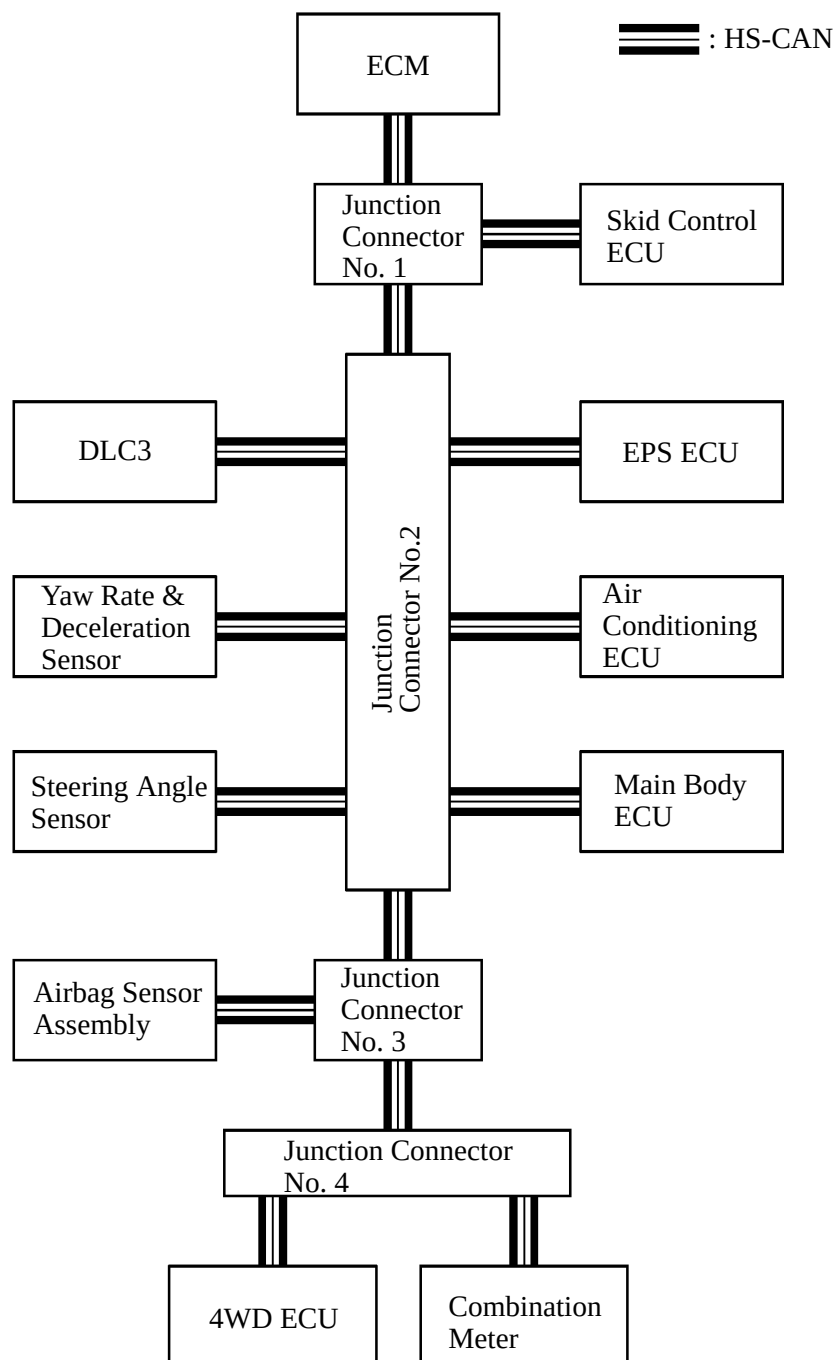
BODY ELECTRICAL

MULTIPLEX COMMUNICATION

DESCRIPTION

- On the '06 model, multiplex communication in which many different ECUs are linked to a bus line and data are mutually transmitted among the ECUs through the line is used.
- On the '06 model, CAN (Controller Area Network) is used among the ECUs as shown below.

► System Diagram ◀

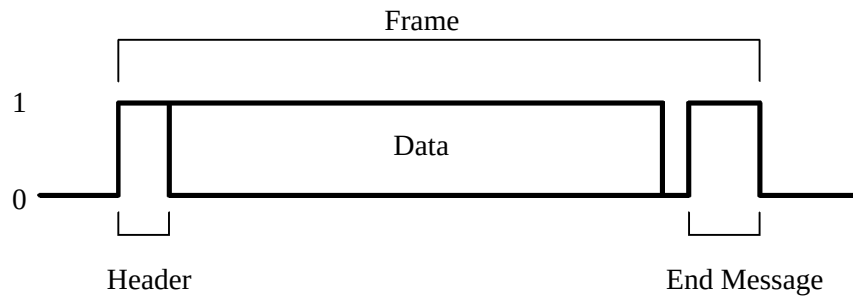


— REFERENCE —

Multiplex communication uses serial communication data that consists of bits and frames in order to exchange information among the various ECUs. This allows a reduction of the amount of wiring on the vehicle.

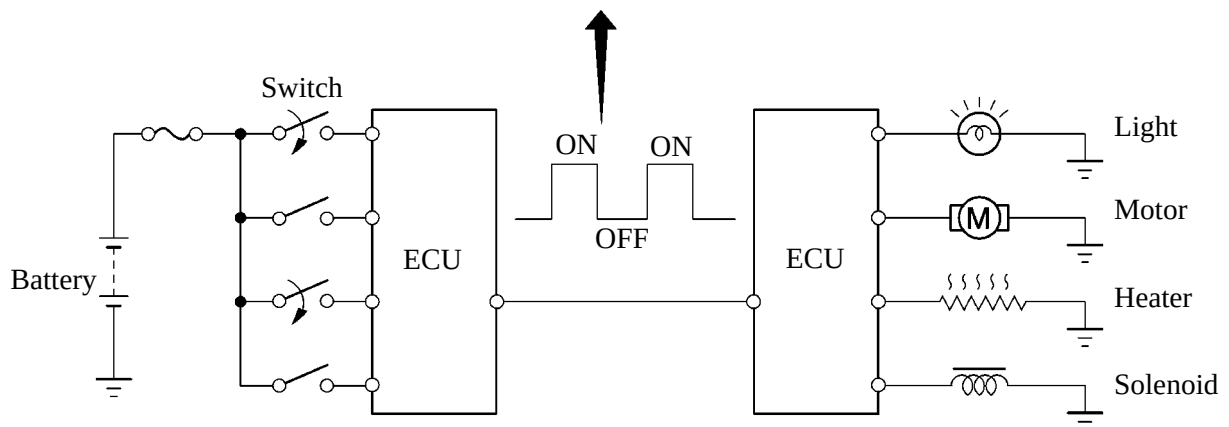
- A bit is the basic unit of communication that is used to represent the information. A bit is represented by binary values of “0” or “1”.
- A frame is a body of data that is transmitted together. A frame contains a header that indicates the beginning, and an end message that indicates the end.

► Conceptual Drawing ◀



240BE05

Serial Communication Data

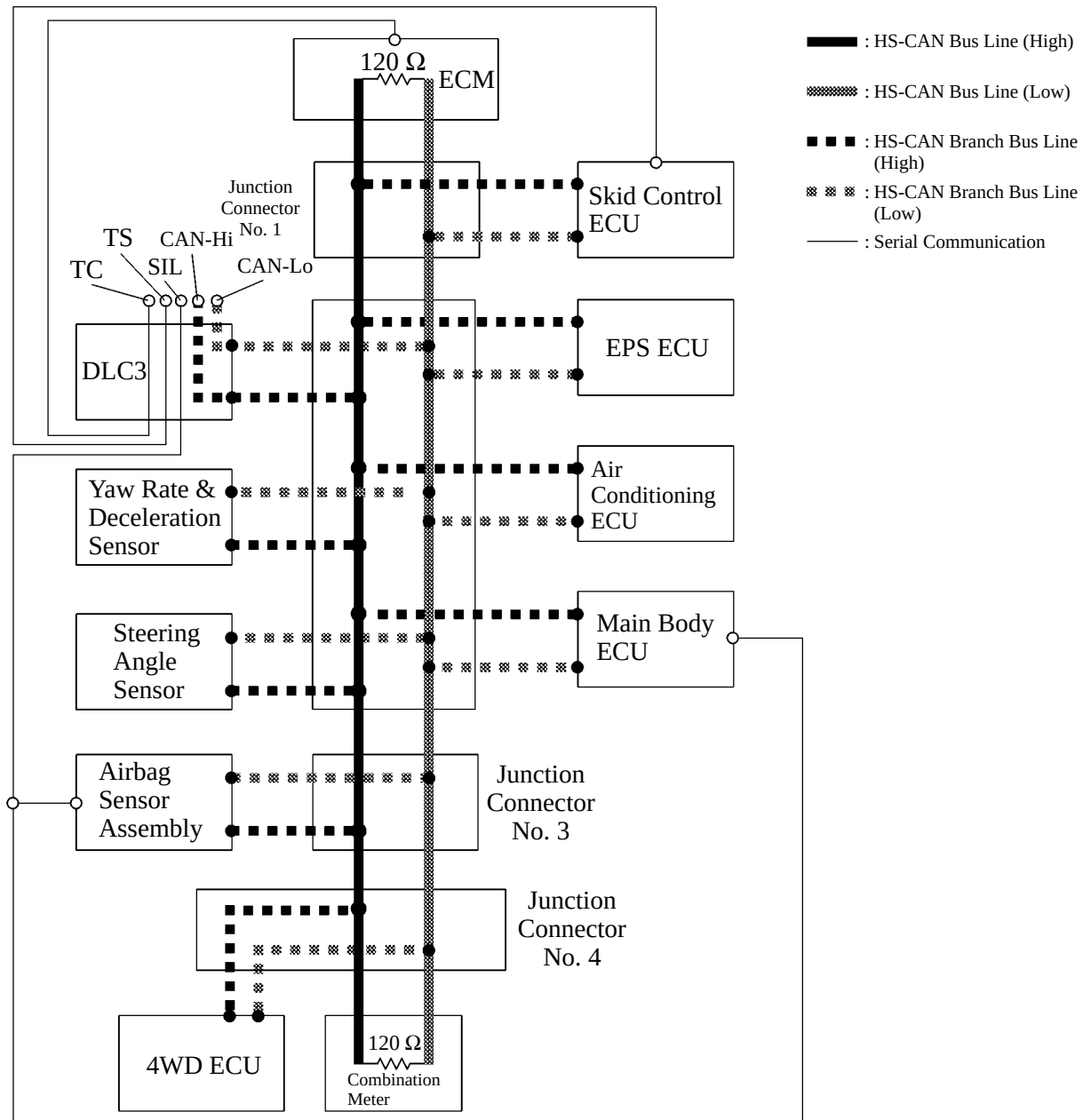


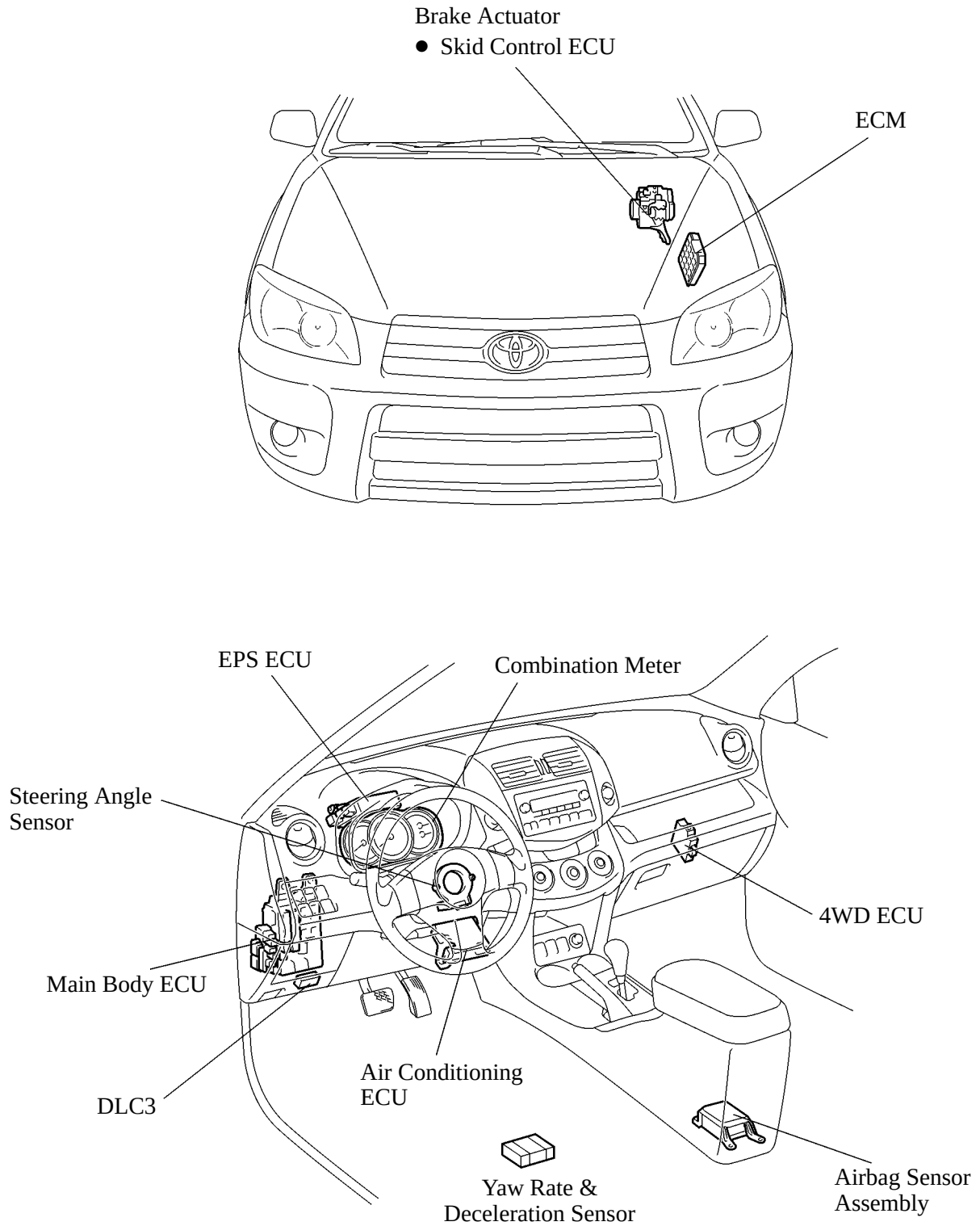
240BE03

■ CAN (Controller Area Network)

- The CAN (Controller Area Network) is a serial data communication for real time application. It is multiplex communication to be equipped for a vehicle and has communication speed (500 kbps) and the function to detect malfunction.
- The communication wire uses a twisted-pair wire. The bus line has a high line (2.5 V to 3.5 V of voltage is applied) and a low line (1.5 V to 2.5 V of voltage is applied).
- The CAN system in the '06 models is used to connect the following ECUs and parts via junction connector No. 1, No. 2, No. 3 and No. 4.

► System Diagram ◀



■ LAYOUT OF CAN COMPONENTS

■ DIAGNOSIS

If a malfunction occurs on CAN communication line, the ECU that is connected to CAN communication line stores the DTCs (Diagnostic Trouble Codes) in its memory.

- There are 2-digit DTCs and 5-digit DTCs for CAN communication.
- The 5-digit DTCs can be read by connecting a hand-held tester to the DLC3.
- The 2-digit DTCs can be read by connecting the SST (09843-18040) to TC and CG terminals of the DLC3.

For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

■ CUSTOMIZED BODY ELECTRONICS SYSTEM

A hand-held tester can change the specification of the systems or functions.

System	Hand-held Tester Display Content	Content	Default	Selection
Wireless Door Lock Remote Control System	OPEN DOOR WARN (Open door warning)	Function to make the buzzer sound for 10 seconds if the door is open when locking with the wireless door lock function.	ON	ON/OFF
	WIRELESS OPER (Wireless door lock control function)	Function to turn ON/OFF of the wireless door lock.	ON	ON/OFF
	HAZARD ANS BACK (Hazard answer back of the wireless)	Function to turn ON/OFF of the hazard answer back of the wireless door lock.	ON	ON/OFF
	AUTO LOCK DELAY (Auto lock time)	Function to change the time until relocking after unlocking with the wireless door lock.	30 s	30 s/ 60 s
	UNLOCK/2 OPER (2 times operation wireless unlock)	Function to unlock the driver's door by pressing the unlock button of the transmitter once and to unlock all the doors by pressing it twice. In the OFF setting, pressing once makes all the doors unlocked.	ON	ON/OFF
	ALARM FUNCTION (Panic function)	Function to operate the theft deterrent system by keeping pressing the lock button of the transmitter for 1.5 seconds. If there is the panic button, press the panic button instead of the lock button.	ON	ON/OFF
	WIRLS BUZZ RESP (Wireless buzzer response)	Function to turn on/off of the wireless buzzer response function.	ON	ON/OFF
Door Lock Control System	UNLK/KEY TWICE (Unlock w/2 times D key operation)	Function to unlock only the driver's door by operating the key once and to unlock all the doors by operating key twice. In the OFF setting, operating the key "UNLOCK" once makes all the doors unlocked.	ON	ON/OFF
Illuminated Entry System	LIGHTING TIME	Function to change the lighting time after closing the door. (It will quickly fade out in case of turning the ignition ON.)	15 s	7.5 s/ 15 s/ 30 s
	ILLUMI SYSTEM	Function to light up the front interior light, key illumination and foot light when one of the following occurs; ignition turn ON, door unlocked or door open.	ON	ON/OFF
	LIGHT CONTROL	Function to light up the front interior light, key illumination and foot light when the ignition switch is ON and the shift position is not P.	ON	ON/OFF
	I/L ON/UNLOCK (Interior light ON w/door key unlock)	Function to light the interior light, etc. when the door is unlocked with a transmitter, door key or door lock control switch.	ON	ON/OFF
	I/L ON/ACC OFF (Light the I/L when ACC OFF)	Function to light the interior light when the ignition switch is operated from "ACC" to "LOCK".	ON	ON/OFF

(Continued)

System	Hand-held Tester Display Content	Contents	Default	Selection
Warning	KEY REMND SOUND	Function to change the frequency of the key reminder buzzer.	Normal	Normal Fast/ Slow/ 0 s
	SEAT BELT WARN	Function to change the seat-belt warning buzzer.	D/P ON	D/P ON/ D ON/ P ON/ D/P OFF
Light Control	DRL FUNCTION	Function to turn on/off of the DRL function.	ON	ON/OFF
Air Conditioning*	SET TEMP SHIFT	Function to control with the shifted temperature against the display temperature.	Normal	+2°C/ +1°C/ Normal/ - 1°C/ - 2°C
	AIR INLET MODE	In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATED mode.	Auto	Manual/ Auto
	COMPRS/DEF OPER (Compressor/Air Inlet DEF Operation)	Function to turn the A/C ON automatically linking with the FRONT DEF button when A/C OFF.	Link	Normal/ Link
	EVAP CTRL	Function to set the evaporator control to the AUTOMATIC position (AUTO) to save power or to the coldest position (MANUAL) to dehumidify the air and to prevent the windows fogging up.	Auto	Manual/ Auto
	AUTO BLOW UP (Foot/DEF automatic blow up function)	Function to switch the blower level automatically when the defroster is ON.	ON	ON/OFF
	FOOT/DEF MODE (Foot/DEF auto mode)	Function to turn the air flow from FOOT/DEF ON automatically when AUTO MODE is ON.	ON	ON/OFF
	AMBIENT TMP SFT (Ambient Temperature Shift)	Function to control with the shifted ambient temperature against the display ambient temperature.	Normal	+3°C/ +2°C/ +1°C/ Normal/ - 1°C/ - 2°C/ - 3°C

*: Only for Models with Automatic Air Conditioning

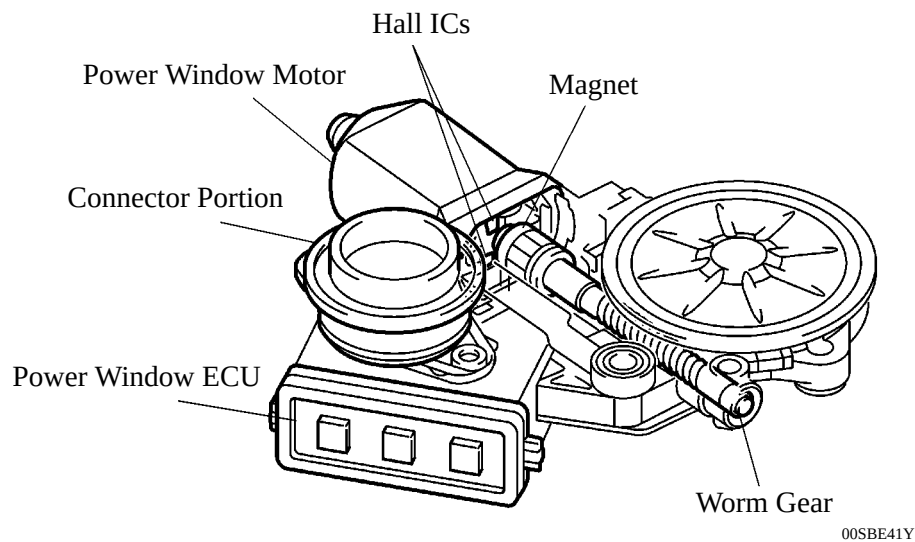
■ JAM PROTECTION FUNCTION

1. General

- The jam protection function automatically stops the power window and moves it downward if foreign object gets jammed in the door window during one-touch auto-up operation or manual-up operation.
- The mechanism uses two Hall ICs to detect the door glass position and direction of movement.
- The power window ECU is built into the power window motor assembly.
- The reverse-direction conditions and amount of down movement after jam detection are as follows: The jam protection function operates and lowers the window approximately 50 mm (1.9 in.) or until 1 second has elapsed. After this, if the amount (space) that the door glass is open has not reached approximately 200 mm (7.87 in.), the jam protection function will continue to lower the window until the space is approximately 200 mm (7.87 in.) or 5 seconds have elapsed. If the door glass reaches the fully open position before the initial 50 mm (1.9 in.) lowering of the door glass is reached, the jam protection function will stop at that time.

2. Jammed Window Detection Mechanism

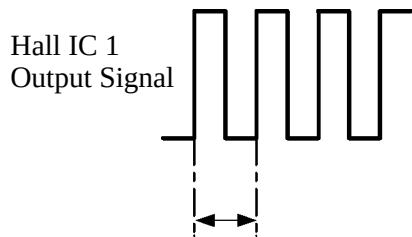
- The jammed window detection mechanism consists of a magnet that is provided on the worm gear of the power window motor assembly, the power window ECU and the two Hall ICs that are provided on the connector.



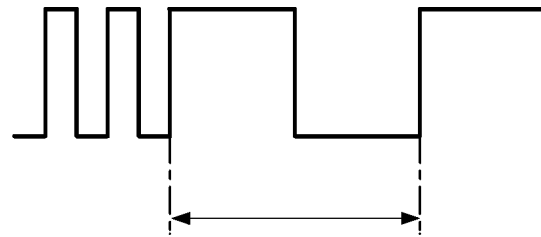
Power Window Motor Assembly

- The Hall IC converts the changes in the magnetic flux that occur through the rotation of the worm gear into block wave signals and outputs them to the power window ECU.
- To control the jam protection function, the power window ECU determines the amount of movement and the jamming of the window glass from the pulse signals from the Hall IC 1, and the moving direction of the window glass from the phase difference between the pulses from the Hall IC 1 and Hall IC 2.

► **Judgment of Amount of Movement and Jamming of Window Glass** ◀

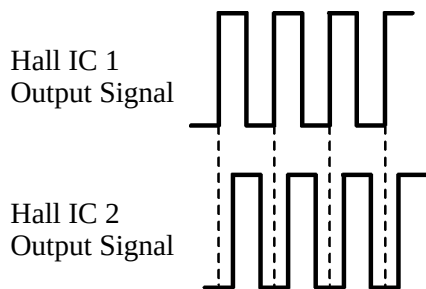


**Power Window Motor
1 Revolution (Normal)**

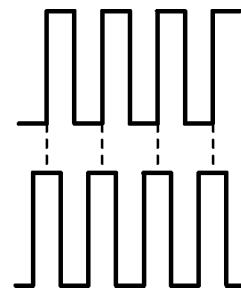


**Power Window Motor
1 Revolution (Jammed)**

232BE34



Window Glass Up



Window Glass Down

232BE35

Service Tip

If the power window motor assembly and power window regulator assembly are replaced, the window position information stored in the system will be lost, and the system must be initialized. After replacing the above parts, initialize the system by performing the steps described below.

- 1) Turn the ignition switch ON, and fully open the driver's window. Continue to hold down the switch for at least 1 second after the window has fully opened*.
- 2) Hold the AUTO switch in the auto up position. Continue to hold the AUTO switch in the auto up position for approximately 1 second after the window has fully closed. The system will memorize the window's fully closed position as the initial position.

For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

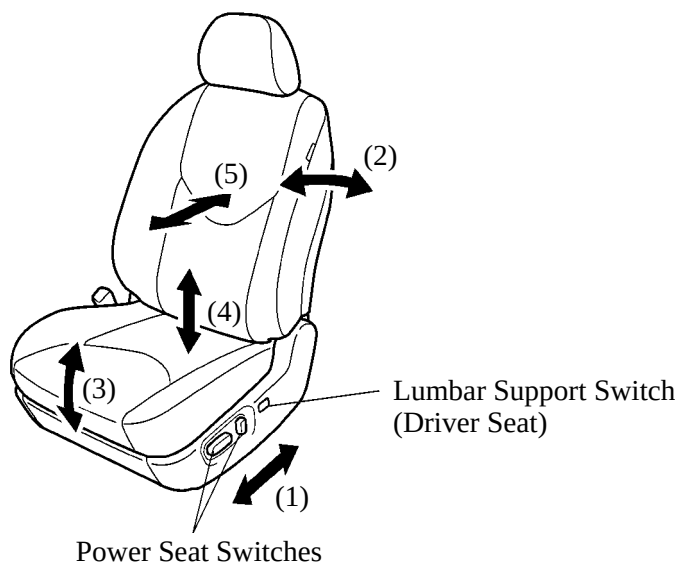
*: When the window reaches its fully open position, the indicator light will change from flashing to illumination, in order to indicate that the window is in the fully open position. However, this does not indicate that the initialization of the system has been completed.

POWER SEAT SYSTEM

DESCRIPTION

- The power seat is used for driver seat on the Limited grade as standard equipment.
- The following features are all for power functions.

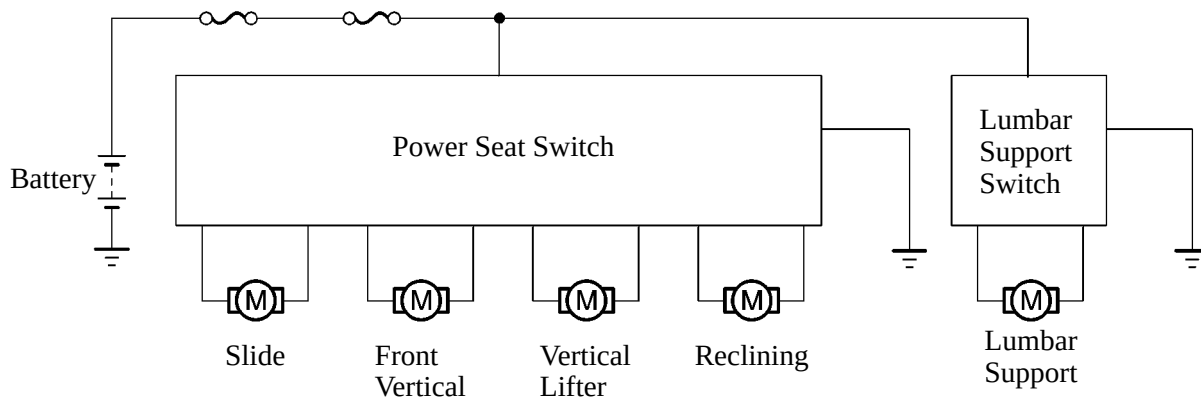
Power Adjustment Function			Stroke
			Driver
(1)	Fore-and-aft Slide	mm (in.)	240 (9.45)
(2)	Reclining	degrees	78
(3)	Front Vertical	degrees	10
(4)	Vertical Lifter	mm (in.)	45 (1.77)
(5)	Lumbar Support (Driver Seat)	mm (in.)	38.4 (1.51)



Driver Seat

01NBE132Y

► System Diagram ◀



211BE41

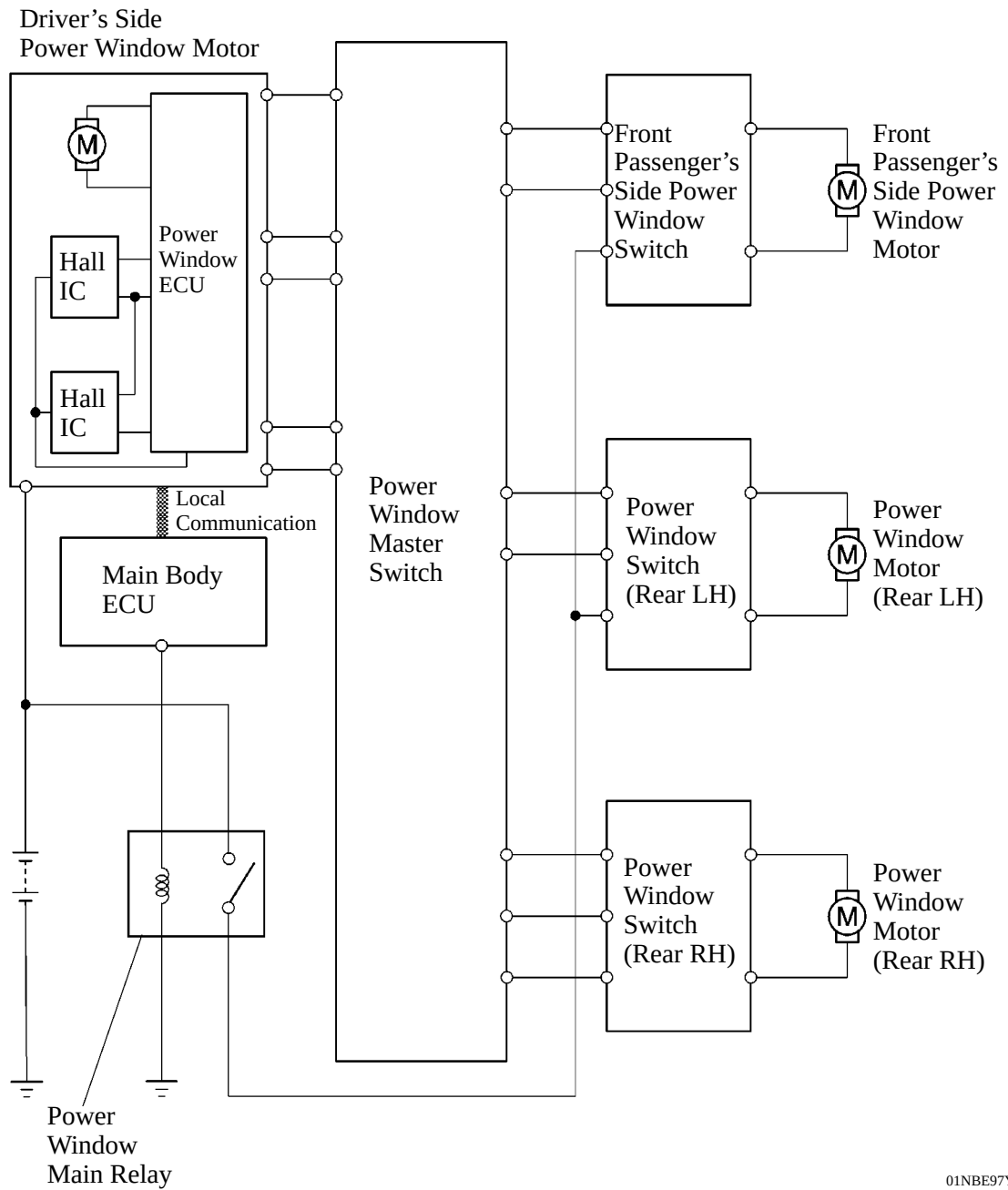
POWER WINDOW SYSTEM

■ DESCRIPTION

- The power window system is standard equipment on all models.
- The power window system has the following functions:

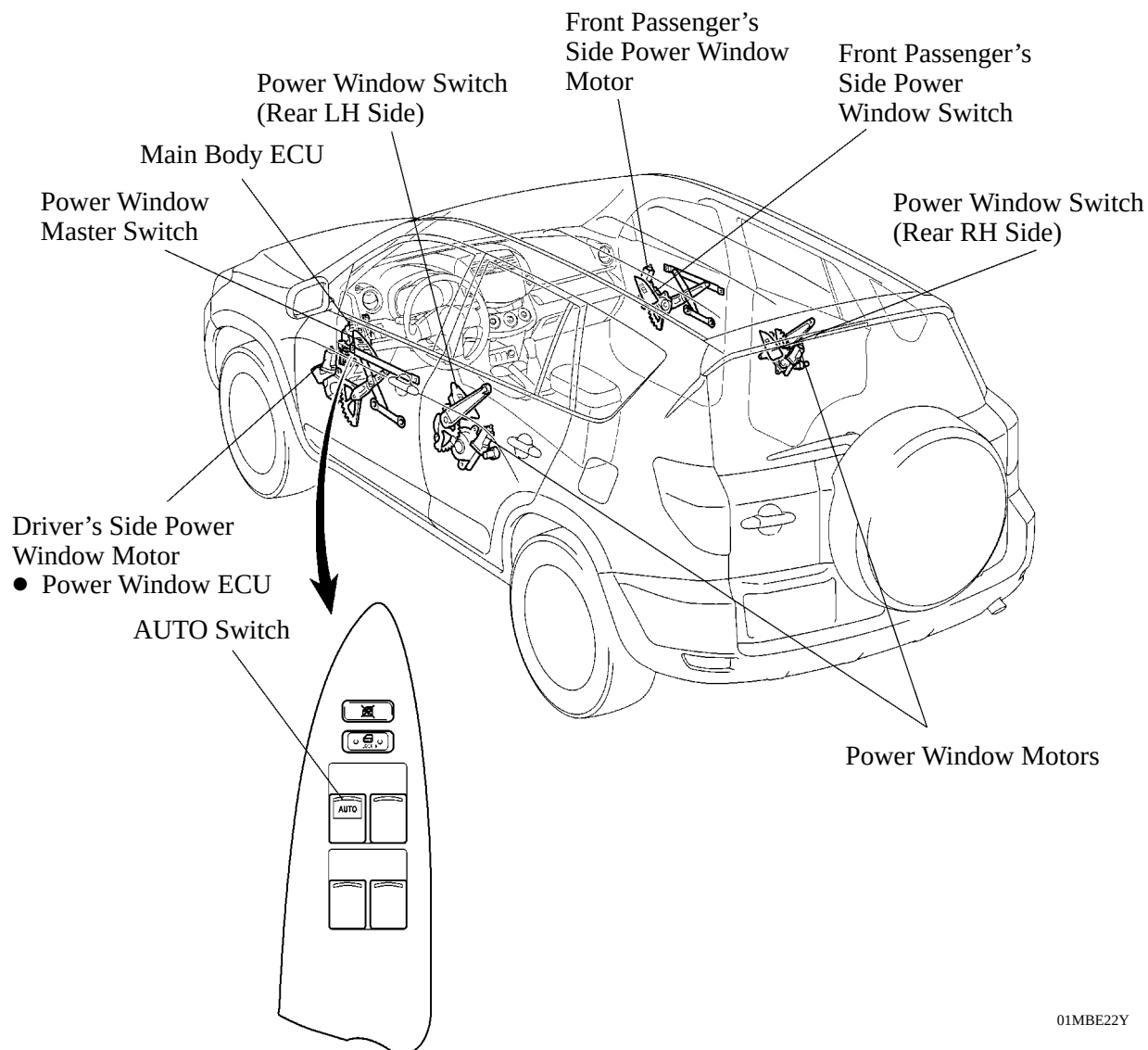
Function	Outline
Manual-up-and-down Function	The manual-up-and-down function causes the window to open or close while the power window switch is being pulled halfway up or pushed halfway down. The window stops as soon as the switch is released.
Driver's Door One-touch Auto Up-and-down Function	The driver's door one-touch auto up-and-down function is used in the driver's window. The driver's one-touch auto up-and-down function automatically opens or closes the driver's door window fully.
Key Off Operation	This function makes it possible to operate the power window for approximately 43 seconds after the ignition switch is turned OFF, if the driver's door is not opened.
Jam Protection Function	The jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in the driver's door window during one-touch auto-up operation or manual-up operation.
Remote Control Function	The up-and-down operations of the front passenger's door window and the rear door windows can be controlled by operating the power window master switch.

► System Diagram ◀



01NBE97Y

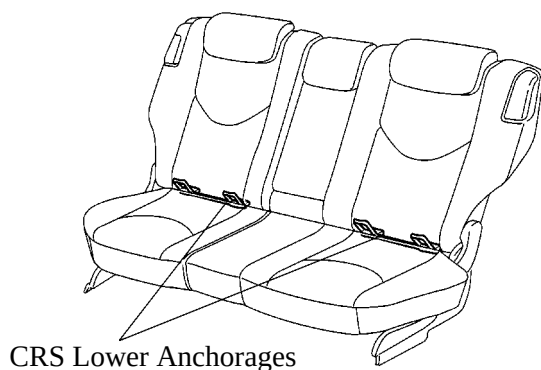
■ LAYOUT OF MAIN COMPONENTS



01MBE22Y

■ REAR SEAT**1. Rear No. 1 Seat**

- To anchor child seats, CRS lower anchorages have been provided at the outer seats of the rear No. 1 seat cushion.
- CRS (Child Restraint System) tether anchor brackets have been provided. The brackets for the right and left outer seats have been provided at the seat backs. The brackets for the center seat are attached to the ceiling.

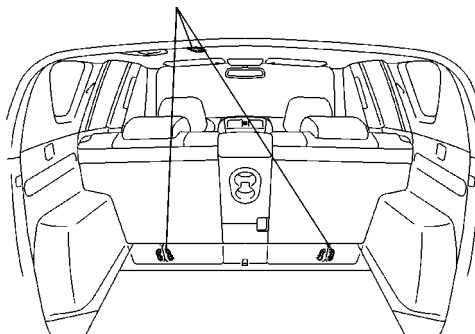


CRS Lower Anchorages

Models with Rear No. 2 Seat

01MBO07Y

CRS Tether Anchor Brackets



01MBO08Y

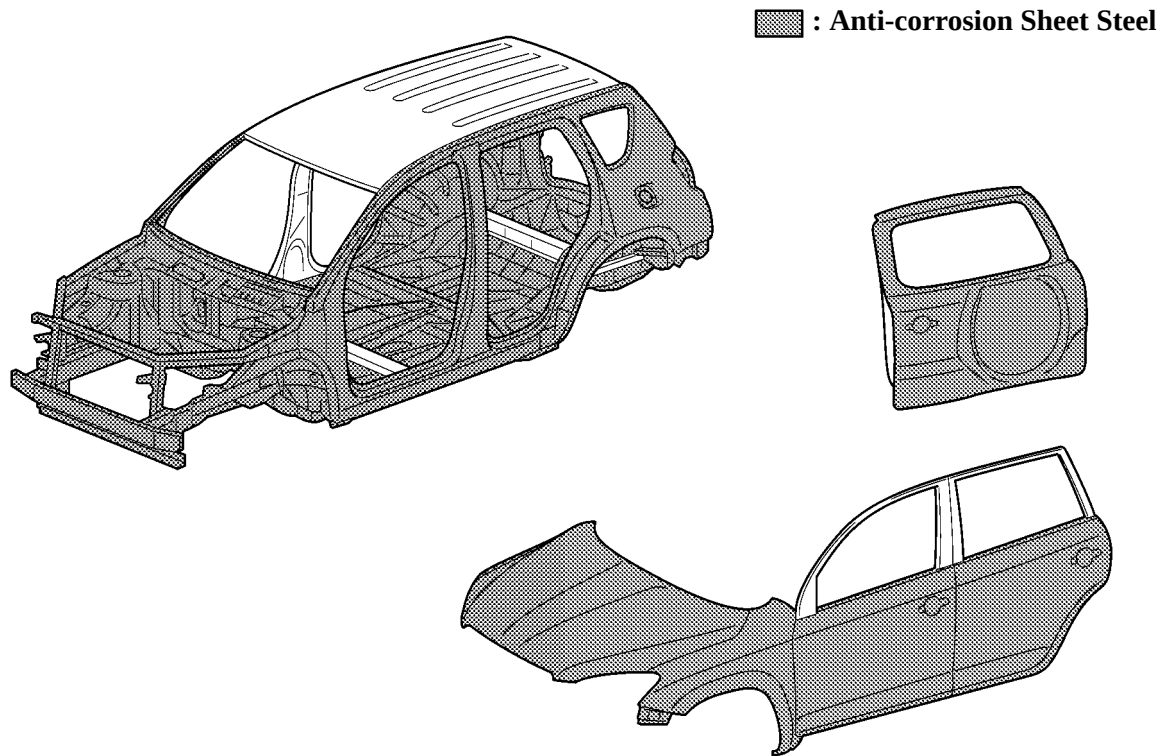
■ RUST-RESISTANT BODY

1. General

Rust-resistant performance is ensured by the extensive use of anti-corrosion sheet steel, as well as by an anti-corrosion treatment which includes the application of anti-rust wax, sealer and anti-chipping paint to easily corroded parts such as the hood, doors and rocker panels.

2. Anti-corrosion Sheet Steel

Anti-corrosion sheet steel is used in all areas other than the interior parts.



Long Body Model

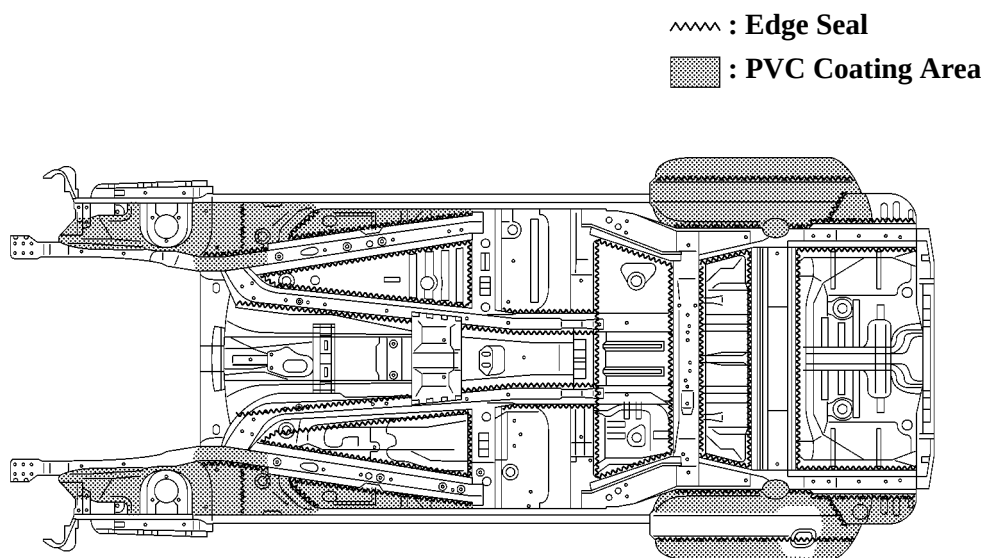
01NBO15Y

3. Wax and Sealer

Wax and sealer are applied to hemmed portions of the hood, door panels, rocker panels, and back door to improve rust-resistant performance.

4. Under Coat

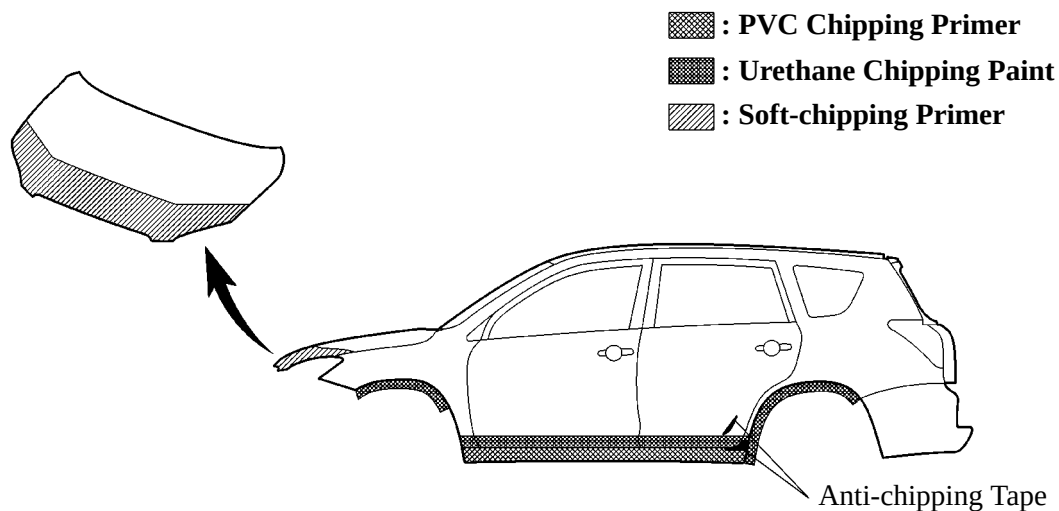
PVC (Polyvinyl Chloride) is applied to the underside of the body, inside the rear wheel housings, and other parts that are susceptible to stone chipping damage, thus ensuring the rust-resistant performance of these areas.



01NBO16Y

5. Anti-chipping Application

- To protect the paint from chipping while the vehicle is being driven, anti-chipping paint is applied to the rockers and the lower part of the doors, and soft-chipping primer is applied to the front end of the hood panel.
- Anti-chipping tape has been provided to the lower part of the rear doors of the models for the cold areas to protect the paint and ensure anti-corrosion performance.



Long Body Model

01NBO17Y

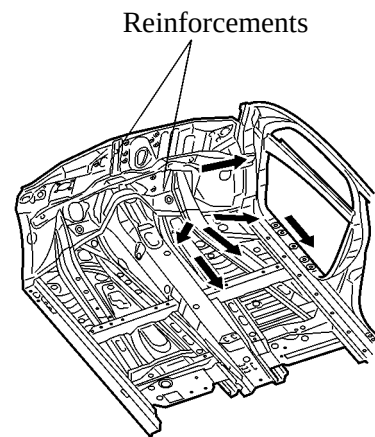
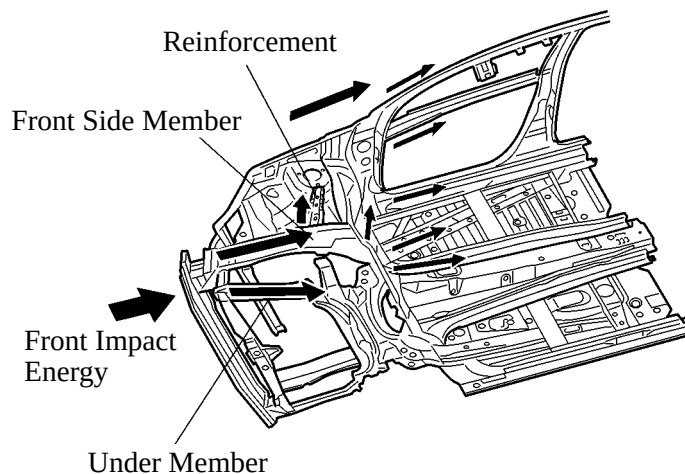
■ SAFETY FEATURES

1. General

The impact absorbing structure of the '06 model can effectively help reduce the impact in the event of a front or side collision. This structure also realizes high-performance occupant protection through the use of reinforcement and member that help minimize cabin deformation.

2. Impact Absorbing Structure for Front Collision

- To help minimize the deformation of the cabin in case of a collision, the following reinforcements effectively dissipate the energy of the impact applied to the front of the vehicle: the front bumper reinforcements, under-floor reinforcements, dash panel reinforcements, floor tunnel reinforcements, rockers, front pillars, and door inner reinforcements.
- A member has been provided at the side of the under member and the floor tunnel, in order to achieve a construction that effectively dissipates the load.
- A cross member has been provided at the dash panel and joined to the side member, and a reinforcement has been provided at the front suspension tower, in order to help reduce the deformation of the rear end of the front side member and help ensure its rigidity.

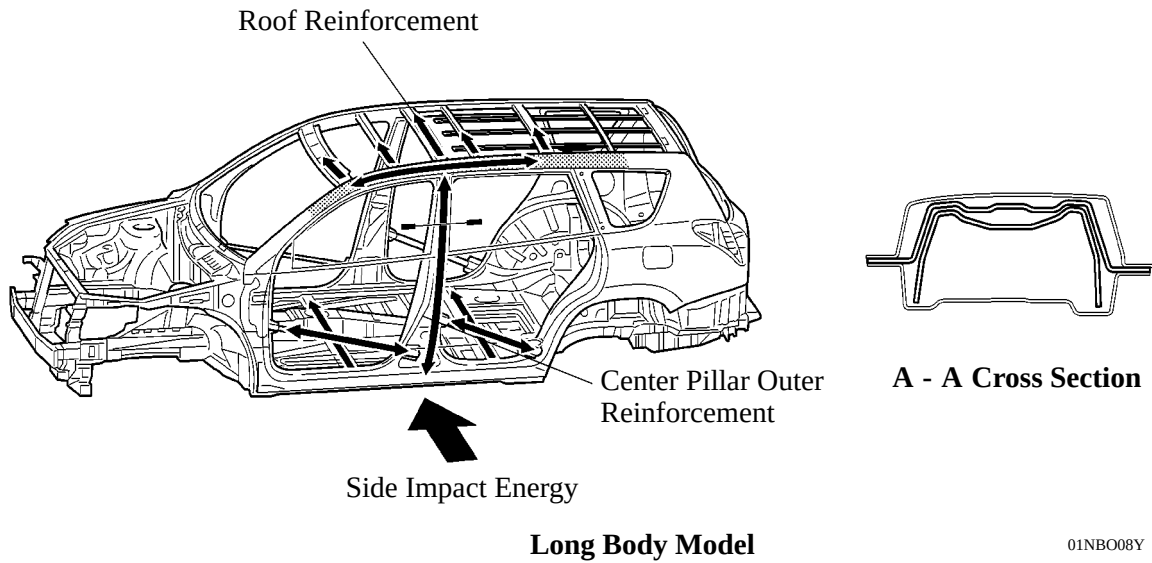


Front Body

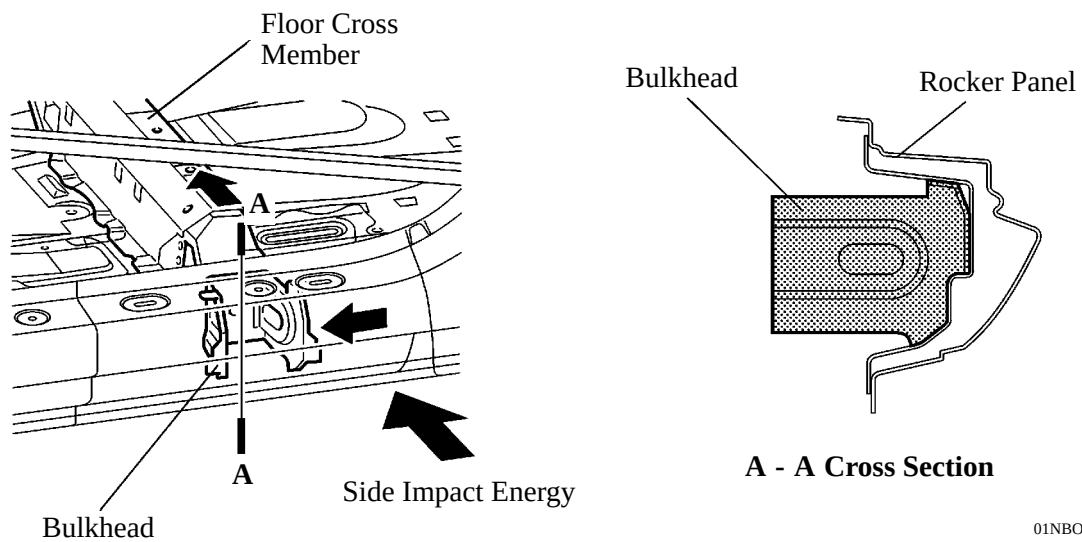
01NBO07Y

3. Impact Absorbing Structure for Side Collision

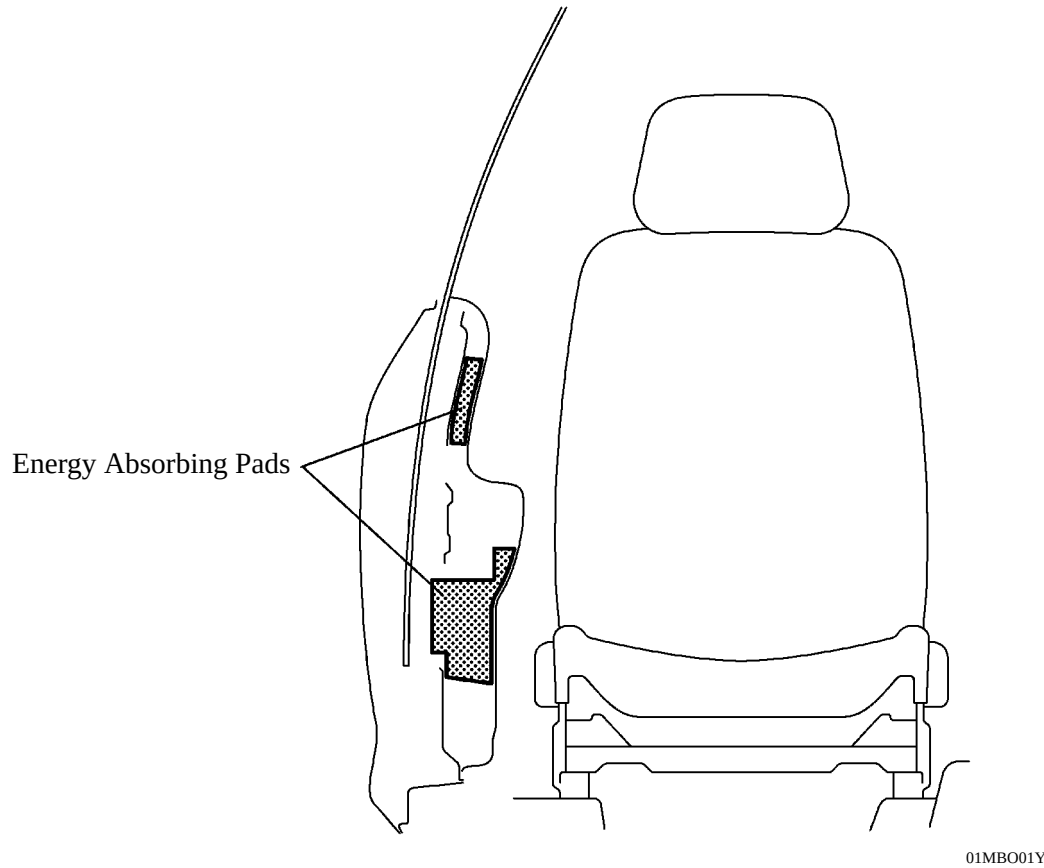
- Reinforcements using high strength sheet steel have been optimally located at the center pillar and the roof to help ensure the rigidity of the body.



- A bulkhead has been provided at the rocker to achieve a construction that effectively transmits the side impact energy to the floor cross member.

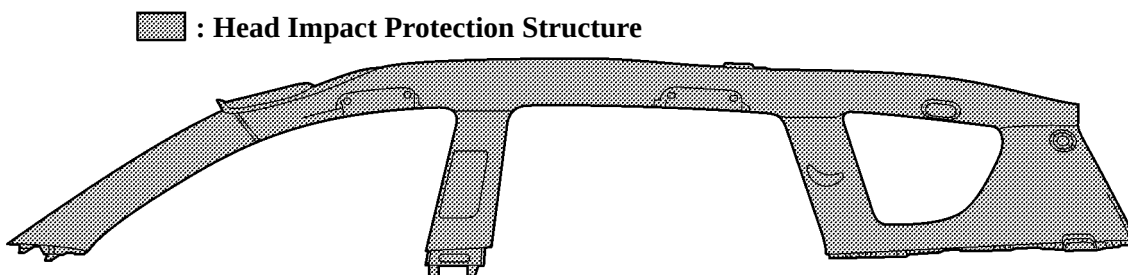


- Energy absorbing pads have been provided inside the door trim to help dampen the impact to the occupant during a side collision.



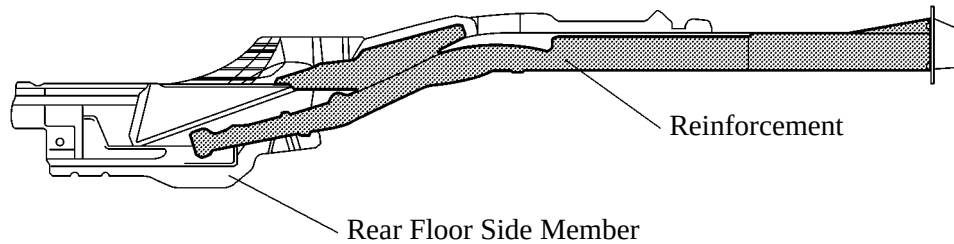
- A head impact protection structure is used. With this type of construction, if the occupant's head hits against the roof side rail and pillar in reaction to a collision, the inner panel of the roof side rail and pillar collapses to help reduce the impact.

► Head Impact Protection Structure ◀



4. Impact Absorbing Structure for Rear Collision

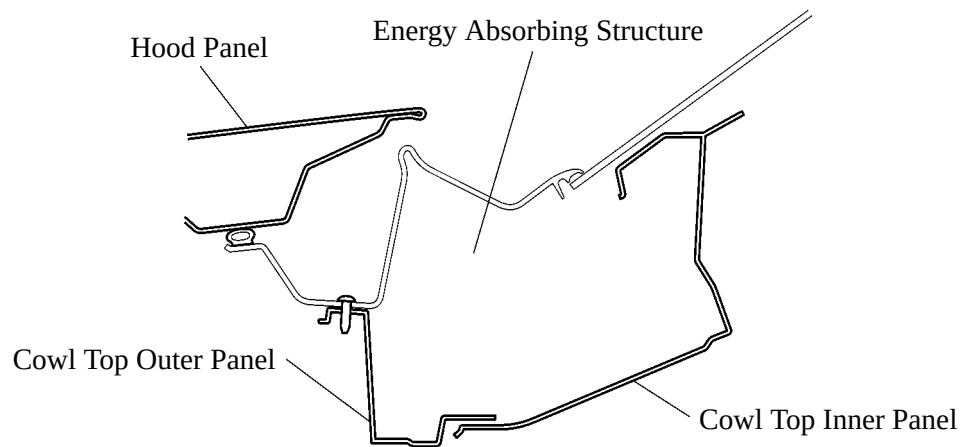
To control the deformation of the body during a rear-end collision, a reinforcement has been optimally located at the rear floor side member.



01NBO11Y

5. Lessening Pedestrian Injury

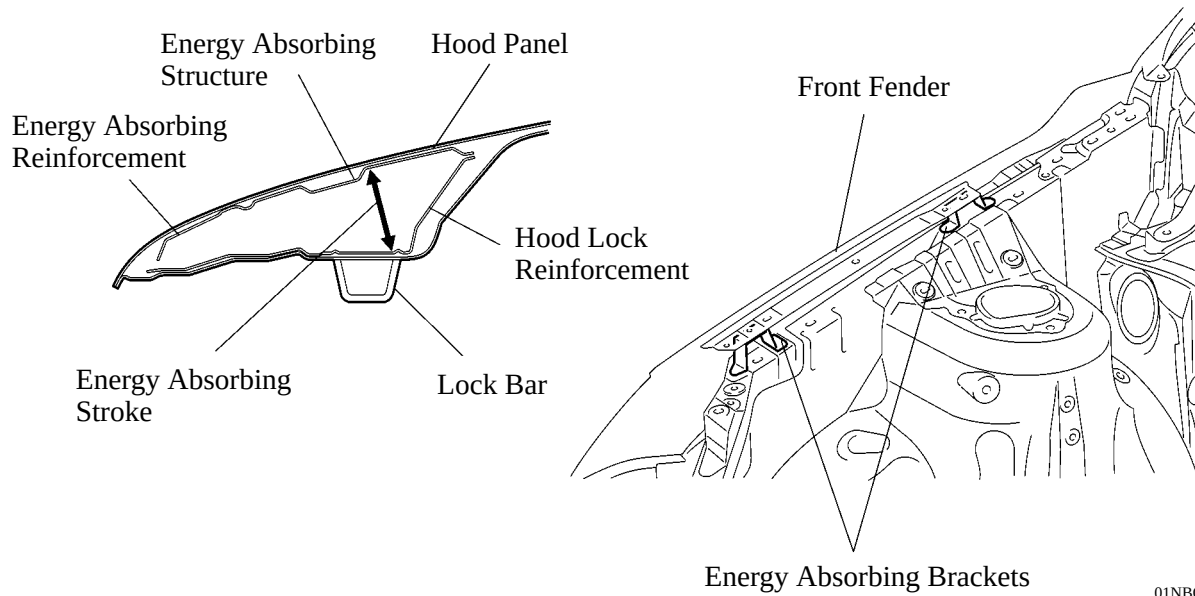
The cowl is made with an energy absorbing structure to help dampen the impact from above and help ensure the pedestrian protection performance.



01NBO12Y

Lessening Pedestrian Head Injury

- An energy absorbing structure has been provided around the hood lock to help lessen the injury to the heads of the pedestrians.
- Energy absorbing brackets are used at the area where the front fender is mounted to help lessen the injury to the heads of the pedestrians.

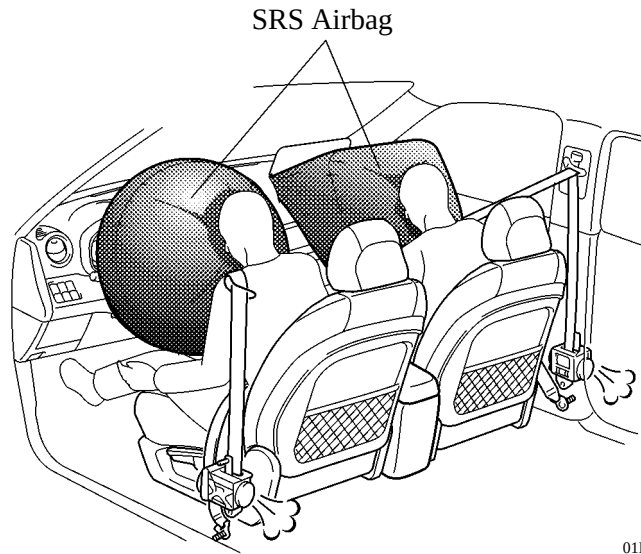


01NB013Y

SAFETY

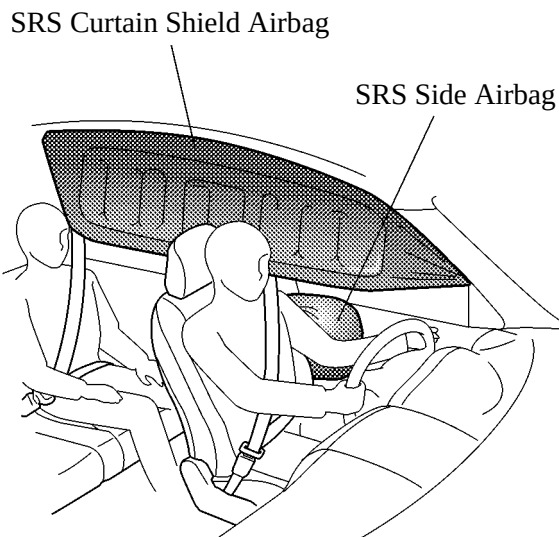
SRS Airbag System

- Dual-stage SRS (Supplemental Restraint System) airbags are standard equipment for the driver and front passenger seats. In the event of a severe frontal collision, the airbags function with the seat belts to help reduce the impact on the driver's and front passenger's heads and chests. The seat position sensor is used only for the driver's seat to help the SRS driver side air bag deploy at the right moment.



01MBE16Y

- The SRS side airbags (driver and front passenger seats) which help reduce side impacts are available as optional equipment.
- The SRS curtain shield airbags (front and rear seats) which help reduce side impacts are available as optional equipment.



01NBE06Y

■ SEAT BELT

1. General

- The following types of seat belts are provided.

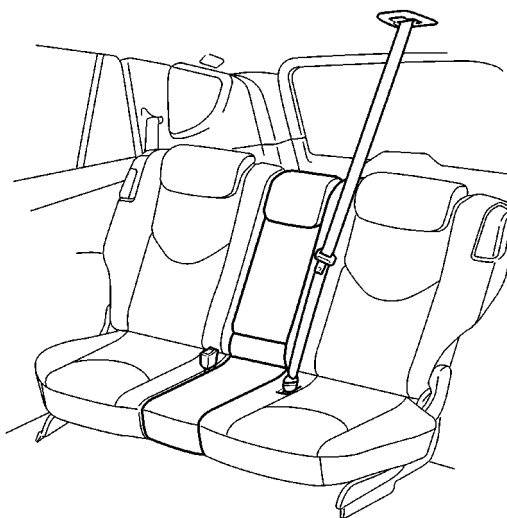
Seat		Seat Belt Type	Remarks
Front Seat	Driver	3-point ELR* ²	Electrical Sensing Type Pretensioner & Force Limiter
	Passenger	3-point ALR* ³	—
Rear No.1 Seat (Include center seat)		3-point ELR* ² & ALR* ³	—
Rear No.2 Seat* ¹		3-point ELR* ² & ALR* ³	—

*¹: Only for Models with Rear No. 2 Seat

*²: Emergency Locking Retractor

*³: Automatic Locking Retractor

- The seat belt for the center seat of the rear No. 1 seat and its storage box have been provided on the ceiling to ensure the ease of use of the rear seats.



01MBO09Y

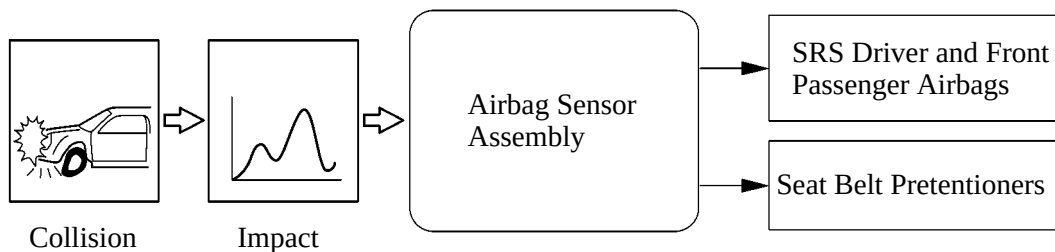
Models with Rear No. 2 Seat

2. Pretensioner and Force Limiter

- In accordance with the ignition signal from the airbag sensor assembly, the seat belt pretensioner activates simultaneously with the deployment of SRS airbag for the driver and front passenger.
- In the beginning of the collision if the tension of the seat belt applied to the occupant reaches a predetermined level, the force limiter activates to control the force.
- Even if the front passenger airbag is not deployed in accordance with the front passenger occupant classification system, the pretensioner and force limiter for the front passenger will be deployed.
 - Roll sensing of curtain shield airbags* and seat belt pretensioners are used for the driver and front passenger, in the event that the vehicle rolls over.

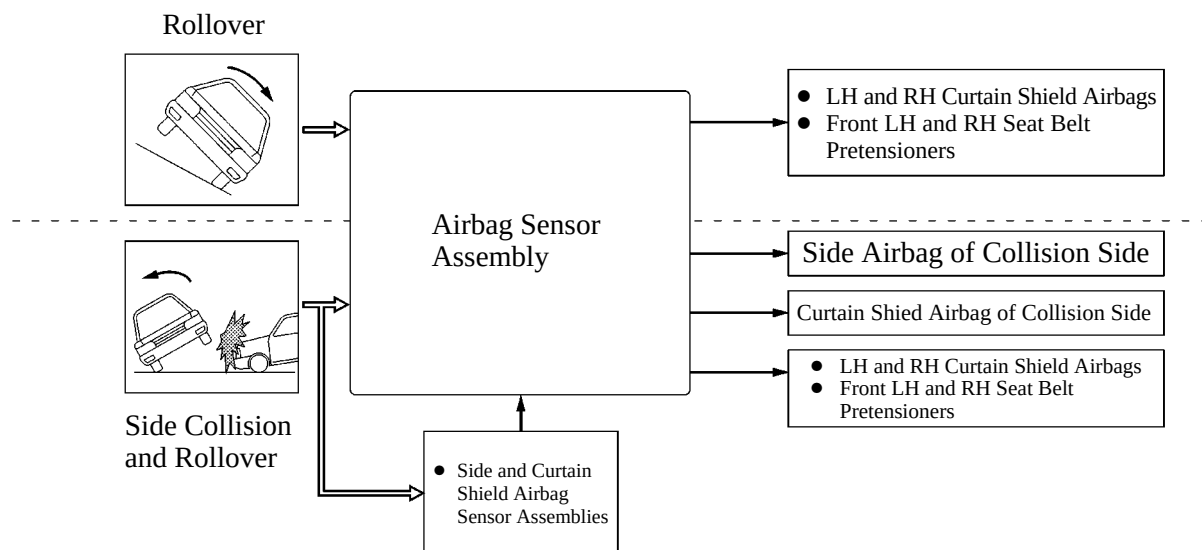
*: Optional equipment

► Front Airbag Operation ◀



287BO25

► Roll Sensing of Curtain Shield Airbags Operation ◀



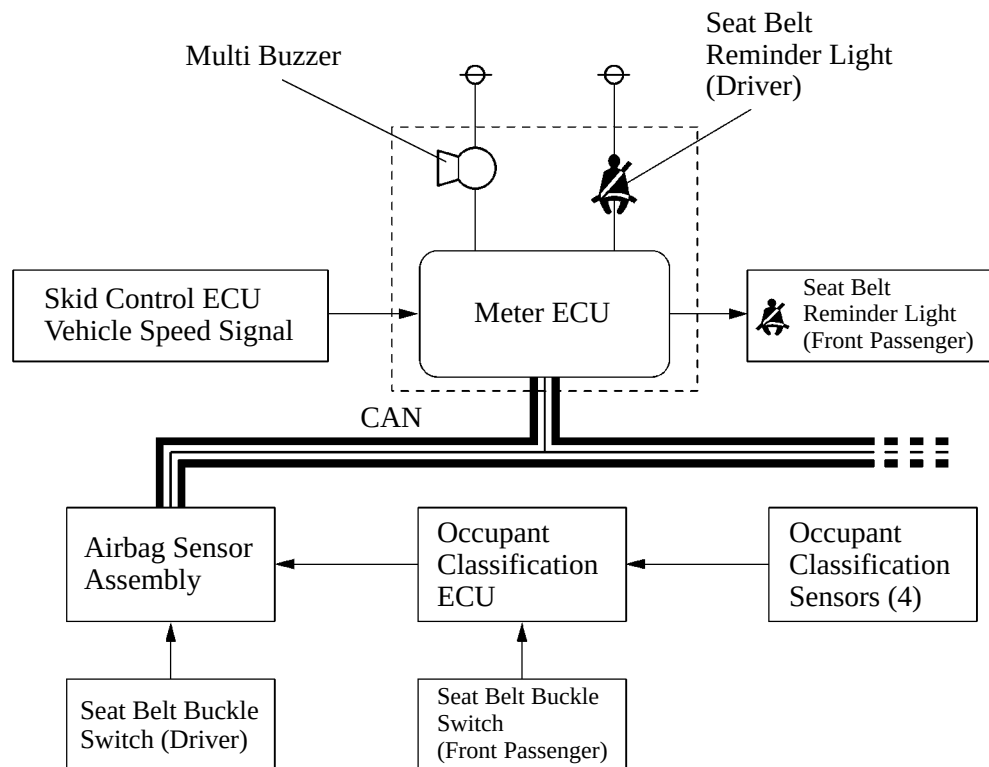
278BO22

SEAT BELT REMINDER SYSTEM

DESCRIPTION

- A seat belt reminder system is used. If the seat belt is not buckled, the reminder light flashes and the multi buzzer sounds. [The multi buzzer will sound for approximately 30 seconds when the vehicle speed reaches 12 mph (20 km/h) or more.]
- When the ignition switch is turned ON, this system determines whether or not the seat belt is buckled depending on whether the signal from the seat belt buckle switch is on or off.
- The '06 models use the front passenger occupant classification system to detect the presence of an occupant in the front passenger seat. The airbag sensor assembly transmits the resultant detection signal to the meter ECU via the CAN. For details on the front passenger occupant classification system, see page BE-59.

► System Diagram ◀



01MBE05Y

Service Tip

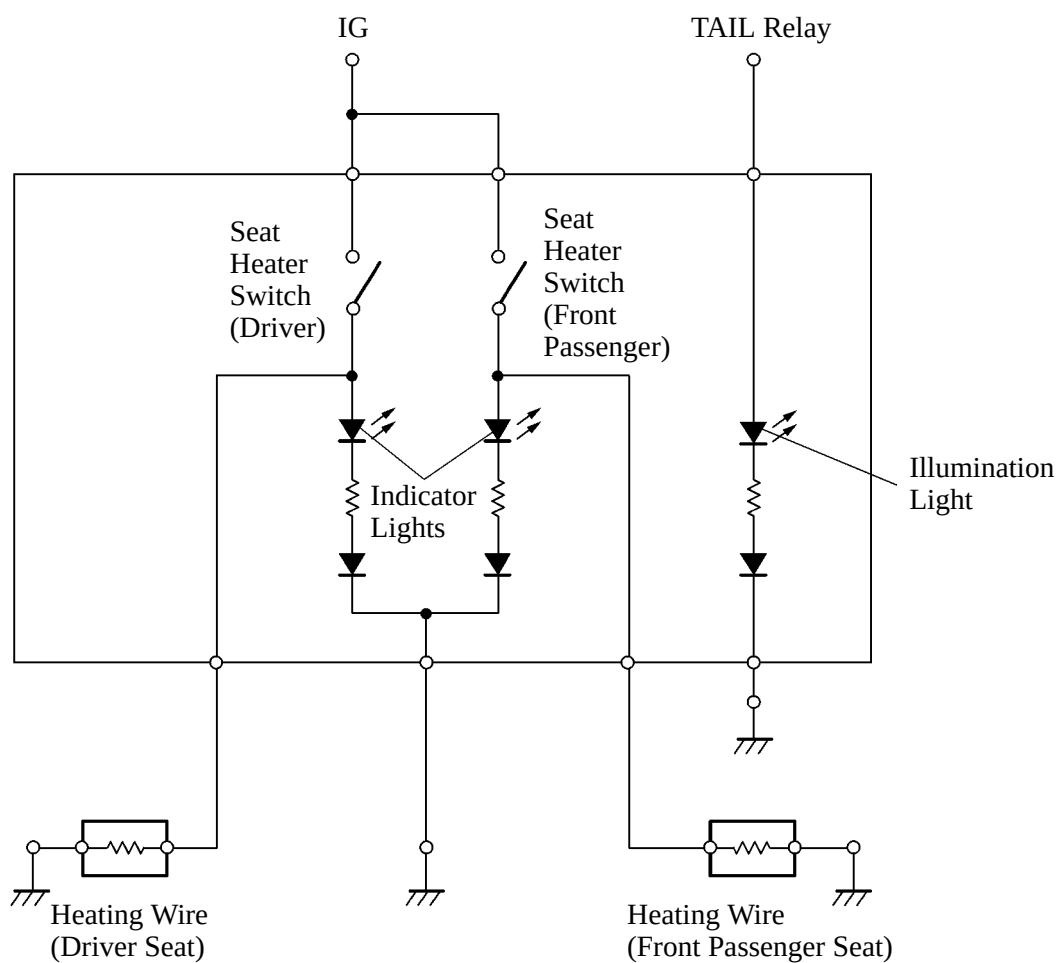
Upon receiving a request from a user who cannot wear a seat belt for a special reason, the buzzer reminder may be canceled through the use of the hand-held tester.
Refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

SEAT HEATER

DESCRIPTION

- The seat heater for the driver and front passenger seats are provided as optional equipment on the Limited grade.
- By operating the dial-type seat heater control switch, which is located on the center console, the temperature can be controlled steplessly within the range of 30 °C to 42 °C (86 °F to 108 °F).
- Whether the seat heater is ON or OFF can be determined by illuminating condition of the indicator light of the seat heater control switch.

► System Diagram ◀



01NBE84Y

■ FUNCTION

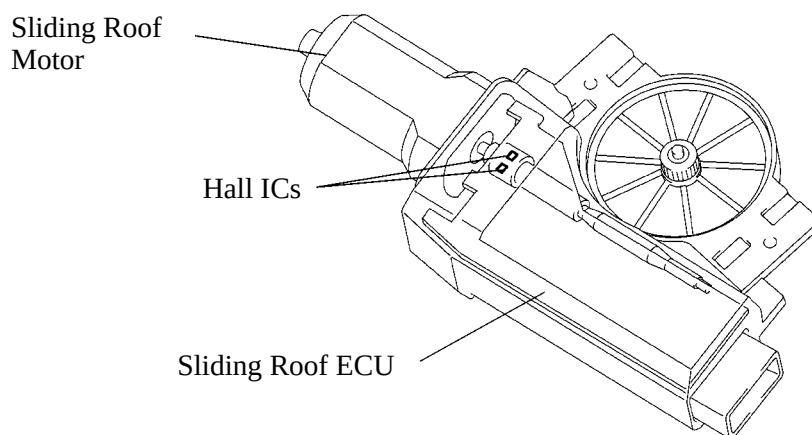
1. General

The sliding roof has following functions:

Function	Outline
Manual Open-and-close	This function causes the sliding roof to open (or close) when the SLIDE OPEN switch (or SLIDE CLOSE switch) is pressed for a maximum of 0.3 seconds. The sliding roof stops as soon as the switch is released.
One-touch Auto Open-and-close	This function causes the sliding roof to be fully opened (or closed) when the SLIDE OPEN switch (or SLIDE CLOSE switch) is pressed for a minimum of 0.3 seconds.
Manual Tilt Up-and- down	This function causes the sliding roof to tilt up (or tilt down) when the TILT UP switch (or TILT DOWN switch) is pressed for a maximum of 0.3 seconds. The sliding roof stops as soon as the switch is released.
One-touch Auto Tilt Up-and-down	This function enables the sliding roof to be fully tilted up (or down) when the TILT UP switch (or TILT DOWN switch) is pressed for a minimum of 0.3 seconds.
Jam Protection	This function automatically stops the sliding roof and moves it open half way (or fully tilt up) if a foreign object gets jammed in the sliding roof during one-touch auto-close operation (or one-touch auto tilt down operation).
Key-ff Operation	This function makes it possible to operate the sliding roof for approx. 43 seconds after the ignition switch is turned to ACC or OFF, if the front doors are not opened.

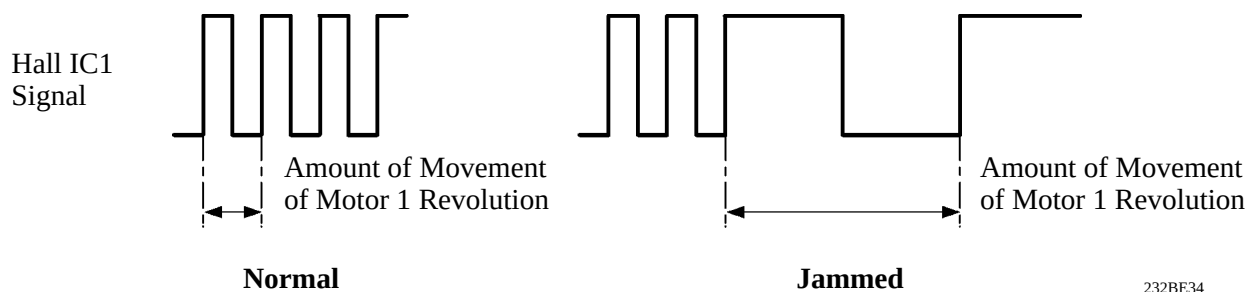
2. Jam Protection Function

- The Hall IC converts the changes in the magnetic flux that occur through the rotation of the worm gear into pulse signals and outputs them to the ECU.

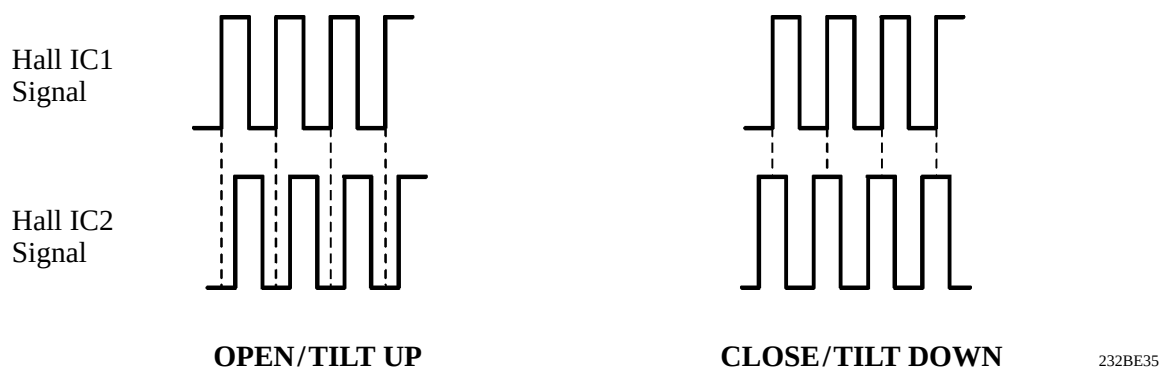


- To control the jam protection function, the ECU determines the amount of movement and the jamming of the sliding roof from the pulse signals from the Hall IC1, and the moving direction of the sliding roof from the phase difference between the pulses from the Hall IC1 and Hall IC2.

► **Judgment of Amount of Movement and Jamming** ◀



► **Judgment of Moving Direction** ◀

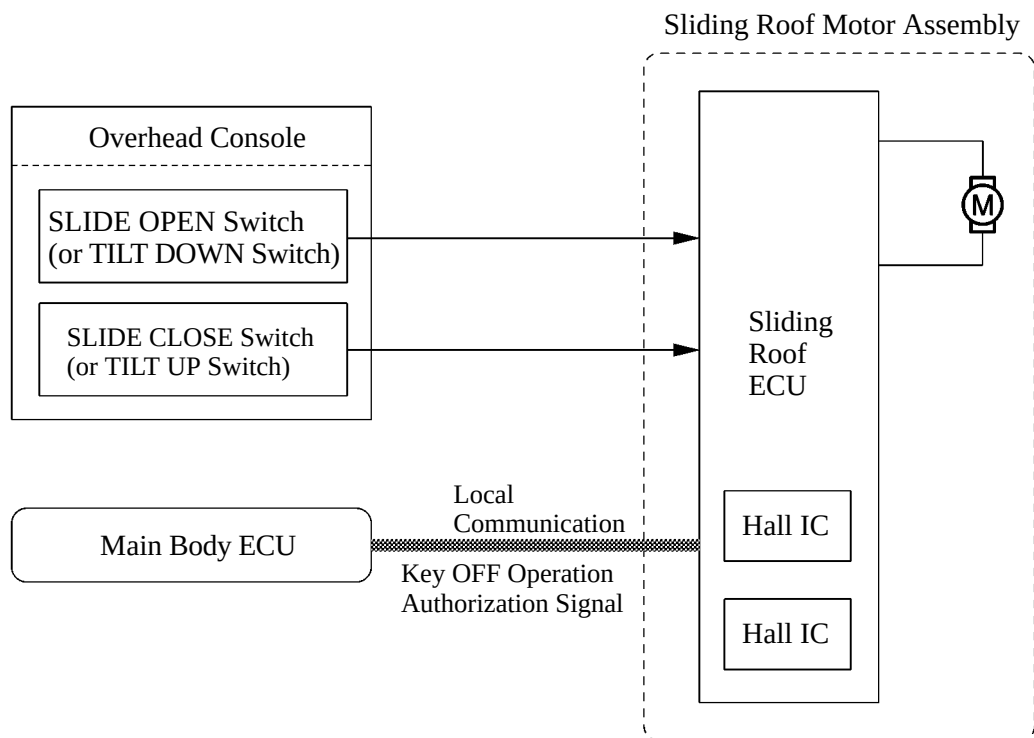


SLIDING ROOF SYSTEM

DESCRIPTION

- The sliding roof system is optional equipment on the Limited grade and Sport grade.
- A jam protection function has been provided.
- The '06 models use pulse sensors (Hall ICs) to detect the sliding roof position.
- The sliding roof motor assembly consists of a sliding roof motor, sliding roof ECU, drive gear, etc. The gear cover is integrated with the front housing, and the drive gear and the worm wheel are integrated in order to achieve a simpler construction.

► System Diagram ◀



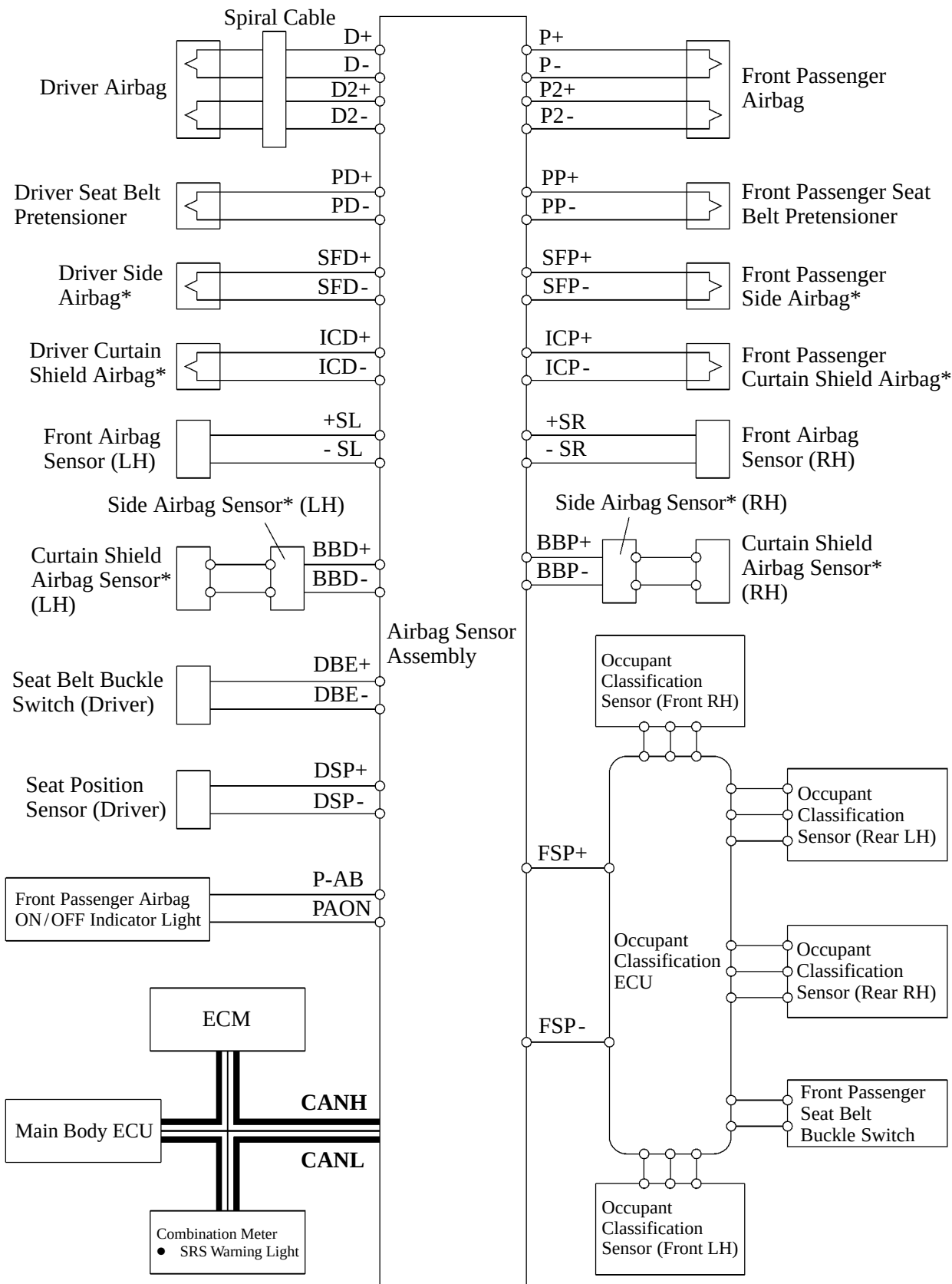
01NBE126Y

Service Tip

The sliding roof ECU memorizes the initial position of the sliding roof. Therefore, the data will be lost if the sliding roof motor assembly is removed, thus enabling the sliding roof to be operated only manually. Reinstalling the sliding roof motor, initialize the system by performing the steps described below.

- As a precondition to the initialization, the sliding roof must be tilted up to the fully open position.
- With the ignition switch ON, keep the TILT UP or SLIDE CLOSE switch pressed. This will enable the sliding roof ECU to start initializing and perform the tilt up, tilt down, open, and close operations of the sliding roof in sequence.
- The initialization process ends when the close operation is completed.
- Keep the TILT UP or SLIDE CLOSE switch pressed during initialization. If the TILT UP or SLIDE CLOSE switch is released during initialization, the system will not be able to complete the initialization. If this occurs, the aforementioned steps must be performed again.

WIRING DIAGRAM



01MBE26Y

*: Only for Models with Driver, Front Passenger, Side and Roll Sensing of Curtain Shield Airbags

■ AIRBAG FOR SIDE/REAR SIDE COLLISION

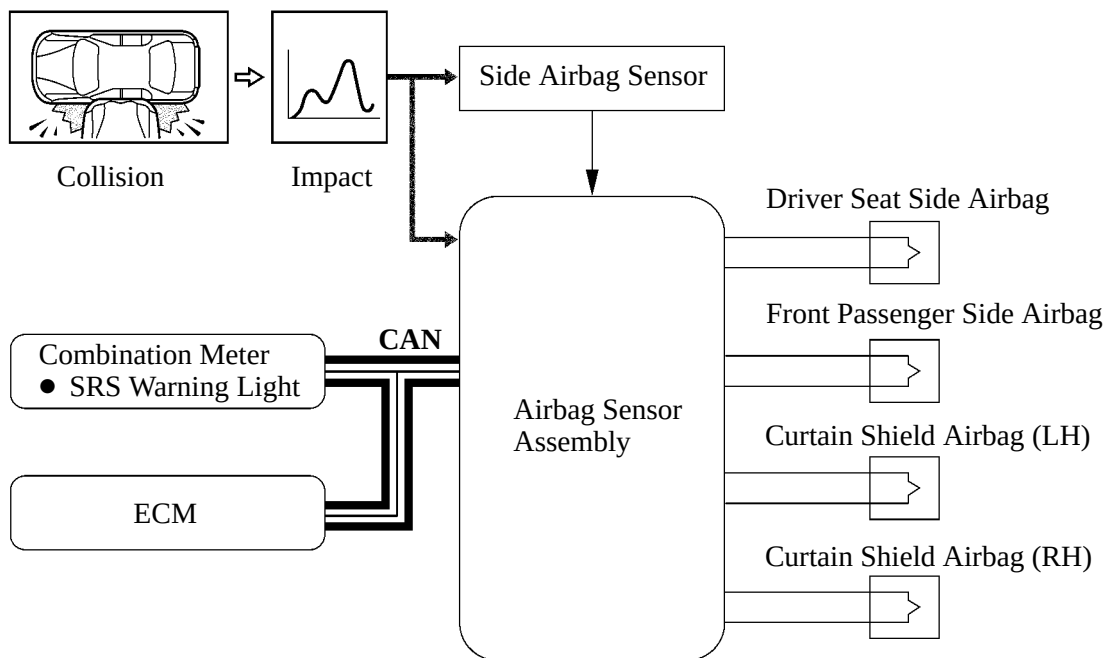
1. General

The airbag for side collisions contains two airbags: side and curtain shield airbags. These airbags deploy simultaneously. The airbag for rear side collisions contains only the curtain shield airbag.

- With the airbag for side collisions, if the side airbag sensor detects an impact, it informs the airbag sensor assembly, and the airbag sensor assembly causes the side and curtain shield airbags to be deployed simultaneously.
- With the airbag for rear side collisions, if the curtain shield airbag sensor detects an impact, it informs the airbag sensor assembly via the side airbag sensor, and the airbag sensor assembly causes the curtain shield airbag to be deployed.

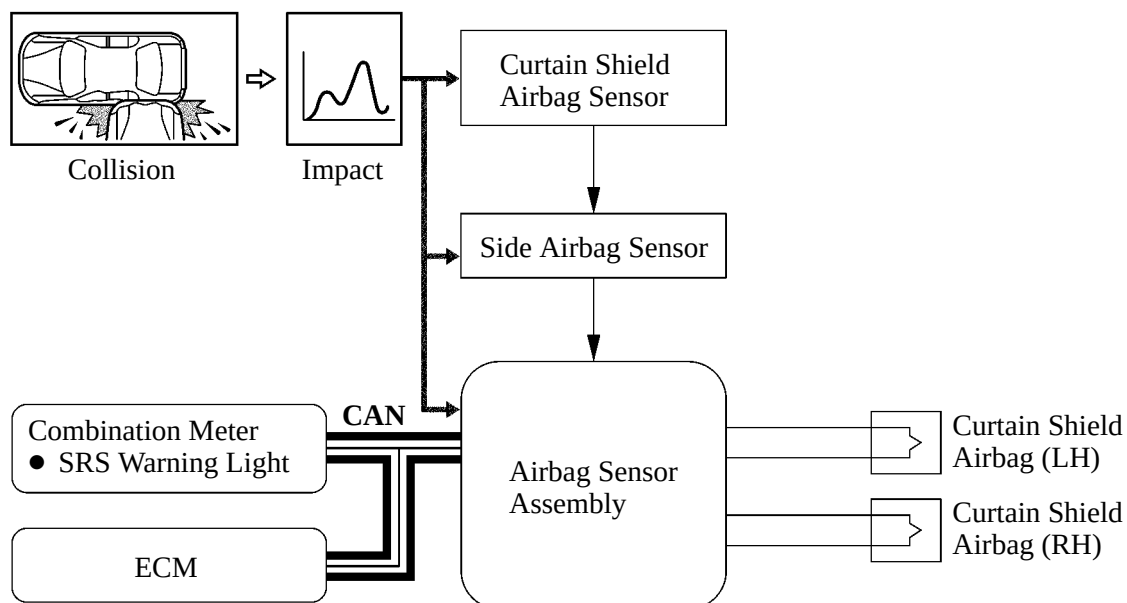
► System Operation ◀

Airbag for Side Collision



00RBE18Y

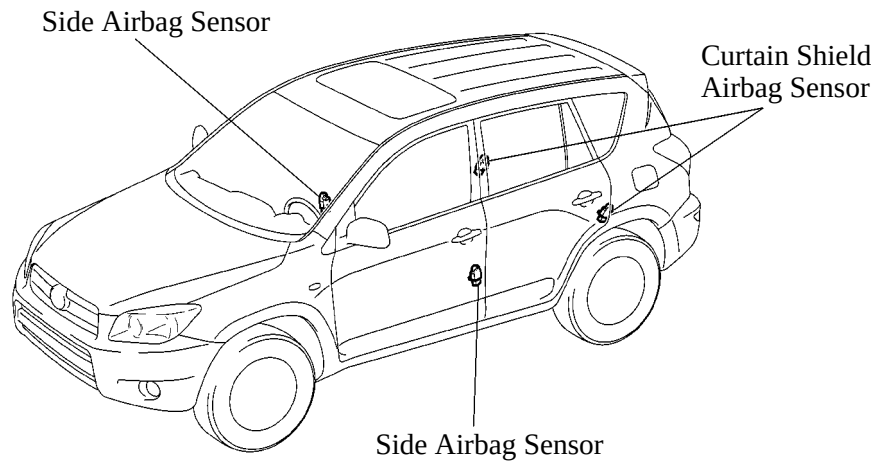
Airbag for Rear Side Collision



00SBE46Y

2. Side Airbag Sensor and Curtain Shield Airbag Sensor

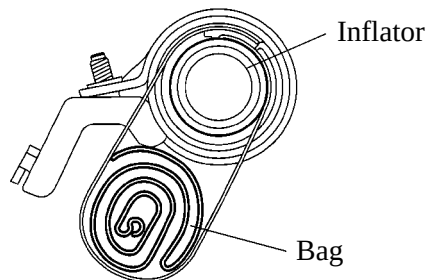
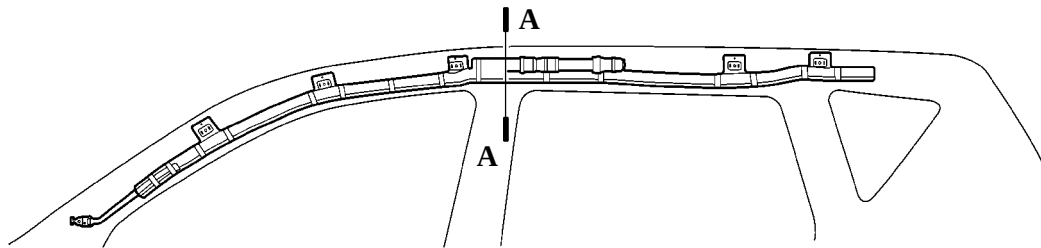
The deceleration sensor is enclosed in each side and curtain shield airbag sensor. Based on the deceleration of the vehicle during a side or side rear collision, a distortion is created in the sensor and converted into an electrical signal.



01NBE09Y

3. Curtain Shield Airbag

A rear side collision is detected by the curtain shield airbag sensor in order to deploy the curtain shield airbag.



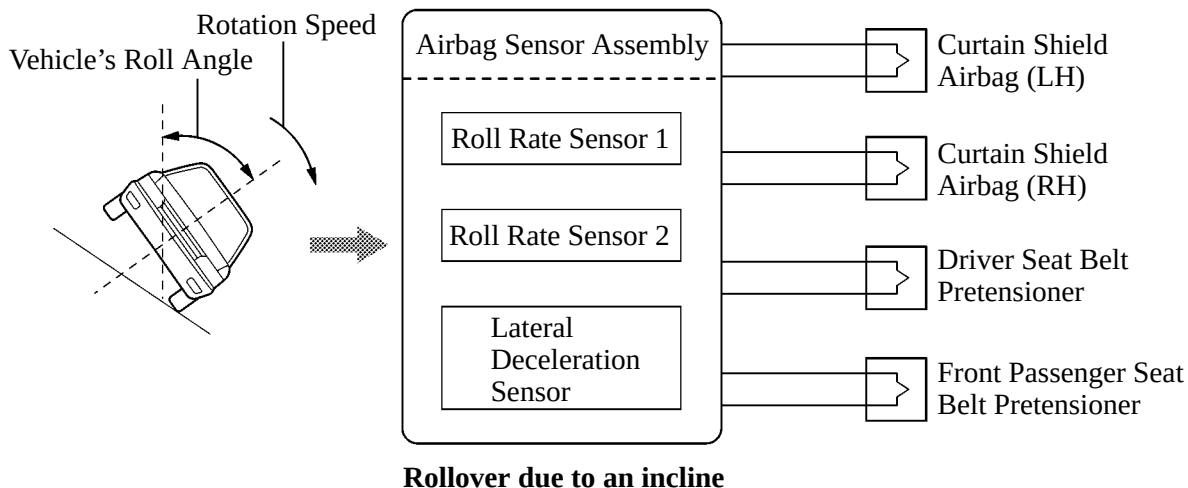
A - A Cross Section

01NBE124Y

■ AIRBAG FOR ROLLOVER

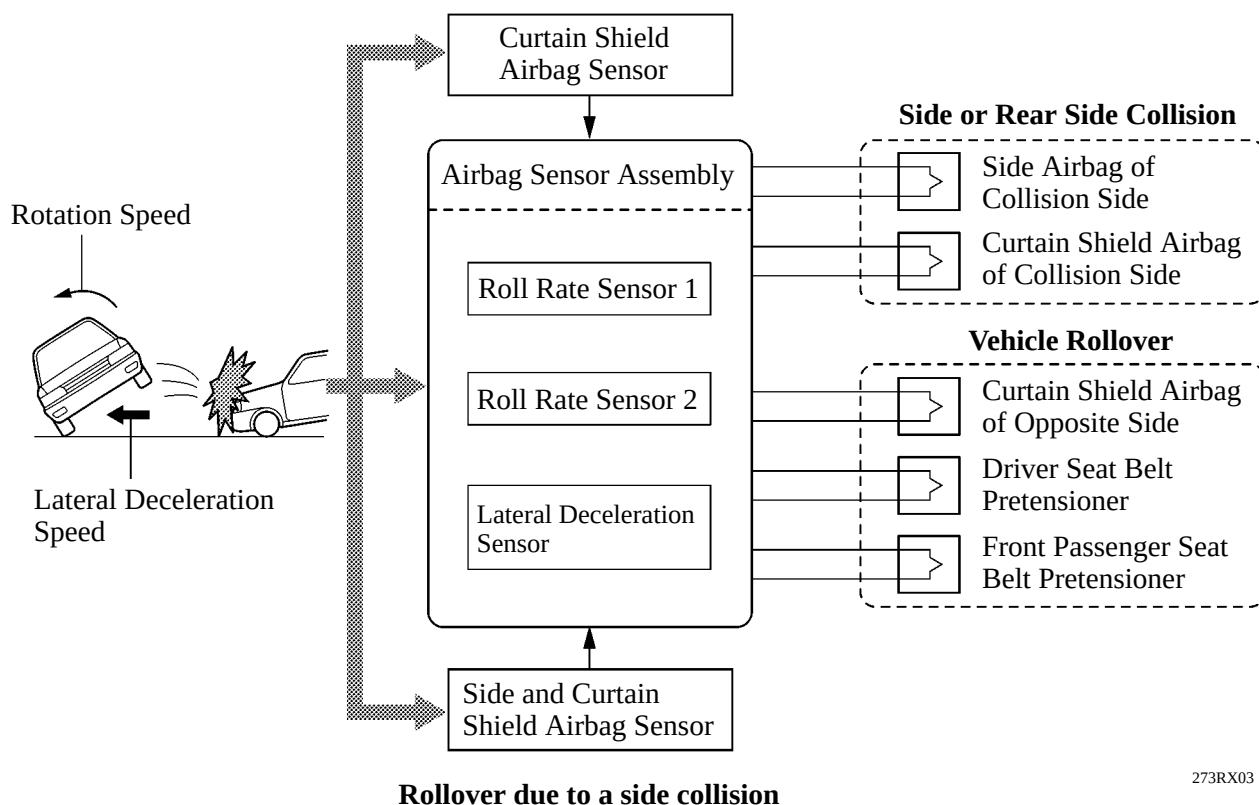
When the vehicle is rolling sideways, the RSCA (Roll Sensing of Curtain shield Airbag) helps to reduce the impact that is applied to the occupants by operating the left and right curtain shield airbags and the seat belt pretensioners for the driver and front passenger.

- If the vehicle rolls over due to an incline, the two roll rate sensors and lateral deceleration sensor that are built into the airbag sensor assembly detect the vehicle's roll angle, rotation speed and lateral deceleration speed.



273RX02

- If the vehicle has rolled over due to a side or rear side collision, the side and curtain shield and/or curtain shield airbag sensors detect the impact of the collision and deploy the side and/or curtain shield airbags on the collision side. Rollover is detected by the two roll rate sensors and lateral deceleration sensor, and airbag sensor assembly deploys the curtain shield airbag on the opposite side of the collision and the driver and front passenger seat belt pretensioners.



273RX03

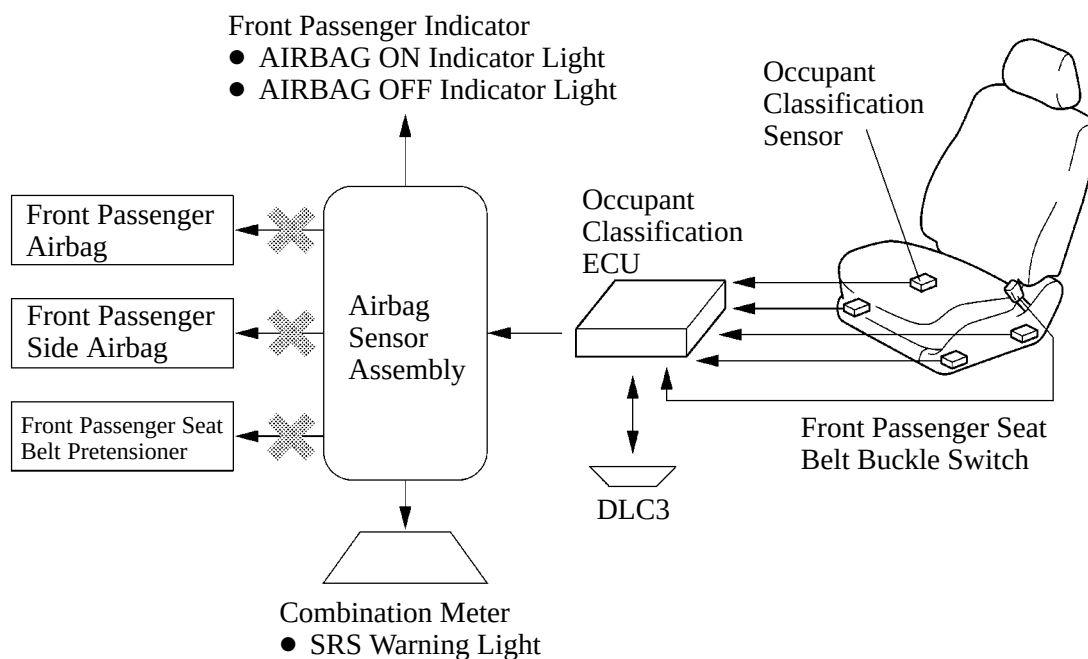
FRONT PASSENGER OCCUPANT CLASSIFICATION SYSTEM

1. General

The front passenger occupant classification system judges whether the front passenger seat is occupied by an adult or child (with child seat) or is unoccupied, in accordance with the load that is applied to the front passenger seat and whether the seat belt is buckled. Thus, it restricts the deployment of the front passenger airbag, front passenger side airbag, and the front passenger seat belt pretensioner. In addition, the system informs the driver of the result of the judgment through the use of the AIRBAG ON/ OFF indicator lights.

- This system consists of the occupant classification ECU, four occupant classification sensors, AIRBAG ON/OFF indicator lights, seat belt buckle switch, and airbag sensor assembly.

► System Diagram ◀



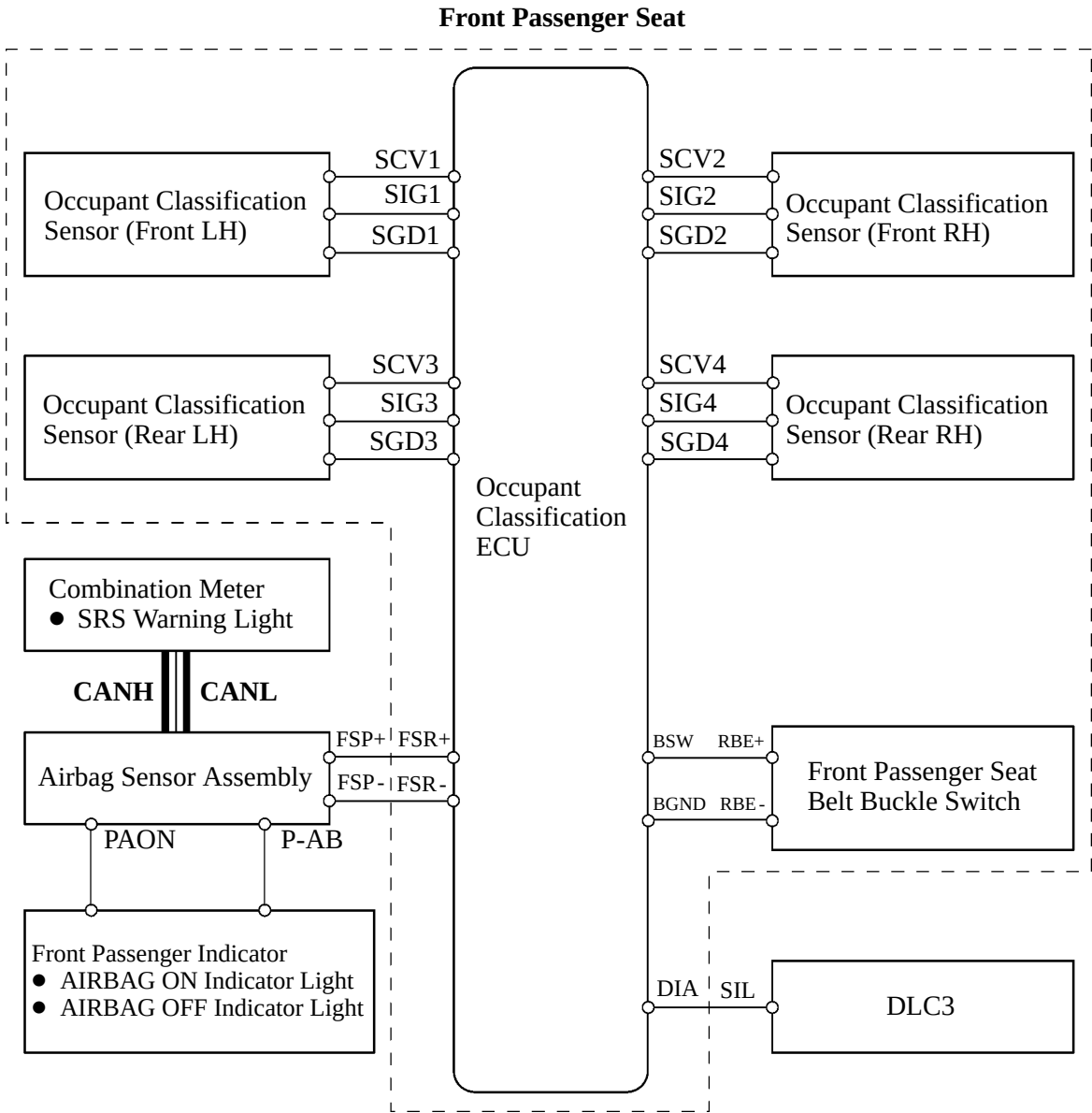
267NF12

Service Tip

- When installing items to the front passenger seat or removing/installing the front passenger seat, connect the hand-held tester and be sure to perform a system check and perform a zero-point calibration of the sensor load value.
- If the maintenance is performed due to the SRS warning light being on constantly or due to a collision, in addition to the above item, check that the hand-held tester display value indicates within the range of 30 kg (66 lb) +/- 3 kg (6.6 lb) when a 30 kg (66 lb) weight is placed on the front passenger seat.

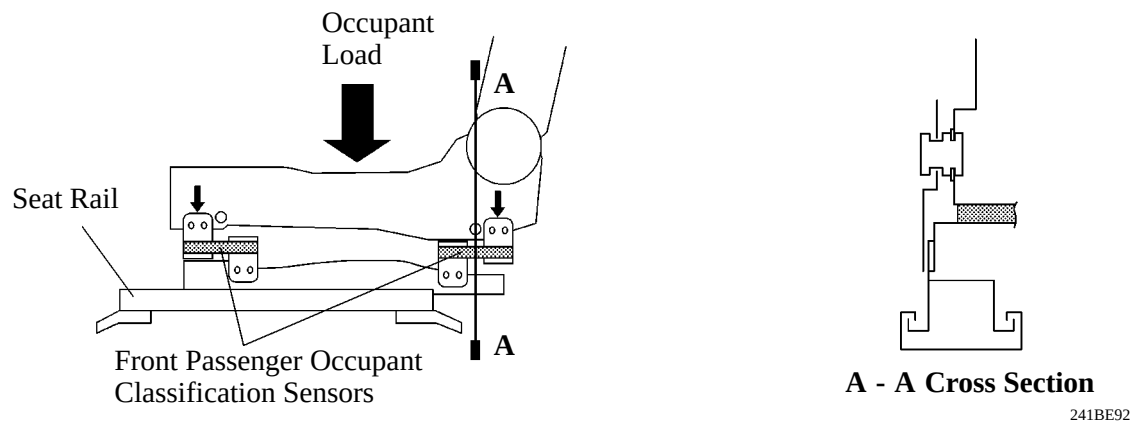
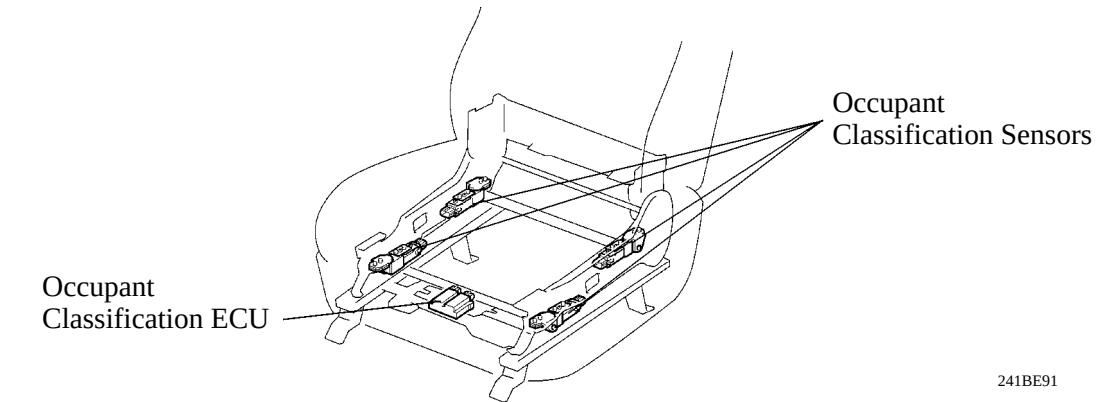
For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

2. Wiring Diagram

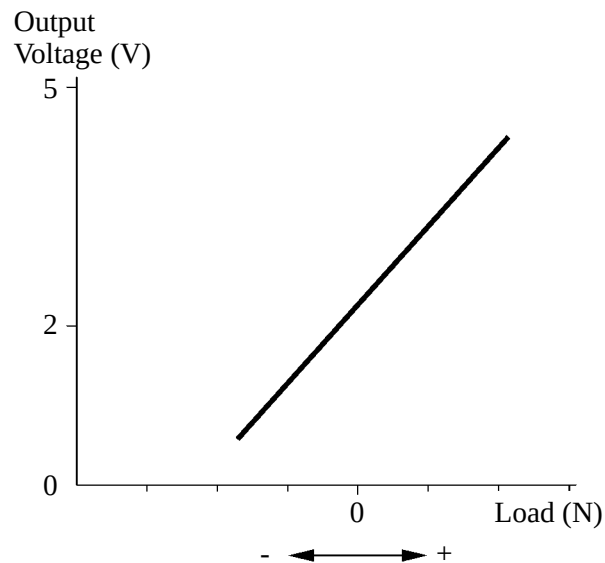


3. Occupant Classification Sensor

The occupant classification sensors are installed on 4 brackets connecting the seat rail and seat frame. Accordingly, when load is applied to the front passenger seat by an occupant sitting in it, the occupant classification sensors register a distortion.



- The occupant classification sensors register a change in resistance value in response to a distortion. Accordingly, the occupant classification sensors output a voltage to the occupant classification ECU in response to the weight (load) of the front passenger seat occupant.



4. System Operation

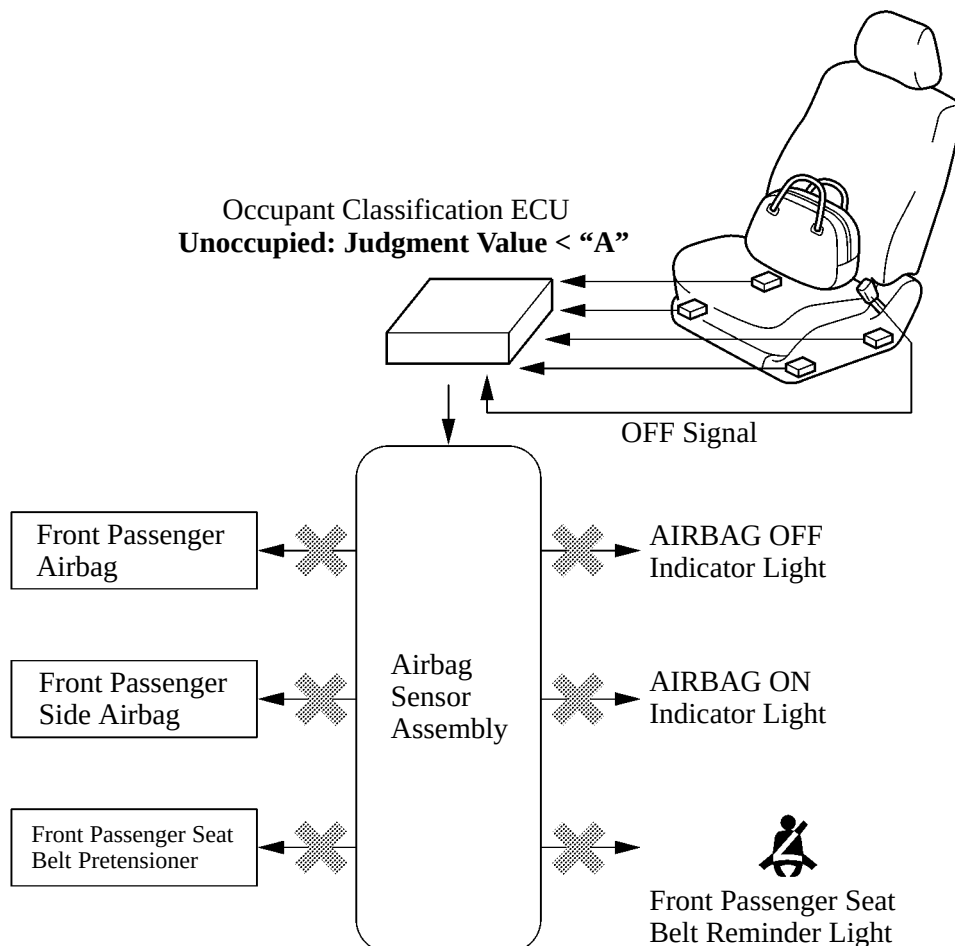
General

This system makes the following judgments: unoccupied judgment, child seat judgment, child judgment, and adult judgment. In addition, it performs an initial check to check the circuit of the AIRBAG ON/OFF indicator lights when the ignition switch is ON.

- The occupant classification ECU constantly monitors the weight of the front passenger seat, and makes a judgment in accordance with the signals from the occupant classification sensor and the state of the seat belt buckle switch, regardless of the position of the ignition switch.
- The occupant classification ECU contains criteria value “A” to judge whether the seat is being occupied by a child or a child seat in accordance with the signals from the four occupant classification sensors and seat belt buckle switch, and criteria value “B” to judge whether the occupant is an adult or child (with child seat).
- The occupant classification ECU makes an occupied or unoccupied judgment in accordance with the signals from the seat belt buckle switch.

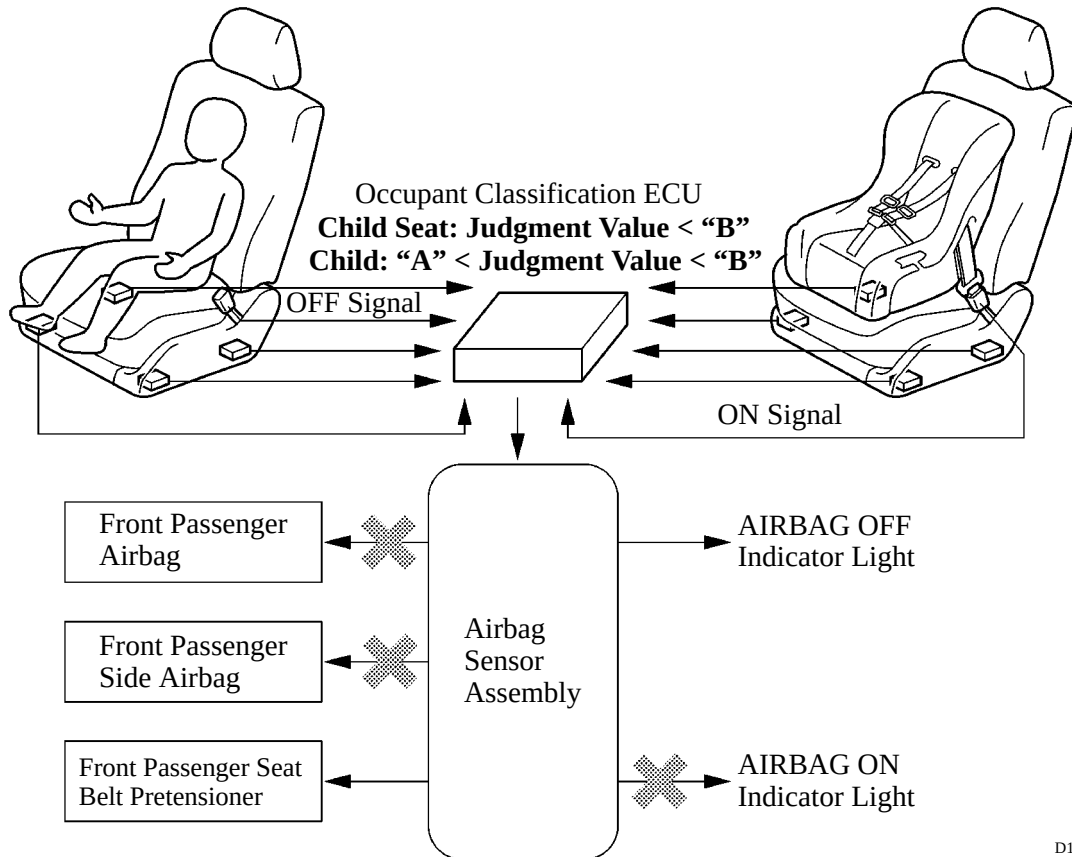
Unoccupied Judgment

- The occupant classification ECU makes an unoccupied judgment when the judgment value is lower than criteria value “A” and the seat belt buckle switch is off.
- If the ignition switch is turned ON in this state, the system performs an initial check, and does not illuminate the AIRBAG ON/OFF indicator lights. Then, the system prohibits the deployment of the front passenger airbag, front passenger side airbag, and the front passenger seat belt pretensioner, and does not blink the front passenger seat belt reminder light.



Child Seat or Child Judgment

- If the judgment value is lower than criteria value “B” and the seat belt buckle switch is on, the occupant classification ECU judges that a child seat is installed.
- If the judgment value is higher than criteria value “A”, but lower than criteria value “B”, and the seat belt buckle switch is off, the occupant classification ECU judges that the seat is being occupied by a child.
- When the ignition switch is turned ON under these conditions, the system performs an initial check and illuminates the AIRBAG OFF indicator light to indicate that the front passenger airbag and front passenger side airbag have been deactivated.

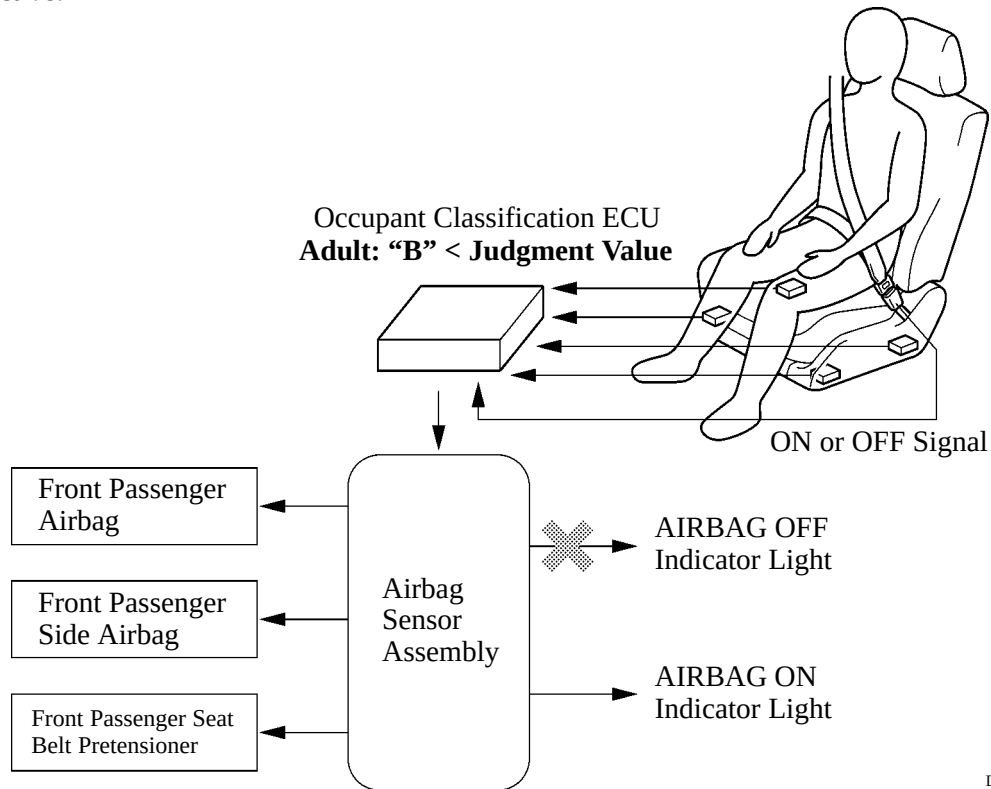


D13N56

- After the occupant classification ECU judges that child seat is installed, the AIRBAG OFF indicator light does not go off unless the seat belt buckle switch is turned off.

Adult Judgment

- When the judgment value is higher than criteria value “B”, the occupant classification ECU judges that the seat is being occupied by an adult.
- If the ignition switch is turned ON in this state, the system performs an initial check and illuminates the AIRBAG ON indicator light, indicating that the front passenger airbag and front passenger side airbag are active.

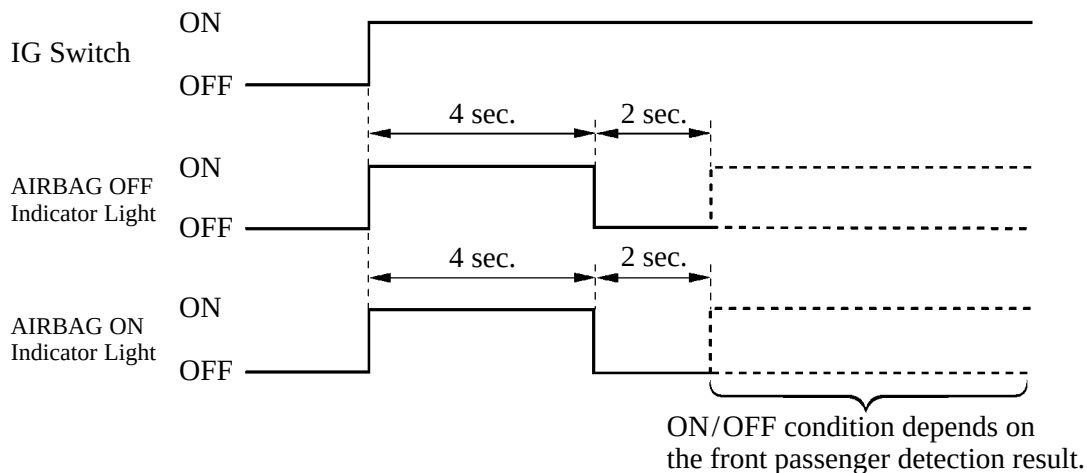


D13N57

- After the occupant classification ECU judges that the occupant is an adult, if the judgment value is determined as criteria value “B” or less according to occupant load movement, the ECU continues adult judgment for approximately 10 seconds before switching to the child judgment.

Initial Check

After the ignition switch is turned ON, the occupant classification ECU lights up the AIRBAG ON/OFF indicator lights via the airbag sensor assembly based on the timing chart below in order to check the indicator light circuits.



259ESW53

5. Precaution for Occupant Classification System Operation

To avoid potential death or serious injury when the front passenger occupant classification system does not detect the conditions correctly, observe the following.

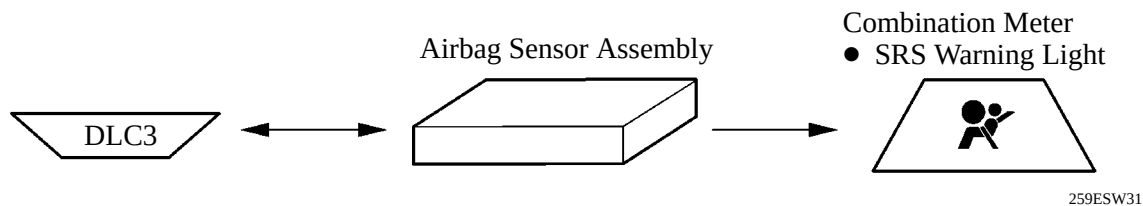
- Wear the seat belt properly.
- Make sure the front passenger seat belt tab has not been left inserted into the buckle before someone sits in the front passenger seat.
- Make sure the AIRBAG ON indicator light is illuminated when using the seat belt extender for the front passenger seat. If the AIRBAG OFF indicator light is illuminated, disconnect the extender tongue from the seat belt buckle, then reconnect the seat belt. Reconnect the seat belt extender after making sure the AIRBAG ON indicator light is illuminated. If you use the seat belt extender while the AIRBAG OFF indicator light is illuminated, the front passenger airbag and front passenger side airbag may not activate correctly, which could cause death or serious injury in the event of collision.
- Do not put a heavy load in the front passenger seatback pocket or attach a seatback table to the front passenger seatback.
- Do not put weight on the front passenger seat by putting your hands or feet on the front passenger seatback from the rear passenger seat.
- Do not let a rear passenger lift the front passenger seat with his/her feet or press on the seatback with his/her legs.
- Do not put objects under the front passenger seat.
- Do not recline the front passenger seatback so far that it touches a rear seat. This may cause the AIRBAG OFF indicator light to be illuminated, which indicates that the front passenger airbags will not deploy in the event of a severe accident. If the seatback touches the rear seat, return the seatback to a position where it does not touch the rear seat.
Keep the front passenger seatback as upright as possible when the vehicle is moving. Reclining the seatback excessively may lessen the effectiveness of the seat belt system.
- Make sure the AIRBAG ON indicator light may be illuminated when an adult sits in the front passenger seat. If the AIRBAG OFF indicator light is illuminated, ask the passenger to sit properly with back upright and against the seat, with legs comfortably extended and wear the seat belt correctly. Nonetheless, if the AIRBAG OFF indicator light remains illuminated, let the passenger sit in the rear seat. When it is unavoidable to sit in the front passenger seat, ask the passenger to move the seat as far back as possible, remain properly seated.
- When it is unavoidable to install the forward-facing child restraint system on the front passenger seat, install the child restraint system on the front passenger seat in the proper order.
- Do not kick the front passenger seat or subject it to severe impact. Otherwise, the SRS warning light may come on to indicate a malfunction of the detection system.
- Child restraint systems installed on the rear seat should not contact the front seatbacks.

■ DIAGNOSIS

1. General

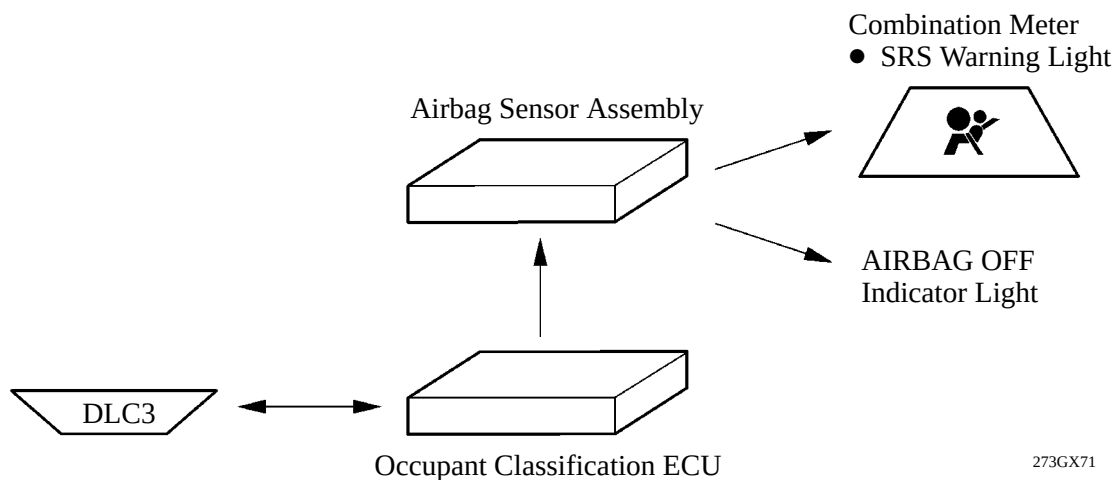
If the airbag sensor assembly detects a malfunction in the SRS airbag system, the airbag sensor assembly stores the malfunction data in memory, in addition to illuminating the SRS warning light.

- The airbag sensor assembly outputs malfunction data, 5-digit DTCs (Diagnostic Trouble Codes) or 2-digit DTCs, to the hand-held tester or the SRS warning light.



If the occupant classification ECU detects a malfunction in the occupant classification system, it stores the malfunction data in memory via the airbag sensor assembly, illuminating the SRS warning light and AIRBAG OFF indicator light.

- The occupant classification ECU outputs 5-digit DTCs to the hand-held tester.



2. DTC of SRS Airbag System

There are 2 types of DTCs of the SRS airbag system: 5-digit and 2-digit.

- The 5-digit DTC can be read by connecting a hand-held tester to the DLC3 terminal.
- The 2-digit DTC can be read through the blinking of the SRS warning light with the SST(09843-18040) connected to the TC and CG terminals of the DLC3.
- If the SRS airbag deploys, the airbag sensor assembly will turn on the SRS warning light. However, it is different from the ordinary diagnosis function that a DTC will not be memorized. The SRS warning light can be turned off only by changing the airbag sensor assembly to a new one.

3. DTC of Occupant Classification System

There is only a 5-digit DTC for the occupant classification system.

- The 5-digit DTC can be read by connecting a hand-held tester to the DLC3 terminal.

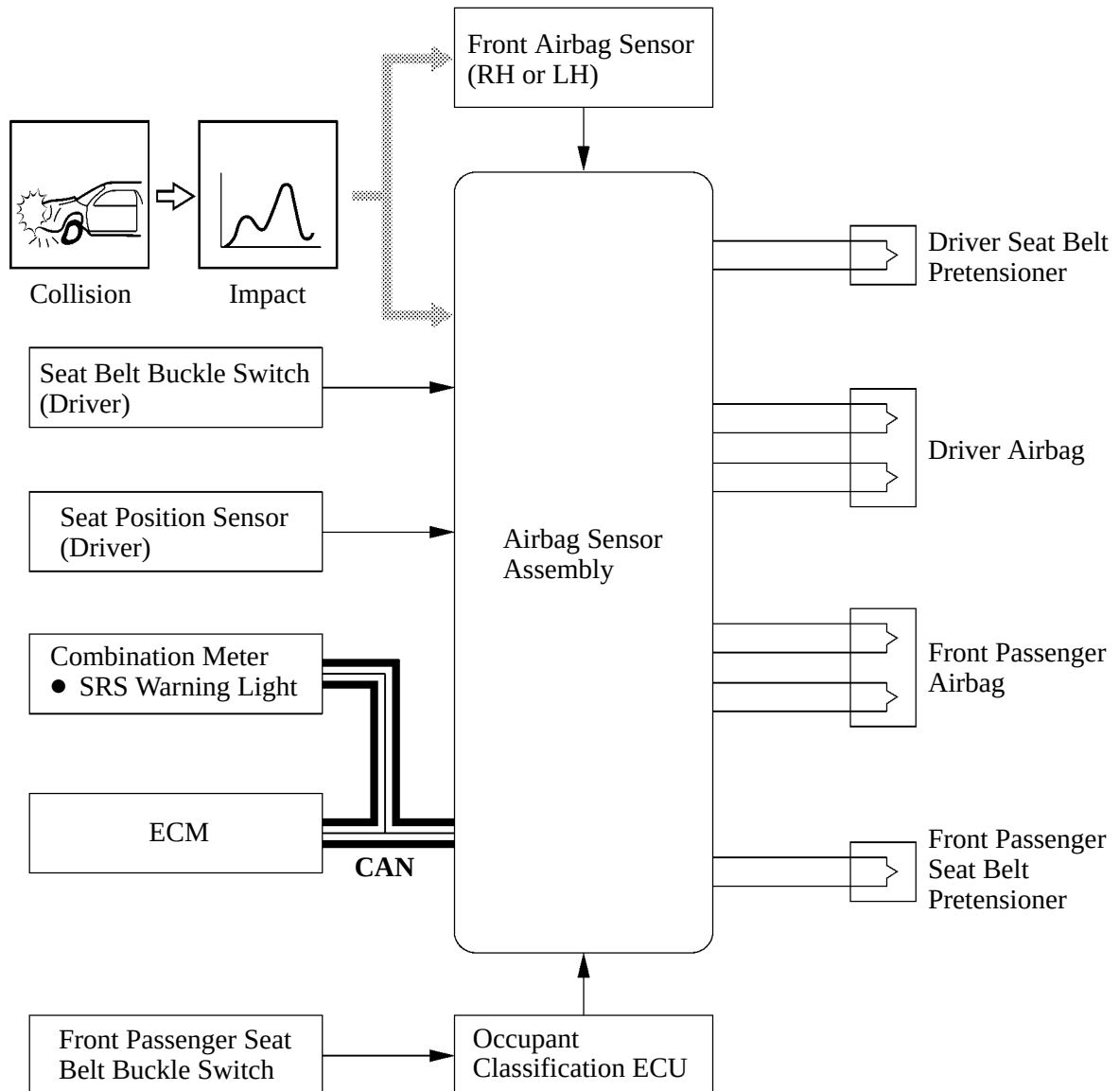
For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

■ AIRBAG FOR FRONTAL COLLISION

1. General

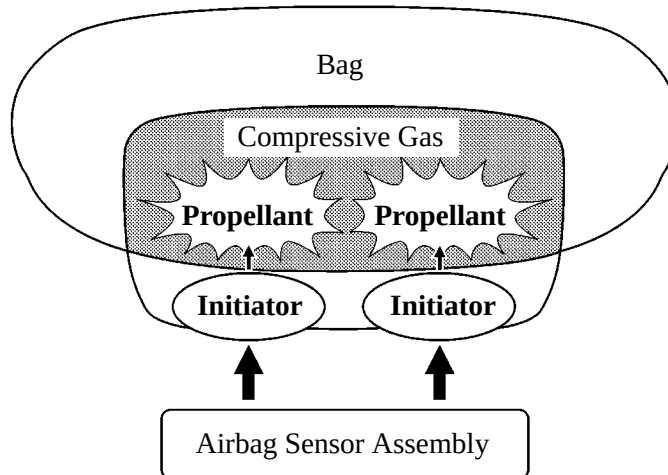
In conjunction with impact absorbing structure for front collision, the driver and front passenger dual-stage SRS airbags and the driver knee airbag have been designed to help reduce injury to the head, chest and leg in the event of a front collision. These airbags all deploy with the same timing, and are supplements to the seat belts.

► System Operation ◀



2. Dual-stage SRS Airbags

To support the dual-stage control, these airbag assemblies contain 2 sets of initiators and propellants. The airbag sensor assembly helps optimize the airbag inflation output by delaying the inflation timing of these initiators.



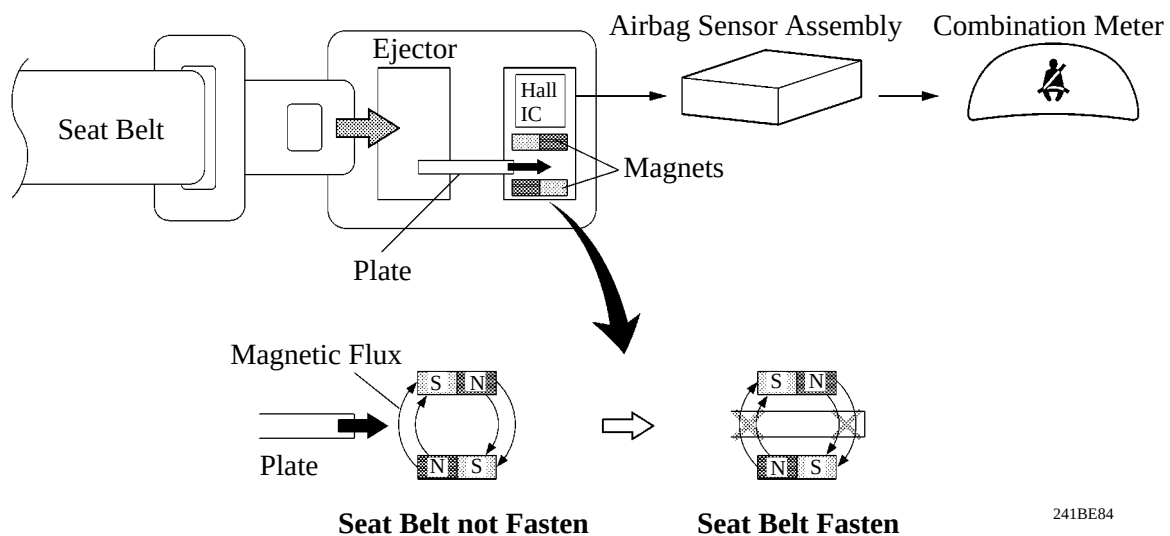
228AV15

3. Front Airbag Sensor

- The electrical (acceleration sensor) type airbag sensor is used for front airbag sensor.
- The acceleration sensor is enclosed in the front airbag sensor. Based on the deceleration of the vehicle during a front collision, a distortion is created in the sensor and converted into an electrical signal. Accordingly, the extent of the initial collision can be detected in detail.

4. Seat Belt Buckle Switch (for Driver)

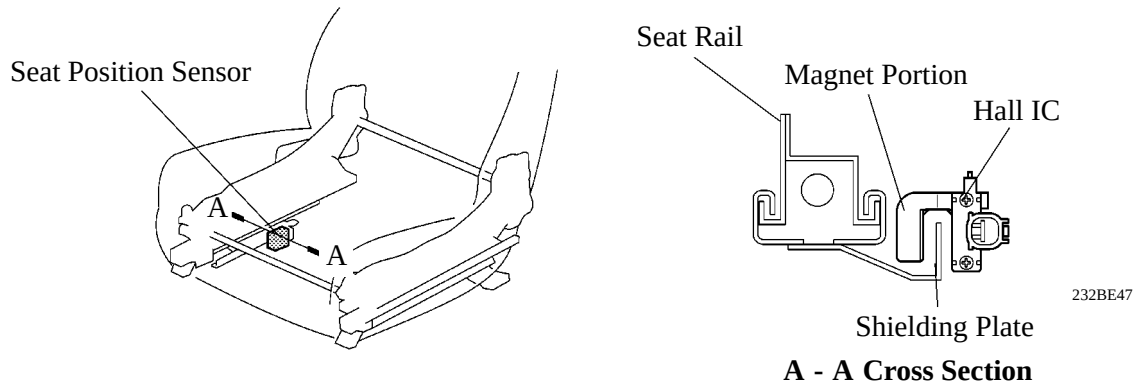
- The seat belt buckle switch which consists of an ejector with a plate, a Hall IC, and two magnets is integrated in the front seat inner belt assembly.
- The ejector with plate blocks the magnetic flux density between the two magnets. The Hall IC outputs this change to the airbag sensor assembly.



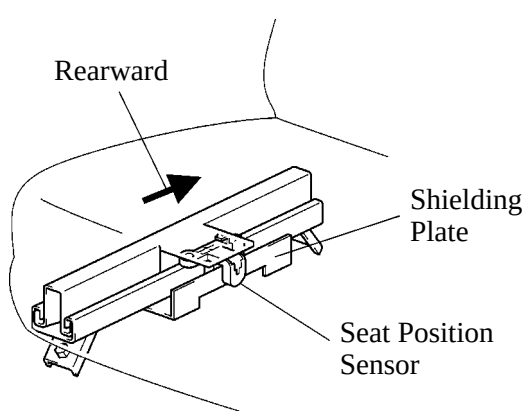
241BE84

5. Seat Position Sensor (for Driver)

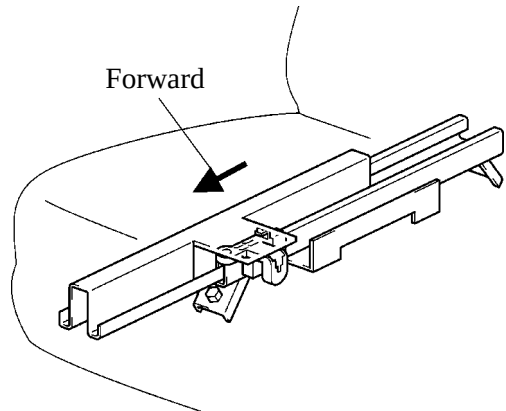
- The seat position sensor which is attached to the seat rail of the driver seat detects the sliding position of the seat. In addition, the shielding plate is installed on this seat rail to make the seat position sensor judge the seat position.
- The seat position sensor uses a Hall IC for its sensor and has a magnet portion on its opposite side.



- The seat position sensor judges that the seat position is rearward if the sensor is located over the shielding plate, and the seat position is forward if the shielding plate is not located over the sensor.



Seat position is rearward



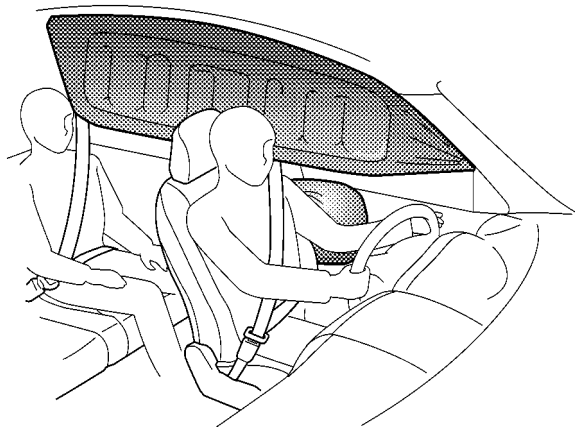
Seat position is forward

SRS AIRBAG SYSTEM

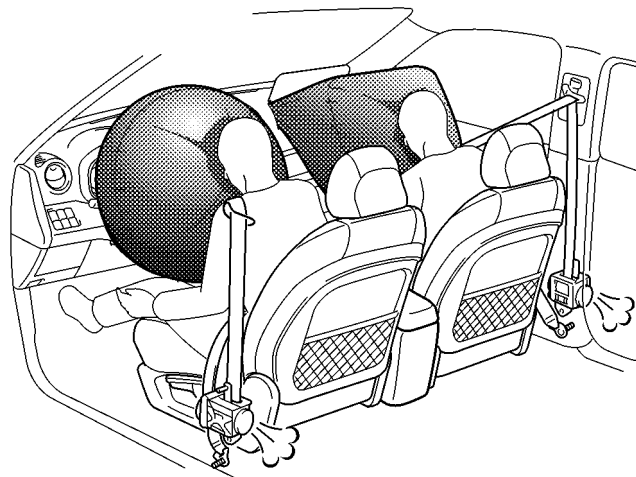
■ DESCRIPTION

- The dual-stage SRS (Supplemental Restraint System) driver and front passenger airbags are used to help reduce the shocks to the heads and chests of the driver and front passenger in the event of frontal collision as supplements to the seat belts. The dual-stage SRS airbag system controls the airbag inflating output by judging the extent of impact, seat position and whether or not the seat belt is fastened.
- The SRS side and curtain shield airbags are used to help reduce the shocks to the heads and the chests of the driver, front passenger, and outer rear passengers in the event of a side collision.
- The RSCA (Roll Sensing of Curtain shield Airbag) control is used in order to deploy the curtain shield airbag and the driver and front passenger seat belt pretensioners, in the event that the vehicle rolls over.
- As a countermeasure against an interruption in the power supply in the event of a collision involving the vehicle, a backup power supply which consists of a power supply capacitor and a voltage boost circuit (DC-DC converter) is provided in the airbag sensor assembly.
- The airbag sensor assembly uses a fuel cut control that stops the fuel pump if any airbag is deployed.
- The '06 models have the SRS airbag system with the following equipments:

Destination		U.S.A & Canada
Airbag Type	Driver and Front Passenger Airbags	Standard
	Driver, Front Passenger, Side and Roll Sensing of Curtain Shield Airbags	Option

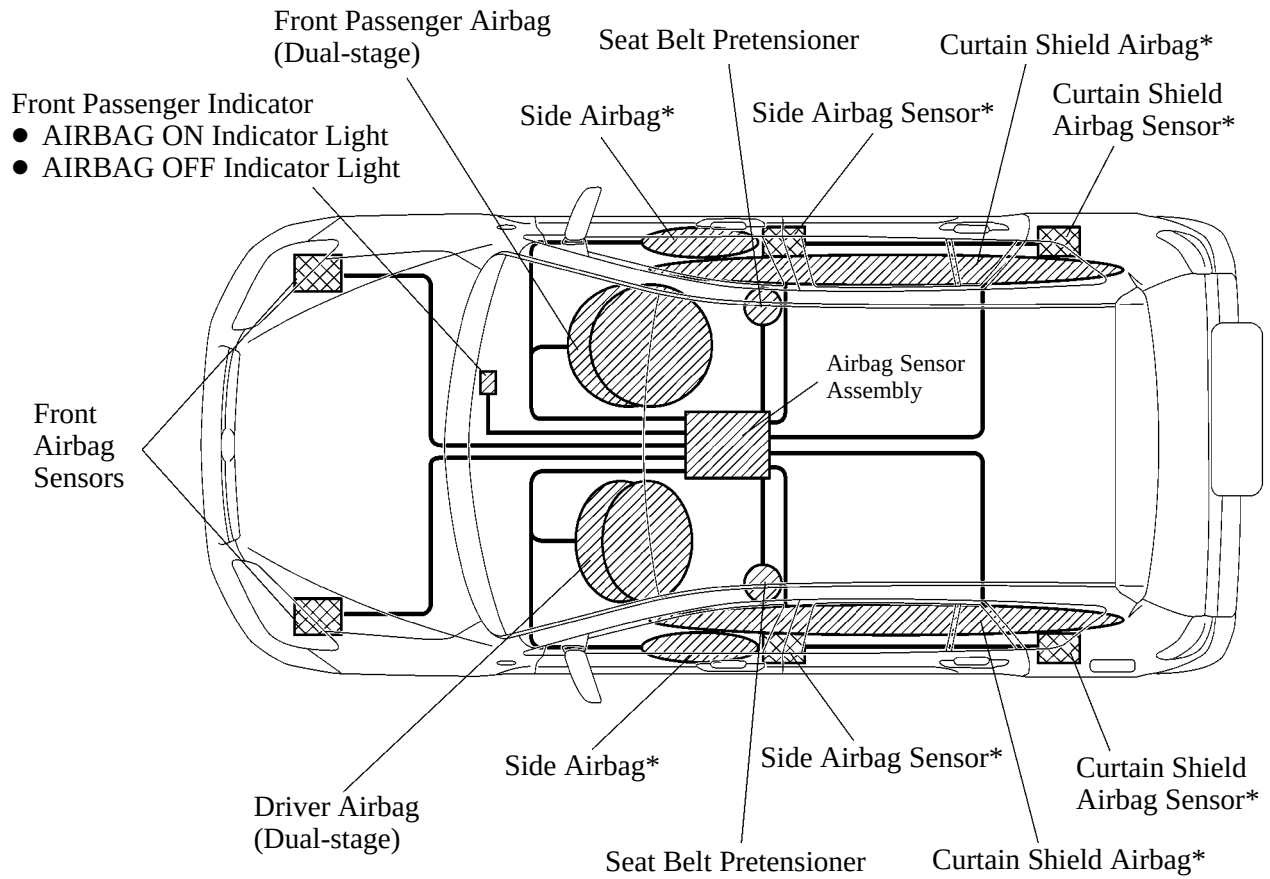


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01MBE16Y

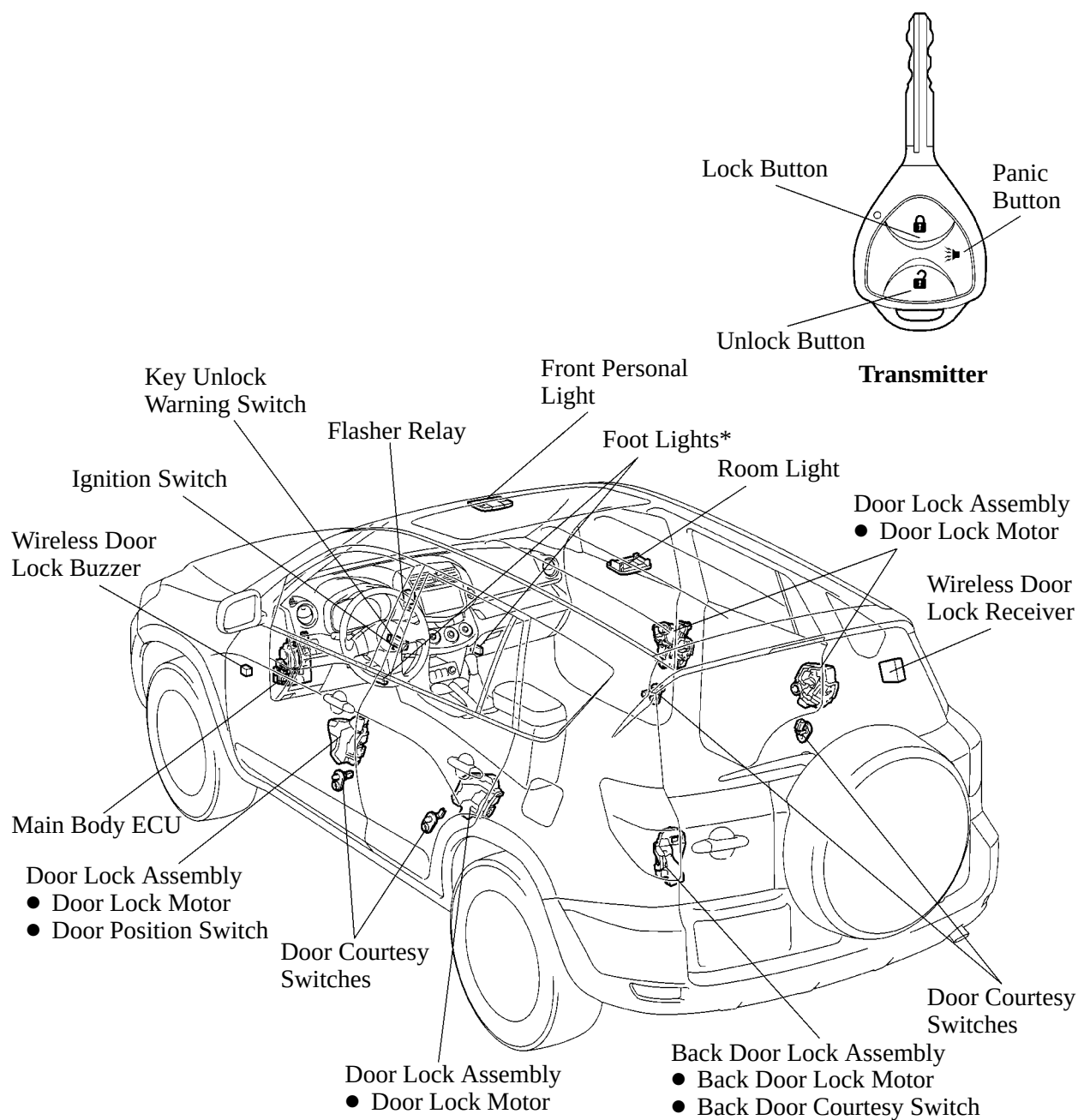
► System Diagram ◀



01MBE15Y

*: Only for Models with Driver, Front Passenger, Side and Roll Sensing of Curtain Shield Airbags

■ LAYOUT OF MAIN COMPONENTS



*: Models with Foot Lights

01MBE25Y

WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

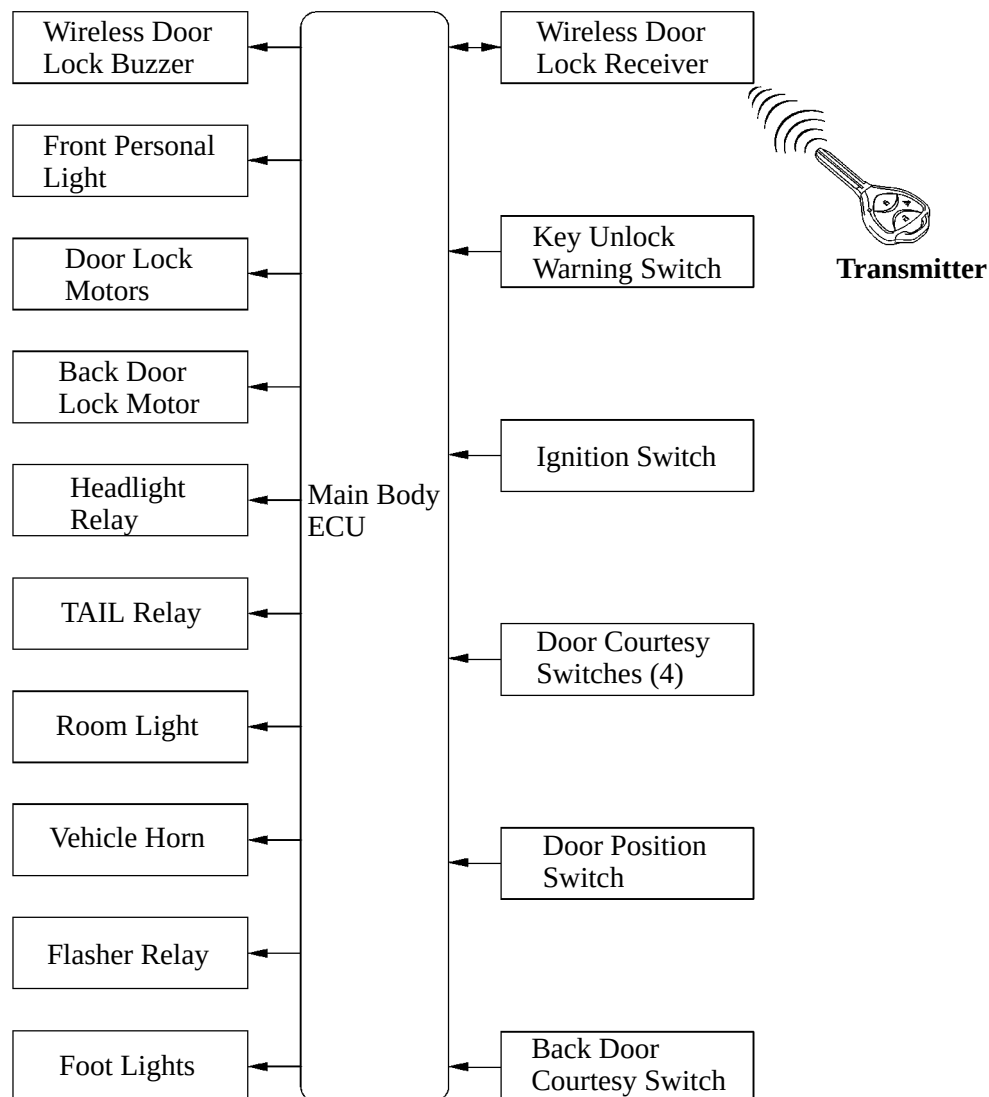
DESCRIPTION

The wireless door lock remote control system has been provided as standard equipment on all models.

This system is a convenient system for locking and unlocking all doors at a distance. This system in the '06 models has the following features:

- In this system, the wireless door lock receiver performs the code identification process and sends the lock or unlock signal to the main body ECU, then the main body ECU effects the door lock control.
- A key-integrated, three-button (lock, unlock, panic) type transmitter is used.
- To inform the user that the locking or unlocking of the doors has been completed through the operation of the transmitter, an answer back operation, which flashes the hazard lights and sounds the wireless door lock buzzer, has been provided.
- A panic alarm operation is provided that activates alarms when the panic button on the transmitter is pressed and held for approximately 0.8 seconds.
- A door ajar warning function, which sounds the wireless door lock buzzer if a lock button is pressed while any one of the doors is ajar, has been provided.

System Diagram ◀



01MBE01Y

*: Models with Foot Lights

■ FUNCTION

1. General

The wireless door lock remote control system has the following functions:

Function	Outline
All Doors Lock	Pressing the lock button on the transmitter locks all doors.
All Doors Unlock (2-step Unlock)	Pressing the unlock button on the transmitter once unlocks the driver's door. If the unlock button is pushed again within 3 seconds, all doors unlock.
Automatic Lock Function	If no door is opened for 30 seconds and the ignition key is not in the ignition key cylinder after unlocking the doors by pushing the unlock button on the transmitter, all doors are locked again automatically.
Answer Back Operation	The hazard light flashes once when locking, and the hazard light flashes twice when unlocking, to inform that the operation has been completed.
	The wireless door lock buzzer sounds once when locking, and the wireless door lock buzzer sounds twice when unlocking, to inform that the operation has been completed.
Panic Alarm Operation	Pressing and holding the panic button on the transmitter for approximately 0.8 seconds activates alarms. Pushing any button on the transmitter during the alarms cancels the alarms.
Door Ajar Warning Function	If any door is open or ajar, pressing the lock button of the transmitter will cause the wireless door lock buzzer to sound for about 10 seconds.
Transmitter Recognition Code Registration Function	● A maximum of 4 types of transmitter recognition codes can be registered in the wireless door control receiver. ● When 4 codes are already registered and a new code is registered, it is written over the oldest of the already registered codes.
Customized Body Electronics	For details, see page BE-7

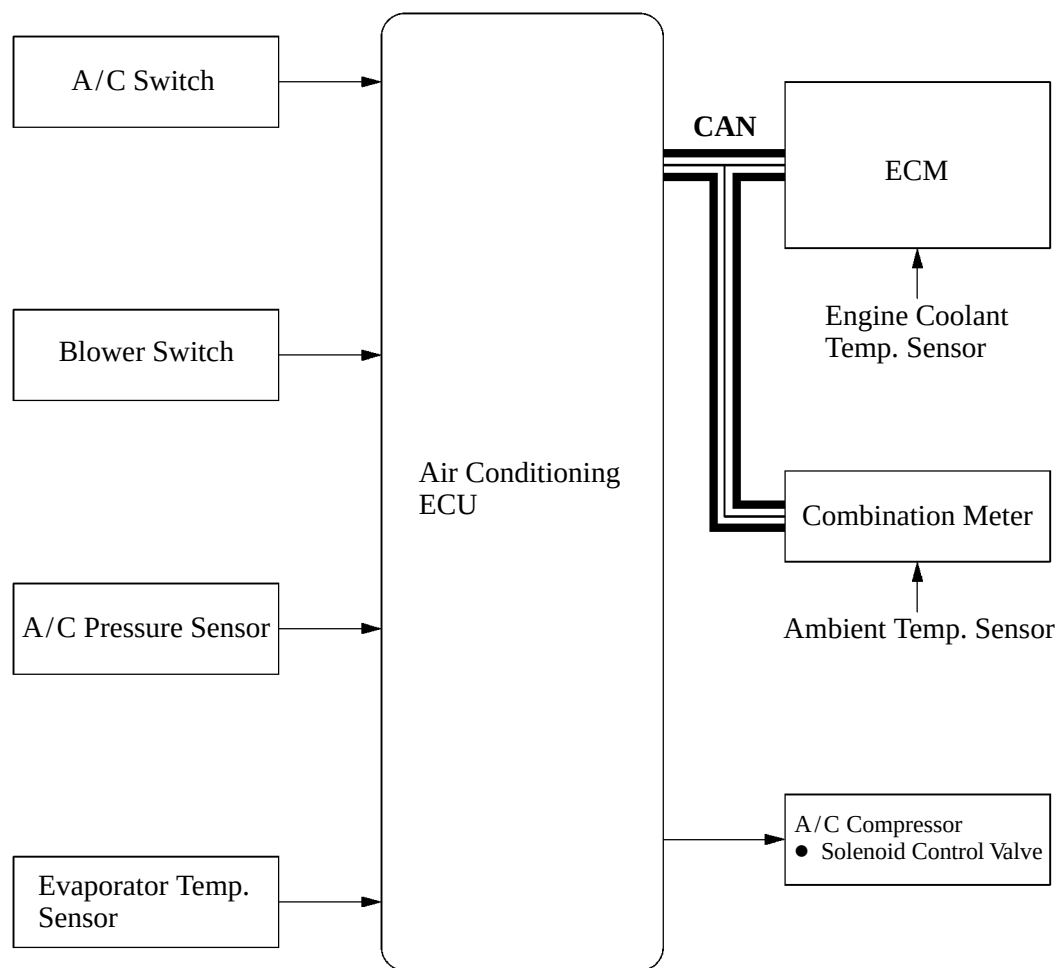
2. Transmitter Recognition Code Registration Function

The table below shows the 4 special coded ID registration function modes through which up to 4 different codes can be registered. The codes are electronically registered (written and stored) in the EEPROM. For details of the recognition code registration procedure, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

Mode	Function
Rewrite Mode	Erases all previously registered codes and registers only the newly received codes.
Add Mode	Adds a newly received code while preserving any previously registered codes. This mode is used when adding a new transmitter. If the number of codes exceeds 4, the oldest registered code is erased first.
Confirm Mode	Confirms how many codes are currently registered. When adding a new code, this mode is used to check how many codes already exist.
Prohibit Mode	Deletes all the registered codes and prohibits the wireless door lock function. This mode is used when the transmitter is lost.

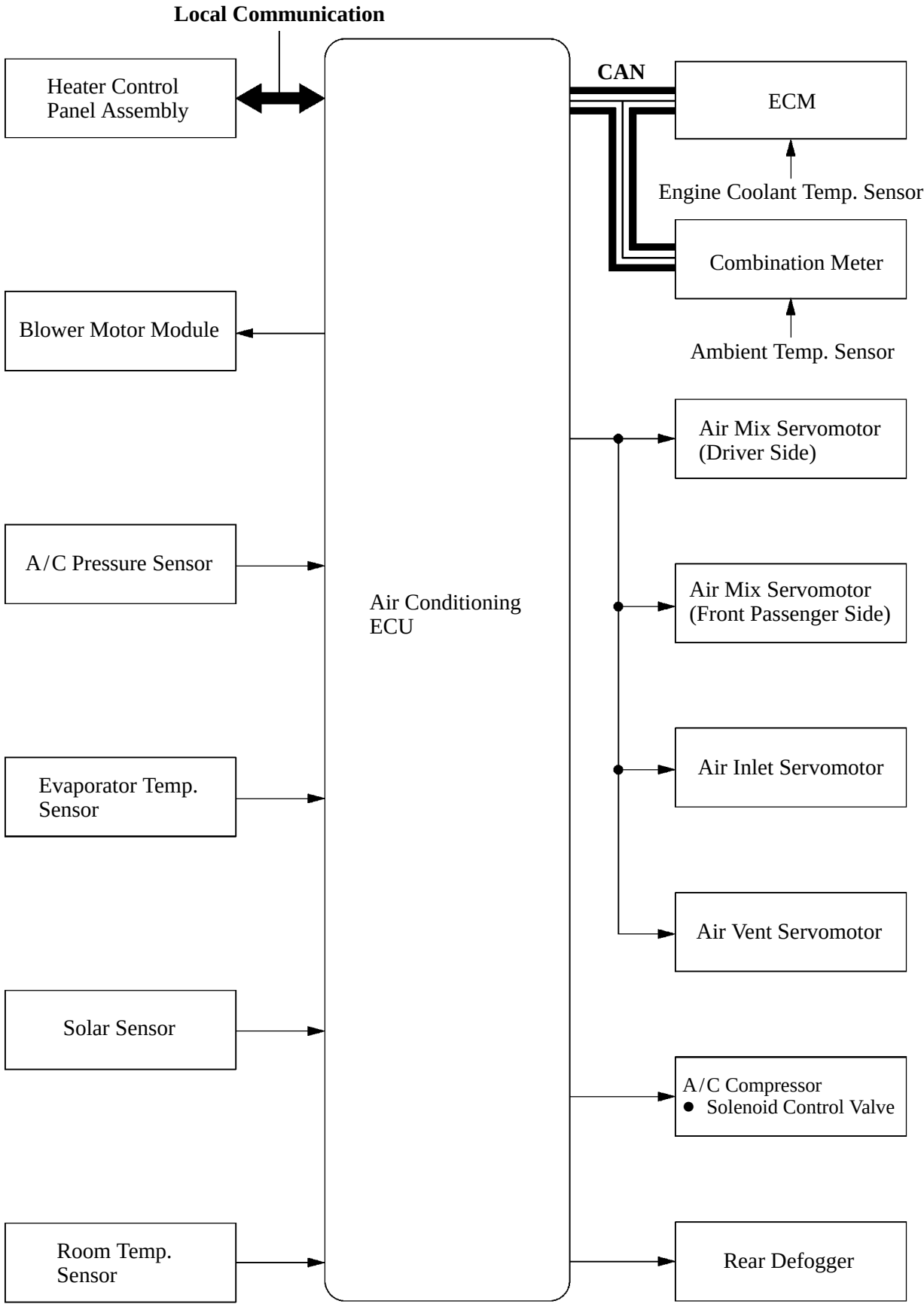
■ SYSTEM DIAGRAM

► Manual Air Conditioning ◀

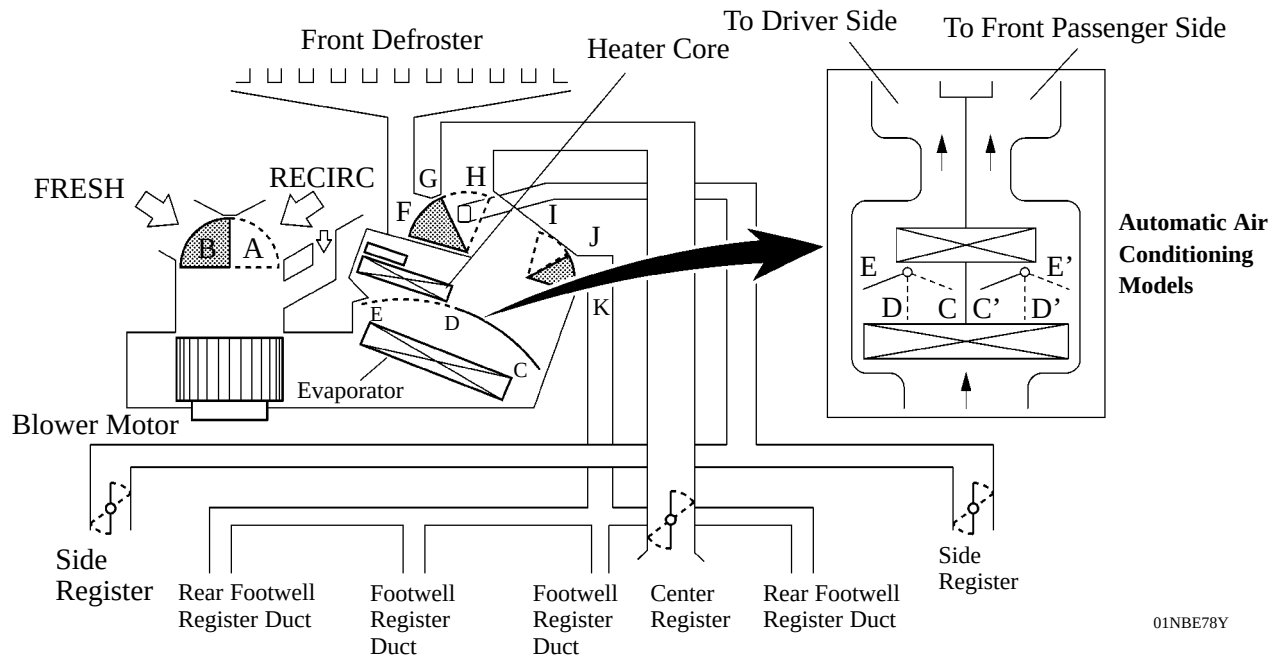


01MBE08Y

► Automatic Air Conditioning ◀



■ MODE POSITION AND DAMPER OPERATION



01NBE78Y

► Function of Main Damper ◀

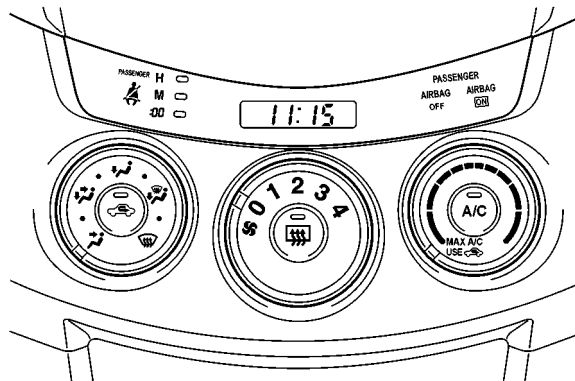
Control Damper	Operation Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A	Brings in fresh air.
	RECIRC	B	Recirculates internal air.
Air Mix Control Damper	MAX COLD - MAX HOT Temp. Setting (Auto A/C): 16°C (61°F) - 30°C (86°F)	C - D - E (C' - D' - E')	Varies the mixture ratio of the fresh air and the recirculation air in order to regulate the temperature continuously from HOT to COLD.
Mode Control Damper	DEF 187BE28	H, K	Defrosts the windshield through the front defroster and side register.
	FOOT/DEF 187BE27	H, J	Defrosts the windshield through the front defroster and side register, while air is also blown out from the footwell register duct and rear footwell register duct.
	FOOT 187BE26	H, I	Air blows out of the footwell register dust, rear footwell register duct, and side register. In addition, air blows out slightly from the front defroster.
	BI-LEVEL 187BE25	F, I	Air blows out of the center register, side register, footwell register duct and rear footwell register duct.
	FACE 187BE24	F, K	Air blows out of the center register and side register.

■ CONSTRUCTION AND OPERATION

1. Heater Control Panel

Heater Control Panel (Manual Control Type)

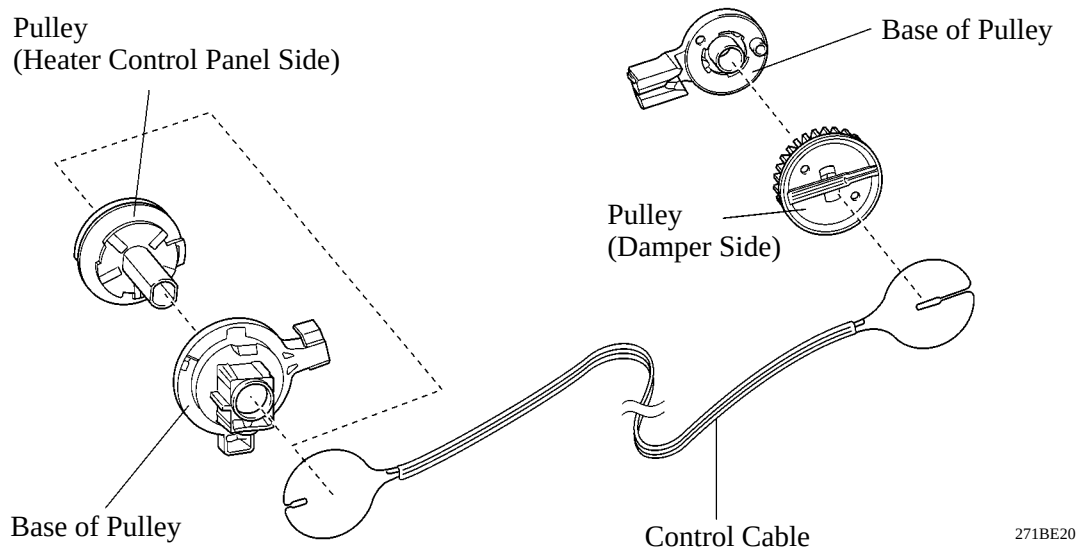
- The rotary switch type heater control panel is used.
- The '06 models use two cables on pulleys to operate the heater control panel and damper.
- Five air outlet modes are provided on the control panel on the models with air conditioning. To realize finer mode settings, a positive feel is provided between the positions of these modes, thus realizing the high comfort level.
- When the FOOT/DEF or DEF mode is selected, the A/C compressor turns ON and the air conditioning switches to the fresh mode. As a result, the fogging of the window glass is eliminated quickly.



01MMO36Y

Heater Control Cable

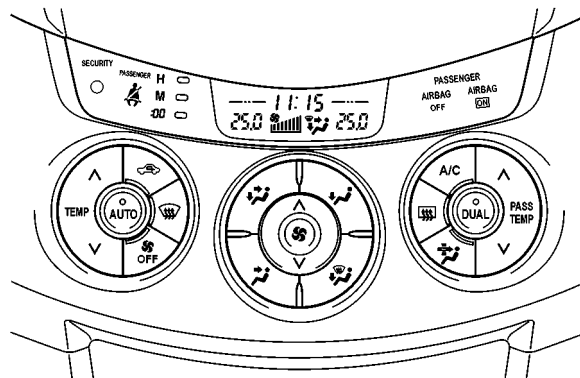
- The '06 models use two cables on pulleys that are always operated in the pulling direction to operate the heater control panel and damper.
- This cable is circular, and is placed around the cable pulleys that are provided at the heater control panel and the damper.
- The operation of the heater control panel is transmitted to the damper via the control cable, which always moves in the pulling direction. Due to the consistent action point of the pulleys, the fluctuation of the operating effort has been minimized through the use of the pulleys. These measures have improved the ease of use and reduced the operating effort.



271BE20

Heater Control Panel (Automatic Control Type)

- The push switch type heater control panel with LCD (Liquid Crystal Display) is used to ensure excellent visibility.
- The temperature control switches for the driver and front passenger are provided on the heater control panel to enhance their ease of use.

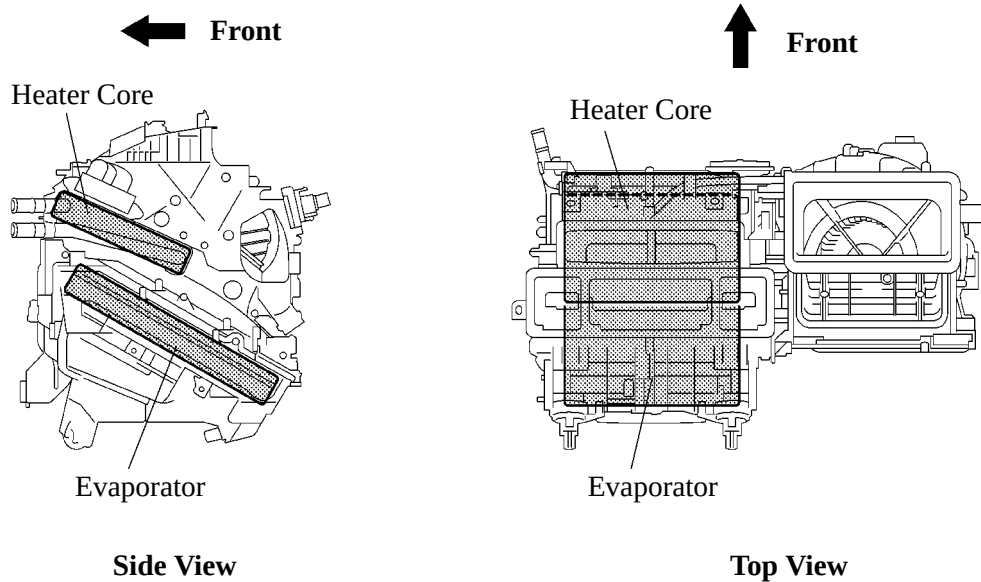


01MMO37Y

2. Air Conditioning and Blower Units

General

A semi-center location air conditioning unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, is used.

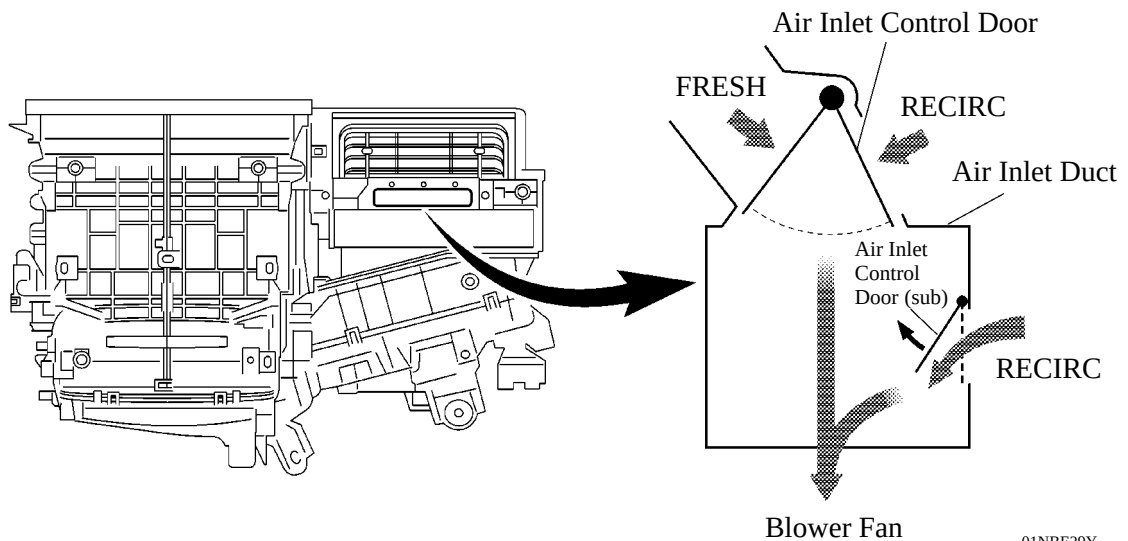


01NBE77Y

Partial Recirculation System

The partial recirculation system is used.

This system has an air inlet control door (sub) in the cabin side of the air inlet duct. Thus, it is able to cycle a small volume of recirculated air even in the FRESH mode, thus enhancing heating and air conditioning performance. When the blower switch is ON, the suction force of the blower fan opens this air inlet control door (sub).

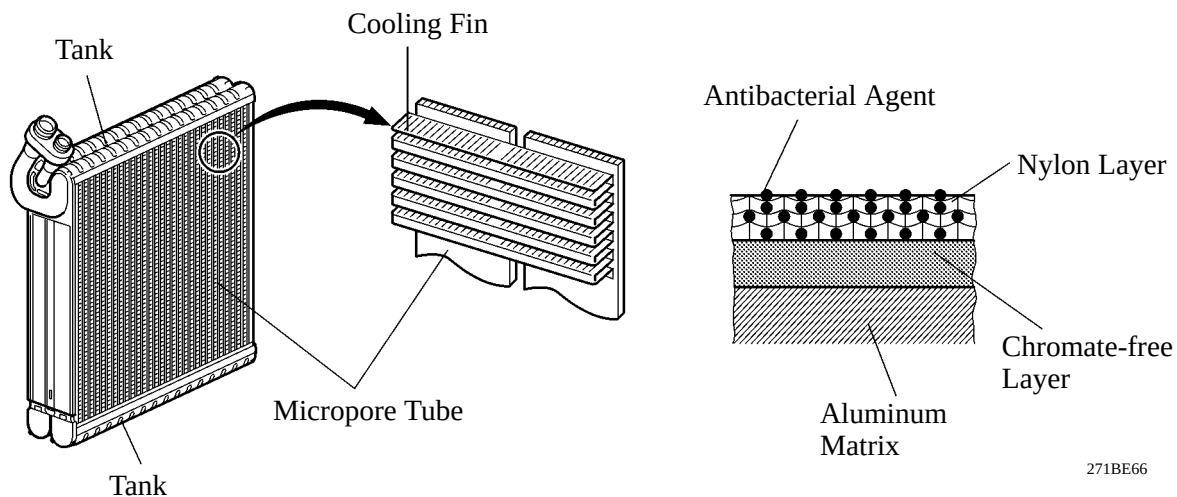


01NBE29Y

Evaporator

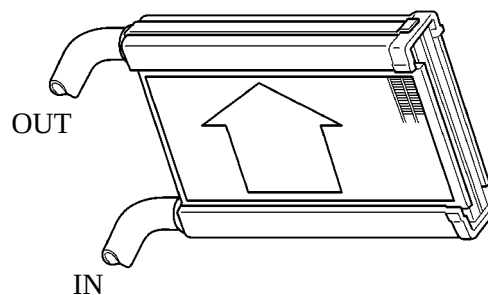
A revolutionary super-slim structure evaporator is used. Placing the tanks at the top and the bottom of the evaporator and adopting a micropore tube construction have realized the following effects:

- The heat exchanging efficiency is improved.
- The temperature distribution is made more uniform.
- The evaporator is made thinner: 58 mm (2.3 in.) → 38 mm (1.5 in.)
- The evaporator body has been coated with a type of resin that contains an antibacterial agent in order to minimize the source of foul odor and the propagation of bacteria. The substrate below this coating consists of a chromate-free layer to help protect the environment.



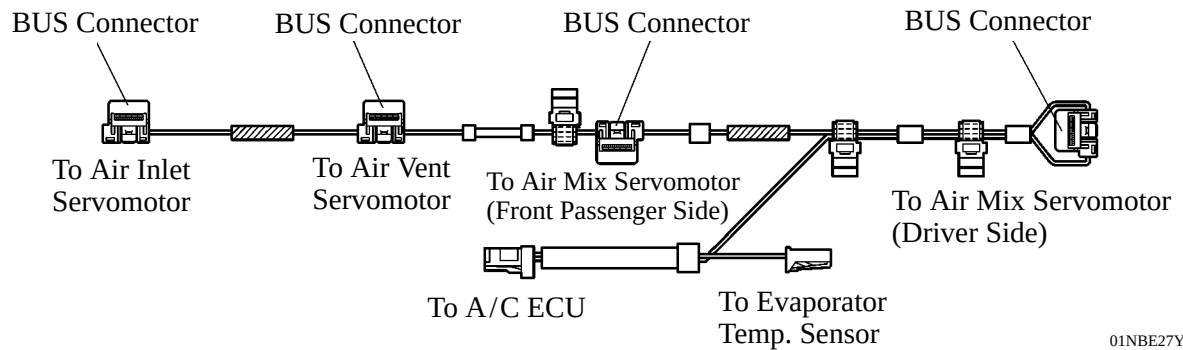
SFA-II Heater Core (SFA-II: Straight Flow Aluminum-II)

This heater core has been made more compact and higher performance by making the core section finer and improving the shapes of the tank section and flow section. Also, the environment is considered. By using aluminum as the material, the amount of the environmental burden disposal (lead) is reduced.

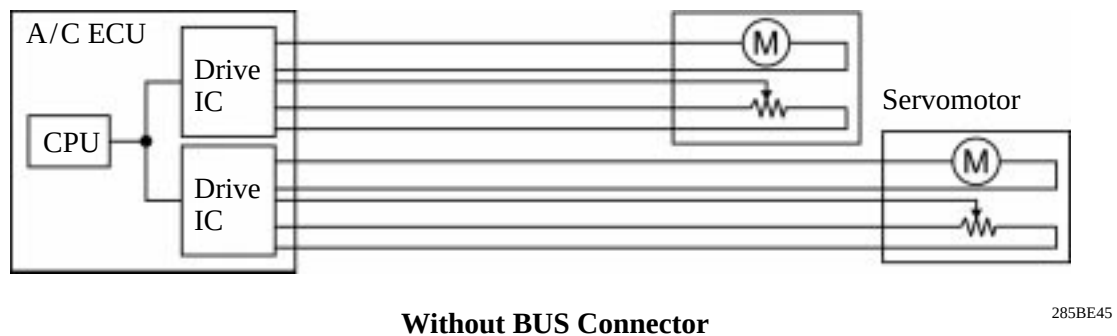
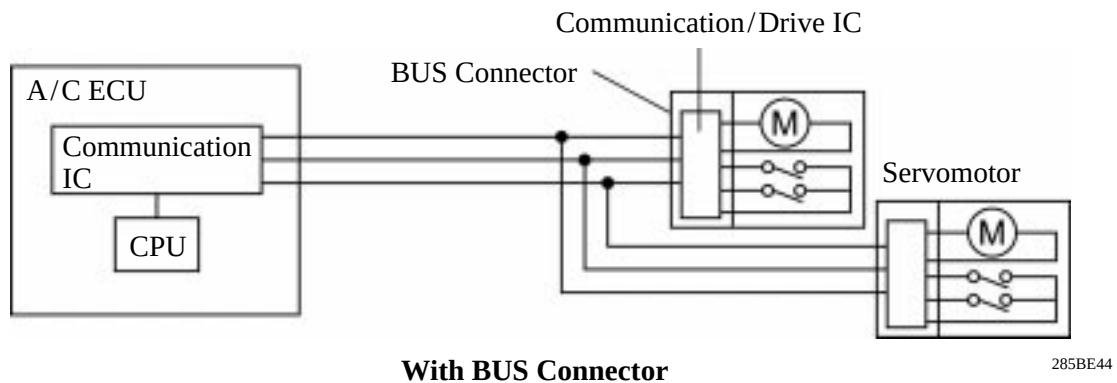


BUS Connector (Only for Models with Automatic Air Conditioning)

A BUS connector is used in the wire harness connection that connects the servomotor from the air conditioning ECU.



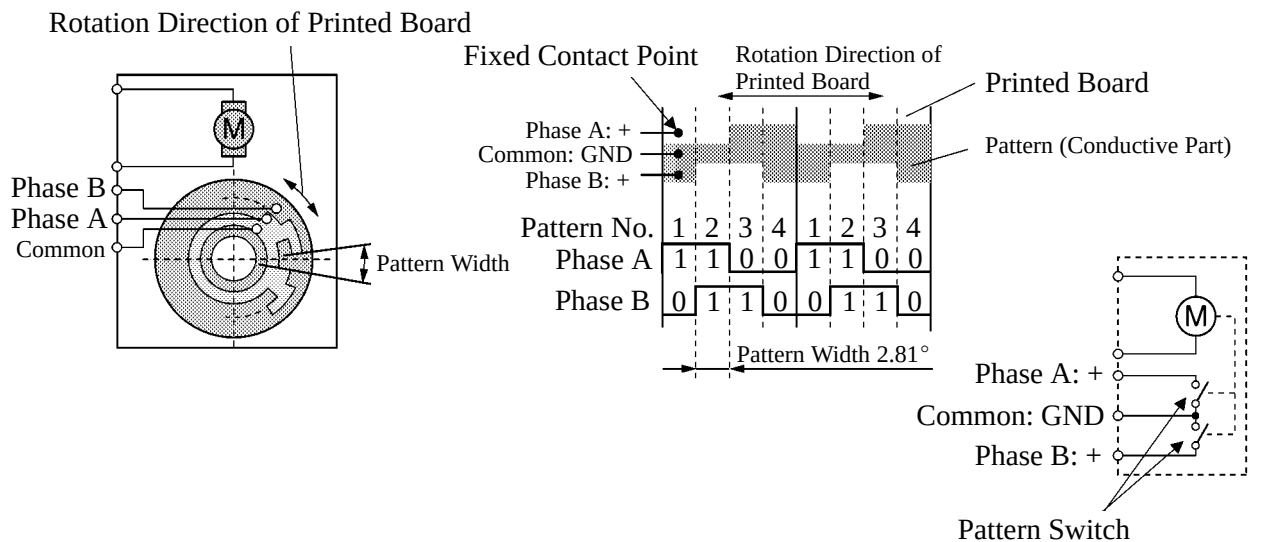
The BUS connector has a built-in communication/drive IC, which communicates with each servomotor connector, actuates the servomotor, and has a position detection function. This enables bus communication for the servomotor wire harness to realize a more lightweight construction and the reduced number of wires.



Servomotor (Only for Models with Automatic Air Conditioning)

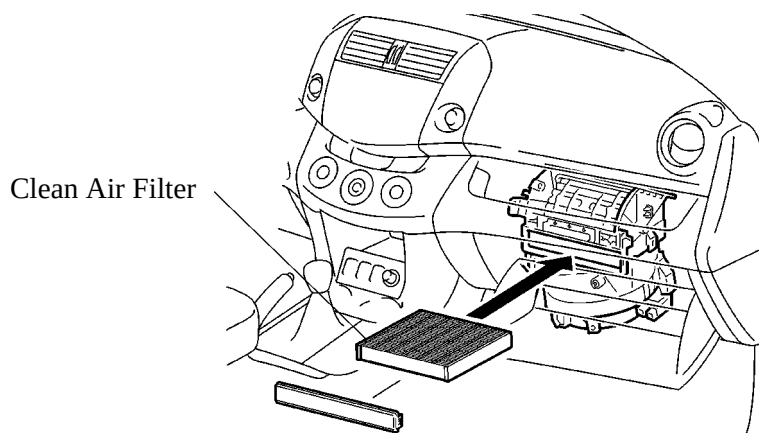
In contrast to the previous type that detects the position by way of a potentiometer voltage, the pulse pattern type servomotor detects the relative position by way of the 2-bit ON/OFF signals.

The forward and reverse revolutions of this motor are detected by way of two phases, A and B, which output four types of patterns. The air conditioning ECU counts the number of pulse patterns in order to determine the stopped position.



Clean Air Filter

A clean air filter (high efficiency type) is used to remove dust, pollen, and other micron particles from air entering from outside the vehicle to provide a comfortable cabin of clean air. The clean air filter is installed in the upper section of the blower fan for easy replacement of the clean air filter without the need for tools by removing the one-touch clip in the glove box, making this easy to service.



01NBE76Y

Service Tip

The clean air filter on the U.S.A models should be changed at 30,000 miles. On the Canada models, it should be changed at 16,000 km. However, it varies with the conditions or environment.

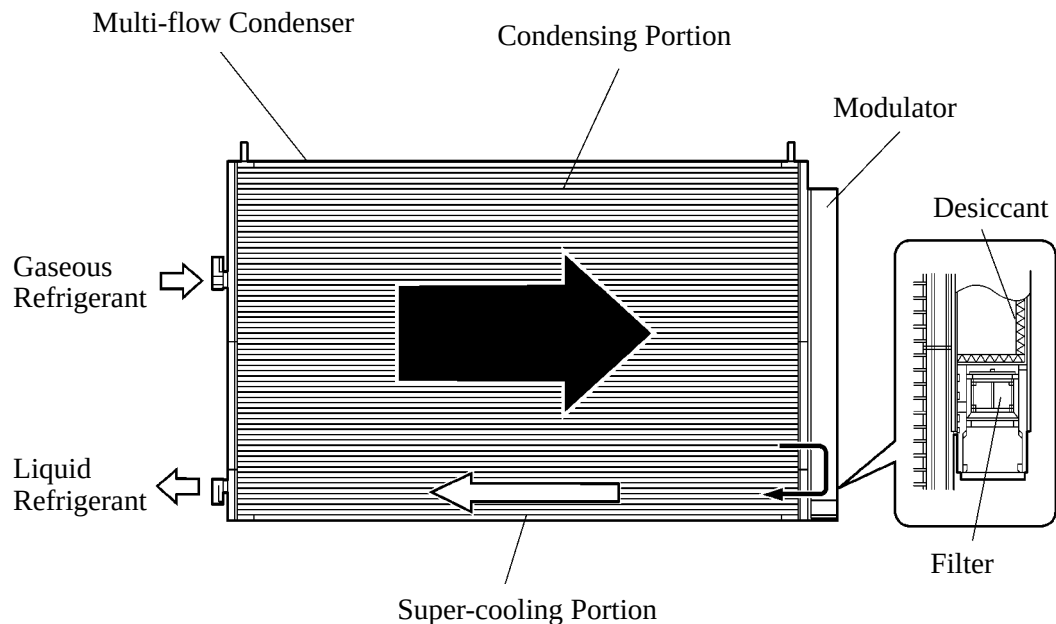
3. Condenser

General

The '06 models use a sub-cool condenser. This is a multi-flow condenser consisting of three portions: a condensing portion, a super-cooling portion and a gas-liquid separator (modulator) all integrated together. This condenser uses a sub-cool cycle for its cooling cycle system to improve heat-exchanging efficiency.

Sub-cool Cycle

In the sub-cool cycle, after the refrigerant passes through the condensing portion of the condenser, both the liquid refrigerant and the gaseous refrigerant that could not be liquefied are cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.

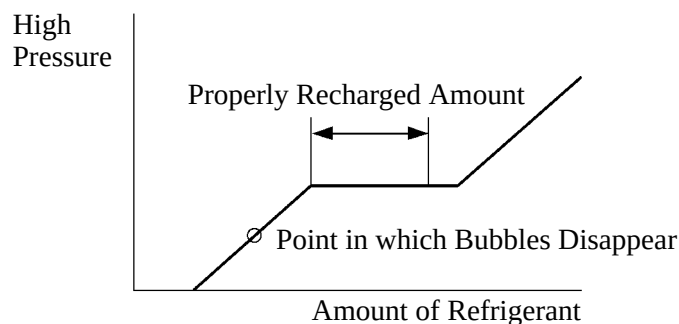


01NBE23Y

NOTE:

The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system is recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system will be affected. If the system is overcharged with refrigerant, this will also lead to a reduced performance.

For the proper method of verifying the amount of the refrigerant and to recharge the system with refrigerant, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).



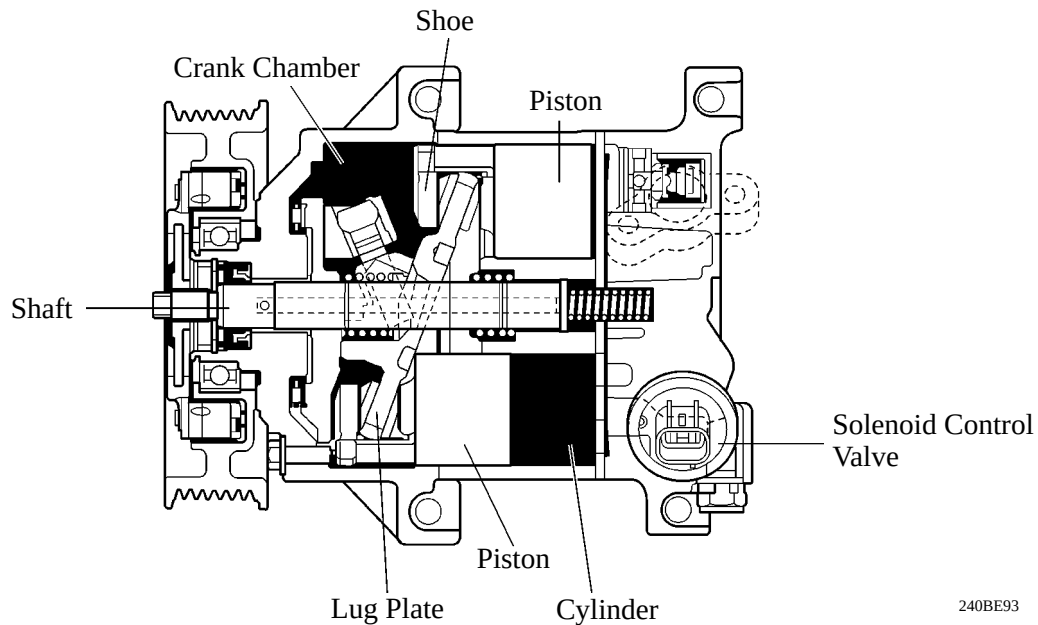
152BE40

4. A/C Compressor

General

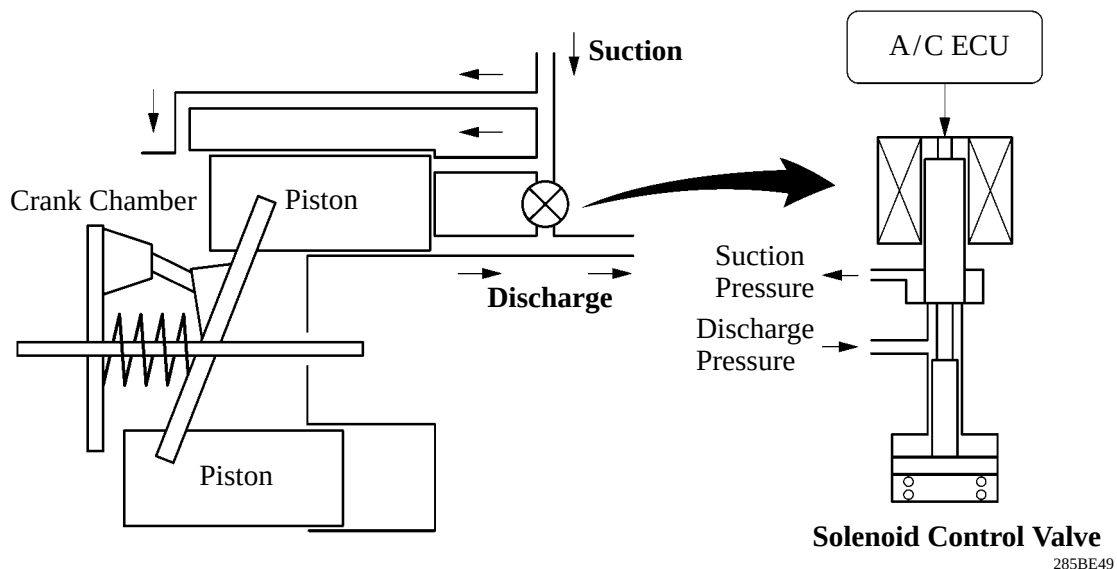
A/C compressor is continuously variable capacity type in which its capacity varies in accordance with the cooling load of the air conditioning.

- This compressor consists of the shaft, lug plate, piston, shoe, crank chamber, cylinder, and solenoid control valve.
- A solenoid control valve that adjusts the suction pressure so that the suction pressure can be controlled as desired is provided.
- The plastic DL (Damper Limiter) type A/C pulley is used.

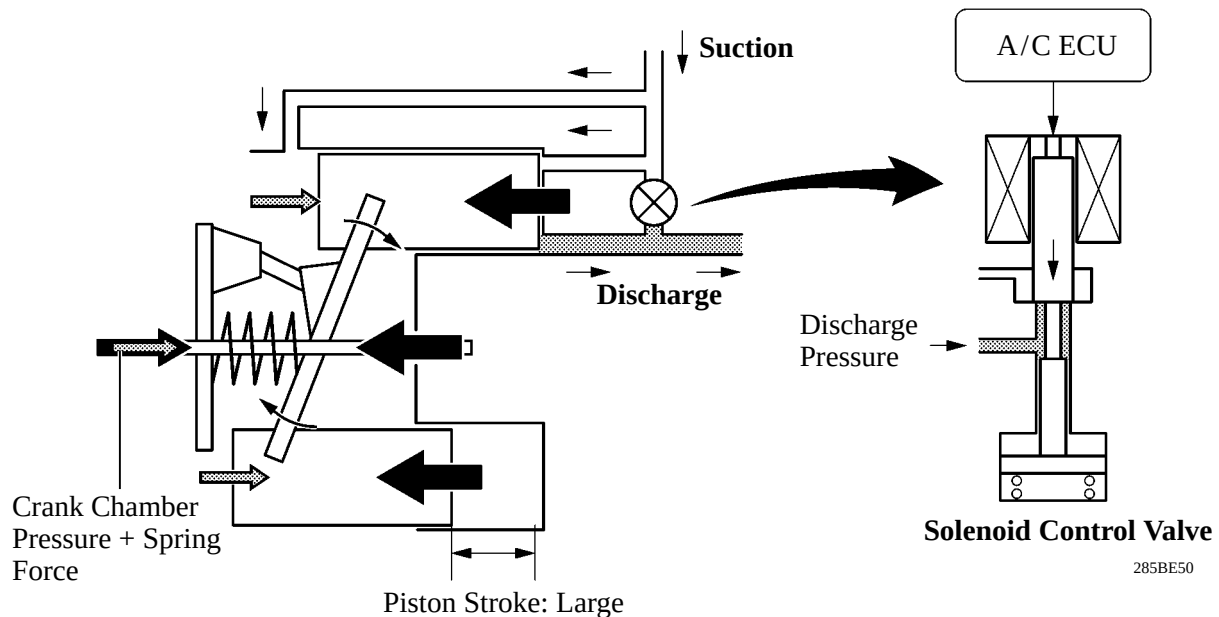


Operation

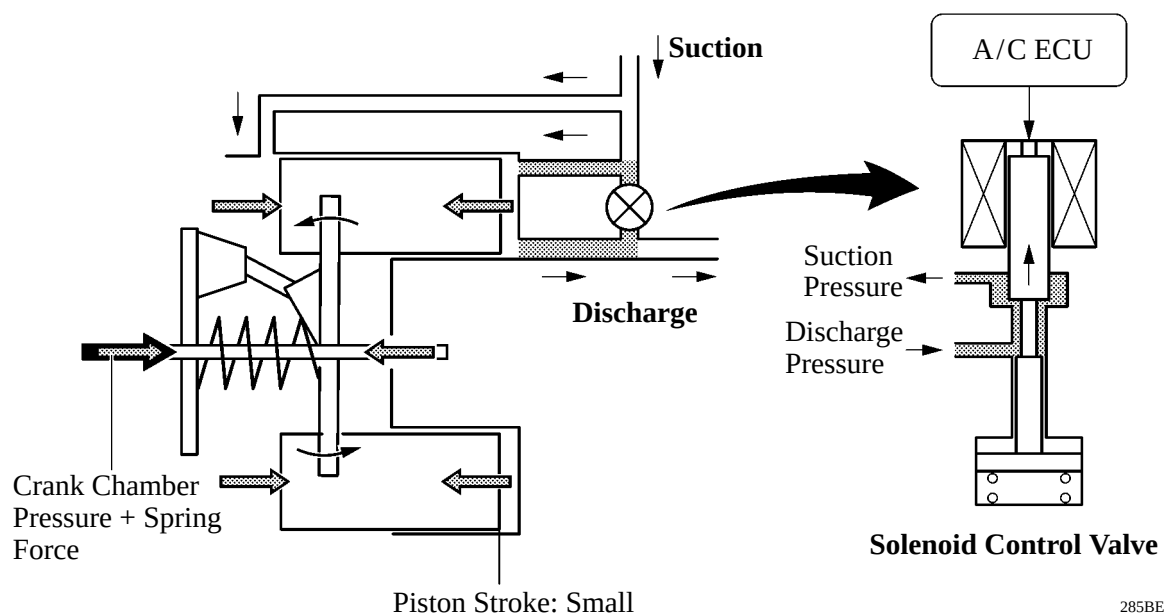
- The crank chamber is connected to the suction passage. A solenoid control valve is provided between the suction passage (low pressure) and the discharge passage (high pressure).
- The solenoid control valve operates under duty cycle control in accordance with the signals from the A/C ECU.



- When the solenoid control valve closes (solenoid coil is energized), a difference in pressure is created and the pressure in the crank chamber decreases. Then, the pressure that is applied to the right side of the piston becomes greater than the pressure that is applied to the left side of the piston. This compresses the spring and tilts the lug plate. As a result, the piston stroke increases and the discharge capacity increases.

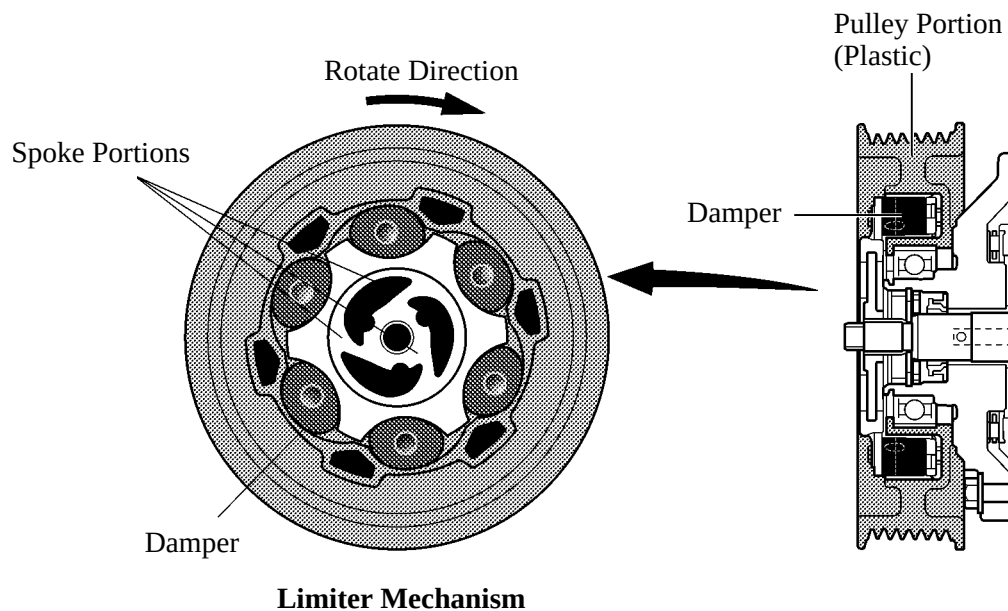


- When the solenoid control valve opens (solenoid coil is not energized), the difference in pressure disappears. Then, the pressure that is applied to the left side of the piston becomes the same as the pressure that is applied to the right side of the piston. Thus, the spring elongates and eliminates the tilt of the lag plate. As a result, there is no piston stroke and the discharge capacity decreases.



Plastic DL Type A/C Pulley

This pulley contains a damper to absorb the torque fluctuations of the engine and a limiter mechanism to protect the drive belt in case the compressor locks. In the event that the compressor locks, the limiter mechanism causes the spoke portion of the pulley to break, thus separating the pulley from the compressor. To reduce weight, the pulley portion is made of plastic.



240BE92

■ AIR CONDITIONING CONTROL

1. Air Conditioning ECU

The air conditioning ECU has following controls.

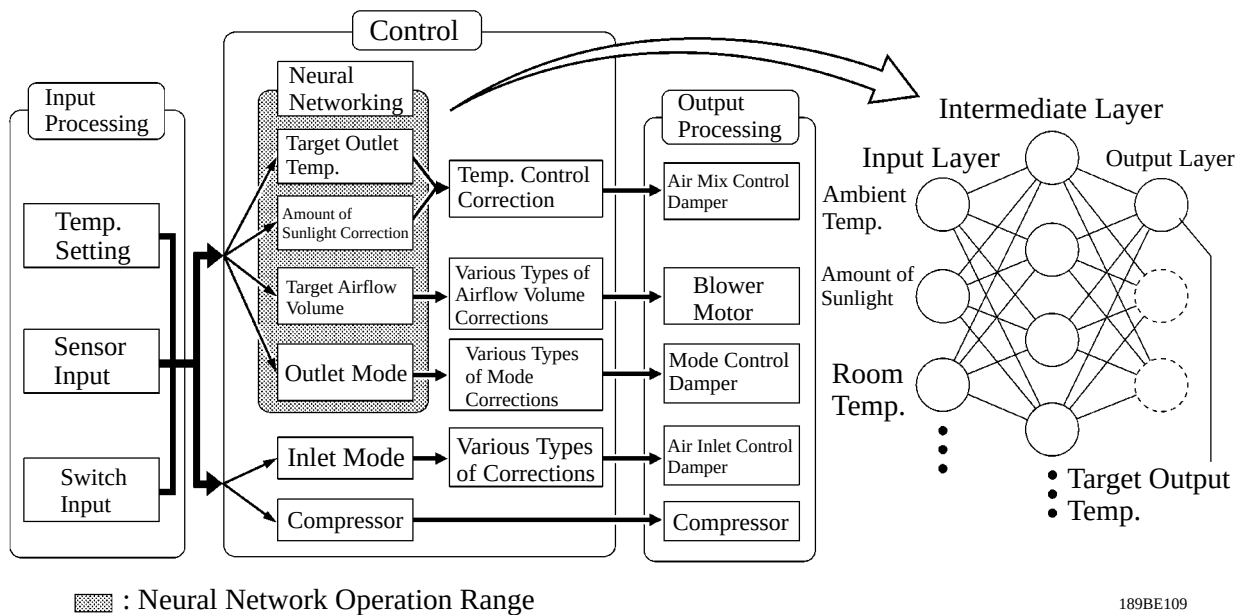
Control	Outline	Automatic	Manual
Neural Network Control [See next page]	This control is capable of effecting complex control by artificially simulating the information processing method of the nervous system of living organisms in order to establish a complex input/output relationship that is similar to a human brain.	○	—
Outlet Air Temperature Control	In compliance with the temperature setting at the temperature control switch, the neural network control calculates the outlet temperature based on the input signals from various sensors. In addition, corrections in accordance with the signals from the evaporative temperature sensor and the water temperature sensor are added to control the outlet air temperature.	○	—
Blower Control	Controls the blower motor in accordance with the airflow volume that has been calculated by the neural network control based on the input signals from various sensors.	○	—
Air Outlet Control	Automatically switches the outlets in accordance with the outlet mode ratio that has been calculated by the neural network control based on the input signals from various sensors.	○	—
Air Inlet Control	Automatically controls the air inlet control damper in accordance with the airflow volume that has been calculated by the neural network control.	○	—
Variable Capacity Compressor Control	Controls the compressor to turn ON/OFF and the discharge capacity based on the signals from various sensors.	○	○
Outer Temperature Indication Control	Based on the signals from the ambient temperature sensor, this control calculates the outside temperature, which is then corrected in the air conditioning ECU, and shown in the multi-information display in the combination meter and air conditioning panel.	○	—
Rear Window Defogger Control	Switches the rear defogger on for 15 minutes when the rear defogger switch is switched on. Switches it off if the switch is pressed while it is operating.	○	—
Micro Dust and Pollen Filter Control [See page BE-37]	Quickly removes pollen from the face areas of the driver and front passenger when the micro dust and pollen filter switch is pressed.	○	—
Self-diagnosis	Checks the sensors in accordance with operation of air conditioning switches, then clock displays a DTC (Diagnosis Trouble Code) to indicate if there is a malfunction or not (sensor check function).	○	○
	Drives the actuators through a predetermined sequence in accordance with the operation of the air conditioning switches (actuator check function).	○	—

2. Neural Network Control

- In the previous automatic air conditioning system, the ECU determined the required outlet air temperature and blower air volume in accordance with the calculation formula that has been obtained based on information received from the sensors.

However, because the sensors of a person are rather complex, a given temperature is sensed differently, depending on the environment in which the person is situated. For example, a given amount of solar radiation can feel comfortably warm in a cold climate, but extremely uncomfortable in a hot climate. Therefore, as a technique for effecting a higher level of control, a neural network is used in the automatic air conditioning system. With this technique, the data that has been collected under varying environmental conditions is stored in the ECU, which effects control to provide enhanced air conditioning comfort.

- The neural network control consists of neurons in the input layer, intermediate layer, and output layer. The input layer neurons process the input data of the outside temperature, the amount of sunlight, and the room temperature based on the outputs of the switches and sensors, and output them to the intermediate layer neurons. Based on this data, the intermediate layer neurons adjust the strength of the links among the neurons. The sum of these is then calculated by the output layer neurons in the form of the required outlet temperature, solar correction, target airflow volume, and outlet mode control volume. Accordingly, air conditioning ECU controls the servomotors and blower motor in accordance with the control volumes that have been calculated by the neural network control.

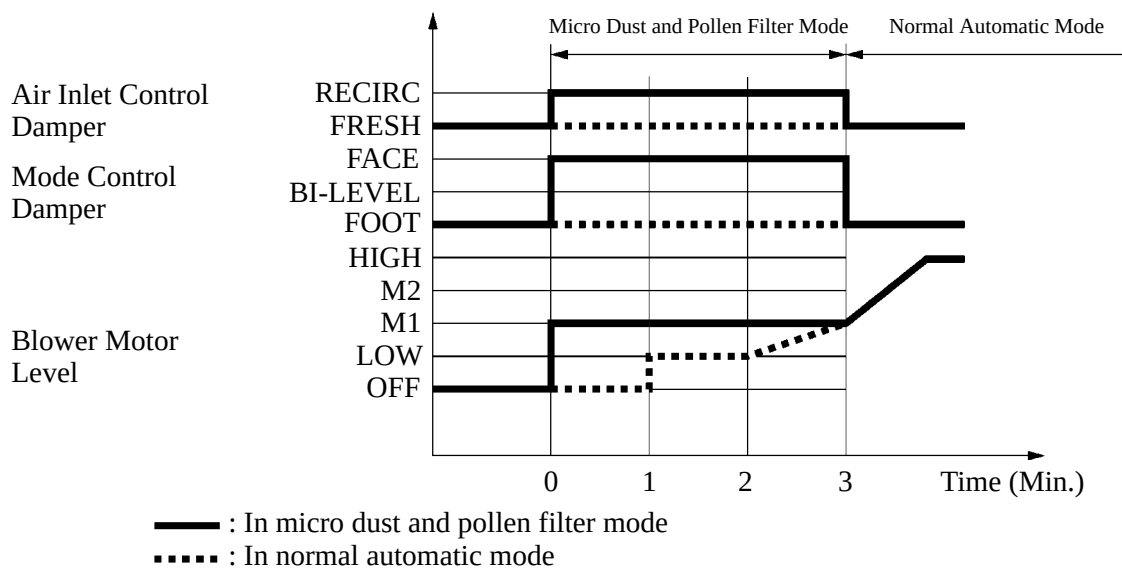


3. Micro Dust and Pollen Filter Control

Operation

- When the micro dust and pollen filter switch is pressed, the air conditioning ECU changes to the recirculation mode and face mode. This allows the air conditioning to direct clean air, which has passed through the clean air filter, to the face areas. Thus, the air conditioning removes pollen and captures it in the clean air filter.
- From the micro dust and pollen filter control, the air conditioning automatically resumes normal automatic mode control after 3 minutes at normal temperatures, or after 1 minute when the outside temperature is low (5°C maximum).

► Example of Operation in Warm-up ◀



01NBE02Y

4. Self-diagnosis

The air conditioning ECU has a self-diagnosis function. It stores any operation failures in the air conditioning system memory in the form of DTC (Diagnostic Trouble Code).

For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

AIR CONDITIONING

■ DESCRIPTION

The '06 models have an air conditioning system with the following equipments.

●: Standard —: Not Available

Destination		U.S.A./CANADA	
Grade		Standard/Sport	Limited
Air Conditioning	Manual	●	—
	Automatic	—	●
Heater	Standard	●	●

- On the Limited grade, the automatic air conditioning has right-left independent control and micro dust and pollen filter function as standard equipment.
- The partial recirculation system and rear footwell register duct are provided on all models, achieving a faster heating effect in cold areas.

► Performance ◀

Heater	Heater Output	W (Kcal/h)	5200 (4471)
	Air Flow Volume	m ³ /h	330
	Power Consumption	W	190/205*
Air Conditioning	Cooling Capacity	W (Kcal/h)	5100 (4385)
	Air Flow Volume	m ³ /h	475
	Power Consumption	W	240/250*

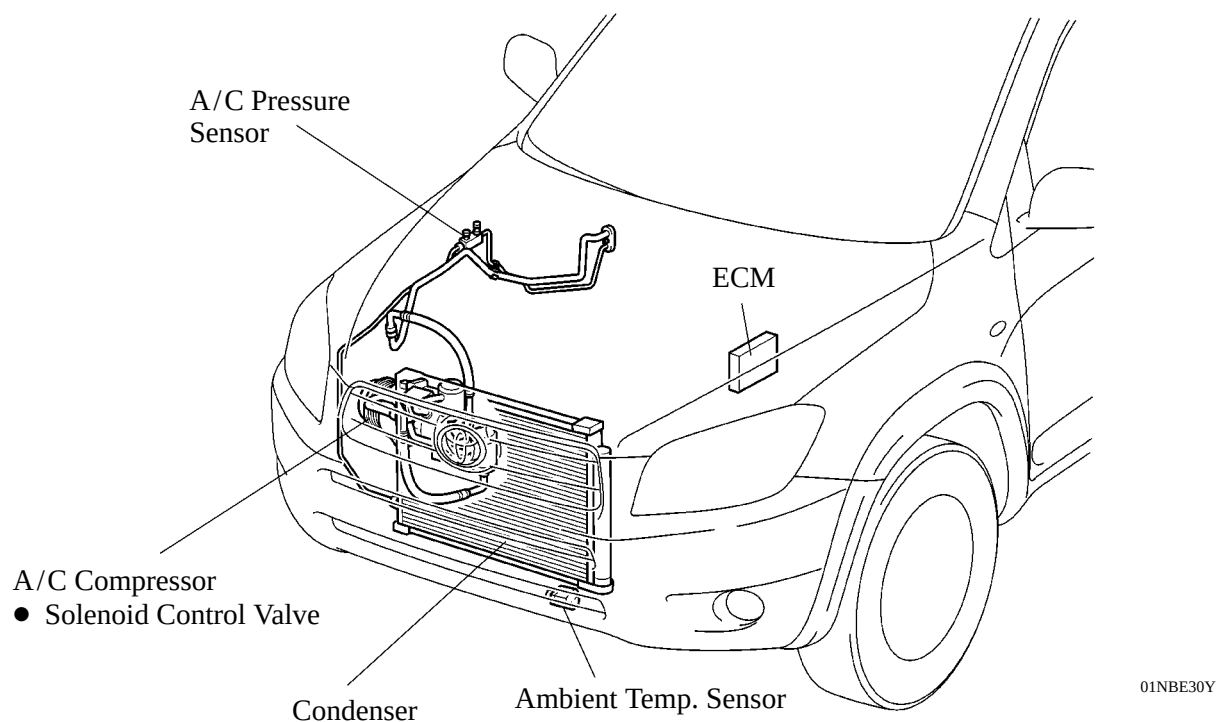
*: Only for Automatic A/C Models

► Specifications ◀

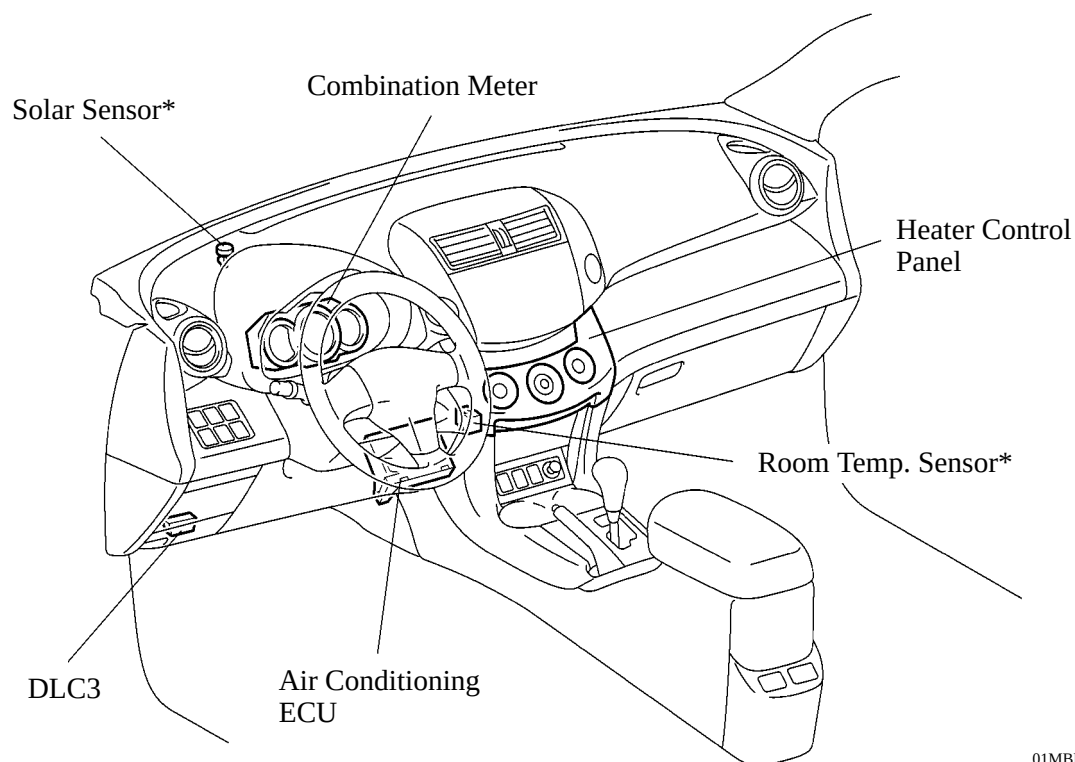
Ventilation and Heater Core	Heater Core	Type	SFA-II (Straight Flow Aluminum-II)	
		Size W x H x L mm (in.)	201.5 x 150 x 27 (7.9 x 5.9 x 1.1)	
		Fin Pitch mm (in.)	1.8 (0.07)	
	Blower	Motor Type	K70-10T/K70-9.5T* ¹	
		Fan Type	Semi Sirocco	
		Fan Size Dia. x H mm (in.)	155 x 70 (6.1 x 2.8)	
Air Conditioning	Condenser	Type	Multi-flow IV (Sub Cool)	
		Size W x H x L mm (in.)	415 x 680 x 16 (16.3 x 26.8 x 0.6)	
		Fin Pitch mm (in.)	2.75 (0.11)	
	Evaporator	Type	Revolutionary & Super Slim	
		Size W x H x L mm (in.)	241 x 226.1 x 38 (9.5 x 8.9 x 1.5)	
		Fin Pitch mm (in.)	3.0 (0.12)	
	Compressor	Type	5SE12	
		Pulley	Plastic DL (without Magnetic Clutch)	
	Refrigerant	Type	R134a	
		Charge Volume g	490 ± 30/450 ± 30* ²	
Clean Air Filter			High Efficiency	
Low Heat Source Countermeasure			Partial Recirculation System	

*¹: Only for Automatic A/C Models*²: Only for 2AZ-FE Engine Models

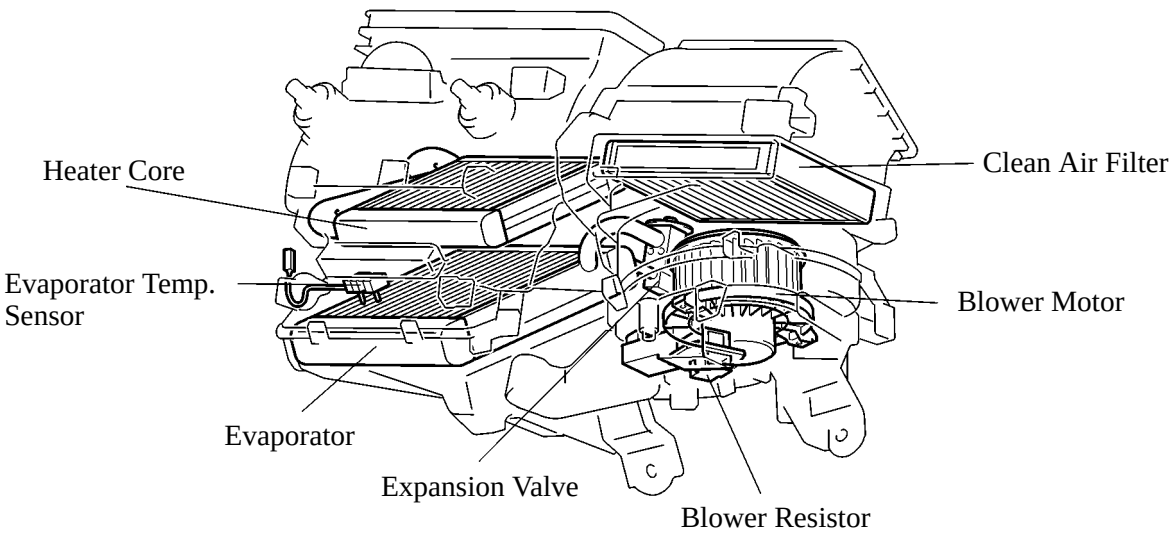
■ LAYOUT OF MAIN COMPONENTS



With Air Conditioning Models

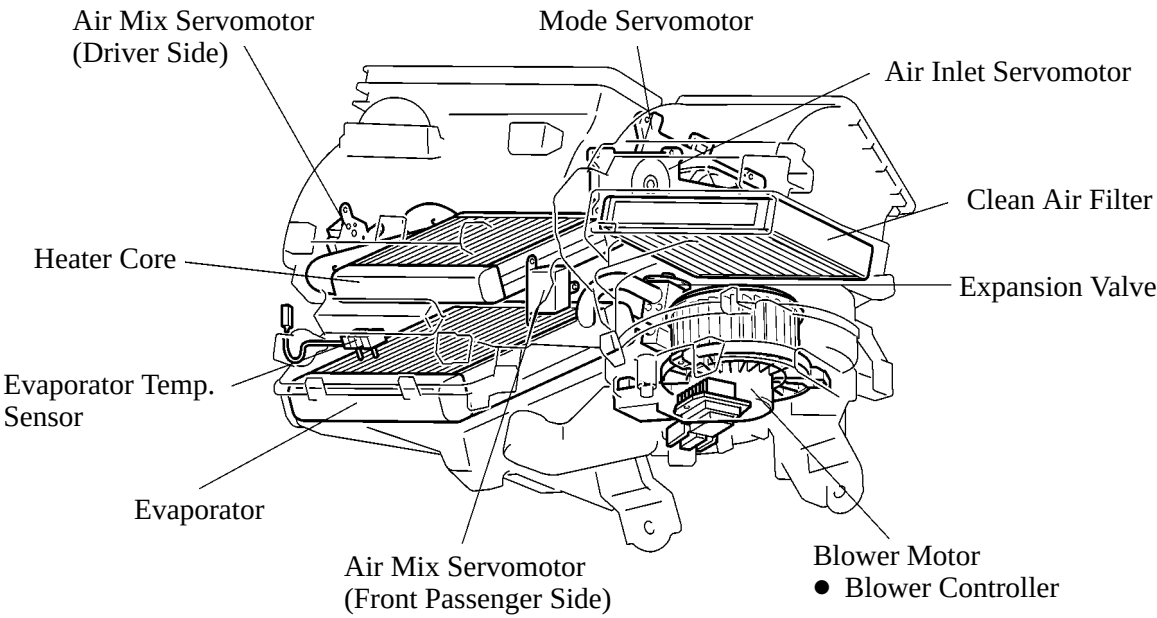


*: Only for Models with Automatic Air Conditioning



Manual Air Conditioning Models

01NBE19Y



Automatic Air Conditioning Models

01NBE20Y

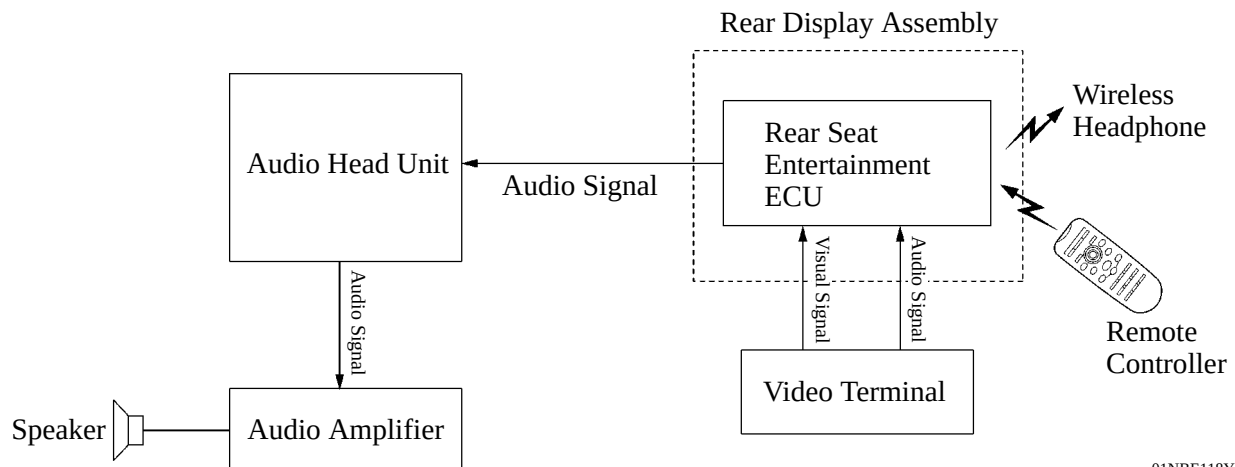
AUDIO SYSTEM

■ RSES (Rear Seat Entertainment System)

General

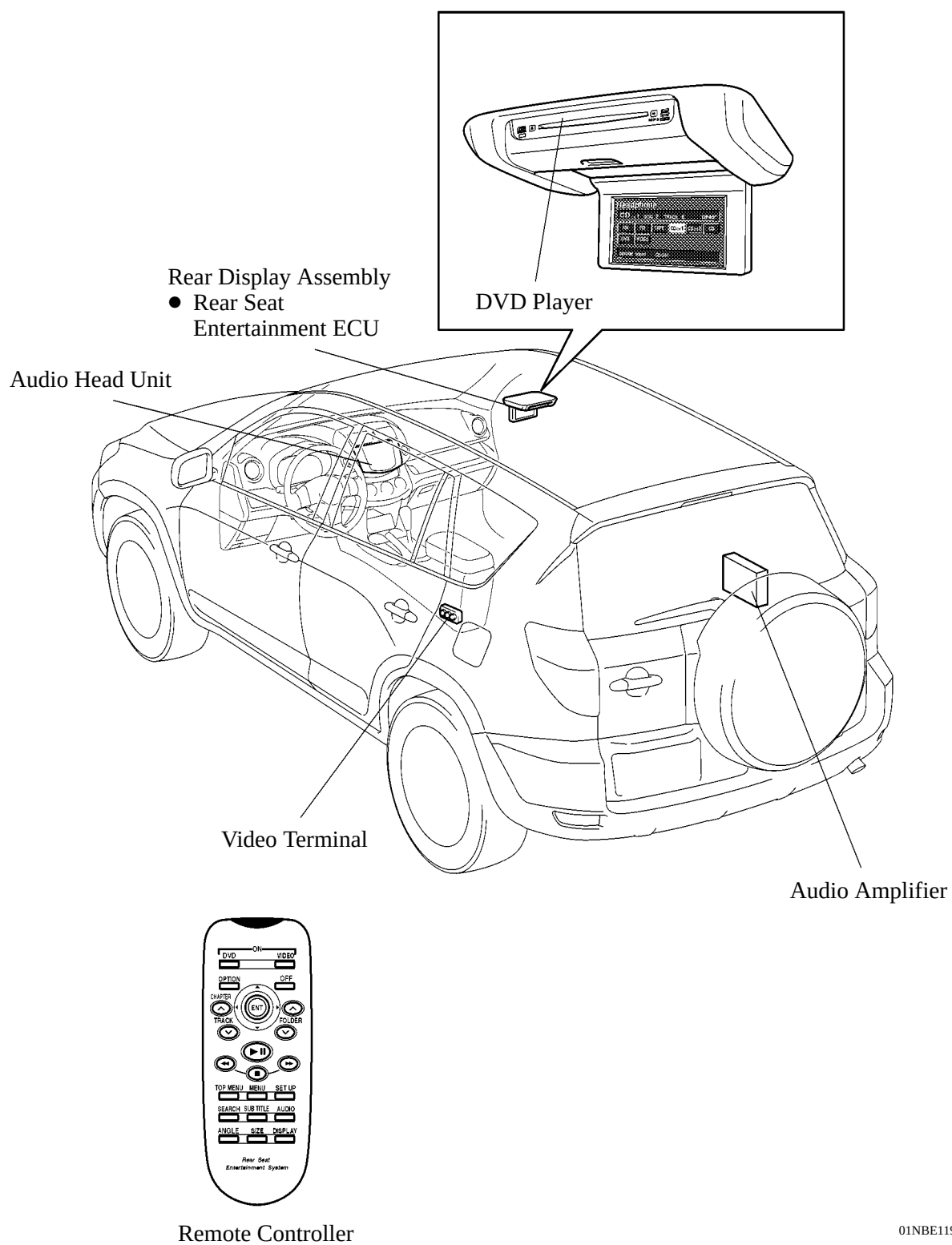
- The RSES (Rear Seat Entertainment System) is available as optional equipment on the Limited grade for U.S.A. models.
- It uses a 9-inch rear display to provide impressive video images to the rear seat occupants.
- It supports the MP3 (MPEG Audio Layer-3) system.
- The maximum opening angle of the rear display is 125°, which dramatically increases the viewing range in the downward direction.
- The rear display can be set at any position. Thus, the users can set the rear display to a position that gives them the best view.
- When the RSES is on, and the ignition switch is turned OFF, the RSES will also turn off. When the ignition switch is turned back ON, the RSES will automatically turn on. At this time, the RSES can resume playing the video image from the point the ignition switch was turned OFF.
- A child lock function is provided to disable the operation of the RSES through the remote controller. This function is activated by turning on the RSE LOCK at the audio head unit.
- The rear seat entertainment ECU is built into the rear display assembly.
- The RSES can be operated only through the remote controller.
- The RSES is controlled by the rear seat entertainment ECU.

System Diagram



01NBE118Y

Layout of Main Components



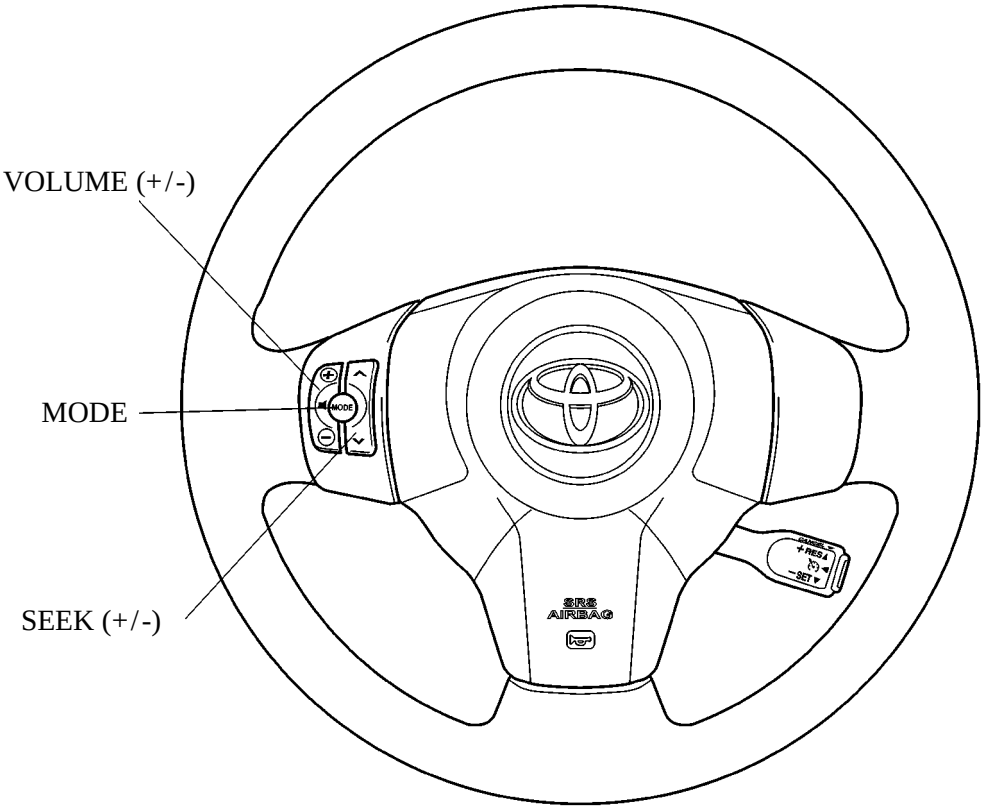
Function of Main Components

Component	Function
Rear Display Assembly	● Displays DVD and video images. ● Receives signals from the remote controller. ● Outputs audio signals to the wireless headphones in the form of infrared signals. ● Controls the distribution of the audio-visual mode to the front (audio head unit) and rear (RSES). ● Processes visual and audio signals from the DVD player and video player, and outputs them to the rear display assembly and headphone terminals. ● Displays the audio-visual control screen. ● Displays the adjustment screen. ● Displays the diagnosis screen. ● The diagnosis screen appears when the diagnosis mode is started on the audio head unit. For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).
Audio Head Unit	● Outputs audio signals to the audio amplifier. ● Outputs a request to the rear display assembly to start the diagnosis mode.
Remote Controller	Outputs various control signals of the RSES to the rear display assembly in the form of infrared signals.
Wireless Headphone	● Receives the audio signals from the rear display assembly in the form of infrared signals. ● Volume adjustment of the wireless headphone can be done by using the volume switch equipped on the wireless headphone.
Video Terminal	This terminal is for connecting the video player's video and audio output terminals.

■ STEERING PAD SWITCH

- A steering wheel with steering pad switches is standard equipment on the Limited grade and optional equipment on the Sport grade. The switches used frequently are located on the steering pad for easy use.
- Listed below are the other main functions of the steering pad switch.

Function			Short Push	Long Push
Steering Pad Switch	VOLUME (+/-)		Volume up/down	Continuous vol. up/down
	SEEK (+/-)	AM/ FM	Channel up/down	Seek up/down
		CD	Track up/down	Disc up/down
	MODE		Switching AM/FM, CD	OFF



METER

■ COMBINATION METER

1. General

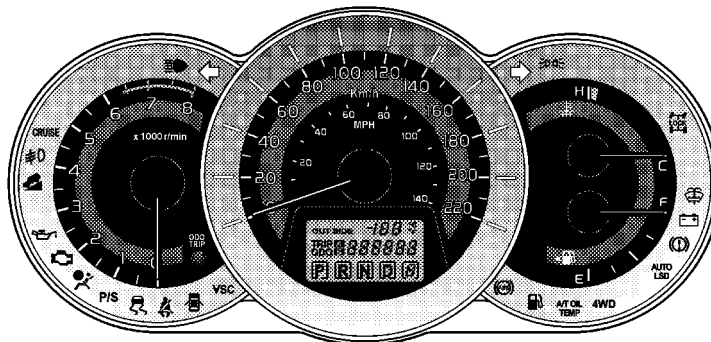
The combination meter in the '06 models has the following features:

- The Optitron display type combination meter is used.
- The Optitron display type combination meter realizes excellent visibility through the use of smoke acrylic in the protective panel, and LEDs (Light Emitting Diodes) that are very bright and have high contrast for illuminating the indicator and dial.
- The step-motor is used to actuate the indicator of the speedometer, the tachometer, the fuel gauge and the water temperature gauge.
- LCDs (Liquid Crystal Displays) are used for the odometer, trip meter, and shift position indicator light.
- A meter ECU and multi buzzer are enclosed in the combination meter. This ECU maintains communication with other ECUs through the CAN (Controller Area Network).
- An oil replacement reminder light has been established in the combination meter, which will light or flash to remind the driver to change the engine oil. (Only for the U.S.A. models)



U.S.A. Model

01MMO15Y



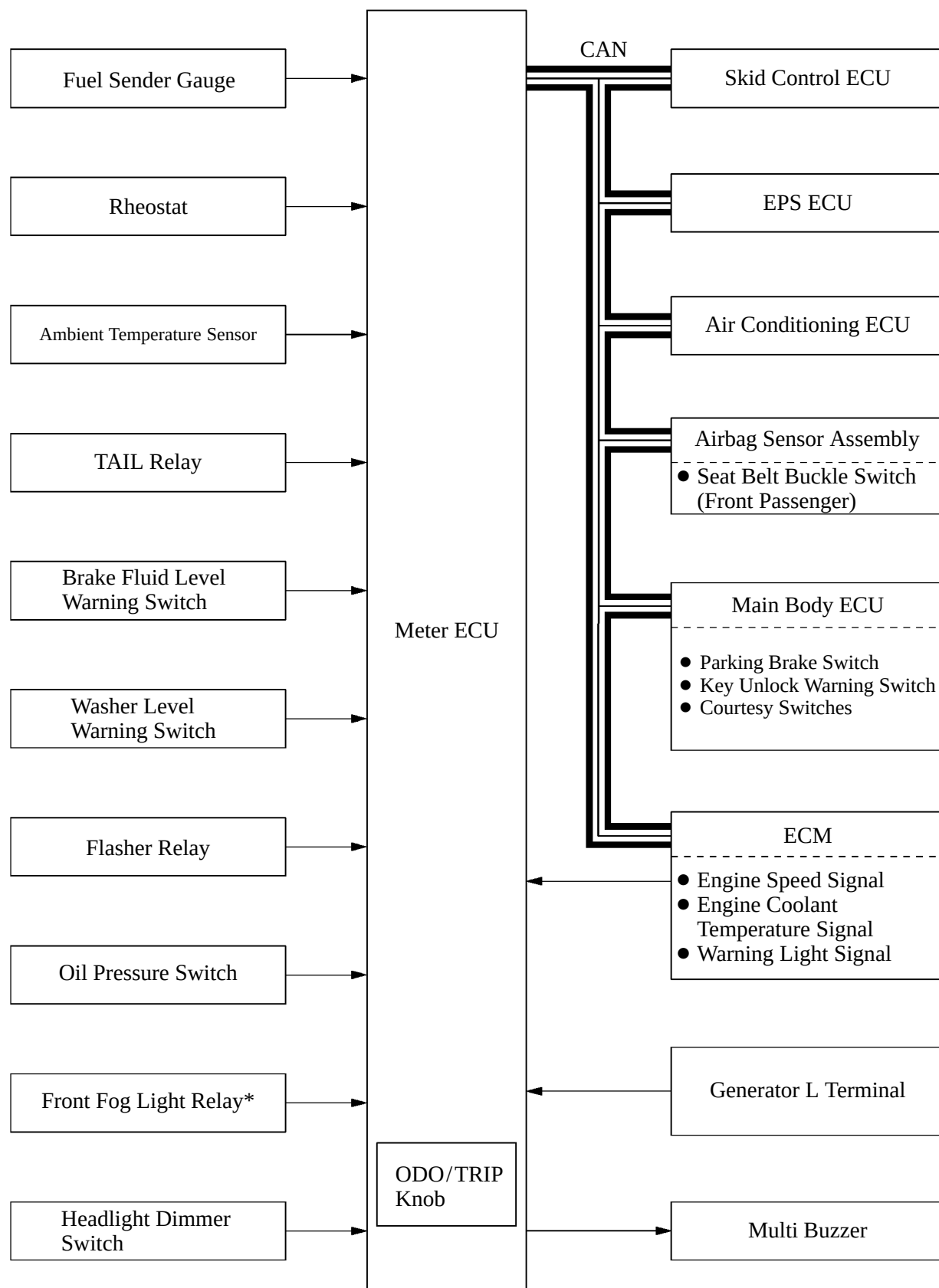
CANADA Model

00MBE27Y

Service Tip

If the LEDs have a malfunction, it must be replaced as a combination meter assembly. Refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

2. System Diagram

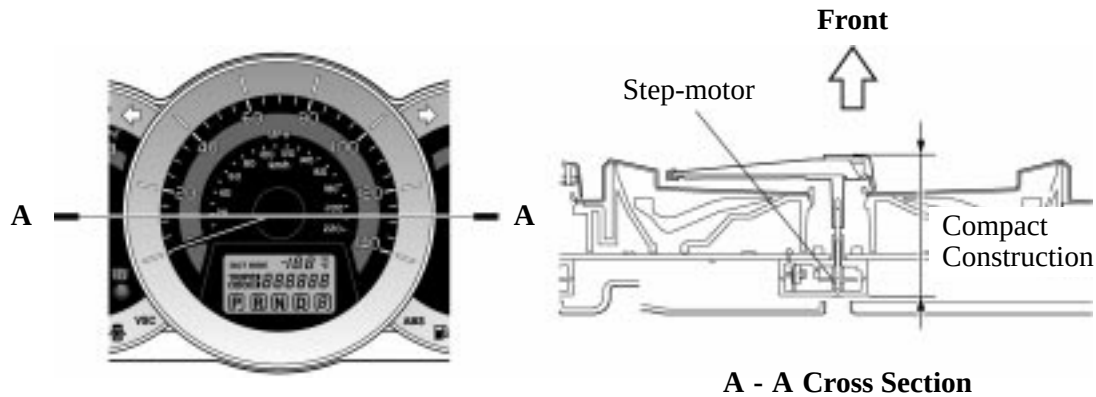


*: Models with Front Fog Light

01MBE04Y

3. Construction

- The step-motor is used to actuate the indicator of the speedometer, the tachometer, the fuel gauge and the water temperature gauge.
- This has resulted in a thinner pointer movement, thus achieving a lightweight and compact construction.
- In the step-motor type, when the power to the combination meter is turned on through the reconnection of the battery terminal, the step-motor initializes once to recognize the zero point of the indicator in relation to the step-motor. However, if the ignition switch is turned ON after 60 seconds or more have elapsed after the initialization, the step-motor initializes again.



4. Oil Replacement Reminder Light (U.S.A. Models)

- An oil replacement reminder light will illuminate or flash to remind the driver to change the engine oil depending on the vehicle driving distance.
- Illuminating and flashing of the oil replacement reminder light are operated based on the accumulated vehicle driving distance memorized in the combination meter (meter ECU).
- The meter ECU calculates the vehicle driving distance based on the signals from the skid control ECU.
- This light has a bulb check function and an oil replacement reminder function.
- When turning the ignition switch ON, the meter ECU will turn on the oil replacement reminder light for 3 seconds for the bulb check.
- When the accumulated vehicle driving distance memorized in the meter ECU exceeds 4500 miles (7200 km) after being reset, the meter ECU will flash the oil replacement reminder light for 15 seconds after the bulb check and remind the driver that the engine oil needs to be changed shortly.
- When the accumulated vehicle driving distance memorized in the meter ECU exceeds 5000 miles (8000 km) after being reset, the meter ECU will keep the oil replacement reminder light on immediately and remind the driver to change the engine oil.



01MBE24Y

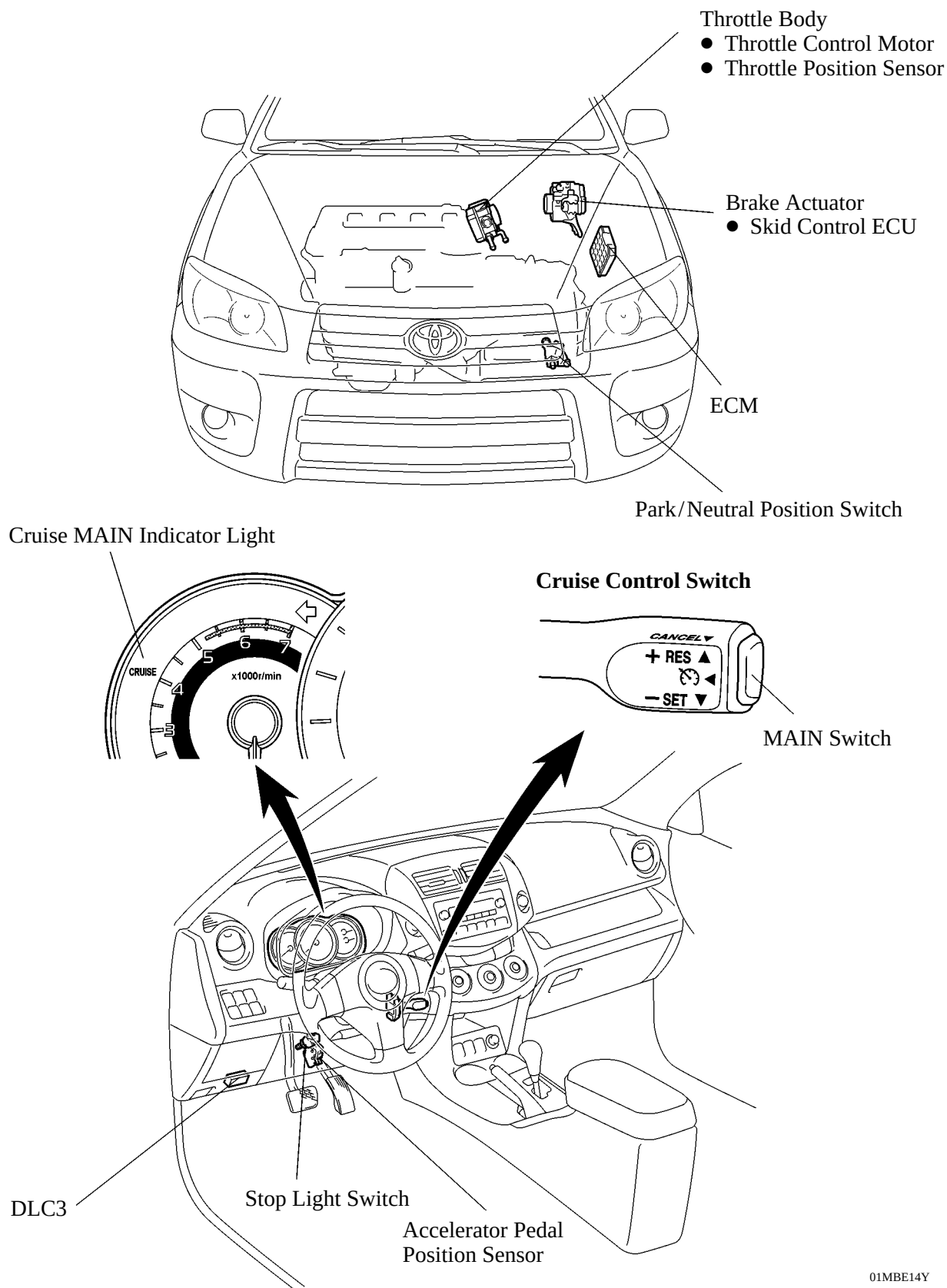
Oil Replacement
Reminder Light

Service Tip

The accumulated vehicle driving distance memorized in the meter ECU can be reset by the following procedures.

- 1) Turn the ignition switch ON and make sure that the odo/trip display screen is in the Trip A mode.
- 2) Turn the ignition switch OFF. Then, while pressing the ODO/TRIP knob, turn the ignition switch ON again. (Note: hold down the knob throughout the entire reset procedure.)
- 3) The odometer indicates “000000” and then the oil replacement reminder light goes off.
- 4) When the light goes off, release the ODO/TRIP knob. The mode should change to Trip A.
- 5) Turn the ignition switch OFF. Turn the ignition switch ON again and confirm that the oil replacement reminder light goes on for 3 seconds and then goes off.
- 6) This completes the reset procedure.

■ LAYOUT OF MAIN COMPONENTS



CRUISE CONTROL SYSTEM

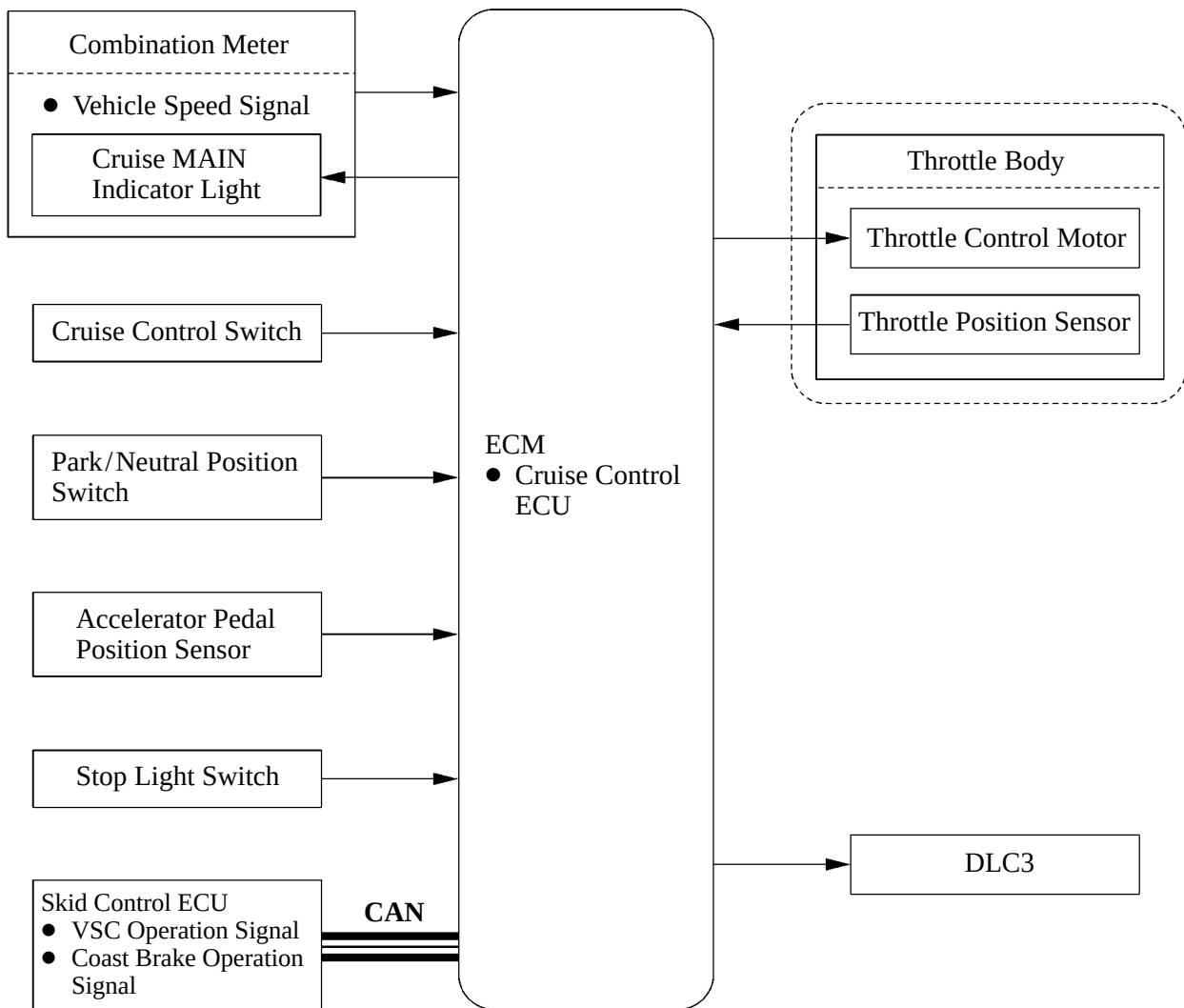
■ DESCRIPTION

Once the system is set to a desired vehicle speed, the throttle valve position is adjusted automatically to maintain the vehicle speed without depressing the accelerator pedal.

- This system effects control through the ETCS-i system.
- The cruise control ECU is integrated in the ECM.

The cruise control system with coast brake function is standard equipment on all the '06 models.

► System Diagram ◄



■ SYSTEM CONTROL

1. General

The cruise control system has the following functions:

Function	Outline
Constant Speed Control	The ECM compares the actual vehicle speed and the set speed. If the vehicle speed is higher than the set speed, the ECM activates the throttle control motor in the throttle closing direction. If the vehicle speed is lower than the set speed, the ECM activates the throttle motor in the throttle opening direction.
Set Control	When the MAIN switch is turned on and the cruise control switch is pressed to the SET/-side and released, the engine ECU stores the vehicle speed in the memory and continues to control the vehicle at that speed.
Coast Control	When the cruise control switch is kept pushed to the SET/-side while running in the cruise control mode, the throttle control motor is energized in the throttle closing direction, and the vehicle keeps decelerating. The ECM stores the vehicle speed when the cruise control switch is released. From then on, the ECM controls the vehicle speed at that speed constantly.
Coast Brake	In addition to the abovementioned coast control, the skid control ECU applies slight braking of approximately 0.1G upon receiving a deceleration request from the ECM, in order to quickly decelerate the vehicle to the set speed.
Tap-down Control	When the difference between the actual vehicle speed and the set speed is less than 5 km/h (3 mph), the set speed can be lowered approx. 1.6 km/h (1 mph) each time by operating the SET/-switch quickly within approx. 0.6 seconds.
Accelerator Control	When the cruise control switch is kept pushed to the RES/+ side while running in the cruise control mode, the throttle control motor is energized in the throttle opening direction. The vehicle keeps accelerating and the ECM stores the vehicle speed when the cruise control switch is released. From then on, the ECM controls the vehicle speed at that speed constantly.
Tap-up Control	When the difference between the actual vehicle speed and the set speed is less than 5 km/h (3 mph), the set speed can be increased approx. 1.6 km/h (1 mph) each time by operating the RES/+ switch quickly within approx. 0.6 seconds.
Low Speed Limit Control	The low speed limit is the lowest speed that cruise control can be set and is designed at approx. 40 km/h (25 mph). The cruise control cannot be set below that speed. If the vehicle speed drops below that speed while running in the cruise control mode, the cruise control is cancelled automatically but the set speed in the memory is maintained.
High Speed Limit Control	The high speed limit is the highest speed that cruise control can be set and is designed at approx. 200 km/h (124 mph). ● The cruise control cannot be set if the vehicle speed exceeds the high speed limit. ● The vehicle will not accelerate when the RES/+ switch is operated if the vehicle speed exceeds the high speed limit.
Manual Cancel Control	If any of the following signals is sent to the ECM while the vehicle is running in the cruise control mode, the cruise control mode is cancelled accordingly. ● Stop light switch ON signal (Depress the brake pedal) ● CANCEL switch ON signal ● MAIN switch OFF signal

(Continued)

Function	Outline
Resume Control	After the cruise control mode is cancelled by any of the cancel switches, the mode can be resumed and controlled at the set speed by operating the cruise control switch in the RES/+ direction when the vehicle speed returns above the low speed limit [approx. 40 km/h (25 mph)].
Automatic Transmission Control	When the vehicle is cruising uphill, there is a case where the overdrive function turns off depending on the ECT (Electronic Control Transmission) control. After that the ECM judges the end of cruising up from the throttle valve angle, the overdrive function will turn on again. There is a case where the overdrive function turns off during ACC or RES switch control.
Automatic Cancel Control	When any of the following conditions occurs during cruise control driving, the set speed in the memory is cleared to cancel the cruise control mode. Furthermore, the cruise MAIN indicator light blinks until the MAIN switch is turned off, and the operation of the cruise control is disabled until the MAIN switch is turned on again. ● Stop light switch open or short circuit. ● The vehicle speed signal abnormal. ● ETCS-i malfunction. ● VSC malfunction ● VSC communication malfunction
	When any of the following conditions occurs during the cruise control driving, the set speed in the memory is cleared to cancel the cruise control mode. Furthermore, the cruise MAIN indicator light blinks until the MAIN switch is turned off, and the operation of the cruise control is disabled until the ignition switch is turned off again. ● Stop light switch input signal abnormal ● Cancel circuit malfunction
	When any of the following conditions occurs during the cruise control driving, the cruise control mode is cancelled. Cruise control can be resumed at the set speed by operating the SET or RESUME switch providing that the vehicle speed is above the lower speed limit [approx. 40 km/h (25 mph)]. ● The vehicle speed falls below the low speed limit [approx. 40 km/h (25 mph)]. (The set speed in the memory is maintained.) ● The vehicle speed drops more than 16 km/h (10 mph) below the set speed as uphill driving. (The set speed in the memory is cleared.)
Other Cancellation Items	While the vehicle is being driven under cruise control, cruise control will be canceled if the VSC is activated. (The set speed in the memory is maintained.)

2. Diagnosis

If a malfunction occurs in the cruise control system during cruise control, the ECM actuates the automatic cancel control and blinks the cruise MAIN indicator light to inform the driver of a malfunction. At this time, the ECM memorizes the malfunction in the form of 5-digit and 2-digit DTCs (Diagnostic Trouble Codes).

- The 5-digit DTCs can be read by connecting a hand-held tester to the DLC3.
- The 2-digit DTCs are output to the cruise MAIN indicator light when the TC and CG terminals of the DLC3 are connected through the use of the SST (09843-18040). Thus, these DTCs can be obtained by counting the number of blinks of the cruise MAIN indicator light.

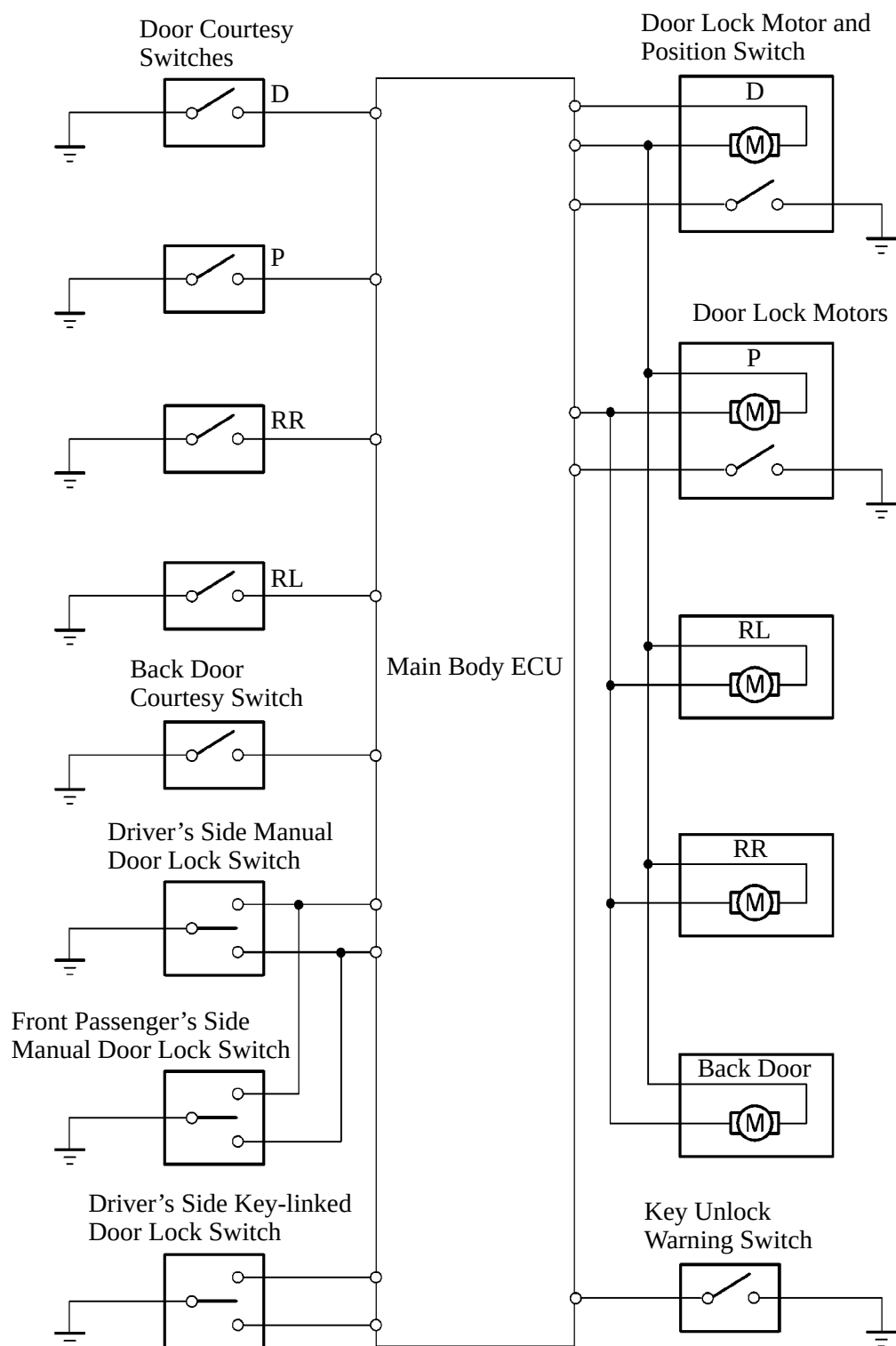
DOOR LOCK CONTROL SYSTEM

■ DESCRIPTION

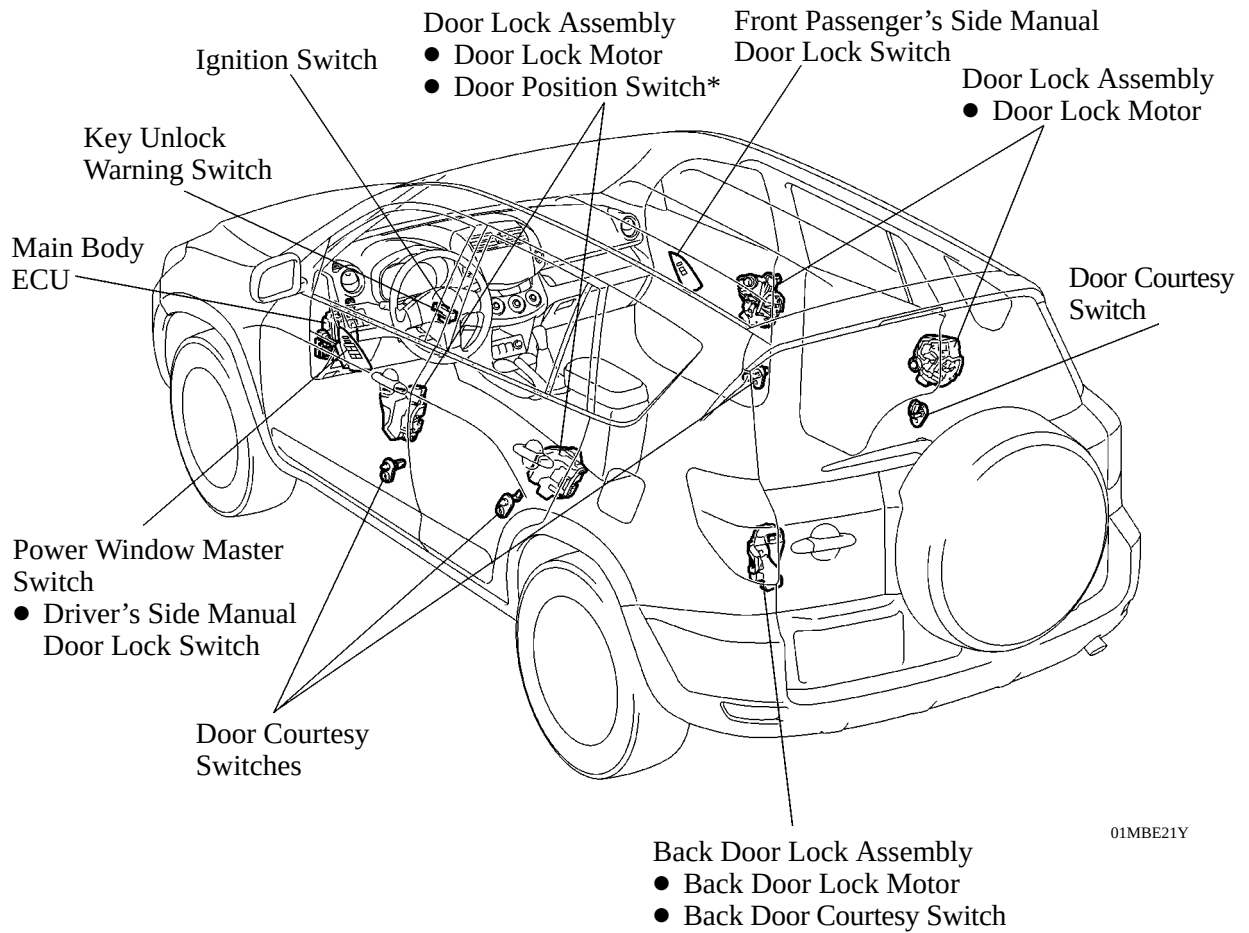
- The door lock control system is provided as standard equipment on all models.
- This system is controlled by the main body ECU. The main body ECU outputs signals to the respective door lock motors.
- The door lock system in the '06 model has the following functions:

Function	Outline
Manual Lock and Unlock	This function can lock or unlock all doors by the door lock control switch operation.
Key-linked Lock and Unlock Function	This function which is linked with the key cylinder can lock or unlock all the doors when a lock or unlock operation is effected.
Key Confine Prevention Function	When the key is inserted in the ignition key cylinder with the driver's and front passenger's door open and if you perform the door lock operation, all the doors will be unlocked.
2-step Unlock Function	This function is provided to unlock the driver's door by turning the key cylinder first and to unlock remaining doors by the door turning it the second time.
Door Lock with Transmitter Function (see page BE-48)	Pressing the door lock button of the transmitter locks all doors.
Door Unlock with Transmitter Function (see page BE-48)	Pressing the door unlock button of the transmitter unlocks all doors.
Customized Body Electronics	For details, see page BE-7

► System Diagram ◀



■ LAYOUT OF MAIN COMPONENTS



01MBE21Y

*: Only for Driver's Side

ENGINE IMMOBILIZER SYSTEM

■ DESCRIPTION

The engine immobilizer system compares the ID code that is registered in the transponder key ECU with the ID code of the transponder chip that is embedded in the ignition key. The system unsets if these ID codes match. Thus, the transponder key ECU and ECM communicate with each other to authorize fuel injection and ignition, enabling the engine to start.

The system is standard equipment on the Canada models and the Limited grade for the U.S.A. models.

Service Tip

When replacing the transponder key ECU or adding a new ignition key, the key's recognition code must be registered.

- When the transponder key ECU has been replaced, the hand-held tester is necessary for the key registration. At this time, the total number of keys that can be registered is three (master key: two, sub key: one).
- The recognition codes of additional keys must be registered. At this time, the total number of keys that can be registered is eight (master key: five, sub key: three).

For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

EQUIPMENT LIST

► U.S.A. ◀

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE				
Grade				—	Limited	Sport	—	Limited	Sport		
Exterior	Bumper	Colored		●	●	●	●	●	●		
		Radiator Grille	Material	●	—	●	●	—	●		
			Material Partially Plated	—	●	—	—	●	—		
	Outside Door Handle	Material		●	—	—	●	—	—		
		Colored		—	●	●	—	●	●		
	Back Door Handle	Colored		●	●	●	●	●	●		
	Outside Rear View Mirror	Material / Remote Control		●	—	—	●	—	—		
		Color / Remote Control / Heater		—	●	●	—	●	●		
	Roof Rail			OP	●	●	OP	●	●		
	Rear Spoiler			●	●	●	●	●	●		
Spats	Front & Rear			OP	●	●	●	●	●		
	Rear			●	—	—	—	—	—		
Chassis	Tire	215 / 70R16		●	—	—	—	—	—		
		225 / 65R17		OP	●	—	●	●	—		
		235 / 55R18		—	—	●	—	—	●		
	Disc Wheel	16 x 6 1/2 J Steel		●	—	—	—	—	—		
		17 x 6 1/2 J Steel		OP	—	—	●	—	—		
		17 x 7 J Aluminum		OP	●	—	OP	●	—		
		18 x 7 1/2 J Aluminum		—	—	●	—	—	●		
	Tire Pressure Warning System			●	●	●	●	●	●		
	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & VSC (Vehicle Stability Control) *1			●	●	●	●	●	●		
	Hill-start Assist Control			OP*2	OP*2	—	●	●	●		
	DAC (Downhill Assist Control)			OP*2	OP*2	—	●	●	●		
	Steering	Wheel	3-spoke Urethane	●	—	●	●	—	●		
			3-spoke Urethane with Steering Pad Switch (Audio)	—	—	OP	—	—	OP		
			3-spoke Leather with Steering Pad Switch (Audio)	—	●	—	—	●	—		
		Column	Manual Tilt & Telescopic	●	●	●	●	●	●		
	EPS (Electrical Power Steering)		●	●	●	●	●	●			
Shift Knob	PVC (Polyvinyl Chloride)		●	—	●	●	—	●			
	Leather		—	●	—	—	●	—			
Body	Seat	Cover	Fabric		●	●	●	●	●	●	
			Leather		—	OP*3	—	—	OP*3	—	
		Front	Driver	6-way Manual	●	—	●	●	—	●	
				8-way Power	—	●	—	—	●	—	
			Passenger	4-way Manual	●	●	●	●	●	●	
		Rear	No. 1	60 / 40 Split Retractable*4		●	●	●	●	●	●
			No. 2			OP	OP	—	OP	OP	—
		Seat Heater			—	OP*5	—	—	OP*5	—	
	Seat Belt	Front	Driver	3-point, Pretensioner & Force Limiter	●	●	●	●	●	●	
			Passenger	3-point, Pretensioner & Force Limiter & ALR*6	●	●	●	●	●	●	
		Rear	Rear No.1	3-point ELR*7, ALR*6	●	●	●	●	●	●	
			Rear No.2		OP*2	OP*2	—	OP*2	OP*2	—	

*1: 2WD models have been provided with Automatic LSD (Limited Slip Differential).

(Continued)

*2: Only for Models with Rear No. 2 Seat

*3: Except Models with Rear No.2 Seat

*4: Models with rear No. 2 seat have been provided with walk-in function.

*5: Models with Leather Seat

*6: Automatic Locking Retractor

*7: Emergency Locking Retractor

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE			
Grade				—	Limited	Sport	—	Limited	Sport	
Body Electrical	Headlight		Halogen		●	●	●	●	●	●
	Light Auto Turn-OFF System				●	●	●	●	●	●
	Front Fog Light				—	●	●	—	●	●
	Daytime Running Lighting System				OP	OP	OP	OP	OP	OP
	Windshield Wiper		Intermittent Type		●	●	●	●	●	●
	Rear Wiper		Intermittent Type		●	●	●	●	●	●
	Audio System		Radio/CD, 6 Speakers		●	—	●	●	—	●
			Radio/In-dash CD Changer, 6 Speakers		OP	●	OP	OP	●	OP
			Radio/In-dash CD Changer, 9 Speakers		—	OP	OP	—	OP	OP
			Rear Seat Entertainment System		—	—	—	—	OP	—
	Air Conditioning		Manual Type		●	—	●	●	—	●
			Automatic Type		—	●	—	—	●	—
			Clean Air Filter		●	●	●	●	●	●
	Heater		Conventional Type		●	●	●	●	●	●
	Cruise Control System				●	●	●	●	●	●
	Illuminated Entry System		Key Illumination & Room Light & Front Personal Light		●	—	●	●	—	●
			Key Illumination & Room Light & Front Personal Light & Foot Light		—	●	—	—	●	—
	Power Window System		All Door Power Type Only for Driver's Seat: One Motion Auto Up-and-down, Jam Protection Function		●	●	●	●	●	●
	Door Lock Control		Power Door Lock Control System		●	●	●	●	●	●
			Wireless Door Lock Remote Control System		●	●	●	●	●	●
	Engine Immobilizer System				—	●	—	—	●	—
	Sliding Roof				—	OP	OP	—	OP	OP
	SRS* ⁸ Airbag System		Driver	Dual-stage	●	●	●	●	●	●
			Front Passenger	Dual-stage with Occupant Classification System	●	●	●	●	●	●
			Side & Roll Sensing Type Curtain Shield		OP	OP	OP	OP	OP	OP

*⁸: Supplemental Restraint System

► Canada ◀

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE					
Grade				—	Limited	Sport	—	Limited	Sport			
Exterior	Bumper		Colored		●	●	●	●	●	●		
	Radiator Grille		Material		●	—	●	●	—	●		
			Material Partially Plated		—	●	—	—	●	—		
	Outside Door Handle		Material		●	—	—	●	—	—		
			Colored		—	●	●	—	●	●		
	Back Door Handle		Colored		●	●	●	●	●	●		
	Outside Rear View Mirror		Color/Remote Control/Heater		●	●	●	●	●	●		
	Roof Rail			OP	●	●	OP	●	●			
	Rear Spoiler			●	●	●	●	●	●			
Spats		Front & Rear		OP	●	●	OP	●	●			
Chassis	Tire		215/70R16		●	—	—	—	—	—		
			225/65R17		OP	●	—	●	●	—		
			235/55R18		—	—	●	—	—	●		
	Disc Wheel		16 x 6 1/2 J Steel		●	—	—	—	—	—		
			17 x 6 1/2 J Steel		OP	—	—	●	—	—		
			17 x 7 J Aluminum		OP	●	—	OP	●	—		
			18 x 7 1/2 J Aluminum		—	—	●	—	—	●		
	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & VSC (Vehicle Stability Control) *1			●	●	●	●	●	●			
	Hill-start Assist Control			OP*1	OP*1	—	●	●	●			
	DAC (Downhill Assist Control)			OP*1	OP*1	—	●	●	●			
	Steering		Wheel	3-spoke Urethane		●	—	●	●	—	●	
				3-spoke Urethane with Steering Pad Switch (Audio)		—	—	OP	—	—	OP	
				3-spoke Leather with Steering Pad Switch (Audio)		—	●	—	—	●	—	
			Column	Manual Tilt &Telescopic		●	●	●	●	●	●	
			EPS (Electrical Power Steering)		●	●	●	●	●	●		
	Shift Knob		PVC (Polyvinyl Chloride)		●	—	●	●	—	●		
			Leather		—	●	—	—	●	—		
Body	Seat		Cover	Fabric		●	●	●	●	●	●	
				Leather		—	OP*2	—	—	OP*2	—	
			Front	Driver	6-way Manual		●	—	●	●	—	●
					8-way Power		—	●	—	—	●	—
				Passenger	4-way Manual		●	●	●	●	●	●
			Rear	No. 1	60/40 Split Retractable*3		●	●	●	●	●	●
				No. 2			OP	OP	—	OP	OP	—
			Seat Heater			—	OP*4	—	—	OP*4	—	
	Seat Belt		Front	Driver	3-point, Pretensioner & Force Limiter		●	●	●	●	●	●
				Passenger	3-point, Pretensioner & Force Limiter & ALR*5		●	●	●	●	●	●
			Rear	Rear No. 1	3-point ELR*6, ALR*5		●	●	●	●	●	●
				Rear No. 2			OP*1	OP*1	—	OP*1	OP*1	—

*1: Only for Models with Rear No. 2 Seat

*2: Except Models with Rear No.2 Seat

*3: Models with rear No. 2 seat have been provided with walk-in function.

*4: Models with Leather Seat

*5: Automatic Locking Retractor

*6: Emergency Locking Retractor

(Continued)

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE			
Grade				—	Limited	Sport	—	Limited	Sport	
Body Electrical	Headlight	Halogen		●	●	●	●	●	●	
	Light Auto Turn-OFF System			●	●	●	●	●	●	
	Front Fog Light			—	●	●	—	●	●	
	Daytime Running Lighting System			●	●	●	●	●	●	
	Windshield Wiper	Intermittent Type		●	●	●	●	●	●	
	Windshield Deicer			●	●	●	●	●	●	
	Rear Wiper	Intermittent Type		●	●	●	●	●	●	
	Audio System	Radio/CD, 6 Speakers		●	—	●	●	—	●	
		Radio/In-dash CD Changer, 6 Speakers		OP	●	OP	OP	●	OP	
		Radio/In-dash CD Changer, 9 Speakers		—	OP	OP	—	OP	OP	
		Rear Seat Entertainment System		—	—	—	—	OP	—	
	Air Conditioning	Manual Type		●	—	●	●	—	●	
		Automatic Type		—	●	—	—	●	—	
		Clean Air Filter		●	●	●	●	●	●	
	Heater	Conventional Type		●	●	●	●	●	●	
	Cruise Control System			●	●	●	●	●	●	
	Illuminated Entry System	Key Illumination & Room Light & Front Personal Light		●	—	●	●	—	●	
		Key Illumination & Room Light & Front Personal Light & Foot Light		—	●	—	—	●	—	
	Power Window System	All Door Power Type Only for Driver's Seat: One Motion Auto Up-and-down, Jam Protection Function		●	●	●	●	●	●	
	Door Lock Control	Power Door Lock Control System		●	●	●	●	●	●	
		Wireless Door Lock Remote Control System		●	●	●	●	●	●	
	Engine Immobilizer System			●	●	●	●	●	●	
	Sliding Roof			—	OP	OP	—	OP	OP	
	SRS* ⁷ Airbag System	Driver	Dual-stage		●	●	●	●	●	●
		Front Passenger	Dual-stage with Occupant Classification System		●	●	●	●	●	●
		Side & Roll Sensing Type Curtain Shield		OP	OP	OP	OP	OP	OP	

*⁷: Supplemental Restraint System

EQUIPMENT

Audio System

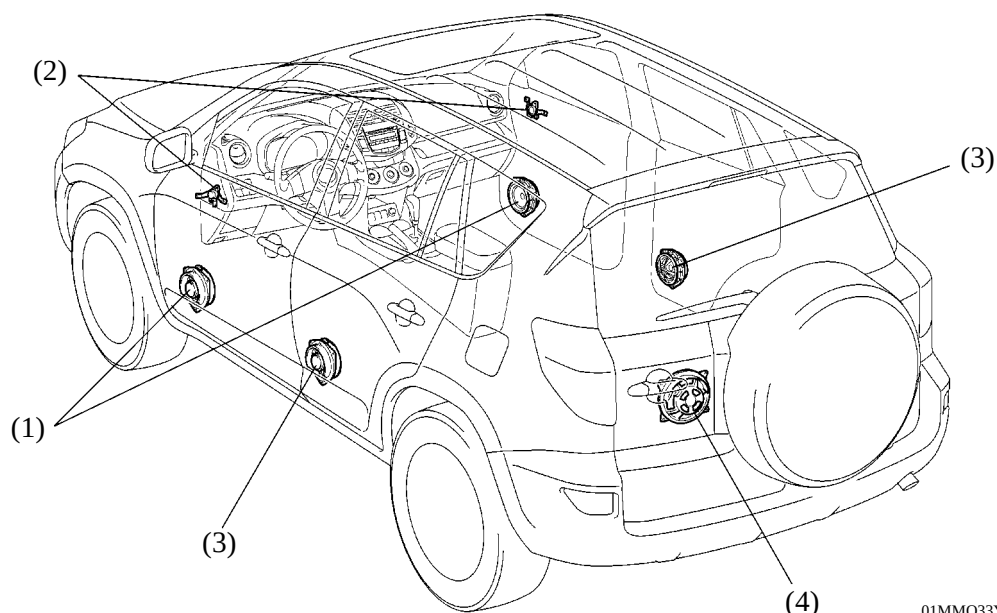
- Three types of audio systems are provided, as detailed below.
- The CD player has a CD-TEXT display function that displays the text information when playing CDs that contain CD text.
- The CD player on the all models has MP3 (MPEG Audio Layer-3) and WMA (Windows Media Audio) format playback functions.

► Head Unit Specifications ◀

●: Standard OP: Option —: None

Design	Specification	Provided		
		Standard	Limited	Sport
01MMO30Y	• AM/FM Tuner • CD Player • CD-TEXT Display Function • MP3 and WMA Playback Function • 6-speaker System • Manufacturer: Fujitsu TEN	•	—	•
01MMO31Y	• AM/FM Tuner • In-dash-6-CD Changer • CD-TEXT Display Function • MP3 and WMA Playback Function • 6-speaker System • Manufacturer: Fujitsu TEN	OP	•	OP
01MMO32Y	• AM/FM Tuner • In-dash-6-CD Changer • CD-TEXT Display Function • MP3 and WMA Playback Function • 9-speaker System • Manufacturer: Fujitsu TEN	—	OP	OP

► Speaker Location ◀



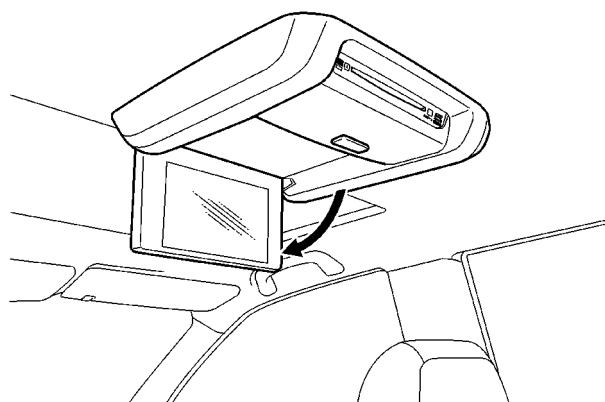
01MMO33Y

► Speaker Specification ◀

Type		Caliber	Impedance	Input Range
(1)	Front Door	JBL	16.0 cm	2.2 Ω
		Standard	16.0 cm	4 Ω
(2)	Tweeter	JBL	6.5 cm	2 Ω
		Standard	6.5 cm	4 Ω
(3)	Rear Door	JBL	16.0 cm/2.0 cm	2.6 Ω
		Standard	16.0 cm	4 Ω
(4)	Woofer	JBL	20.0 cm	2.0 Ω

RSES (Rear Seat Entertainment System)

- The RSES with which the rear seat occupants can enjoy a video DVD (Digital Versatile Disc) has been made available as optional equipment on the Limited grade for the 2GR-FE engine model.
- The RSES consists of a 9-inch wide LCD (Liquid Crystal Display), a DVD player that are located under the roof, and a remote controller.
- The RSES is operated by the remote controller.



Remote Controller

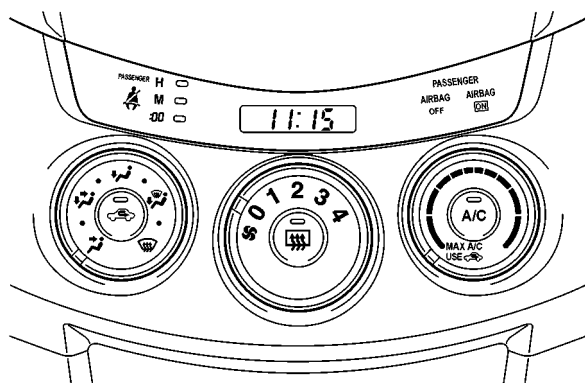


01MMO34Y

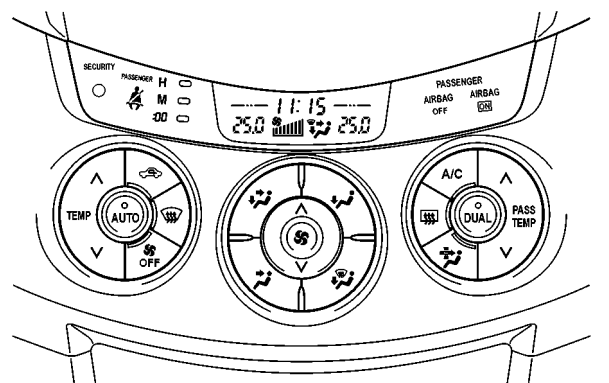
01MMO35Y

Air Conditioning System

- Manual air conditioning is provided as standard equipment for the Standard and Sport grades.
- An automatic air conditioning that can set the temperature independently for the driver and front passenger areas is provided as standard equipment for the Limited grade.
- The automatic air conditioning is provided with the micro dust and pollen filter control.



Manual A/C Model

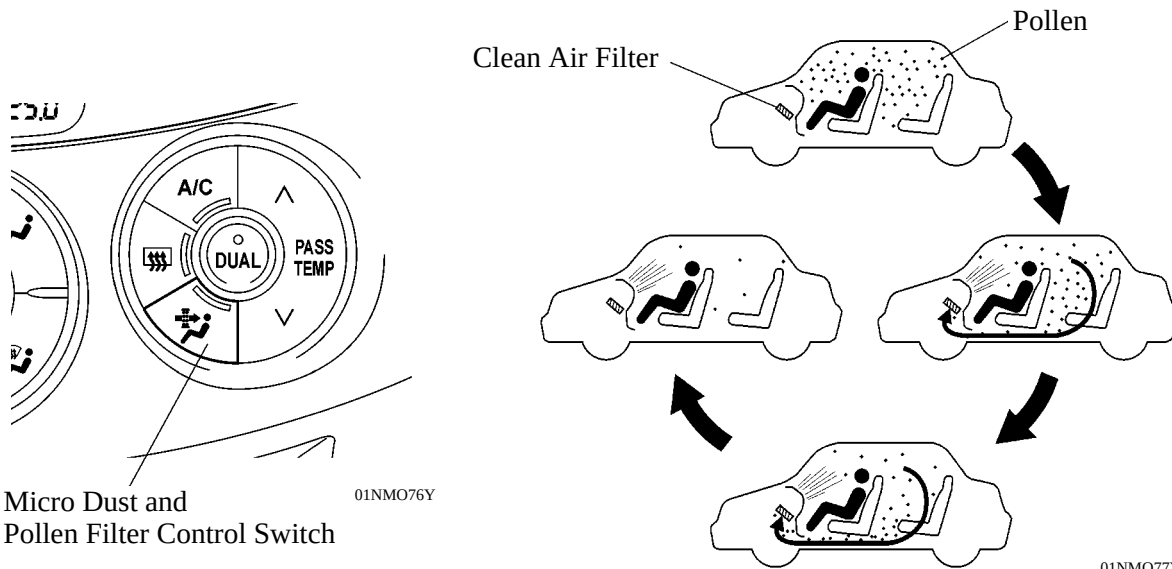


Automatic A/C Model

Micro Dust and Pollen Filter Control

- The micro dust and pollen filter control quickly removes pollen from the front seat occupant area with the pressing of the micro dust and pollen filter control switch on the heater control panel, without requiring any complex air conditioning operation.
- When the user pushes the micro dust and pollen filter control switch, the air conditioning operates in the recirculation mode. The clean air that has passed through the clean air filter blows out from the face outlet to the occupant area.

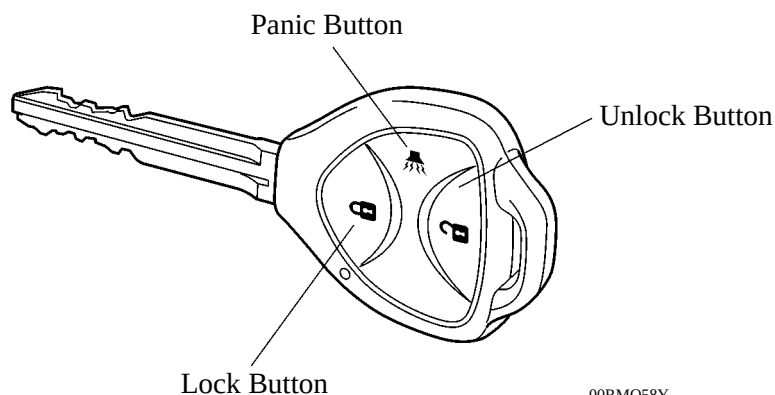
The filtered clean air quickly removes pollen from the occupant area. After that, the air in the cabin recirculates and continues to remove pollen in the air by allowing the clean air filter to capture the pollen. When the amount of pollen in the cabin as a whole diminishes to a certain level, the air conditioning automatically resumes operating in the auto mode.



Conceptual Image of Pollen Removal

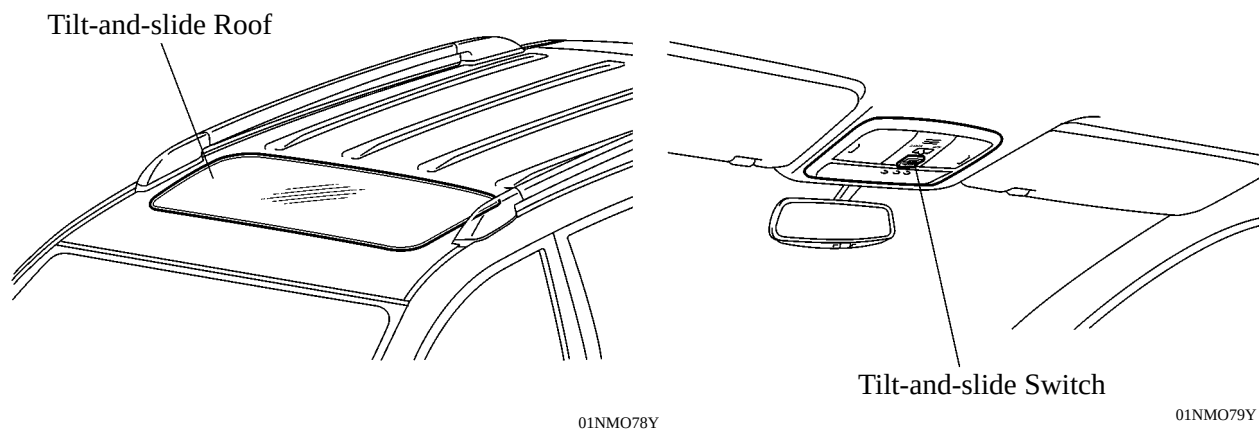
Wireless Door Lock Remote Control System

A wireless door lock remote control system with a panic button and answer back function which blinks the hazard warning lights when locking or unlocking is available as standard equipment.



Sliding Roof System

- A tilt-and-slide roof, which is provided with a one-touch function (slide open/close and tilt up/down) and a jam protection function, is available as optional equipment on the Sport and Limited grades.
- A tilt-and-slide switch is provided at the overhead console.

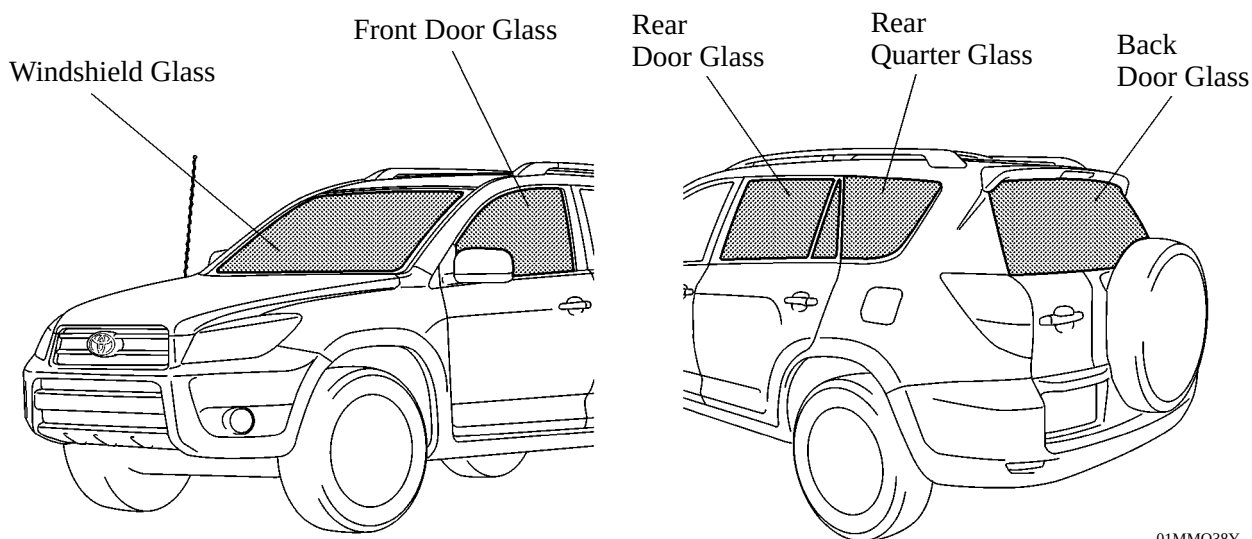


Windshield and Door Glass

The windshield and door glasses are provided as follows:

Glass Portion	Windshield	Front Door Glass	Rear Door Glass		Rear Quarter Glass		Back Door Glass	
Grade	—	—	Standard	Sport and Limited	Standard	Sport and Limited	Standard	Sport and Limited
Glass	Green	UV Reduction Green	UV Reduction Green	Dark Gray*	UV Reduction Green	Dark Gray*	UV Reduction Green	Dark Gray*

*: Optional equipment on Standard grade

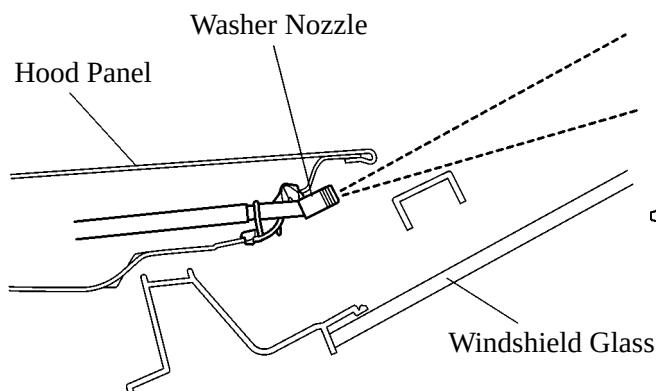


01MMO38Y

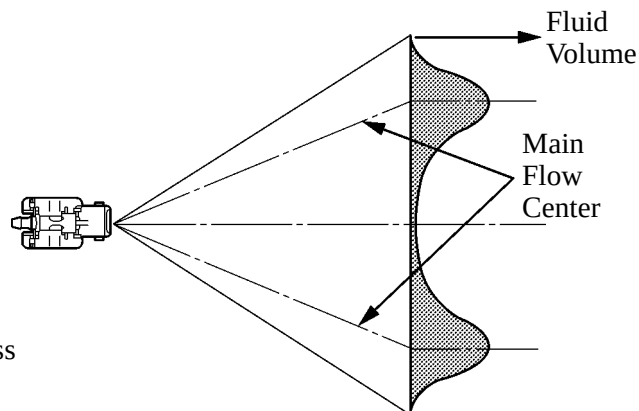
Washer System

Front

- Spray type washer nozzles are provided under the hood panel for improved appearance.
- The spray type washer nozzle sprays the washer fluid over a wide area by spraying it in a fan shape. The washer fluid volume sprayed in the center of the spray area has been reduced so as not to hinder the driver's view when the washer system is operated.



281MO41



281MO42Y

NOTICE:

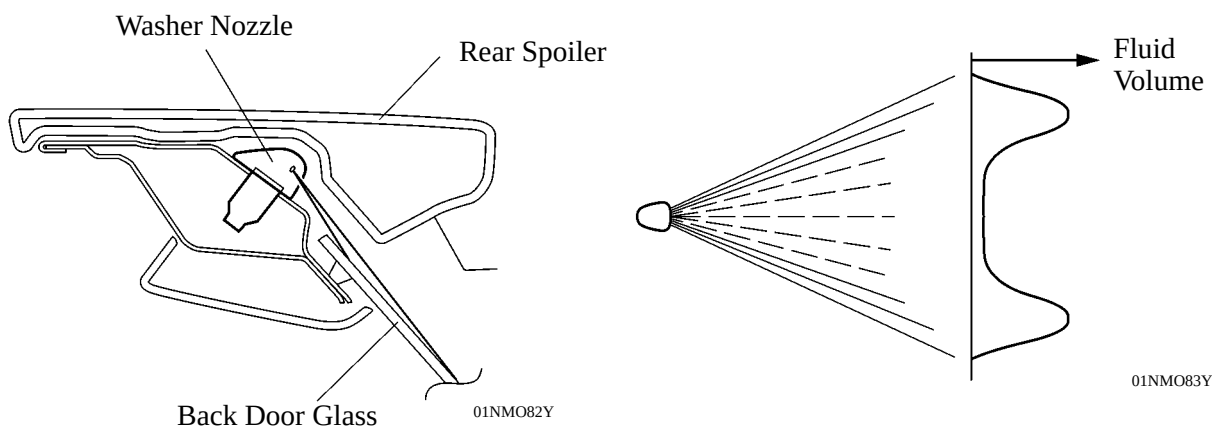
The construction of the spray type washer nozzle does not allow adjustment of the spray angle. Do not adjust the spray angle as this could damage the washer nozzle.

To change the spray angle, replace the nozzle by a nozzle with a different spray angle.

For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

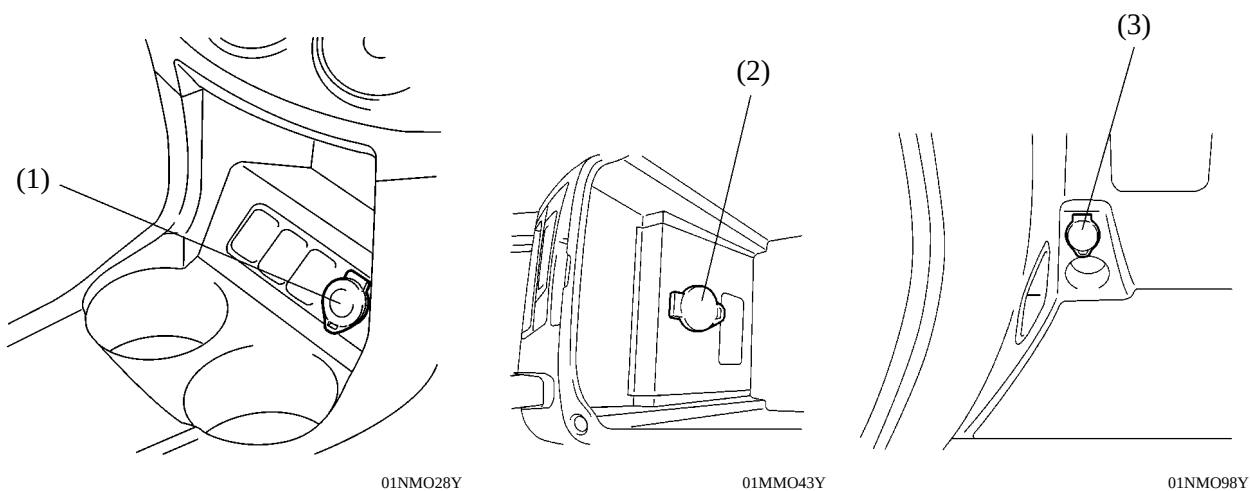
Rear

- A flat-spray type washer nozzle is used on all models.
- The washer nozzle is located below the rear spoiler for an enhanced appearance.
- The flat-spray type washer nozzle sprays washer fluid in a fan shape over a wide area for enhanced wiping performance.

**Power Outlet**

Three power outlets are provided:

- (1) Under the center console
- (2) Inside console box
- (3) Under the left deck side trim



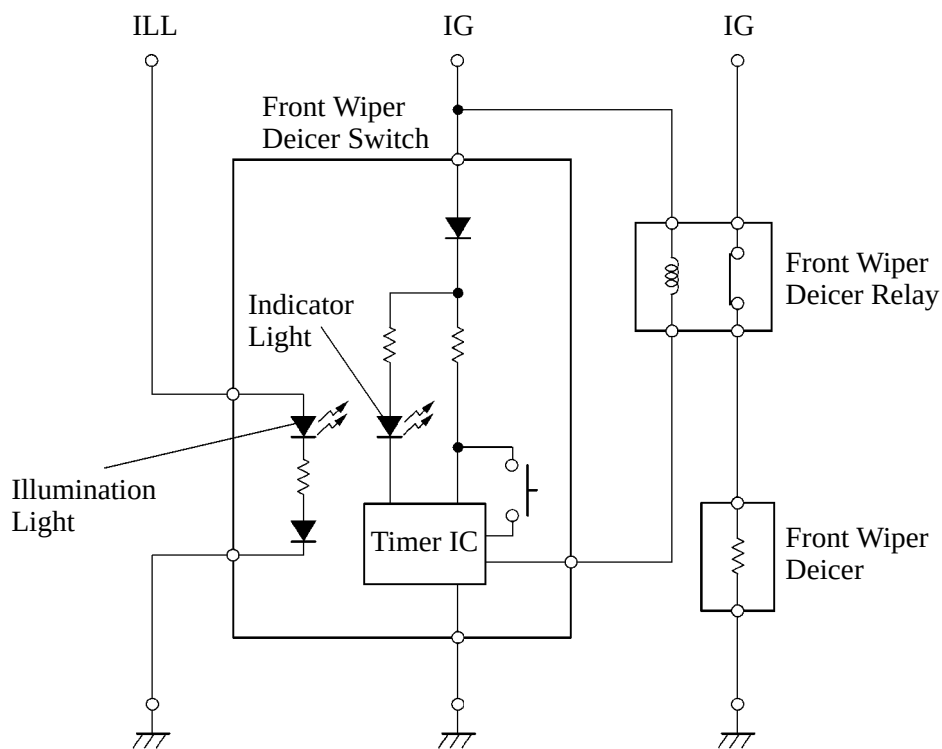
FRONT WIPER DEICER SYSTEM

■ DESCRIPTION

The front wiper deicer system uses the heater wire in the front windshield glass to deice frozen front wipers.

- The front wiper deicer system is provided as standard equipment on the Canada models.
- This system is activated when the ignition switch is turned ON, and front deicer switch is pushed. This switch is provided with a timer function to keep on the deicer for approx. 15 minutes.

► System Diagram ◀

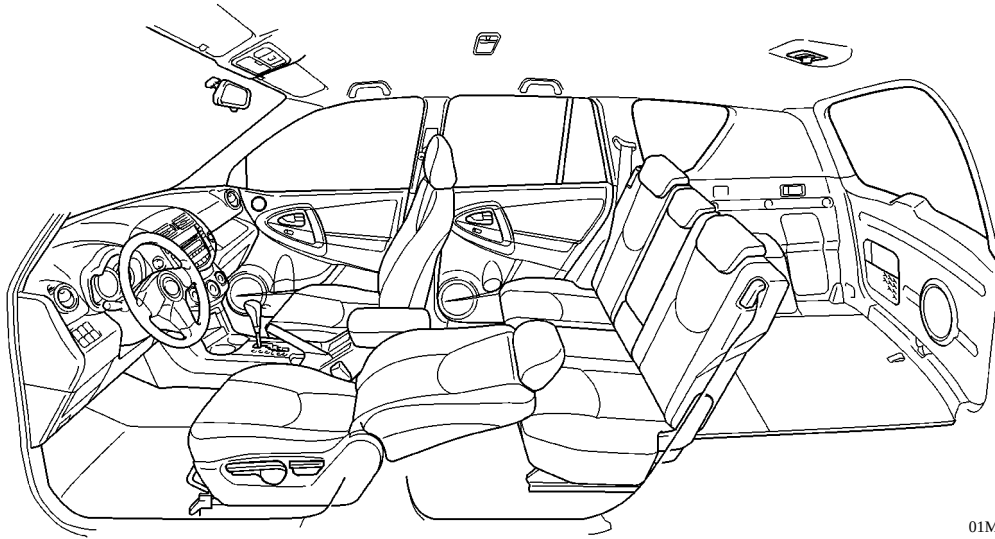


01NBE03Y

INTERIOR

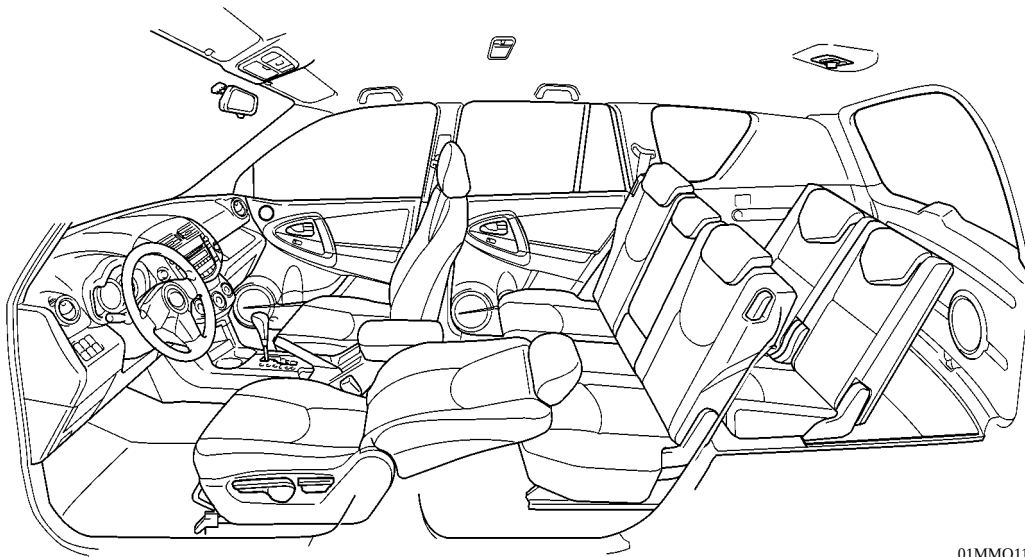
Interior Design

- The vehicle interior uses roundish, slim-shaped seats to make the interior more spacious, realizing an expansive and roomy space.
- A unique, boomerang-shaped ornament is placed on each door trim to express a sporty image.



01MMO10Y

Standard Model

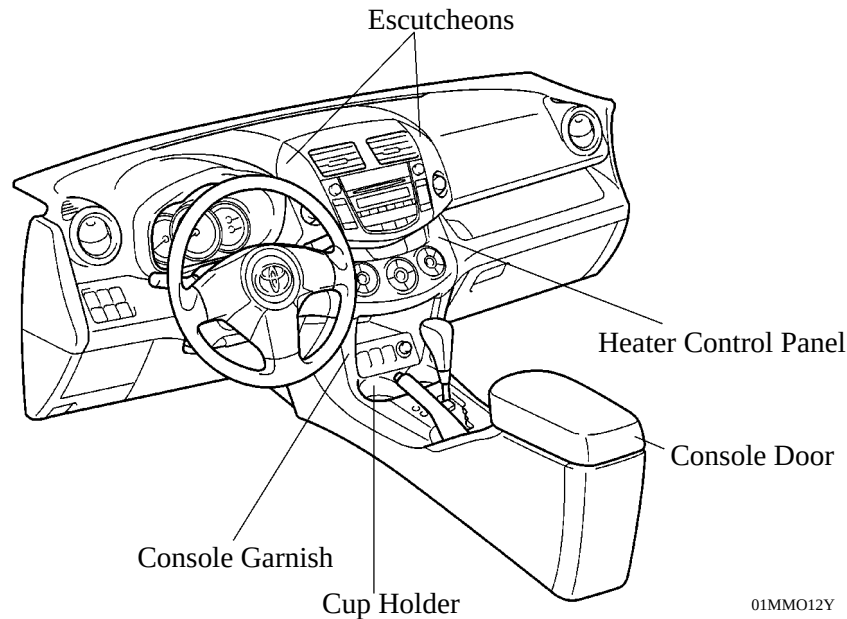


01MMO11Y

With Rear No. 2 Seat

Instrument Panel

- The instrument panel blends an arrangement that emphasizes a horizontal spaciousness with a vertical flow along its center area, in order to portray a sporty image.
- Metallic paint and hairline grain have been applied to the escutcheon, console garnish, and heater control panel in order to express a premium image.
- Shut-fin type side registers are used. Their surface becomes flush when they are closed, thus achieving a simple and streamlined design.
- An illumination is provided for the cup holder in the center console.
- The console door in the center console is covered with the urethane from in order to achieve a soft touch.

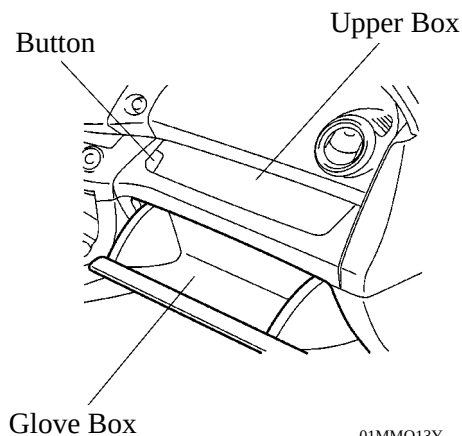


01MMO12Y

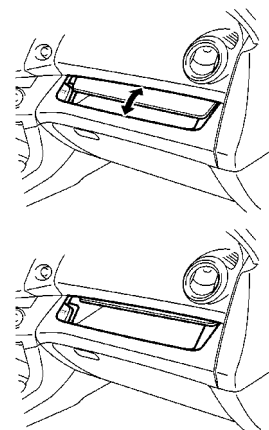
Storage Space

Instrument Panel

- A glove box that uses an air damper is provided on the front passenger side.
- An upper box, with a door that can be opened and closed by pushing a button located above the glove box, is provided.

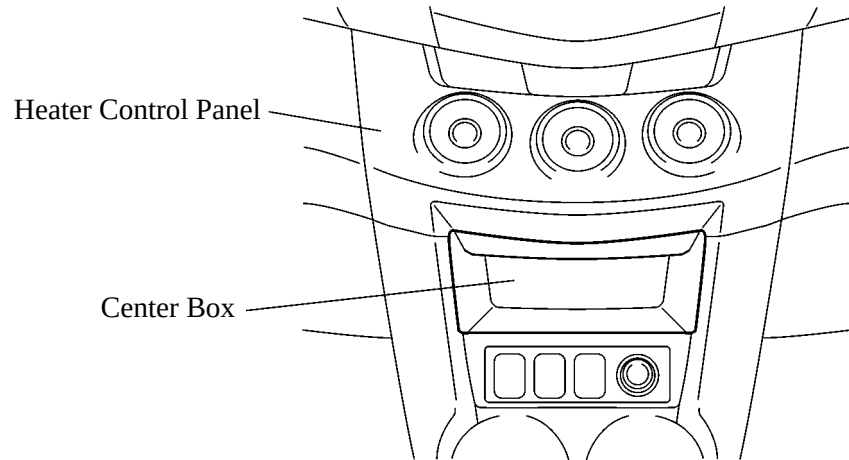


01MMO13Y



01NMO19Y

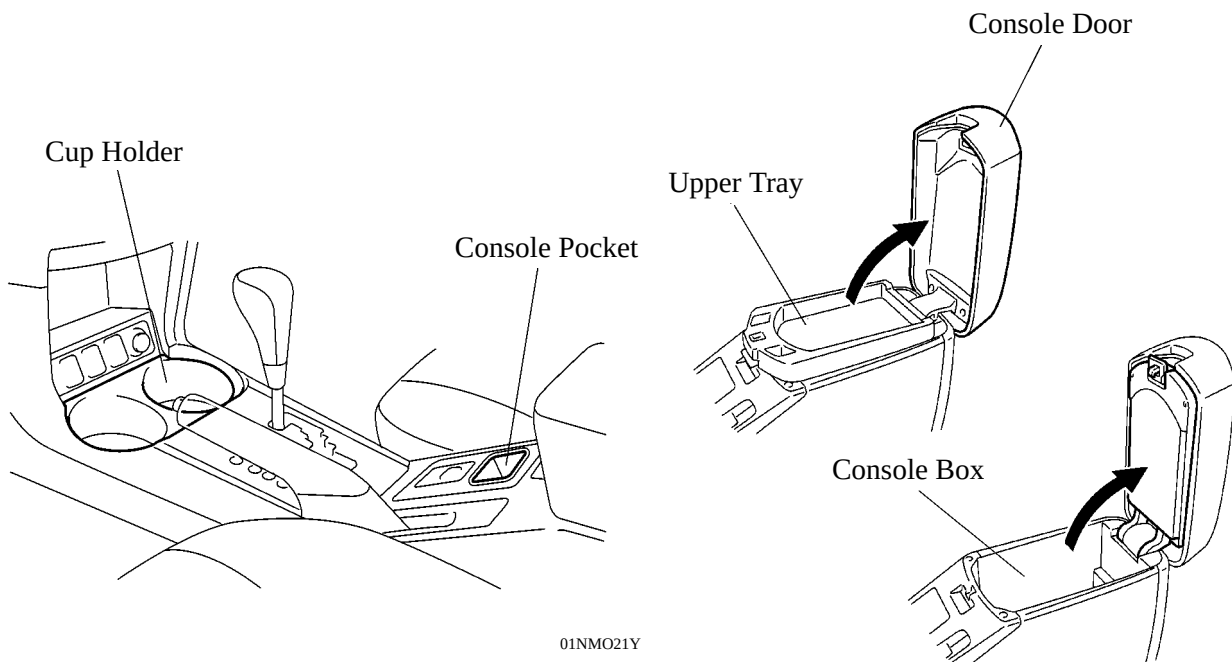
- A center box is provided below the heater control panel.



01NMO20Y

Center Console

- Console pocket, cup holder and console box are provided in the center console.
- The console has dual doors to provide storage space.



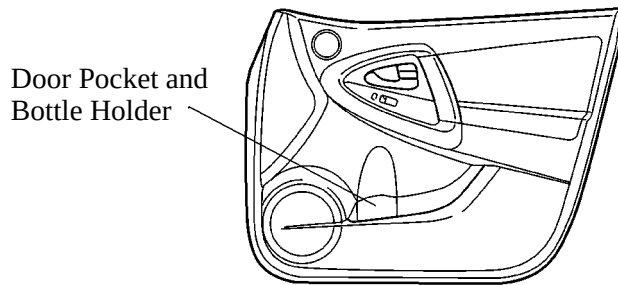
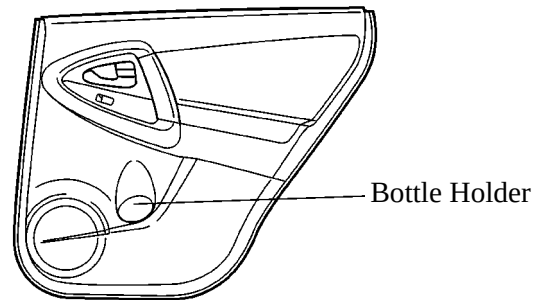
01NMO21Y

01NMO22Y

Console Box

Door Trim

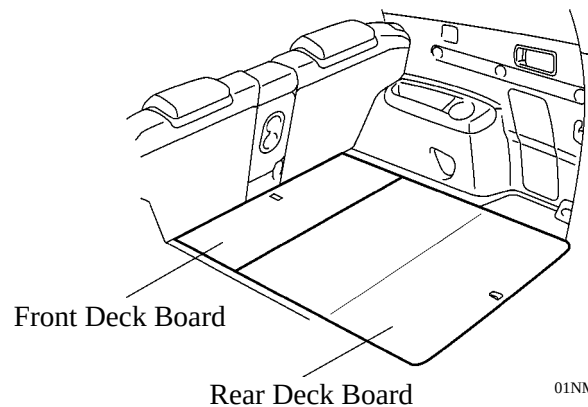
- A door pocket and bottle holder is provided in the front door trim.
- A bottle holder is provided in the rear door trim.

**Front Door Trim****Rear Door Trim**

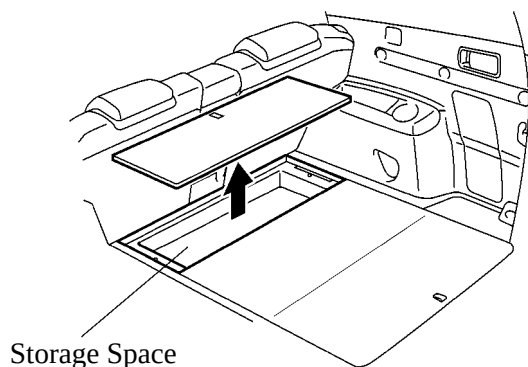
01MMO14Y

Luggage Space

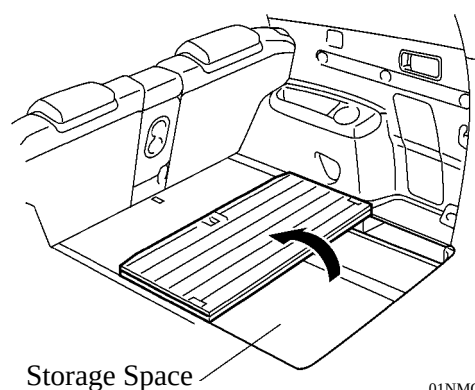
- Front and rear deck boards covered with water-repellent skin have been provided on the models without the rear No. 2 seat.
- The front deck board is a removable type, and a storage space is provided below it.
- The rear deck board is a type that folds in two, for ease of operation and the in-and-out access of cargo under the floor.



01NMO24Y

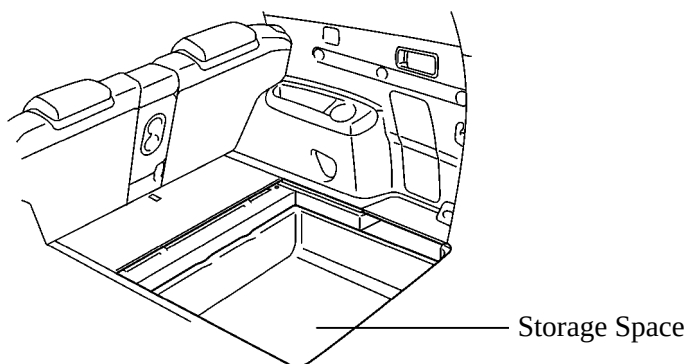
► Deck Board Arrangement ◀

01NMO25Y

Storage Below Front Deck Board

01NMO26Y

Semi-open Rear Deck Board

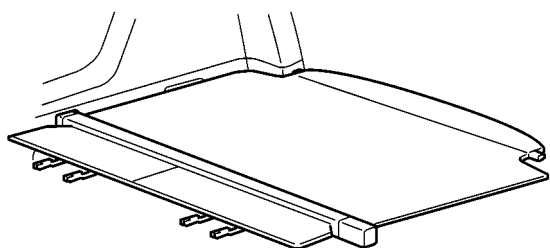


01NMO27Y

Fully Open Rear Deck Board

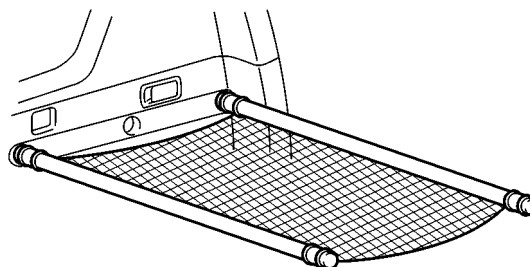
Tonneau Cover and Utility Pipes with Net

A tonneau cover to block the view of the cargo area from the outside of the vehicle, and utility pipes with a net, which can be arranged in various ways, are standard equipment on the Limited grade. They are available as optional equipment on the Standard and Sport grades.



01NMO29Y

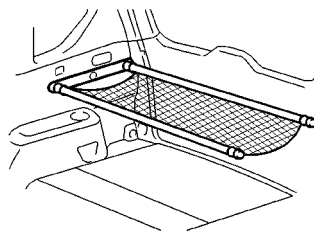
Tonneau Cover



01NMO30Y

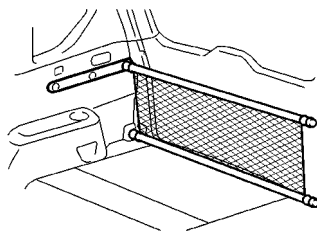
Utility Pipes with Net

► Utility Pipes with Net Arrangement ◀



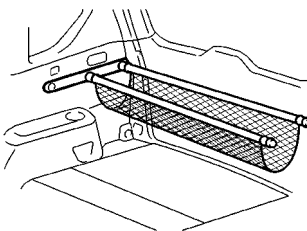
01NMO31Y

Partition



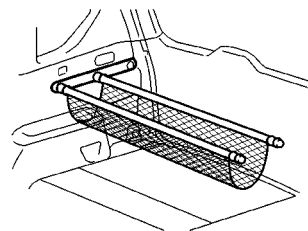
01NMO32Y

**Prevent items from
falling out**



01NMO33Y

Hammock A

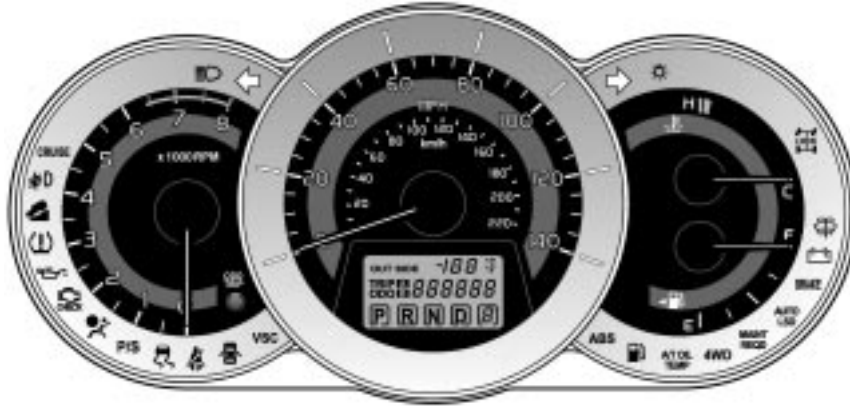


01NMO34Y

Hammock B

Combination Meter

An analog triple-dial type Optitron meter is provided in the combination meter as standard equipment on all models.

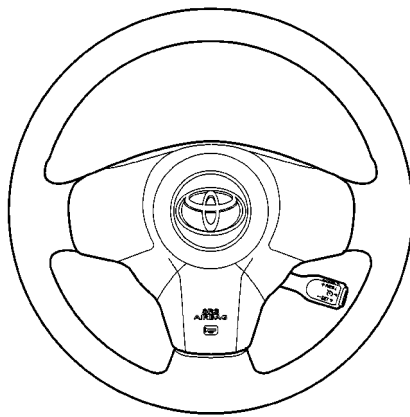


01MMO15Y

Steering Wheel

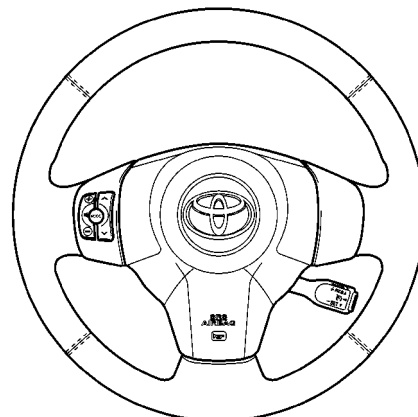
- A 3-spoke urethane steering wheel is provided as standard equipment on the Standard and Sport grades.
- A 3-spoke urethane steering wheel with steering pad switch* is provided as optional equipment on the Sport grade.
- A 3-spoke leather steering wheel with steering pad switch* is provided as standard equipment on the Limited grade.

*: Audio Switch



01MMO45Y

3-spoke Urethane Type

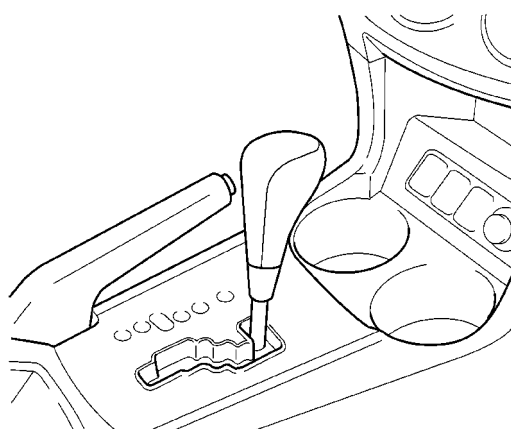


01MMO16Y

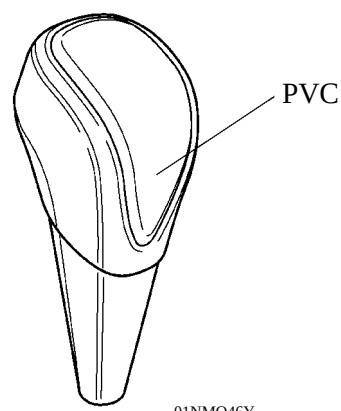
**3-spoke Leather Type with
Steering Pad Switch**

Shift Lever

- PVC (Polyvinyl Chloride) shift lever knob is provided as standard equipment on the Standard and Sport grades.
- Leather shift lever knob is provided as standard equipment on the Limited grade.
- A gate type shift lever is used on the automatic transaxle models for luxuriousness.

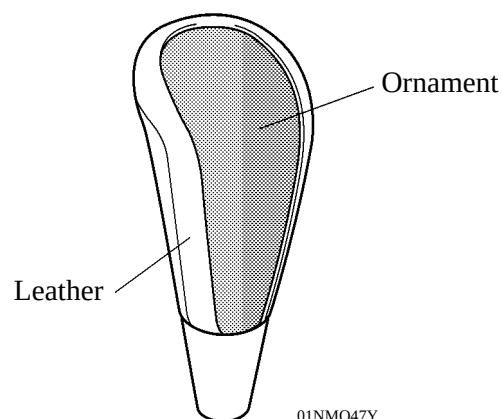


01NMO44Y



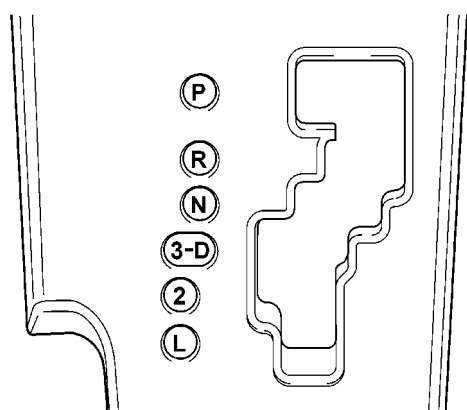
01NMO46Y

For Standard and Sport Grades



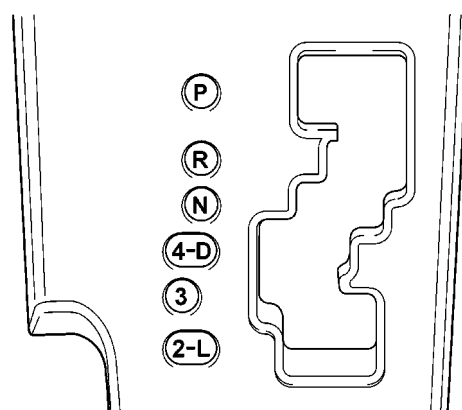
01NMO47Y

For Limited Grade



01NMO45Y

For 4-speed Automatic Transaxle



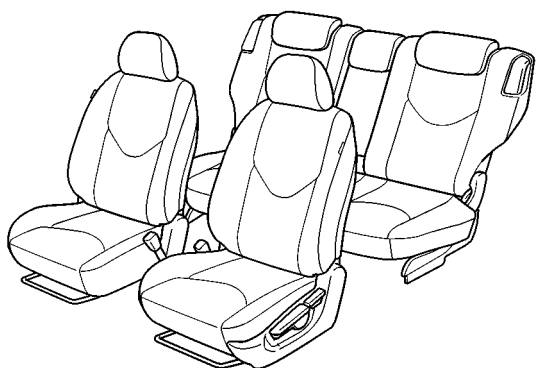
01MMO17Y

For 5-speed Automatic Transaxle

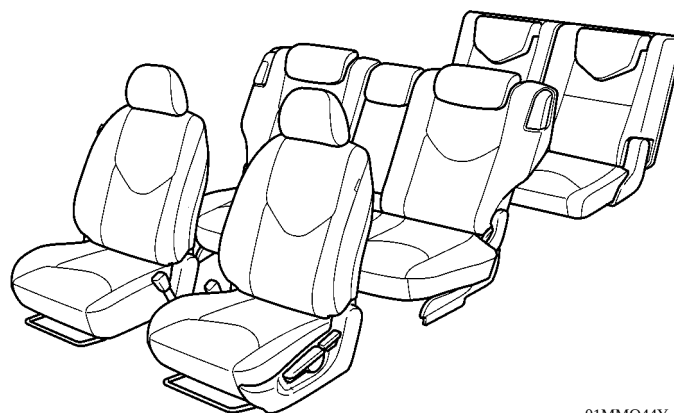
Seat

- Manual type front seats and 60/40 split retractable type rear seats are provided as standard equipment on the Standard and Sport grades.
- Power type front seats are provided as standard equipment on the Limited grade.
- A rear No. 2 seat is available as optional equipment on the Standard and Limited grades.
- Fabric seat covers are provided as standard equipment on all the models, and leather seat covers are available as optional equipment on the Limited grade*.

*: Except Models with Rear No.2 Seat



01NMO48Y

Standard

01MMO44Y

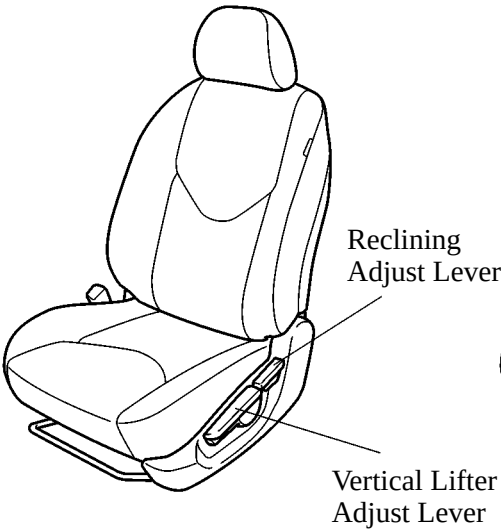
With Rear No. 2 Seat

Front Seat

- 6-way manual seat is provided for the driver seat, and 4-way manual seat is provided for the front passenger seat as standard equipment on the Standard and Sport grades.
- 8-way power seat is provided for the driver seat as standard equipment on the Limited grade.
- On both the driver and front passenger seats, seat back pockets are provided as standard equipment on the Standard grade, and net type seat back pockets are provided as standard equipment on the Limited and Sport grades.

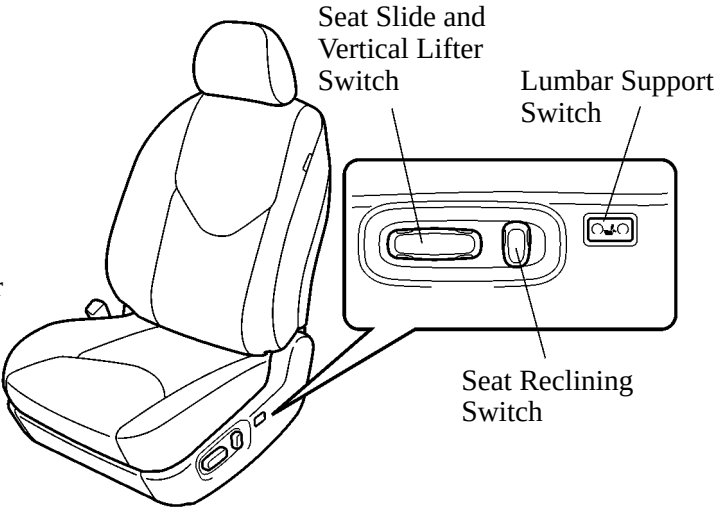
Model Item	New		Previous	
	Driver Seat	Front Passenger Seat	Driver Seat	Front Passenger Seat
Seat Slide	240 mm (9.4 in.) 15 mm (0.6 in.) x 16 Steps		240 mm (9.4 in.) 15 mm (0.6 in.) x 16 Steps	
Seat Reclining	82° (2° x 41 Steps), 78°*		76° (2° x 38 Steps)	
Vertical Lifter	45 mm (1.8 in.)	—	45 mm (1.8 in.)	—
Front Vertical*	10°	—	—	—
Front Tilt*	26 mm (1.0 in.)	—	—	—

*: Power Seat Only



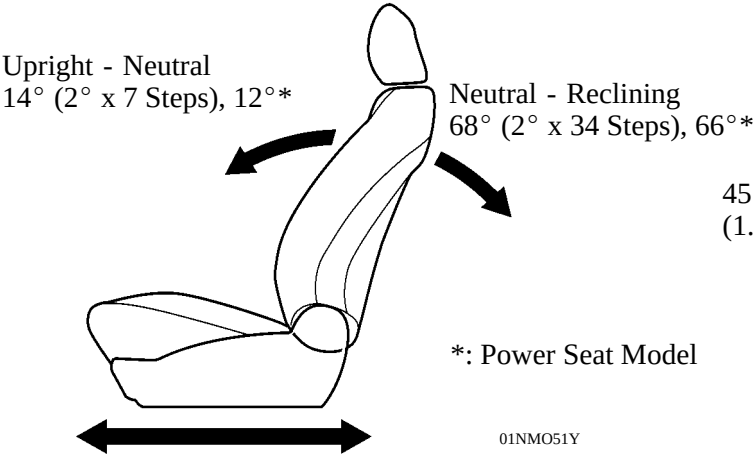
Manual Seat

01NMO49Y



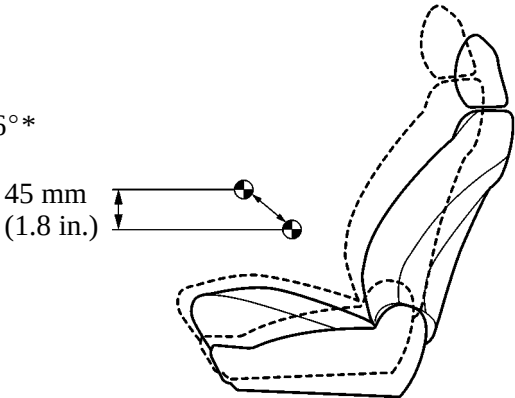
Power Seat

01NMO50Y



Seat Slide: 240 mm (9.4 in.)

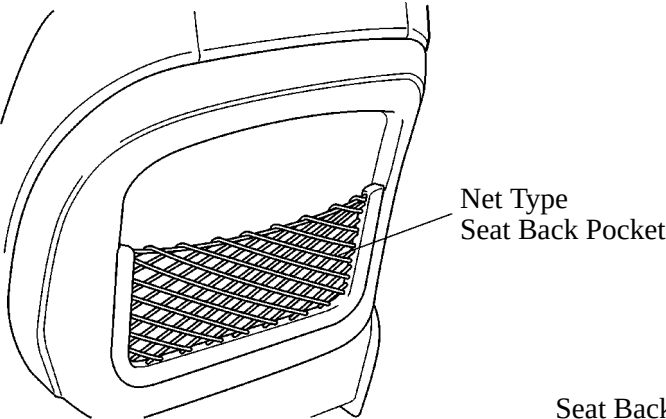
01NMO51Y



01NMO52Y

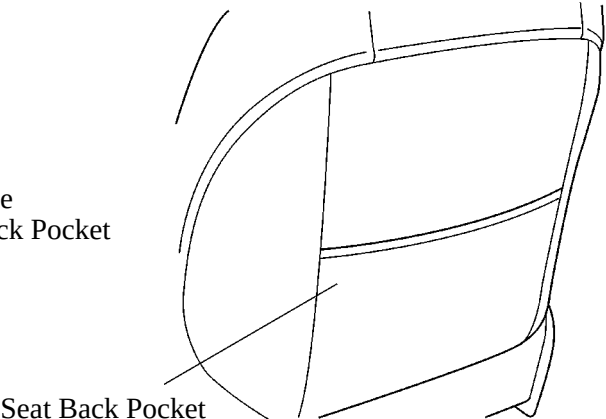
Vertical Lifter

Seat Slide and Reclining



01NMO53Y

For Limited and Sport Grades

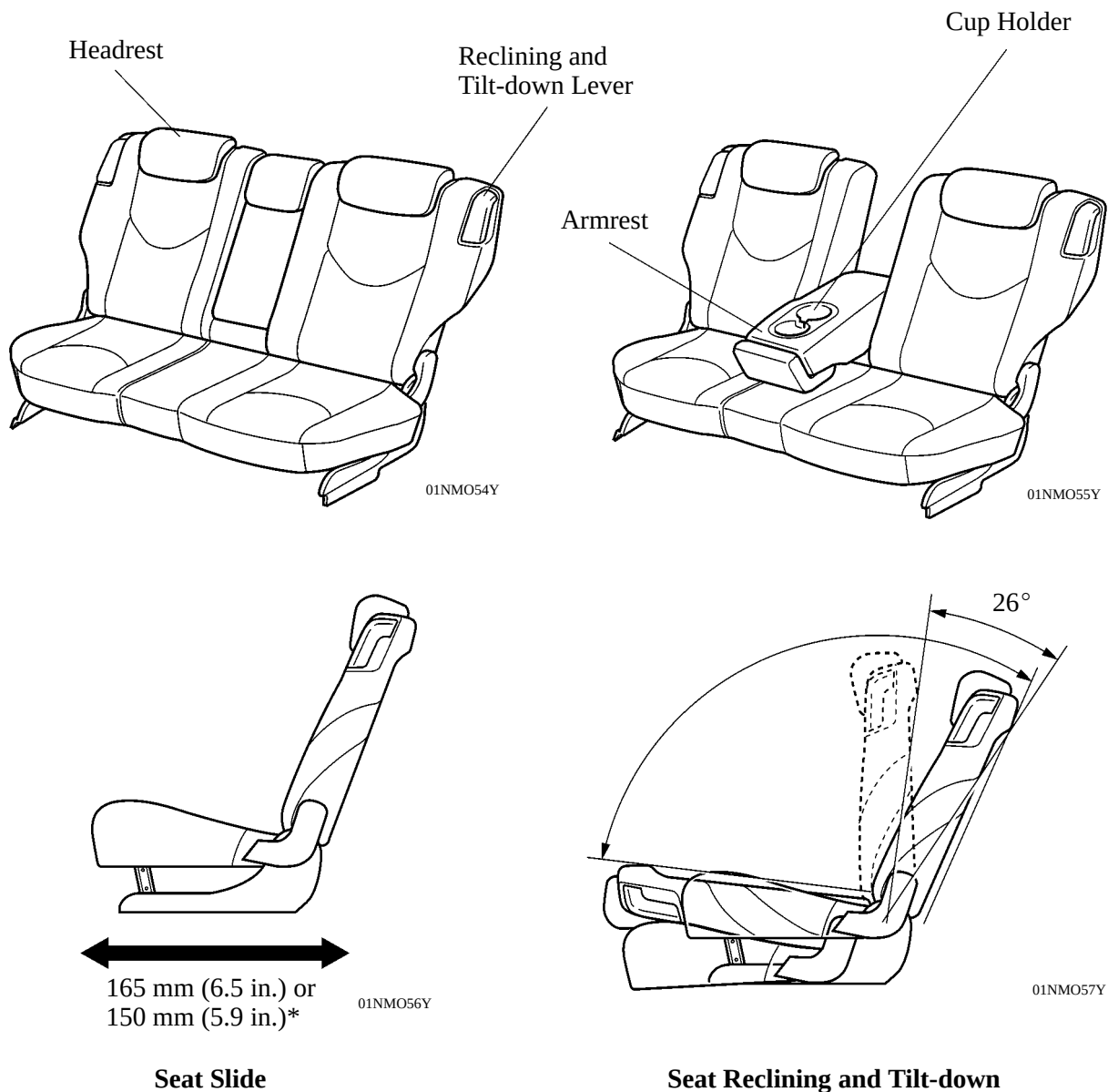


01NMO101Y

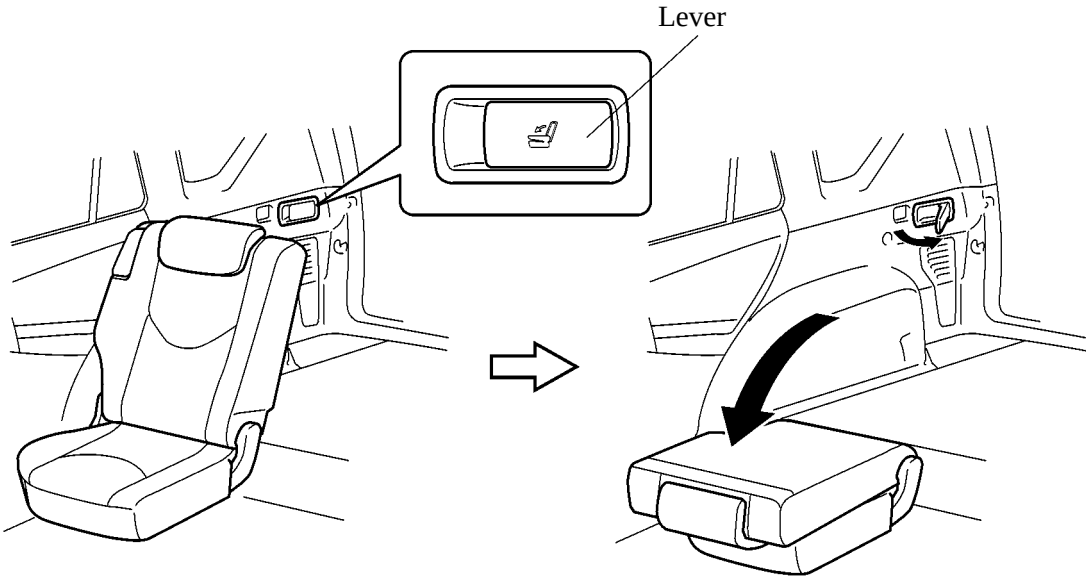
For Standard Grade

Rear Seat**Rear No. 1 Seat**

- A 60/40 split retractable type rear seat with tilt-down function is provided as standard equipment.
- An L-shaped headrest is used to achieve excellent rearward visibility.
- The seat slide movement is 165 mm (6.5 in.), and seat reclining angle is 26°.
- On the models with a rear No. 2 seat, the amount of seat slide is 150 mm (5.9 in.).
- An armrest with a cup holder is provided for the center seat.
- A remote operation mechanism is used to enable the user to operate a lever in the luggage compartment in order to tilt-down the rear seat.
- The models with a rear No. 2 seat have been provided with a walk-in function.

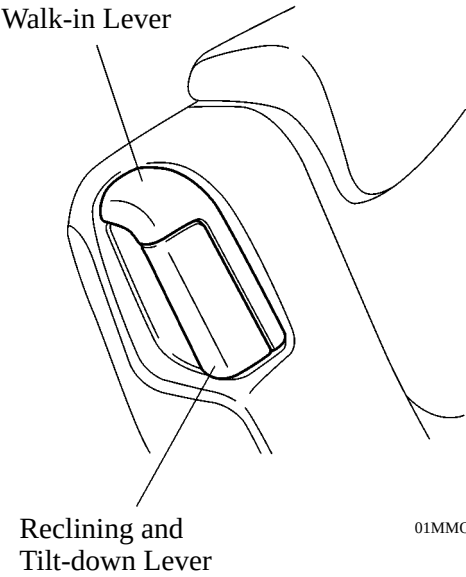


*: Models with a Rear No. 2 Seat

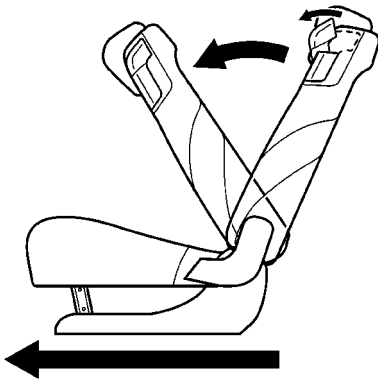


01NMO58Y

Remote Operation Mechanism



01MMO18Y



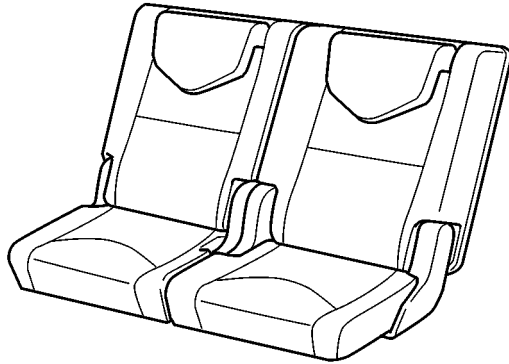
Passenger Side Slide Movement: 120 mm (4.7 in.)

01MMO19Y

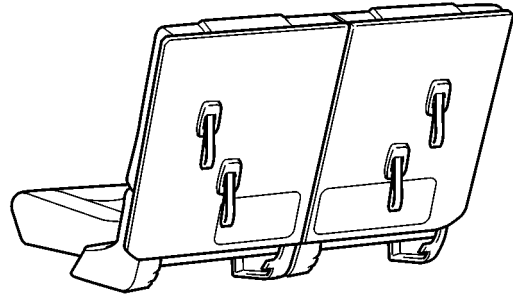
Walk-in Function

Rear No. 2 Seat

- A storable rear No. 2 seat is available as optional equipment on the Standard and Limited grades.
- An L-shaped headrest is used to achieve excellent rearward visibility.

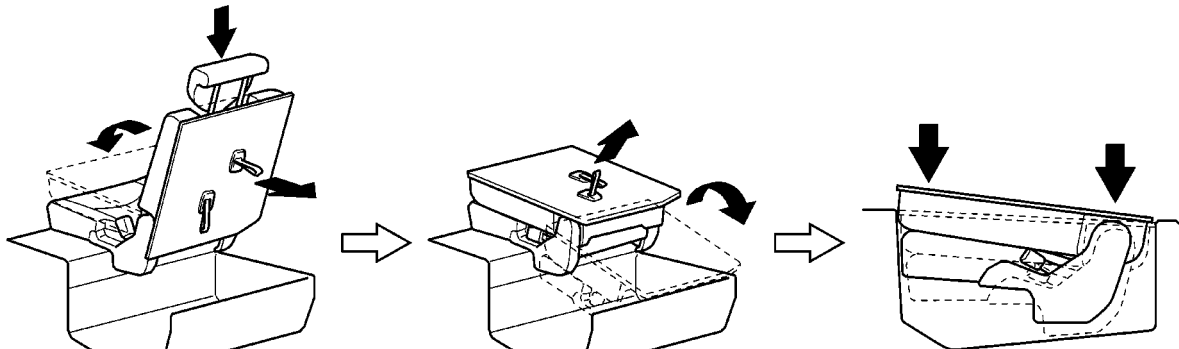


01MMO20Y



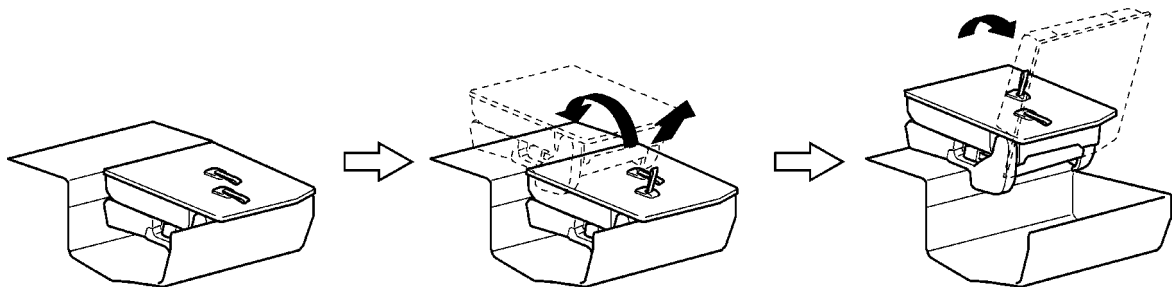
01MMO21Y

1) Storage Operation

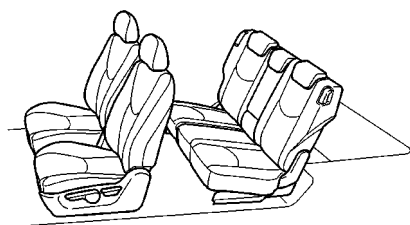


01MMO22Y

2) Set up Operation

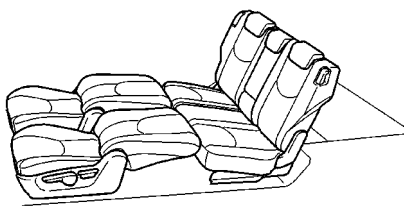


01MMO23Y

Seat Arrangement**Without Rear No. 2 Seat**

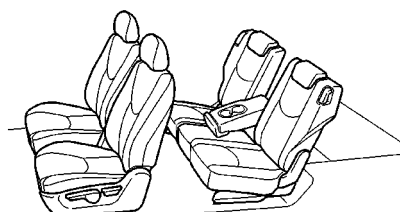
01NMO59Y

Default



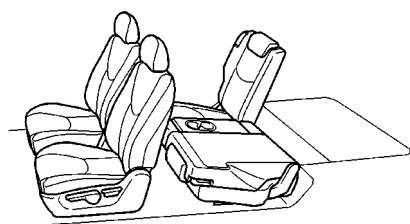
01NMO60Y

Front Seat: Full Flat



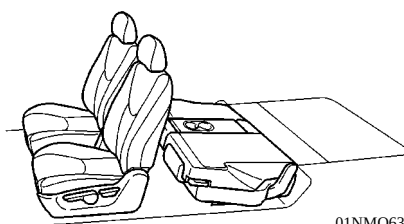
01NMO61Y

Rear Center Seat: Retracted



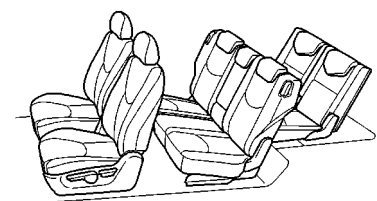
01NMO62Y

Rear Seat: One Side Tilt-down



01NMO63Y

Rear Seat: Tilt-down

With Rear No. 2 Seat

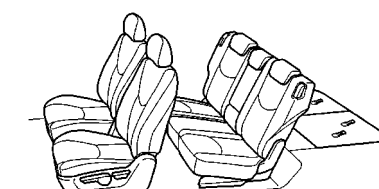
01MMO24Y

Default



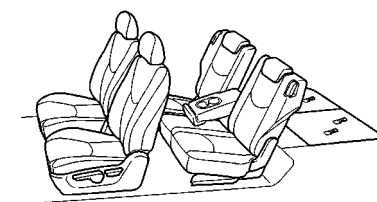
01MMO25Y

Front Seat: Full Flat



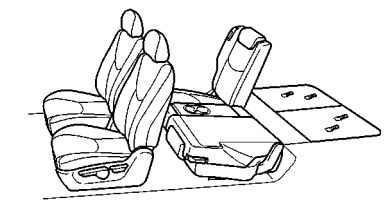
01MMO26Y

Rear No. 2 Seat: Stored



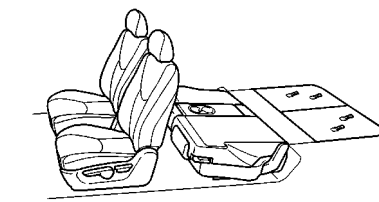
01MMO27Y

Rear No. 1 Center Seat: Retracted



01MMO28Y

Rear No. 1 Seat: One Side Tilt-down



01MMO29Y

Rear No. 1 Seat: Tilt-down

LIGHTING

■ DESCRIPTION

The new models have a lighting system with the following equipments:

●: Standard OP: Option —: Not Available

Destination	U. S. A.			Canada		
System \ Grade	Standard	Sport	Limited	Standard	Sport	Limited
Daytime Running Light System	OP	OP	OP	●	●	●
Illuminated Entry System (Key Illumination + Room Light + Front Personal Light)	●	●	—	●	●	—
Illuminated Entry System (Key Illumination + Room Light + Front Personal Light + Foot Light)	—	—	●	—	—	●
Light Auto Turn-off System	●	●	●	●	●	●
Front Fog Light	—	●	●	—	●	●

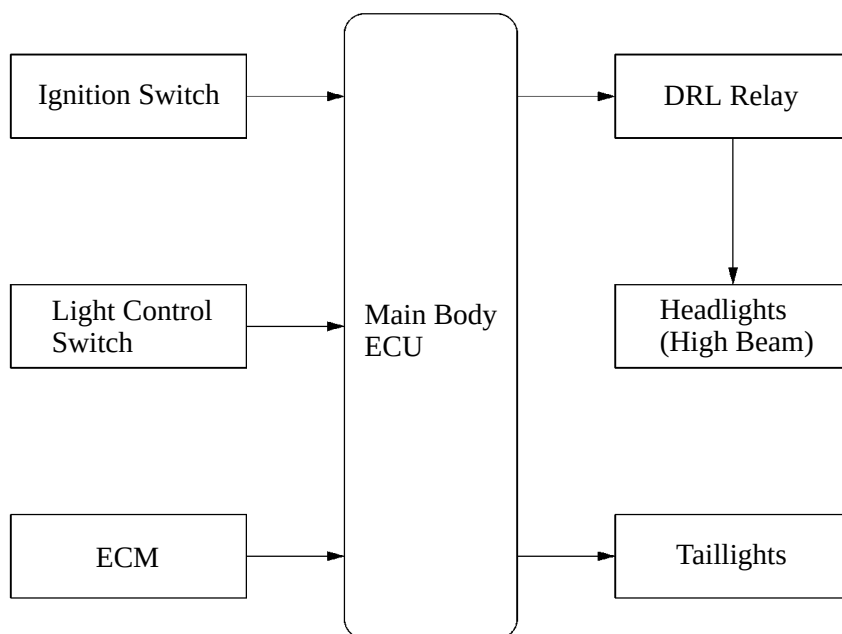


Multi-refractor Headlight

■ DAYTIME RUNNING LIGHT SYSTEM

- The daytime running light system is standard equipment on the Canada models and is available as optional equipment on the U.S.A. models.
- This system is designed to automatically activate the headlights at reduced brightness (high beam) during the daytime to keep the car highly visible to other vehicles.
- This system is controlled by the main body ECU.
- This system is enabled when the conditions given below are met:
 - 1) The ignition switch is ON.
 - 2) Engine running condition.
 - 3) Light control switch is OFF.

► System Diagram ◀

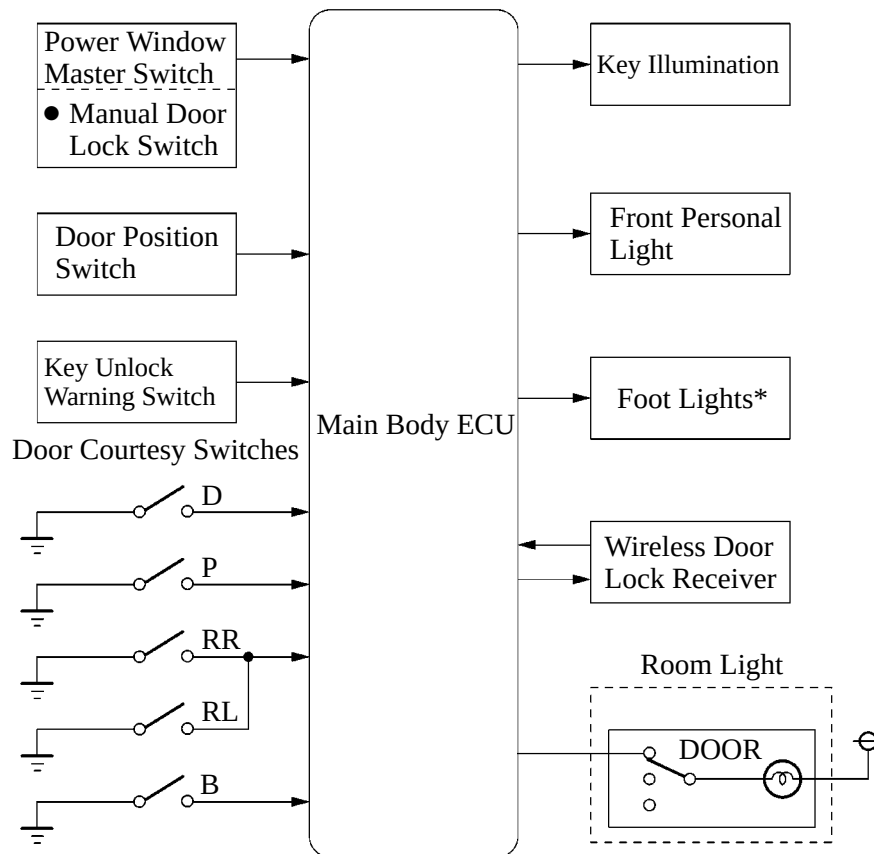


■ ILLUMINATED ENTRY SYSTEM

- This system is controlled by the main body ECU.
- When any one of the following conditions is satisfied, the illuminated entry system turns on the key illumination, room light, front personal light and foot light*.
 - 1) Any door is opened.
 - 2) A door is unlocked through a driver door key transmitter operation.
 - 3) All doors are closed and the ignition switch is turned from ON to OFF.
- When any one of the following conditions is satisfied, these lights will fade out (in approx. 1 sec.).
 - 1) After continuing to be on for approx. 15 sec. after all doors have been properly closed.
 - 2) All doors are closed and all doors are locked.
 - 3) All doors are closed and the ignition switch is turned to ACC or ON.
- A battery saving function is used to automatically turn the key illumination, room light, front personal light and foot light* OFF when the following condition occurs continuously for over 20 minutes: the key is not in the ignition key cylinder when any door is either ajar or open.

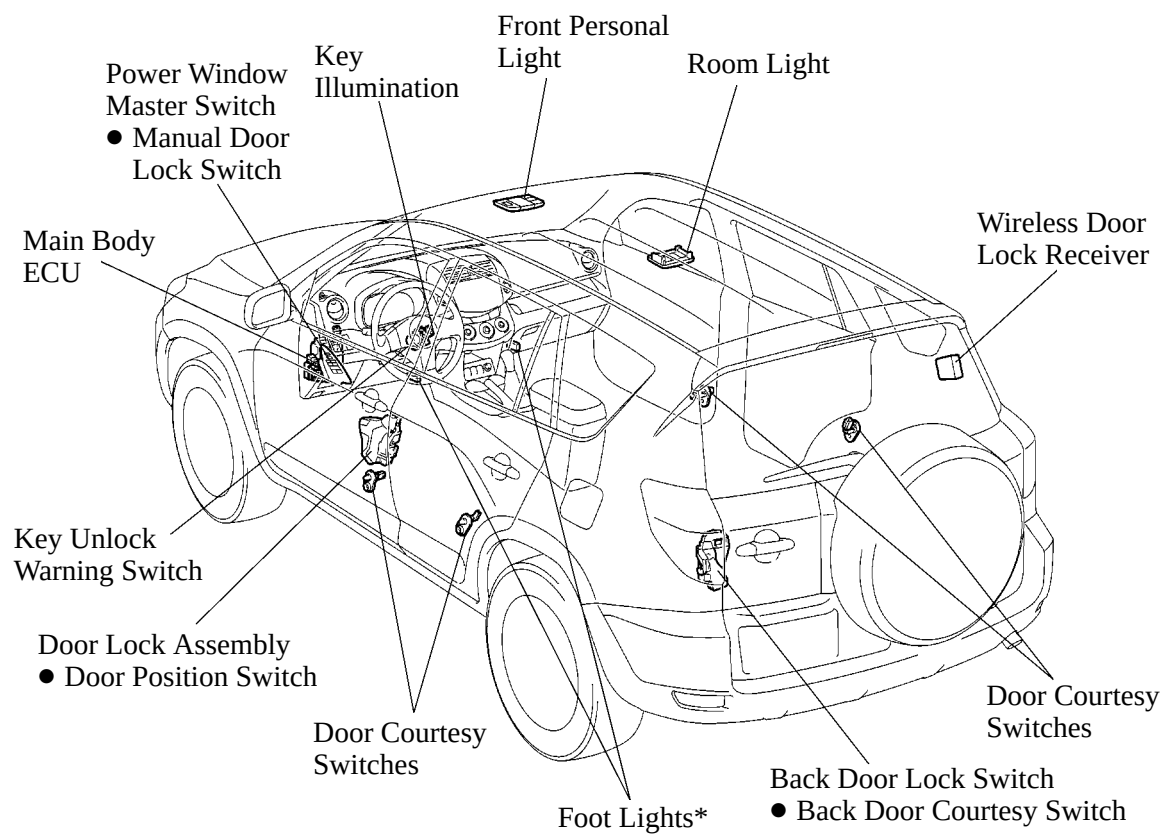
*: Models with Foot Lights

► System Diagram ◀



*: Models with Foot Lights

Layout of Main Components



01MBE20Y

*: Models with Foot Lights

■ LIGHT AUTO TURN-OFF SYSTEM

- The light auto turn-off system is standard equipment on all models.
- When the headlights and taillights are illuminated through the operation of the light control switch, if the ignition switch is turned OFF and all the doors are closed, this system continues to illuminate the headlights and taillights for approximately 30 seconds, and then turns OFF the headlights. However, with all the doors locked, when the lock button on the wireless remote control is pushed, the headlights and taillights are turned OFF immediately.
- When the ignition switch is turned OFF and the driver's door is opened with the taillights on, this system automatically turns them off.
- This system is controlled by the main body ECU.

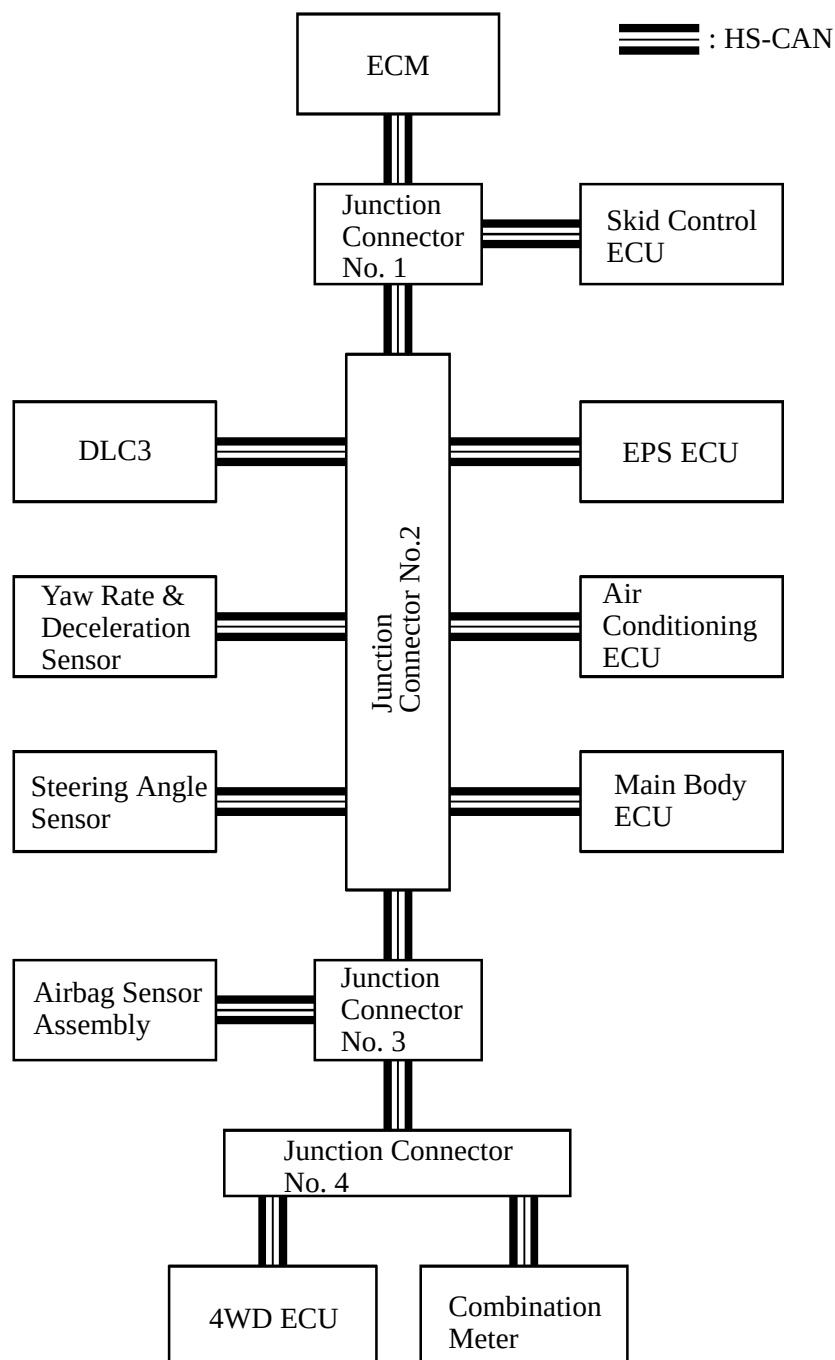
BODY ELECTRICAL

MULTIPLEX COMMUNICATION

DESCRIPTION

- On the '06 model, multiplex communication in which many different ECUs are linked to a bus line and data are mutually transmitted among the ECUs through the line is used.
- On the '06 model, CAN (Controller Area Network) is used among the ECUs as shown below.

► System Diagram ◀

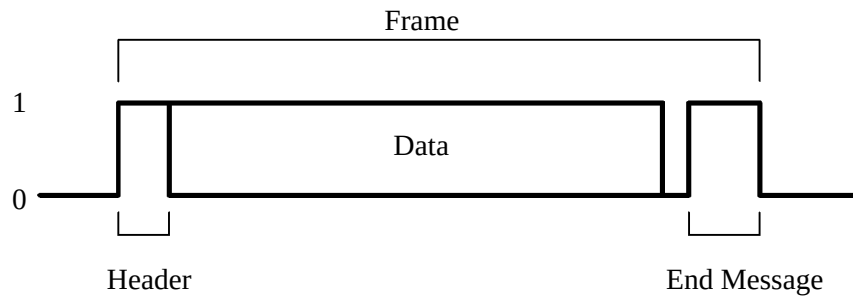


— REFERENCE —

Multiplex communication uses serial communication data that consists of bits and frames in order to exchange information among the various ECUs. This allows a reduction of the amount of wiring on the vehicle.

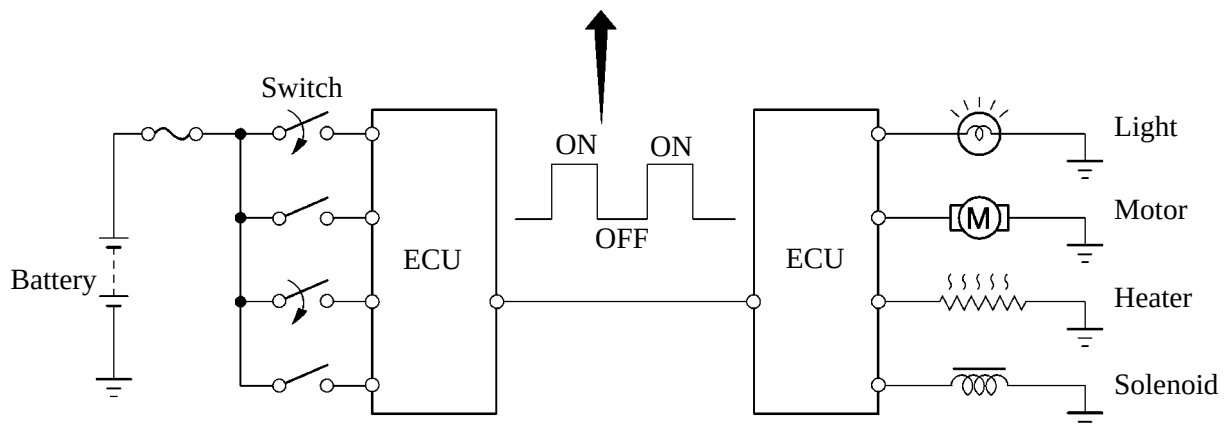
- A bit is the basic unit of communication that is used to represent the information. A bit is represented by binary values of “0” or “1”.
- A frame is a body of data that is transmitted together. A frame contains a header that indicates the beginning, and an end message that indicates the end.

► Conceptual Drawing ◀



240BE05

Serial Communication Data

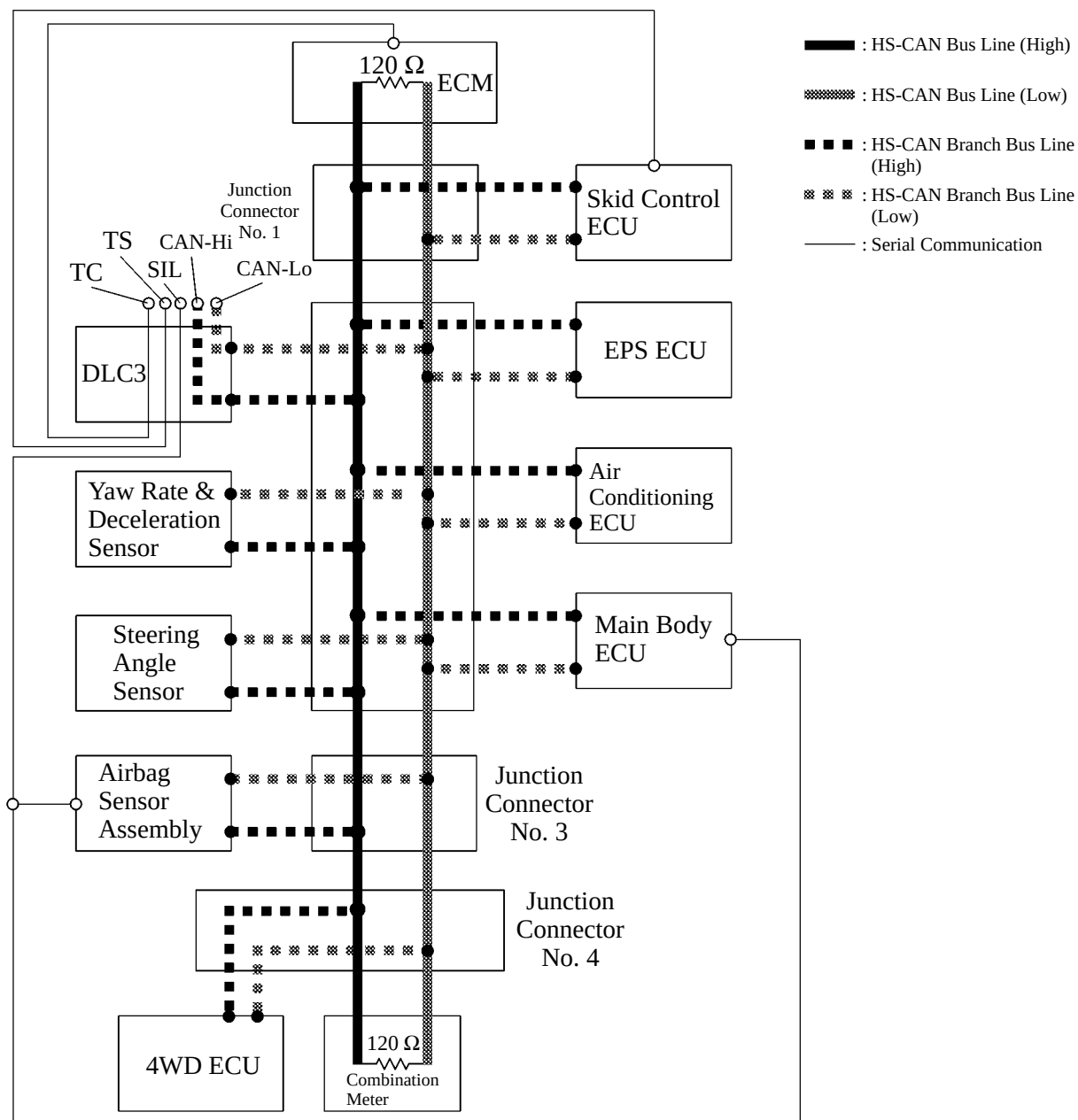


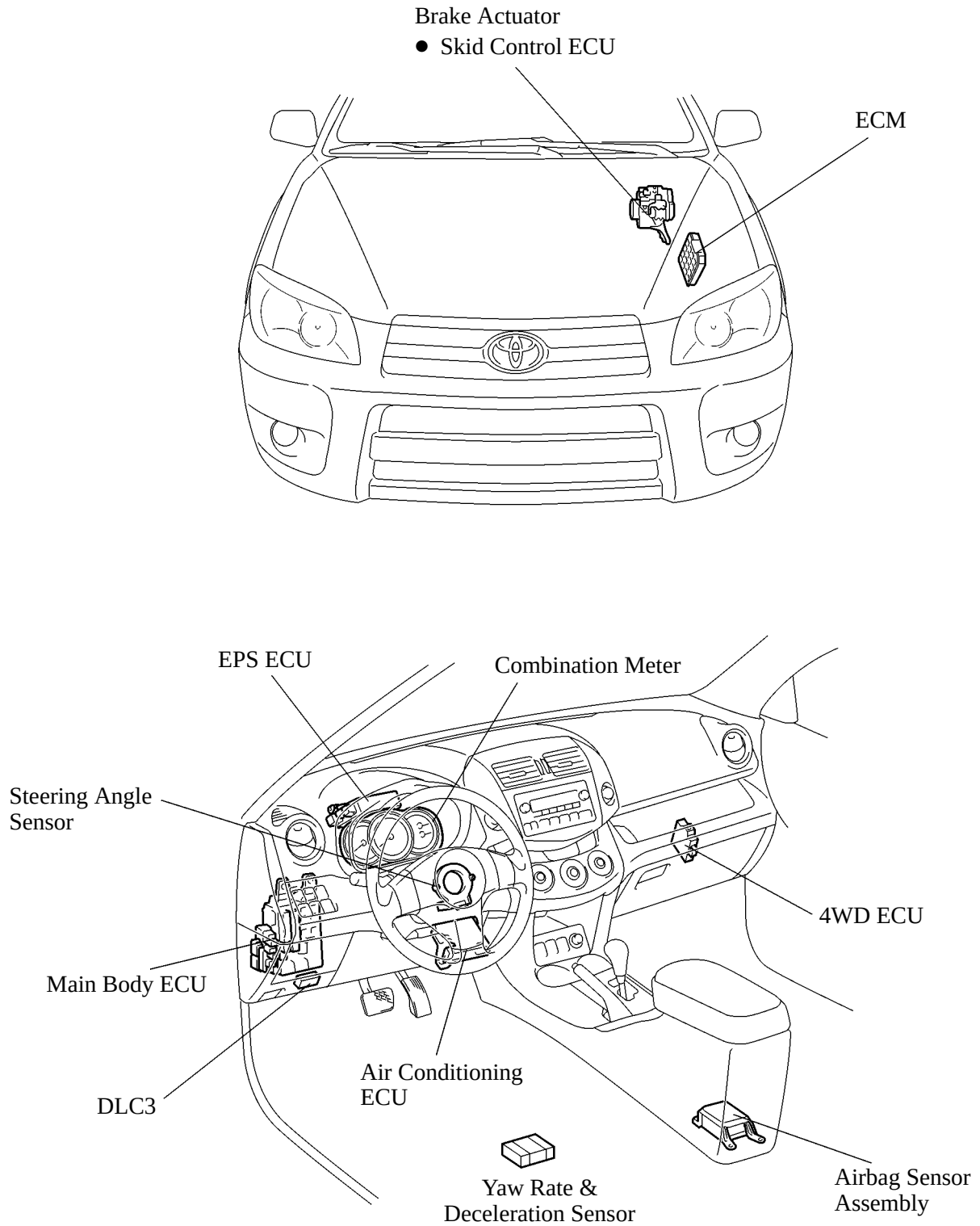
240BE03

■ CAN (Controller Area Network)

- The CAN (Controller Area Network) is a serial data communication for real time application. It is multiplex communication to be equipped for a vehicle and has communication speed (500 kbps) and the function to detect malfunction.
- The communication wire uses a twisted-pair wire. The bus line has a high line (2.5 V to 3.5 V of voltage is applied) and a low line (1.5 V to 2.5 V of voltage is applied).
- The CAN system in the '06 models is used to connect the following ECUs and parts via junction connector No. 1, No. 2, No. 3 and No. 4.

► System Diagram ◀



■ LAYOUT OF CAN COMPONENTS

■ DIAGNOSIS

If a malfunction occurs on CAN communication line, the ECU that is connected to CAN communication line stores the DTCs (Diagnostic Trouble Codes) in its memory.

- There are 2-digit DTCs and 5-digit DTCs for CAN communication.
- The 5-digit DTCs can be read by connecting a hand-held tester to the DLC3.
- The 2-digit DTCs can be read by connecting the SST (09843-18040) to TC and CG terminals of the DLC3.

For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

■ CUSTOMIZED BODY ELECTRONICS SYSTEM

A hand-held tester can change the specification of the systems or functions.

System	Hand-held Tester Display Content	Content	Default	Selection
Wireless Door Lock Remote Control System	OPEN DOOR WARN (Open door warning)	Function to make the buzzer sound for 10 seconds if the door is open when locking with the wireless door lock function.	ON	ON/OFF
	WIRELESS OPER (Wireless door lock control function)	Function to turn ON/OFF of the wireless door lock.	ON	ON/OFF
	HAZARD ANS BACK (Hazard answer back of the wireless)	Function to turn ON/OFF of the hazard answer back of the wireless door lock.	ON	ON/OFF
	AUTO LOCK DELAY (Auto lock time)	Function to change the time until relocking after unlocking with the wireless door lock.	30 s	30 s/ 60 s
	UNLOCK/2 OPER (2 times operation wireless unlock)	Function to unlock the driver's door by pressing the unlock button of the transmitter once and to unlock all the doors by pressing it twice. In the OFF setting, pressing once makes all the doors unlocked.	ON	ON/OFF
	ALARM FUNCTION (Panic function)	Function to operate the theft deterrent system by keeping pressing the lock button of the transmitter for 1.5 seconds. If there is the panic button, press the panic button instead of the lock button.	ON	ON/OFF
	WIRLS BUZZ RESP (Wireless buzzer response)	Function to turn on/off of the wireless buzzer response function.	ON	ON/OFF
Door Lock Control System	UNLK/KEY TWICE (Unlock w/2 times D key operation)	Function to unlock only the driver's door by operating the key once and to unlock all the doors by operating key twice. In the OFF setting, operating the key "UNLOCK" once makes all the doors unlocked.	ON	ON/OFF
Illuminated Entry System	LIGHTING TIME	Function to change the lighting time after closing the door. (It will quickly fade out in case of turning the ignition ON.)	15 s	7.5 s/ 15 s/ 30 s
	ILLUMI SYSTEM	Function to light up the front interior light, key illumination and foot light when one of the following occurs; ignition turn ON, door unlocked or door open.	ON	ON/OFF
	LIGHT CONTROL	Function to light up the front interior light, key illumination and foot light when the ignition switch is ON and the shift position is not P.	ON	ON/OFF
	I/L ON/UNLOCK (Interior light ON w/door key unlock)	Function to light the interior light, etc. when the door is unlocked with a transmitter, door key or door lock control switch.	ON	ON/OFF
	I/L ON/ACC OFF (Light the I/L when ACC OFF)	Function to light the interior light when the ignition switch is operated from "ACC" to "LOCK".	ON	ON/OFF

(Continued)

System	Hand-held Tester Display Content	Contents	Default	Selection
Warning	KEY REMND SOUND	Function to change the frequency of the key reminder buzzer.	Normal	Normal Fast/ Slow/ 0 s
	SEAT BELT WARN	Function to change the seat-belt warning buzzer.	D/P ON	D/P ON/ D ON/ P ON/ D/P OFF
Light Control	DRL FUNCTION	Function to turn on/off of the DRL function.	ON	ON/OFF
Air Conditioning*	SET TEMP SHIFT	Function to control with the shifted temperature against the display temperature.	Normal	+2°C/ +1°C/ Normal/ - 1°C/ - 2°C
	AIR INLET MODE	In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATED mode.	Auto	Manual/ Auto
	COMPRS/DEF OPER (Compressor/Air Inlet DEF Operation)	Function to turn the A/C ON automatically linking with the FRONT DEF button when A/C OFF.	Link	Normal/ Link
	EVAP CTRL	Function to set the evaporator control to the AUTOMATIC position (AUTO) to save power or to the coldest position (MANUAL) to dehumidify the air and to prevent the windows fogging up.	Auto	Manual/ Auto
	AUTO BLOW UP (Foot/DEF automatic blow up function)	Function to switch the blower level automatically when the defroster is ON.	ON	ON/OFF
	FOOT/DEF MODE (Foot/DEF auto mode)	Function to turn the air flow from FOOT/DEF ON automatically when AUTO MODE is ON.	ON	ON/OFF
	AMBIENT TMP SFT (Ambient Temperature Shift)	Function to control with the shifted ambient temperature against the display ambient temperature.	Normal	+3°C/ +2°C/ +1°C/ Normal/ - 1°C/ - 2°C/ - 3°C

*: Only for Models with Automatic Air Conditioning

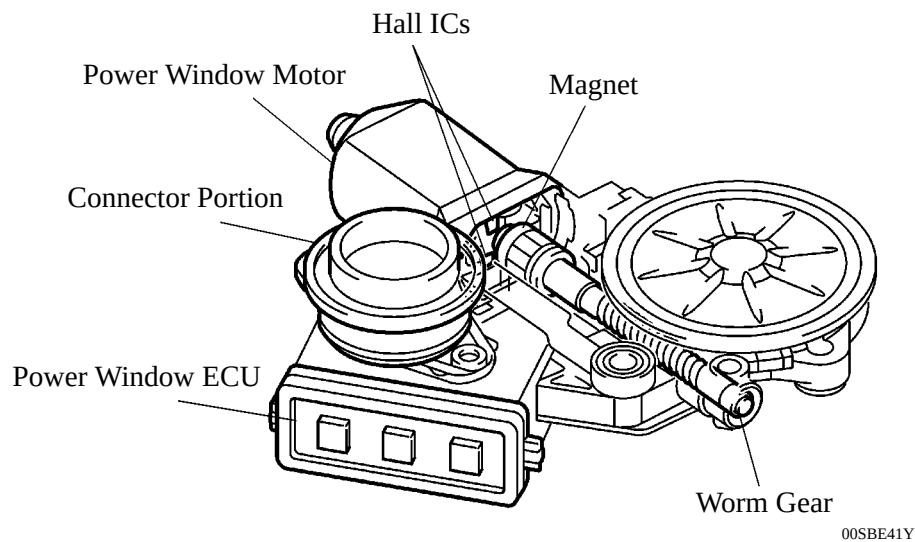
■ JAM PROTECTION FUNCTION

1. General

- The jam protection function automatically stops the power window and moves it downward if foreign object gets jammed in the door window during one-touch auto-up operation or manual-up operation.
- The mechanism uses two Hall ICs to detect the door glass position and direction of movement.
- The power window ECU is built into the power window motor assembly.
- The reverse-direction conditions and amount of down movement after jam detection are as follows: The jam protection function operates and lowers the window approximately 50 mm (1.9 in.) or until 1 second has elapsed. After this, if the amount (space) that the door glass is open has not reached approximately 200 mm (7.87 in.), the jam protection function will continue to lower the window until the space is approximately 200 mm (7.87 in.) or 5 seconds have elapsed. If the door glass reaches the fully open position before the initial 50 mm (1.9 in.) lowering of the door glass is reached, the jam protection function will stop at that time.

2. Jammed Window Detection Mechanism

- The jammed window detection mechanism consists of a magnet that is provided on the worm gear of the power window motor assembly, the power window ECU and the two Hall ICs that are provided on the connector.

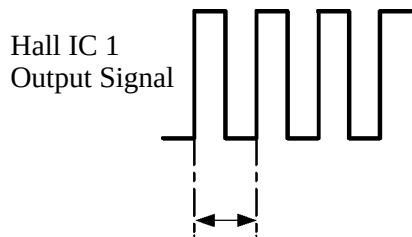


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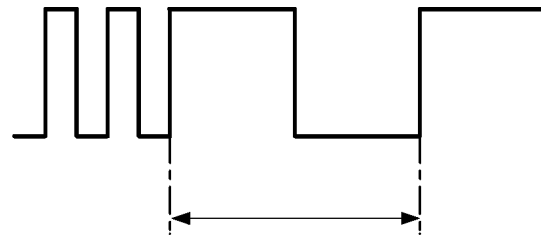
Power Window Motor Assembly

- The Hall IC converts the changes in the magnetic flux that occur through the rotation of the worm gear into block wave signals and outputs them to the power window ECU.
- To control the jam protection function, the power window ECU determines the amount of movement and the jamming of the window glass from the pulse signals from the Hall IC 1, and the moving direction of the window glass from the phase difference between the pulses from the Hall IC 1 and Hall IC 2.

► **Judgment of Amount of Movement and Jamming of Window Glass** ◀

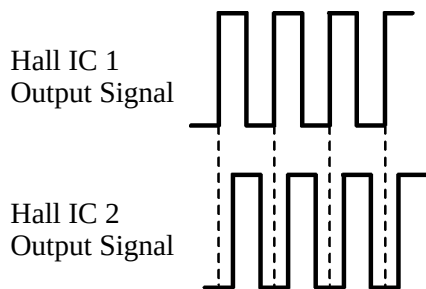


**Power Window Motor
1 Revolution (Normal)**

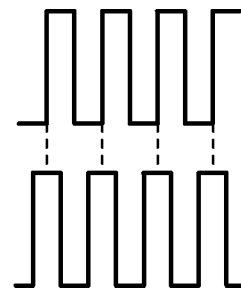


**Power Window Motor
1 Revolution (Jammed)**

232BE34



Window Glass Up



Window Glass Down

232BE35

Service Tip

If the power window motor assembly and power window regulator assembly are replaced, the window position information stored in the system will be lost, and the system must be initialized. After replacing the above parts, initialize the system by performing the steps described below.

- 1) Turn the ignition switch ON, and fully open the driver's window. Continue to hold down the switch for at least 1 second after the window has fully opened*.
- 2) Hold the AUTO switch in the auto up position. Continue to hold the AUTO switch in the auto up position for approximately 1 second after the window has fully closed. The system will memorize the window's fully closed position as the initial position.

For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

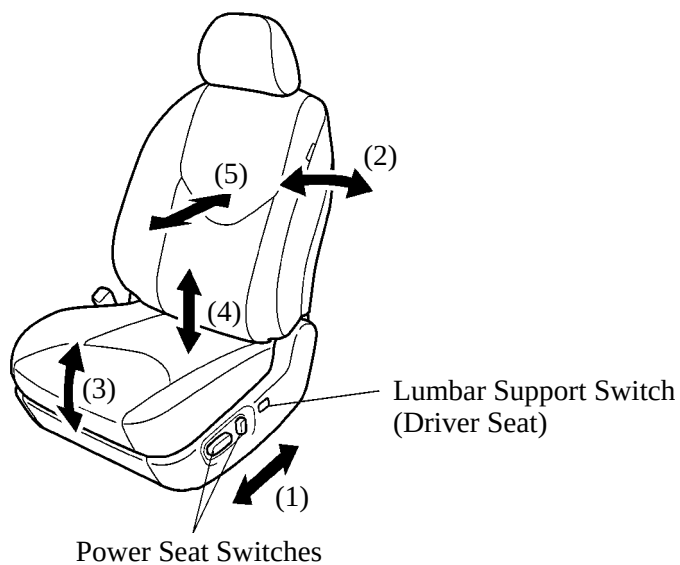
*: When the window reaches its fully open position, the indicator light will change from flashing to illumination, in order to indicate that the window is in the fully open position. However, this does not indicate that the initialization of the system has been completed.

POWER SEAT SYSTEM

DESCRIPTION

- The power seat is used for driver seat on the Limited grade as standard equipment.
- The following features are all for power functions.

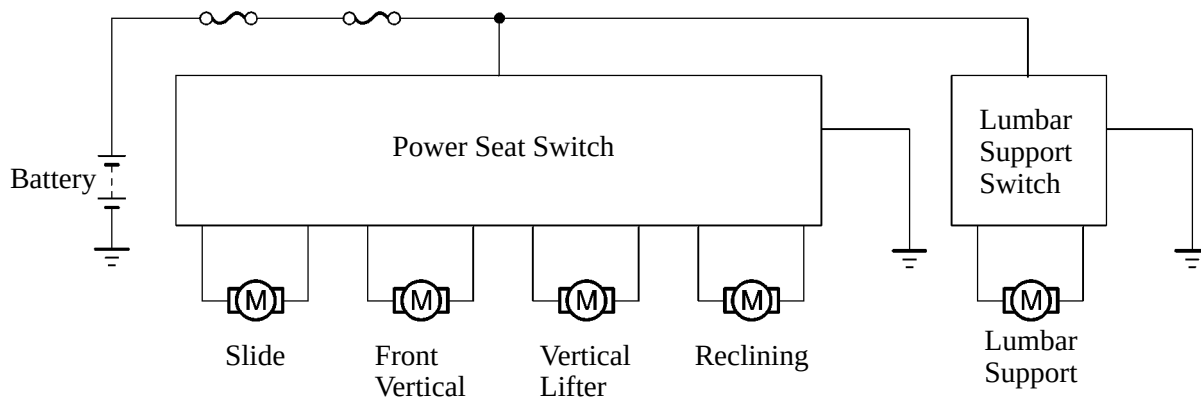
Power Adjustment Function			Stroke
			Driver
(1)	Fore-and-aft Slide	mm (in.)	240 (9.45)
(2)	Reclining	degrees	78
(3)	Front Vertical	degrees	10
(4)	Vertical Lifter	mm (in.)	45 (1.77)
(5)	Lumbar Support (Driver Seat)	mm (in.)	38.4 (1.51)



Driver Seat

01NBE132Y

► System Diagram ◀



211BE41

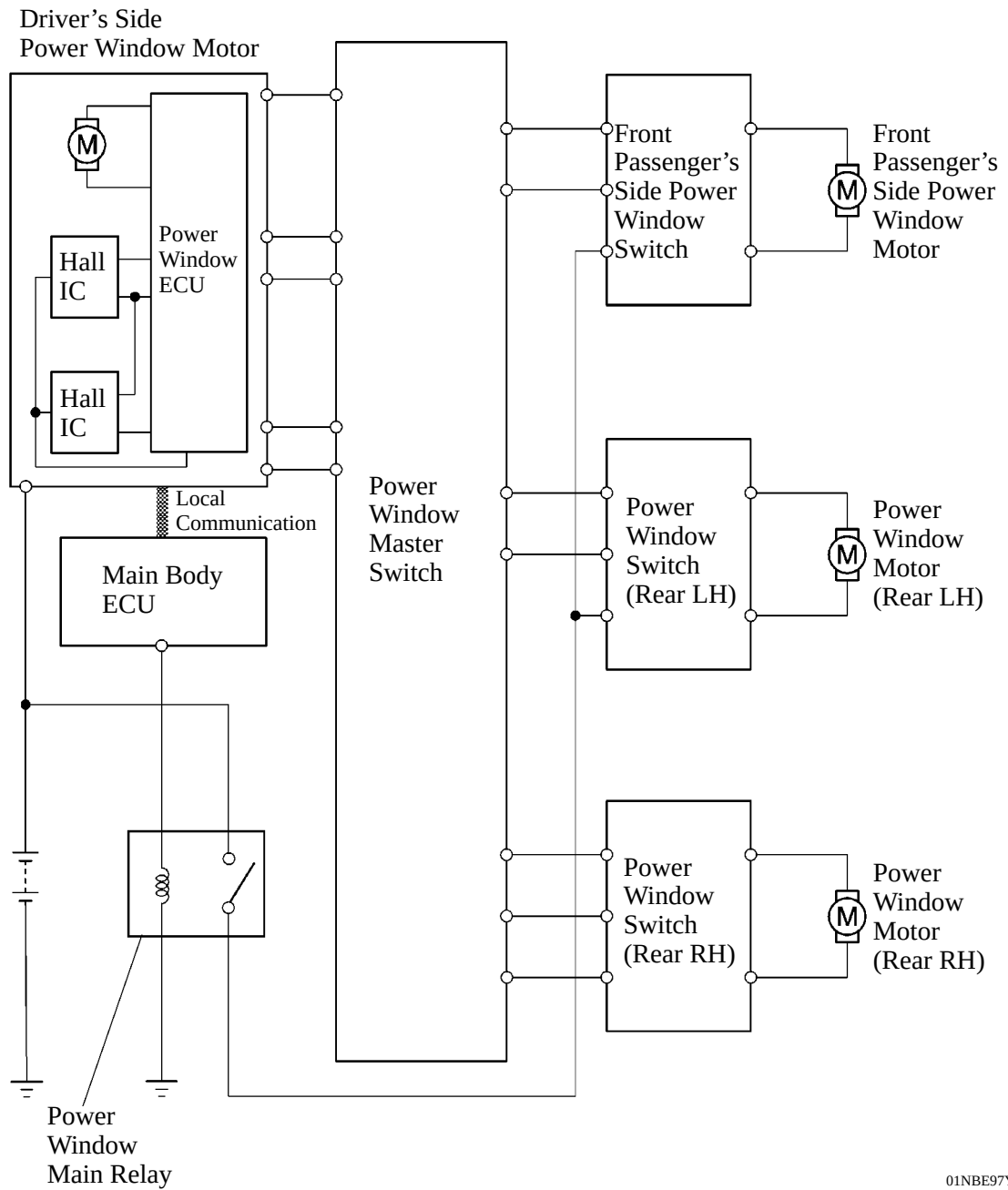
POWER WINDOW SYSTEM

■ DESCRIPTION

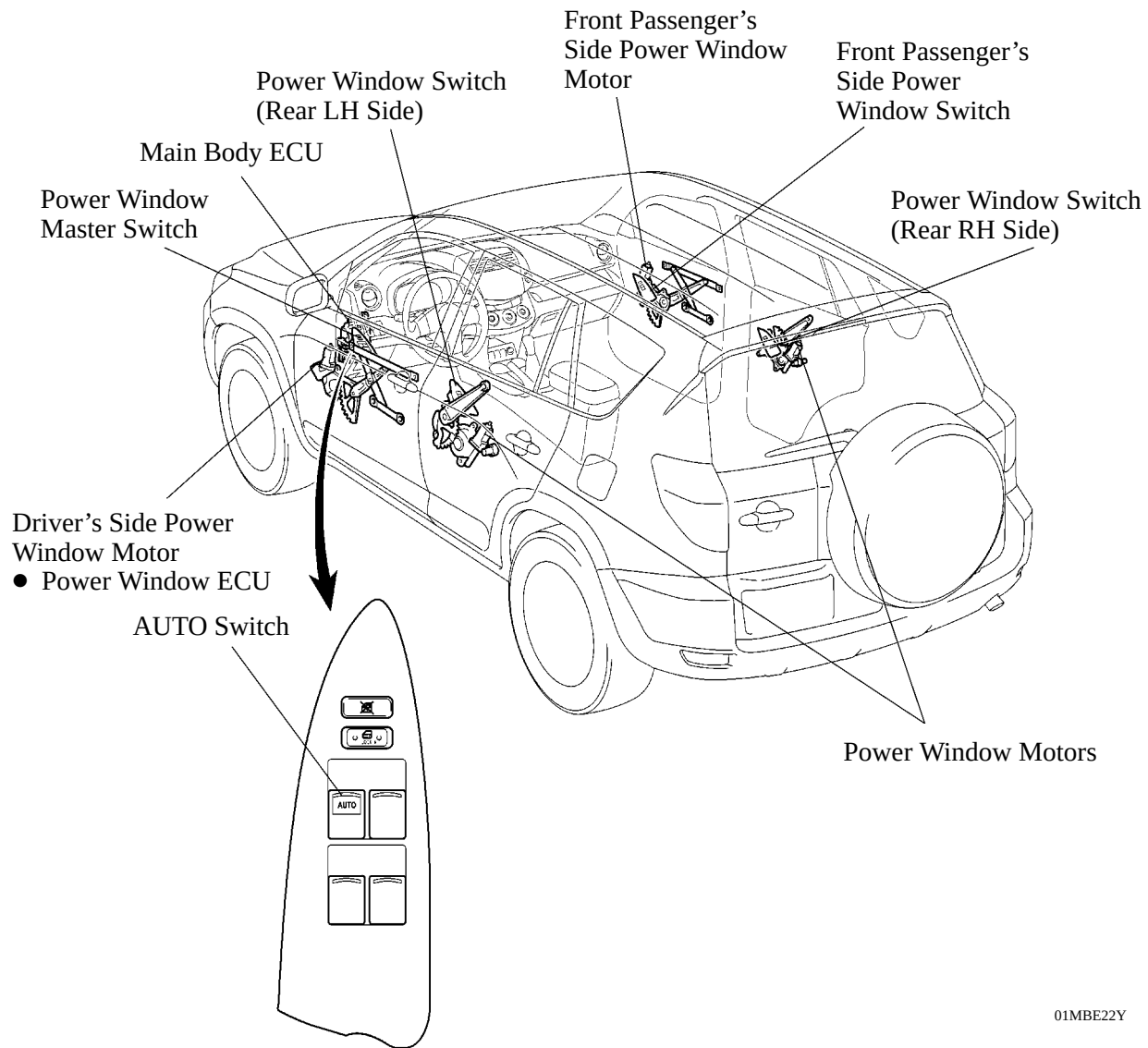
- The power window system is standard equipment on all models.
- The power window system has the following functions:

Function	Outline
Manual-up-and-down Function	The manual-up-and-down function causes the window to open or close while the power window switch is being pulled halfway up or pushed halfway down. The window stops as soon as the switch is released.
Driver's Door One-touch Auto Up-and-down Function	The driver's door one-touch auto up-and-down function is used in the driver's window. The driver's one-touch auto up-and-down function automatically opens or closes the driver's door window fully.
Key Off Operation	This function makes it possible to operate the power window for approximately 43 seconds after the ignition switch is turned OFF, if the driver's door is not opened.
Jam Protection Function	The jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in the driver's door window during one-touch auto-up operation or manual-up operation.
Remote Control Function	The up-and-down operations of the front passenger's door window and the rear door windows can be controlled by operating the power window master switch.

► System Diagram ◀



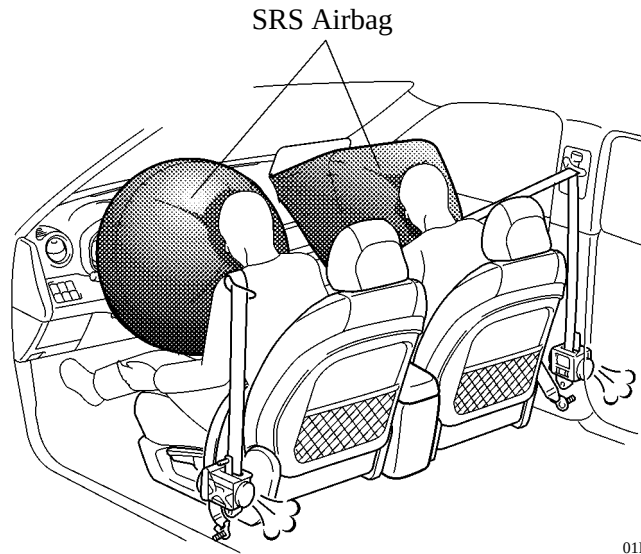
01NBE97Y

■ LAYOUT OF MAIN COMPONENTS

SAFETY

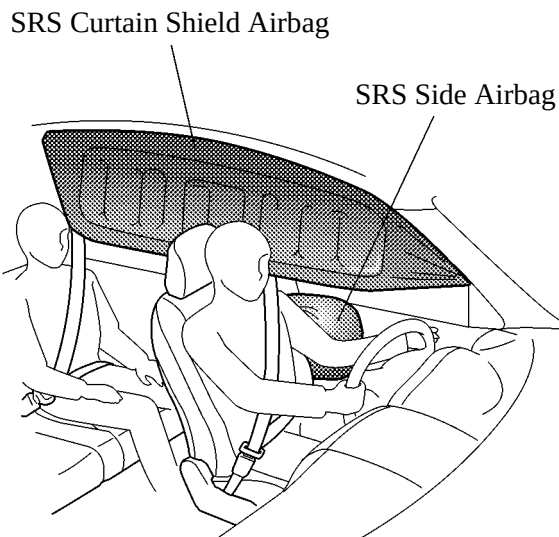
SRS Airbag System

- Dual-stage SRS (Supplemental Restraint System) airbags are standard equipment for the driver and front passenger seats. In the event of a severe frontal collision, the airbags function with the seat belts to help reduce the impact on the driver's and front passenger's heads and chests. The seat position sensor is used only for the driver's seat to help the SRS driver side air bag deploy at the right moment.



01MBE16Y

- The SRS side airbags (driver and front passenger seats) which help reduce side impacts are available as optional equipment.
- The SRS curtain shield airbags (front and rear seats) which help reduce side impacts are available as optional equipment.



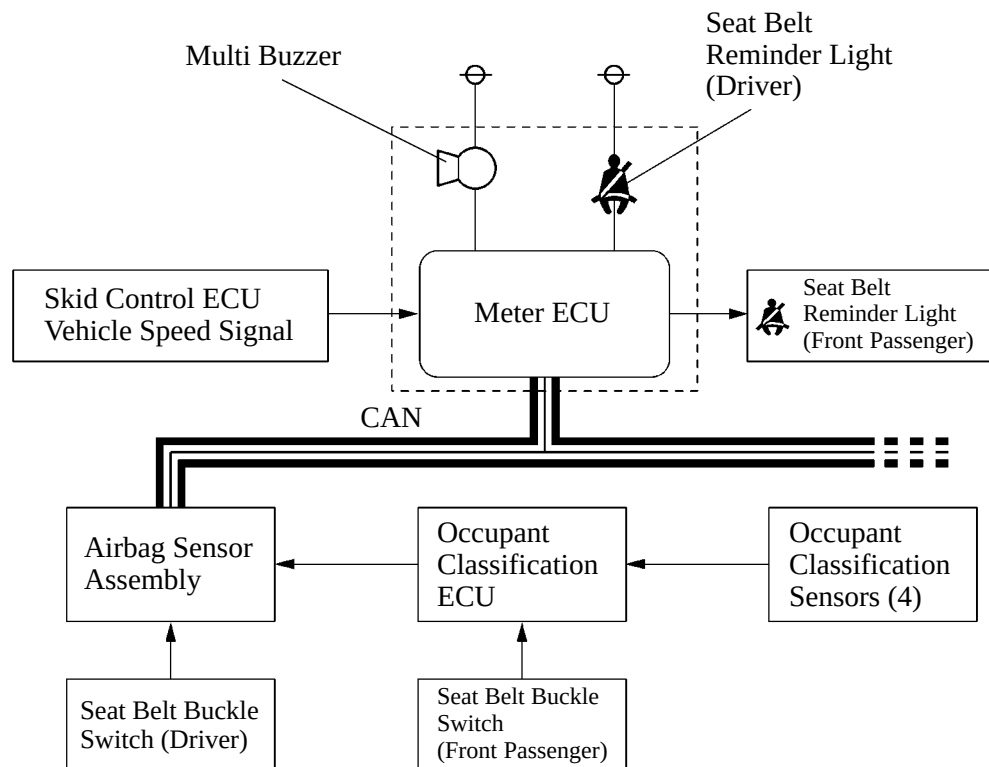
01NBE06Y

SEAT BELT REMINDER SYSTEM

DESCRIPTION

- A seat belt reminder system is used. If the seat belt is not buckled, the reminder light flashes and the multi buzzer sounds. [The multi buzzer will sound for approximately 30 seconds when the vehicle speed reaches 12 mph (20 km/h) or more.]
- When the ignition switch is turned ON, this system determines whether or not the seat belt is buckled depending on whether the signal from the seat belt buckle switch is on or off.
- The '06 models use the front passenger occupant classification system to detect the presence of an occupant in the front passenger seat. The airbag sensor assembly transmits the resultant detection signal to the meter ECU via the CAN. For details on the front passenger occupant classification system, see page BE-59.

► System Diagram ◀



01MBE05Y

Service Tip

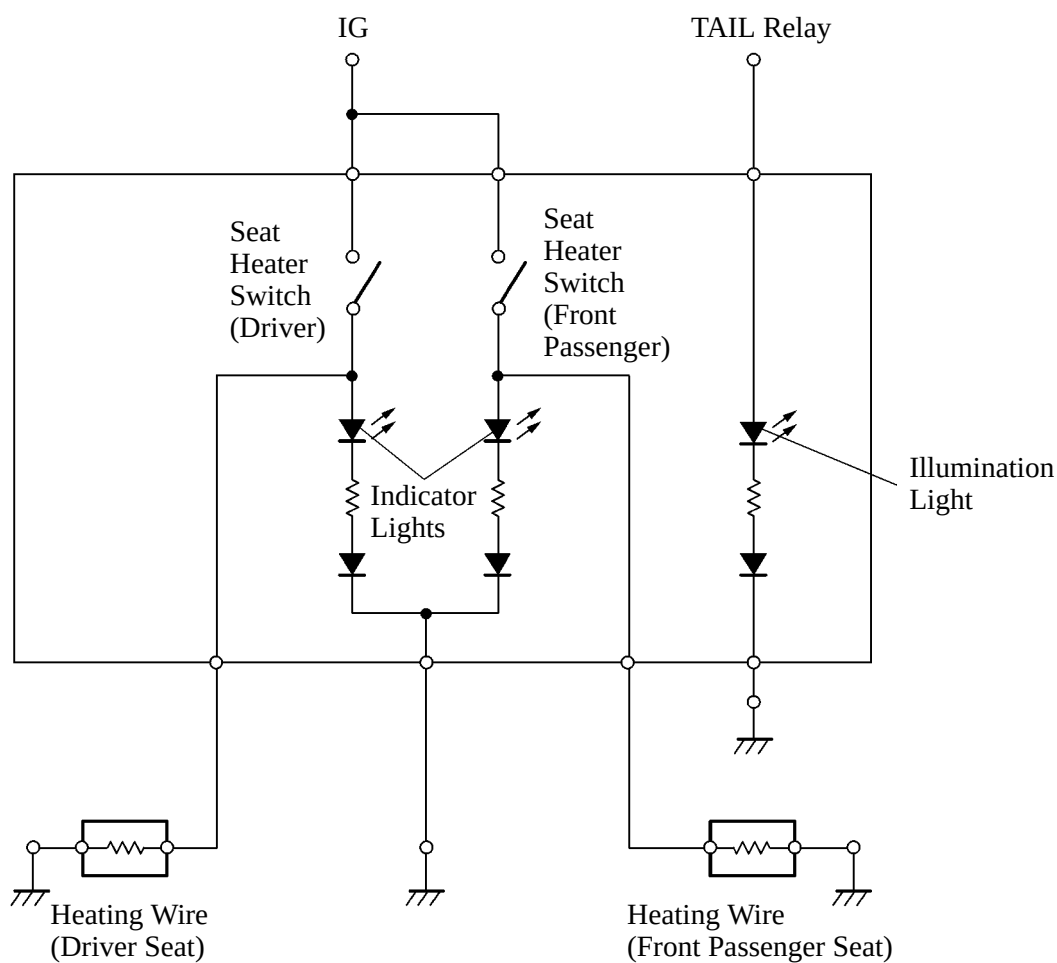
Upon receiving a request from a user who cannot wear a seat belt for a special reason, the buzzer reminder may be canceled through the use of the hand-held tester.
Refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

SEAT HEATER

DESCRIPTION

- The seat heater for the driver and front passenger seats are provided as optional equipment on the Limited grade.
- By operating the dial-type seat heater control switch, which is located on the center console, the temperature can be controlled steplessly within the range of 30 °C to 42 °C (86 °F to 108 °F).
- Whether the seat heater is ON or OFF can be determined by illuminating condition of the indicator light of the seat heater control switch.

► System Diagram ◀



01NBE84Y

■ FUNCTION

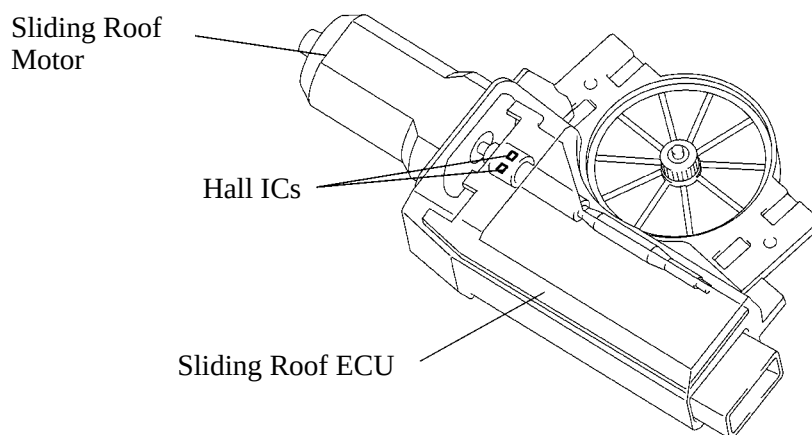
1. General

The sliding roof has following functions:

Function	Outline
Manual Open-and-close	This function causes the sliding roof to open (or close) when the SLIDE OPEN switch (or SLIDE CLOSE switch) is pressed for a maximum of 0.3 seconds. The sliding roof stops as soon as the switch is released.
One-touch Auto Open-and-close	This function causes the sliding roof to be fully opened (or closed) when the SLIDE OPEN switch (or SLIDE CLOSE switch) is pressed for a minimum of 0.3 seconds.
Manual Tilt Up-and- down	This function causes the sliding roof to tilt up (or tilt down) when the TILT UP switch (or TILT DOWN switch) is pressed for a maximum of 0.3 seconds. The sliding roof stops as soon as the switch is released.
One-touch Auto Tilt Up-and-down	This function enables the sliding roof to be fully tilted up (or down) when the TILT UP switch (or TILT DOWN switch) is pressed for a minimum of 0.3 seconds.
Jam Protection	This function automatically stops the sliding roof and moves it open half way (or fully tilt up) if a foreign object gets jammed in the sliding roof during one-touch auto-close operation (or one-touch auto tilt down operation).
Key-ff Operation	This function makes it possible to operate the sliding roof for approx. 43 seconds after the ignition switch is turned to ACC or OFF, if the front doors are not opened.

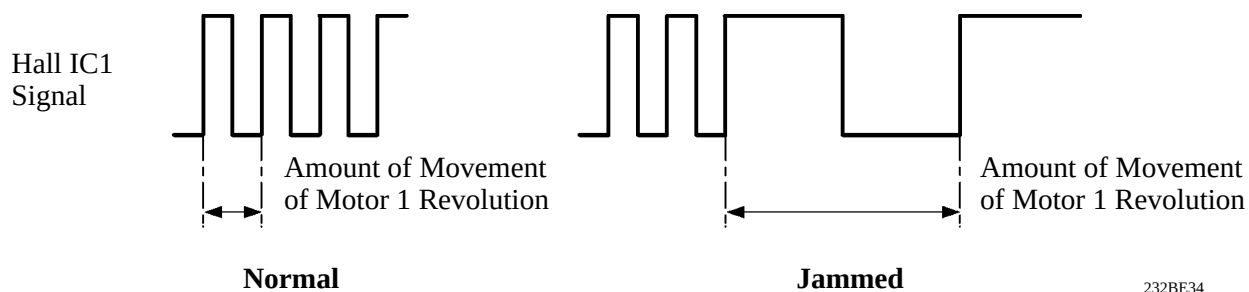
2. Jam Protection Function

- The Hall IC converts the changes in the magnetic flux that occur through the rotation of the worm gear into pulse signals and outputs them to the ECU.

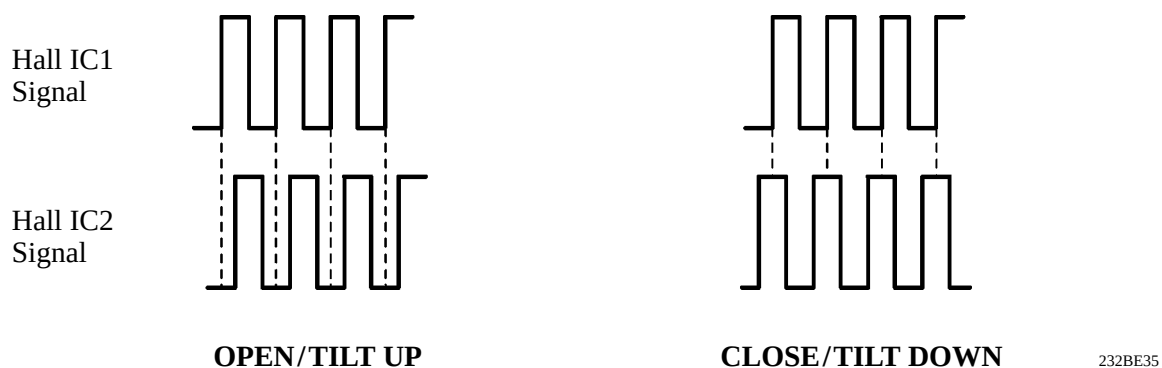


- To control the jam protection function, the ECU determines the amount of movement and the jamming of the sliding roof from the pulse signals from the Hall IC1, and the moving direction of the sliding roof from the phase difference between the pulses from the Hall IC1 and Hall IC2.

► **Judgment of Amount of Movement and Jamming** ◀



► **Judgment of Moving Direction** ◀

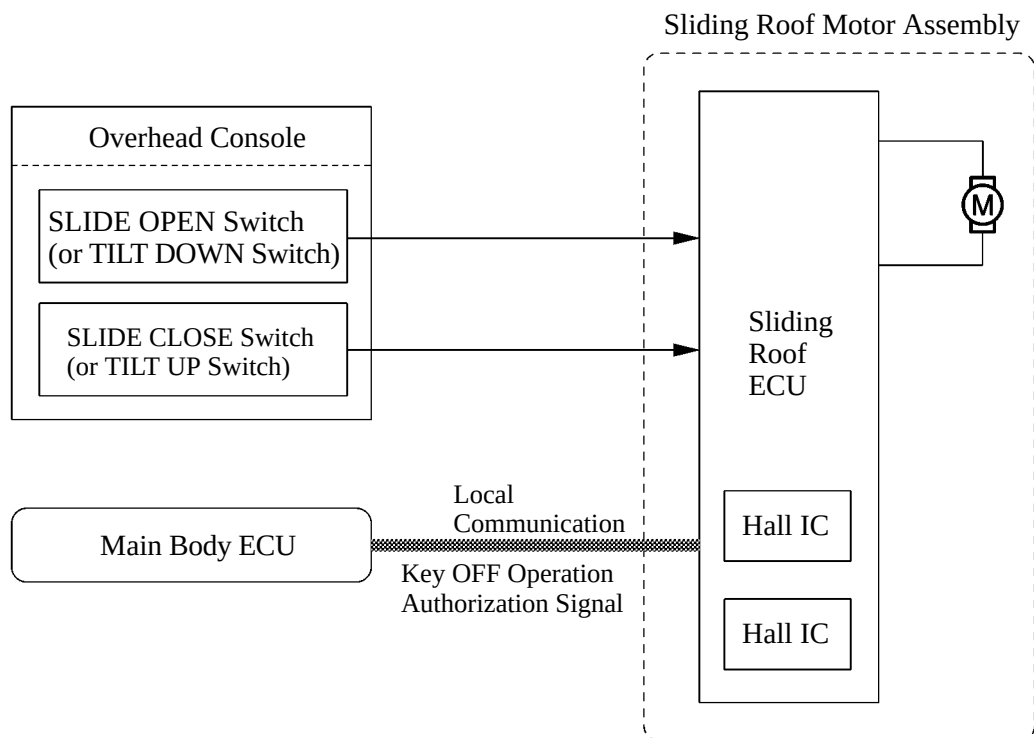


SLIDING ROOF SYSTEM

DESCRIPTION

- The sliding roof system is optional equipment on the Limited grade and Sport grade.
- A jam protection function has been provided.
- The '06 models use pulse sensors (Hall ICs) to detect the sliding roof position.
- The sliding roof motor assembly consists of a sliding roof motor, sliding roof ECU, drive gear, etc. The gear cover is integrated with the front housing, and the drive gear and the worm wheel are integrated in order to achieve a simpler construction.

► System Diagram ◀



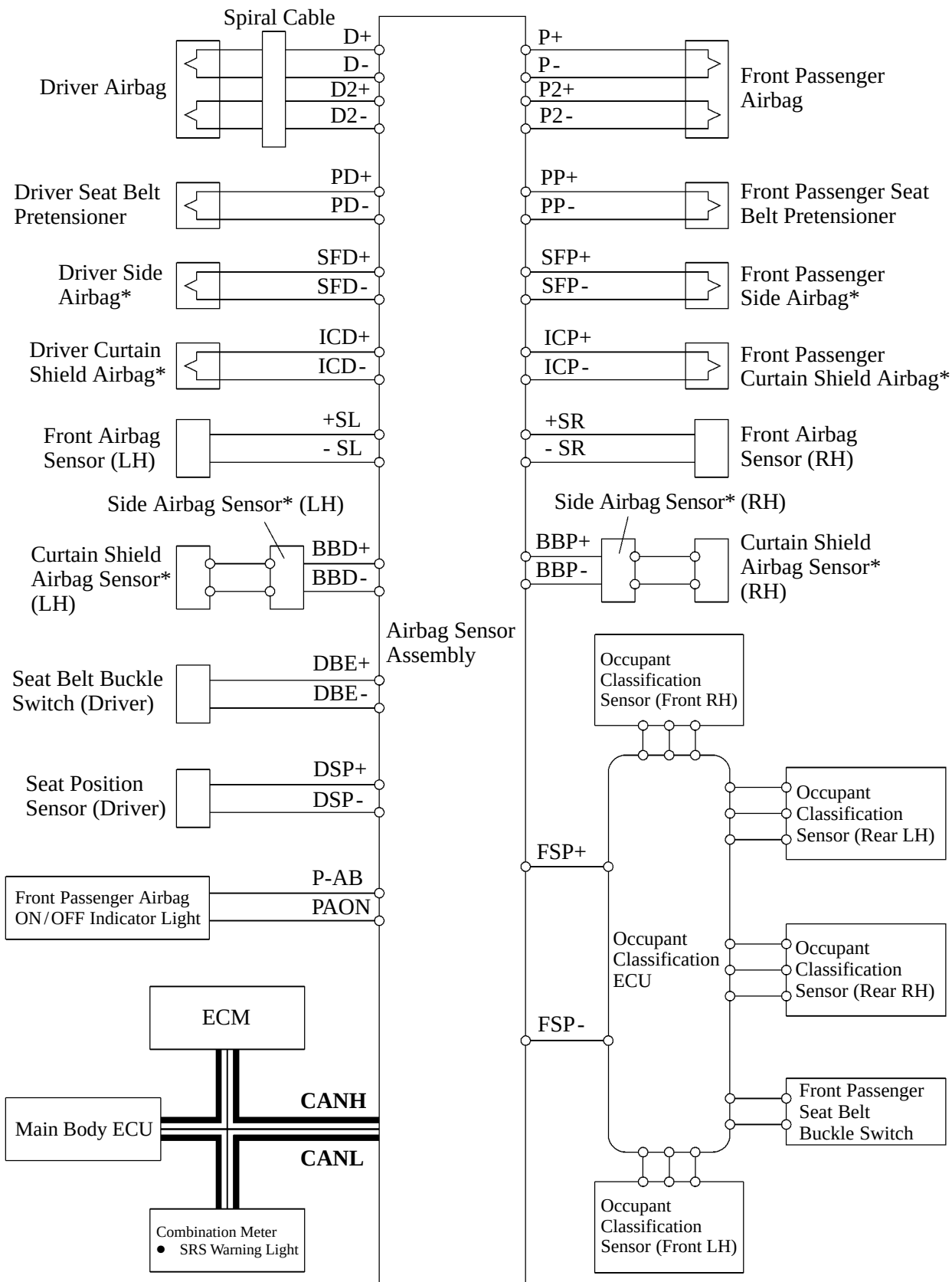
01NBE126Y

Service Tip

The sliding roof ECU memorizes the initial position of the sliding roof. Therefore, the data will be lost if the sliding roof motor assembly is removed, thus enabling the sliding roof to be operated only manually. Reinstalling the sliding roof motor, initialize the system by performing the steps described below.

- As a precondition to the initialization, the sliding roof must be tilted up to the fully open position.
- With the ignition switch ON, keep the TILT UP or SLIDE CLOSE switch pressed. This will enable the sliding roof ECU to start initializing and perform the tilt up, tilt down, open, and close operations of the sliding roof in sequence.
- The initialization process ends when the close operation is completed.
- Keep the TILT UP or SLIDE CLOSE switch pressed during initialization. If the TILT UP or SLIDE CLOSE switch is released during initialization, the system will not be able to complete the initialization. If this occurs, the aforementioned steps must be performed again.

■ WIRING DIAGRAM



01MBE26Y

*: Only for Models with Driver, Front Passenger, Side and Roll Sensing of Curtain Shield Airbags

■ AIRBAG FOR SIDE/REAR SIDE COLLISION

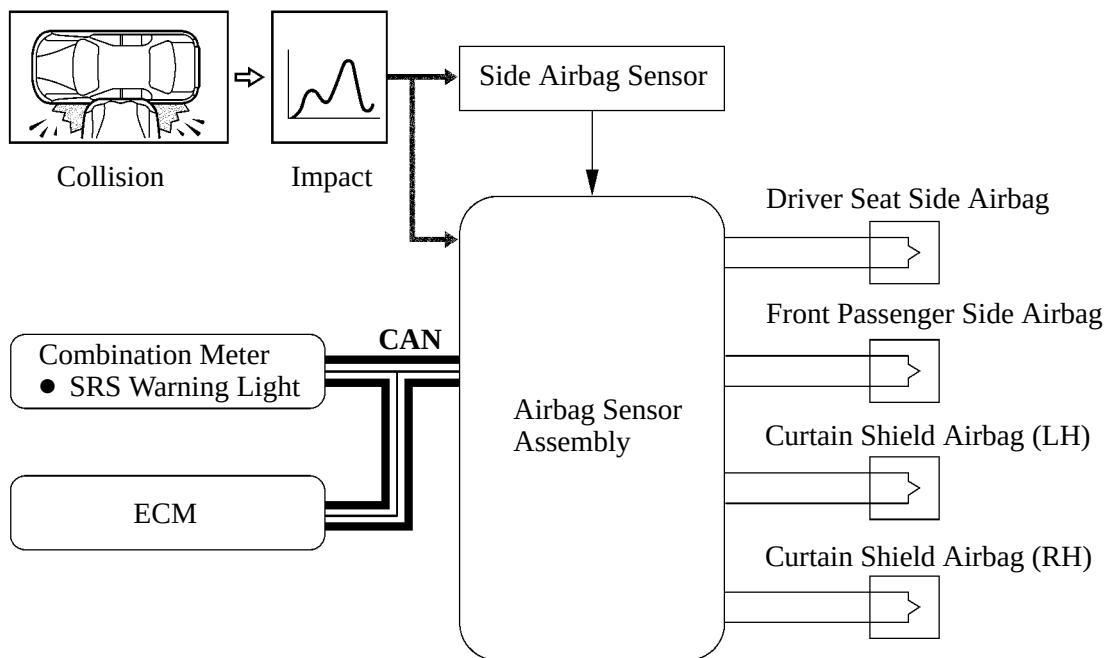
1. General

The airbag for side collisions contains two airbags: side and curtain shield airbags. These airbags deploy simultaneously. The airbag for rear side collisions contains only the curtain shield airbag.

- With the airbag for side collisions, if the side airbag sensor detects an impact, it informs the airbag sensor assembly, and the airbag sensor assembly causes the side and curtain shield airbags to be deployed simultaneously.
- With the airbag for rear side collisions, if the curtain shield airbag sensor detects an impact, it informs the airbag sensor assembly via the side airbag sensor, and the airbag sensor assembly causes the curtain shield airbag to be deployed.

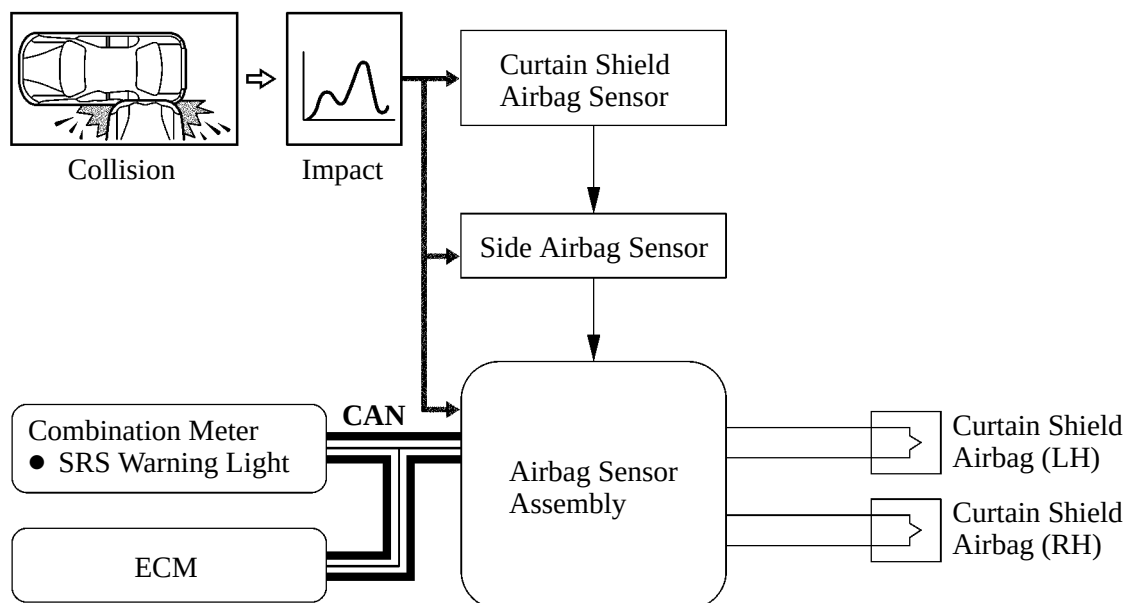
► System Operation ◀

Airbag for Side Collision



00RBE18Y

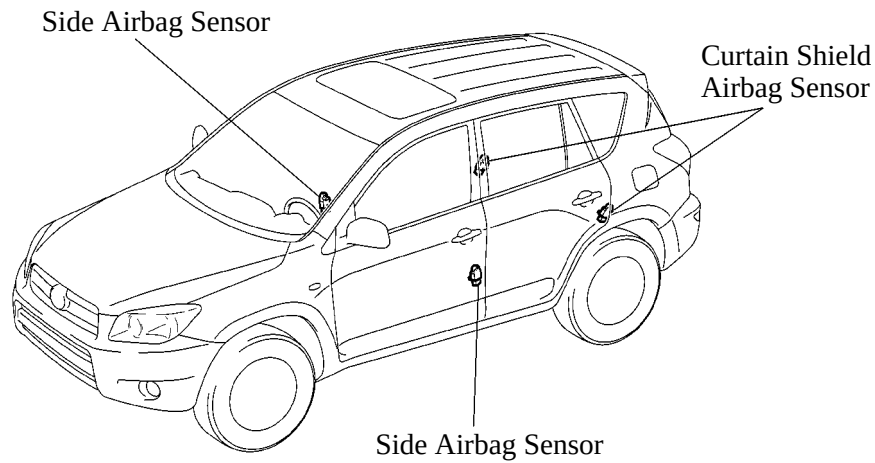
Airbag for Rear Side Collision



00SBE46Y

2. Side Airbag Sensor and Curtain Shield Airbag Sensor

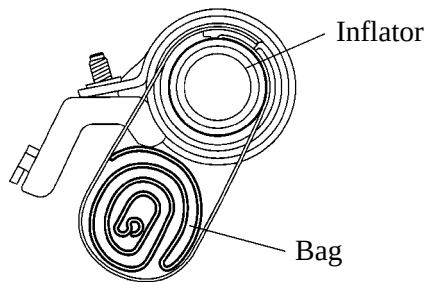
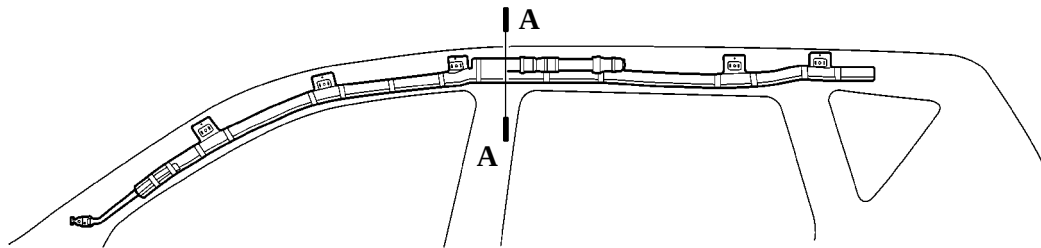
The deceleration sensor is enclosed in each side and curtain shield airbag sensor. Based on the deceleration of the vehicle during a side or side rear collision, a distortion is created in the sensor and converted into an electrical signal.



01NBE09Y

3. Curtain Shield Airbag

A rear side collision is detected by the curtain shield airbag sensor in order to deploy the curtain shield airbag.



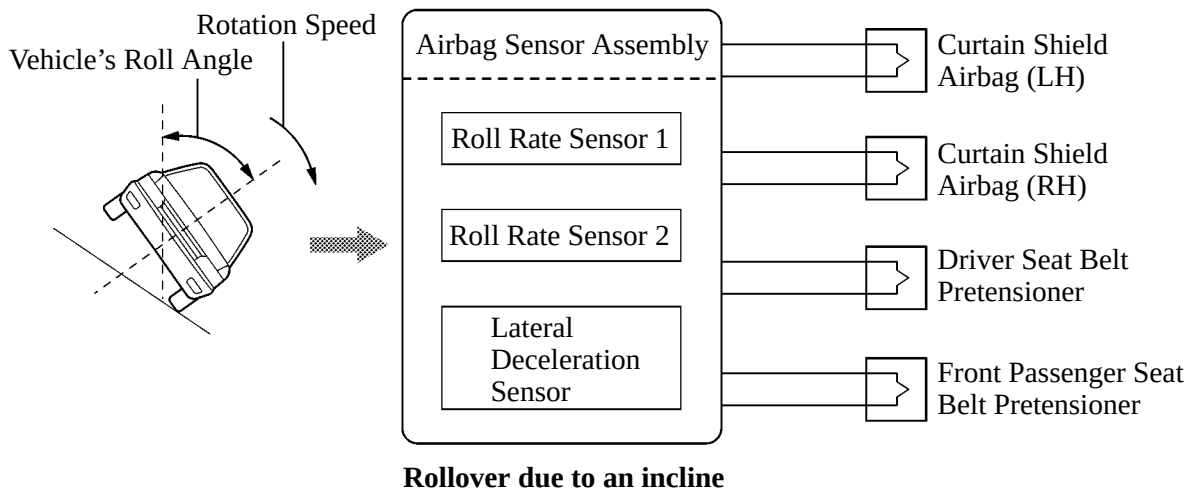
A - A Cross Section

01NBE124Y

AIRBAG FOR ROLLOVER

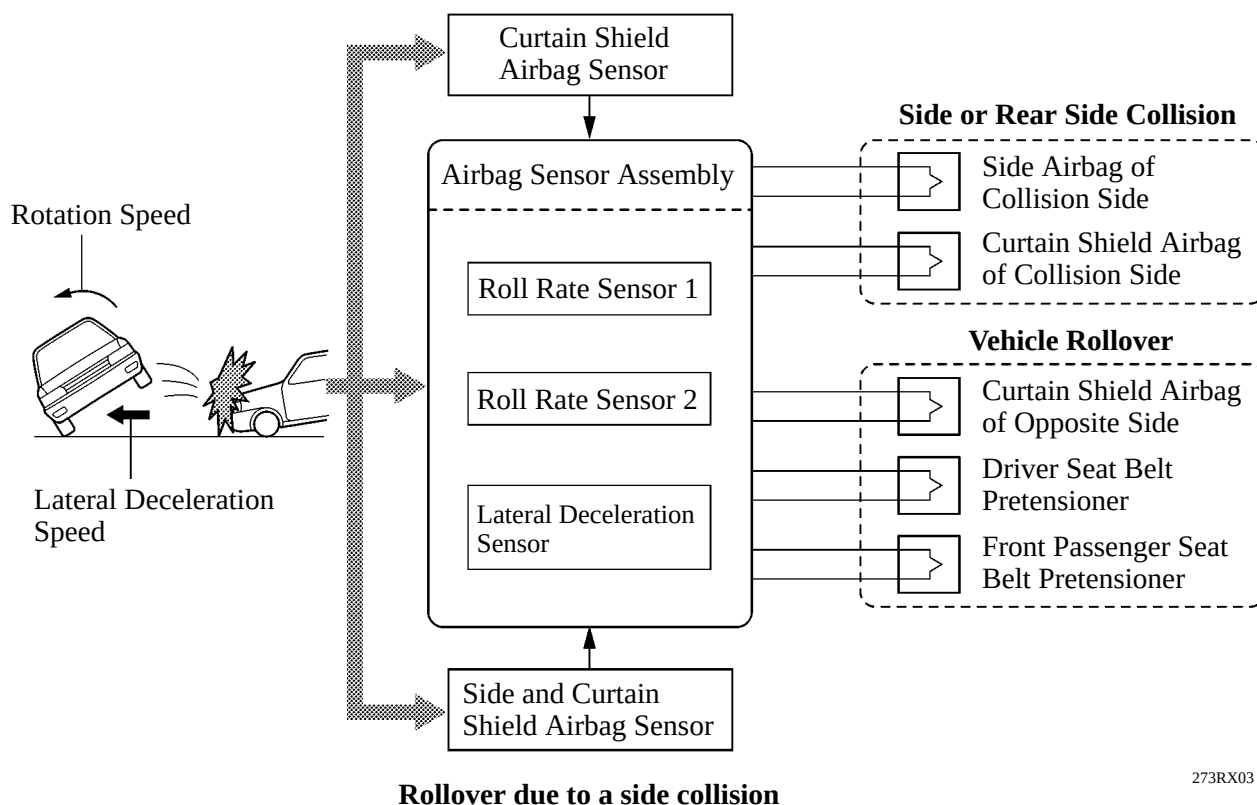
When the vehicle is rolling sideways, the RSCA (Roll Sensing of Curtain shield Airbag) helps to reduce the impact that is applied to the occupants by operating the left and right curtain shield airbags and the seat belt pretensioners for the driver and front passenger.

- If the vehicle rolls over due to an incline, the two roll rate sensors and lateral deceleration sensor that are built into the airbag sensor assembly detect the vehicle's roll angle, rotation speed and lateral deceleration speed.



273RX02

- If the vehicle has rolled over due to a side or rear side collision, the side and curtain shield and/or curtain shield airbag sensors detect the impact of the collision and deploy the side and/or curtain shield airbags on the collision side. Rollover is detected by the two roll rate sensors and lateral deceleration sensor, and airbag sensor assembly deploys the curtain shield airbag on the opposite side of the collision and the driver and front passenger seat belt pretensioners.



273RX03

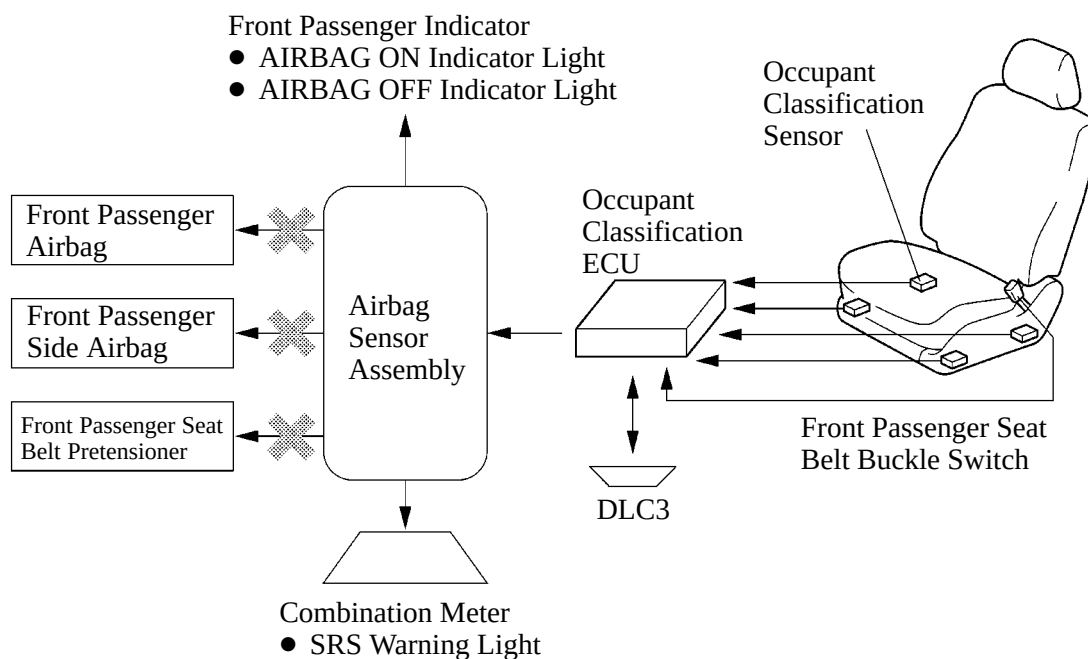
■ FRONT PASSENGER OCCUPANT CLASSIFICATION SYSTEM

1. General

The front passenger occupant classification system judges whether the front passenger seat is occupied by an adult or child (with child seat) or is unoccupied, in accordance with the load that is applied to the front passenger seat and whether the seat belt is buckled. Thus, it restricts the deployment of the front passenger airbag, front passenger side airbag, and the front passenger seat belt pretensioner. In addition, the system informs the driver of the result of the judgment through the use of the AIRBAG ON/ OFF indicator lights.

- This system consists of the occupant classification ECU, four occupant classification sensors, AIRBAG ON/OFF indicator lights, seat belt buckle switch, and airbag sensor assembly.

► System Diagram ◀



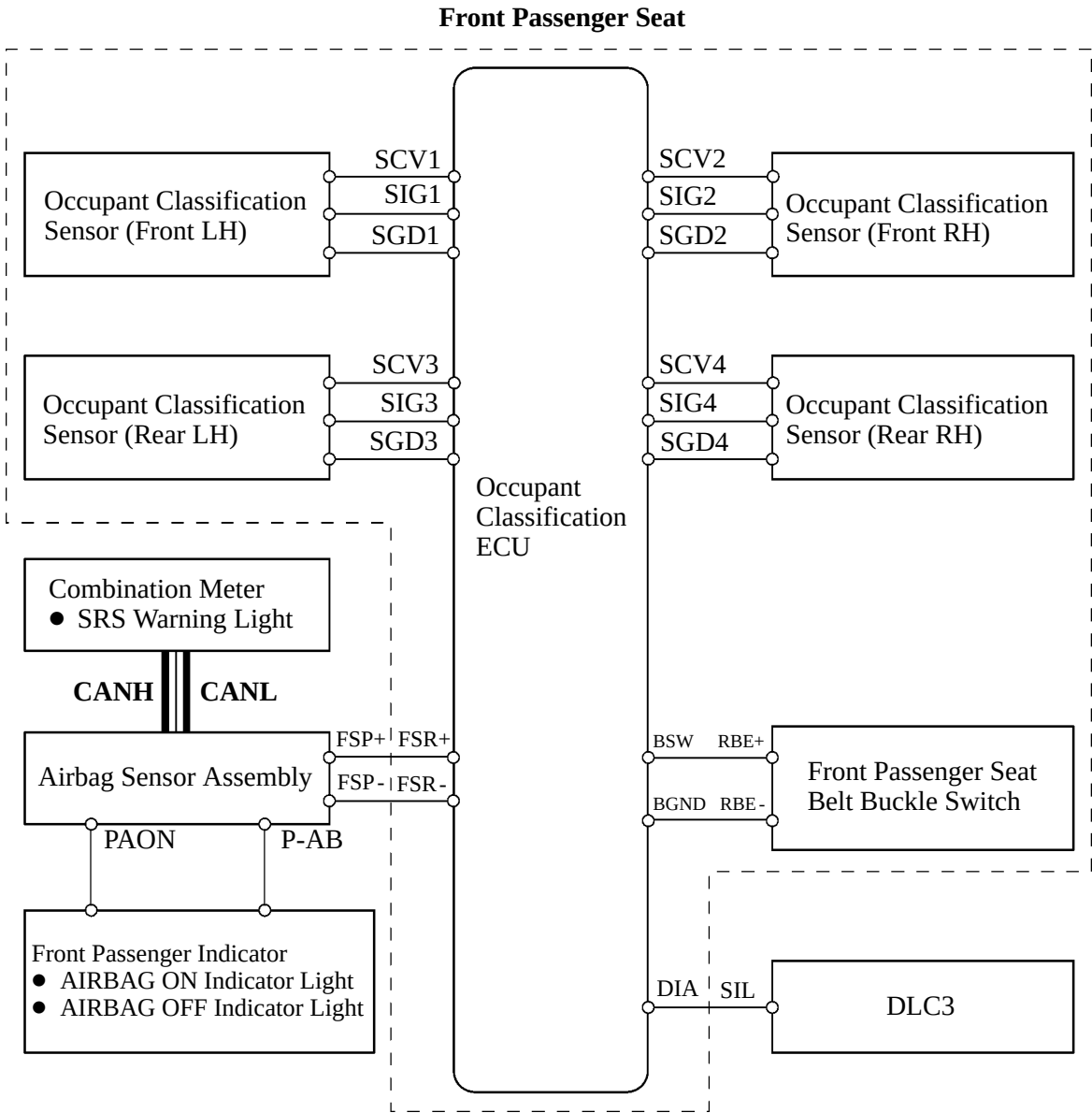
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Service Tip

- When installing items to the front passenger seat or removing/installing the front passenger seat, connect the hand-held tester and be sure to perform a system check and perform a zero-point calibration of the sensor load value.
- If the maintenance is performed due to the SRS warning light being on constantly or due to a collision, in addition to the above item, check that the hand-held tester display value indicates within the range of 30 kg (66 lb) +/- 3 kg (6.6 lb) when a 30 kg (66 lb) weight is placed on the front passenger seat.

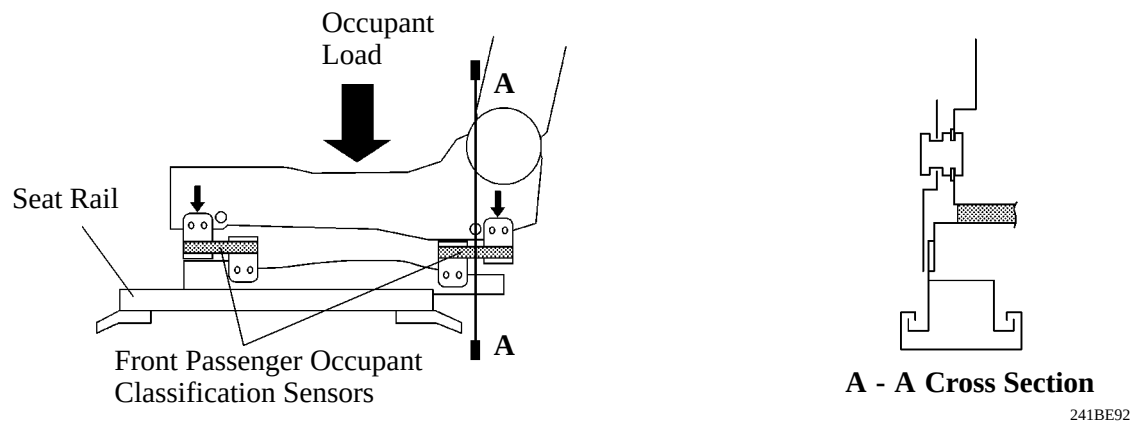
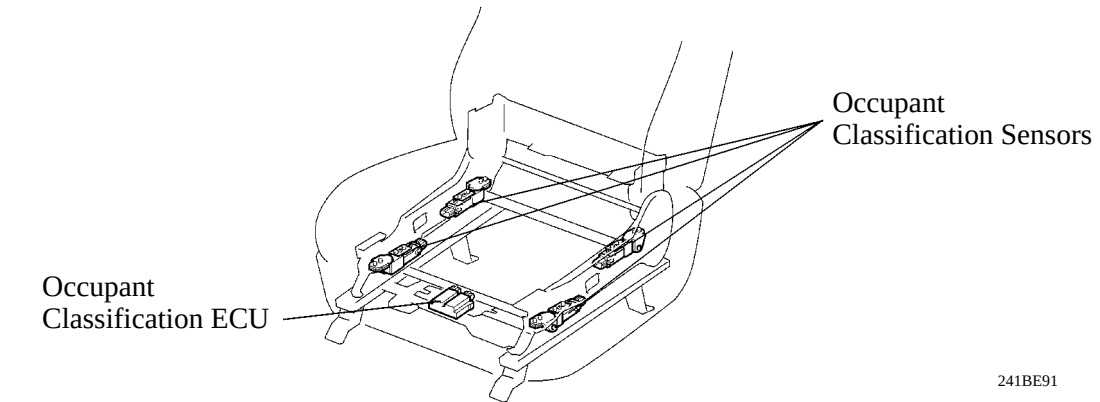
For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

2. Wiring Diagram

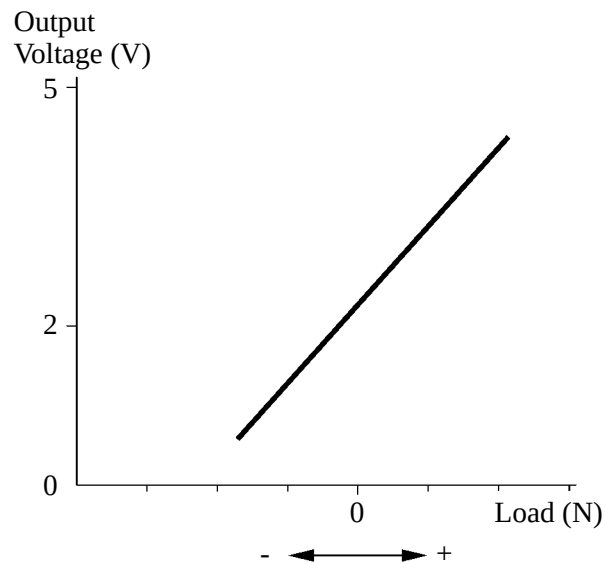


3. Occupant Classification Sensor

The occupant classification sensors are installed on 4 brackets connecting the seat rail and seat frame. Accordingly, when load is applied to the front passenger seat by an occupant sitting in it, the occupant classification sensors register a distortion.



- The occupant classification sensors register a change in resistance value in response to a distortion. Accordingly, the occupant classification sensors output a voltage to the occupant classification ECU in response to the weight (load) of the front passenger seat occupant.



4. System Operation

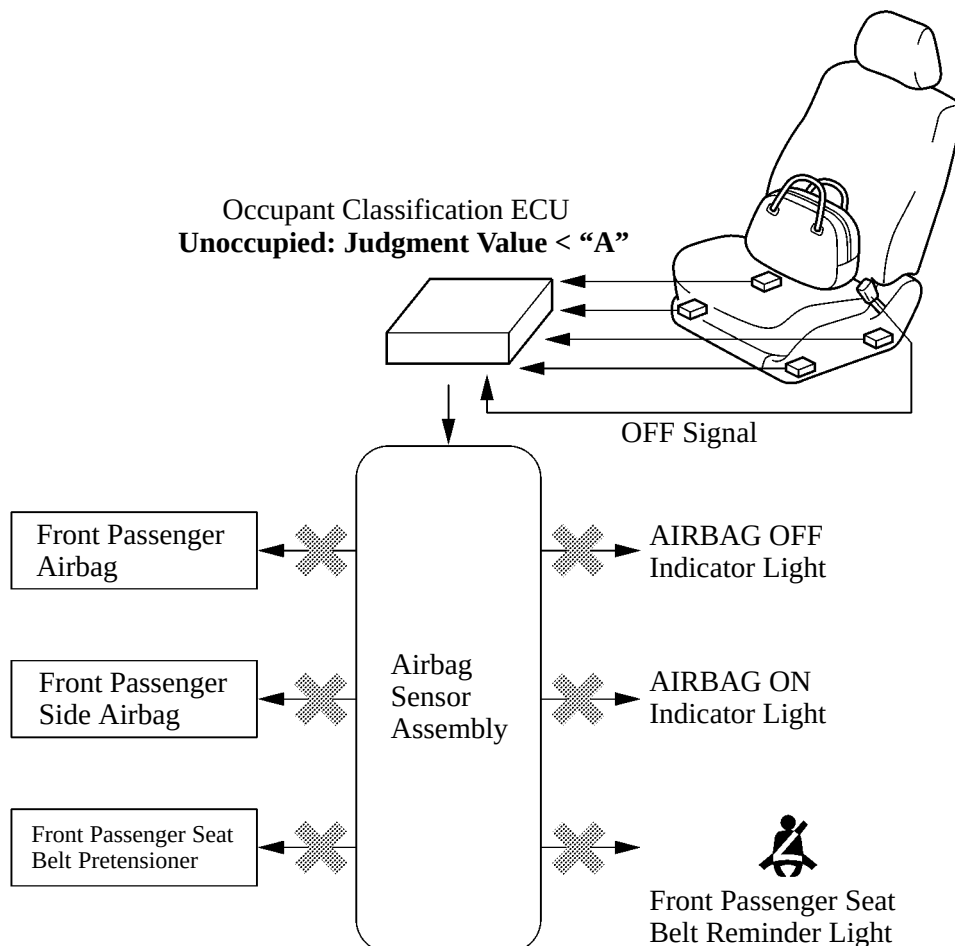
General

This system makes the following judgments: unoccupied judgment, child seat judgment, child judgment, and adult judgment. In addition, it performs an initial check to check the circuit of the AIRBAG ON/OFF indicator lights when the ignition switch is ON.

- The occupant classification ECU constantly monitors the weight of the front passenger seat, and makes a judgment in accordance with the signals from the occupant classification sensor and the state of the seat belt buckle switch, regardless of the position of the ignition switch.
- The occupant classification ECU contains criteria value “A” to judge whether the seat is being occupied by a child or a child seat in accordance with the signals from the four occupant classification sensors and seat belt buckle switch, and criteria value “B” to judge whether the occupant is an adult or child (with child seat).
- The occupant classification ECU makes an occupied or unoccupied judgment in accordance with the signals from the seat belt buckle switch.

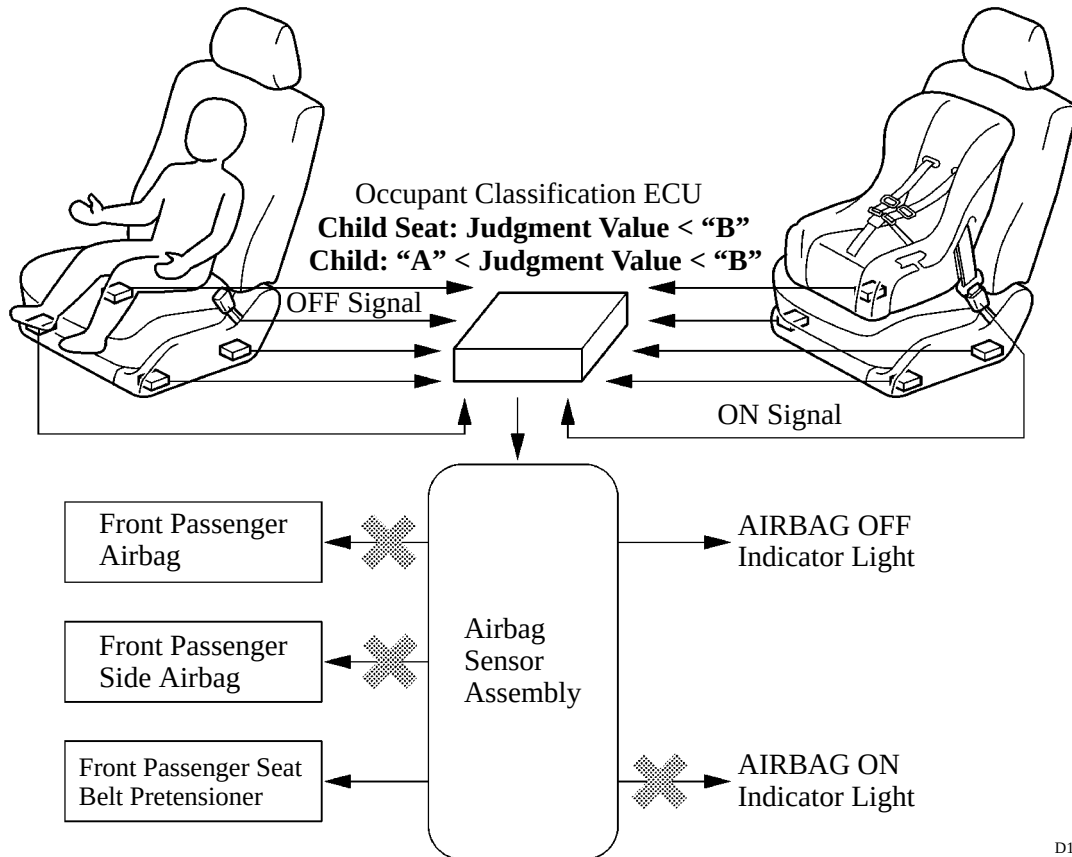
Unoccupied Judgment

- The occupant classification ECU makes an unoccupied judgment when the judgment value is lower than criteria value “A” and the seat belt buckle switch is off.
- If the ignition switch is turned ON in this state, the system performs an initial check, and does not illuminate the AIRBAG ON/OFF indicator lights. Then, the system prohibits the deployment of the front passenger airbag, front passenger side airbag, and the front passenger seat belt pretensioner, and does not blink the front passenger seat belt reminder light.



Child Seat or Child Judgment

- If the judgment value is lower than criteria value “B” and the seat belt buckle switch is on, the occupant classification ECU judges that a child seat is installed.
- If the judgment value is higher than criteria value “A”, but lower than criteria value “B”, and the seat belt buckle switch is off, the occupant classification ECU judges that the seat is being occupied by a child.
- When the ignition switch is turned ON under these conditions, the system performs an initial check and illuminates the AIRBAG OFF indicator light to indicate that the front passenger airbag and front passenger side airbag have been deactivated.

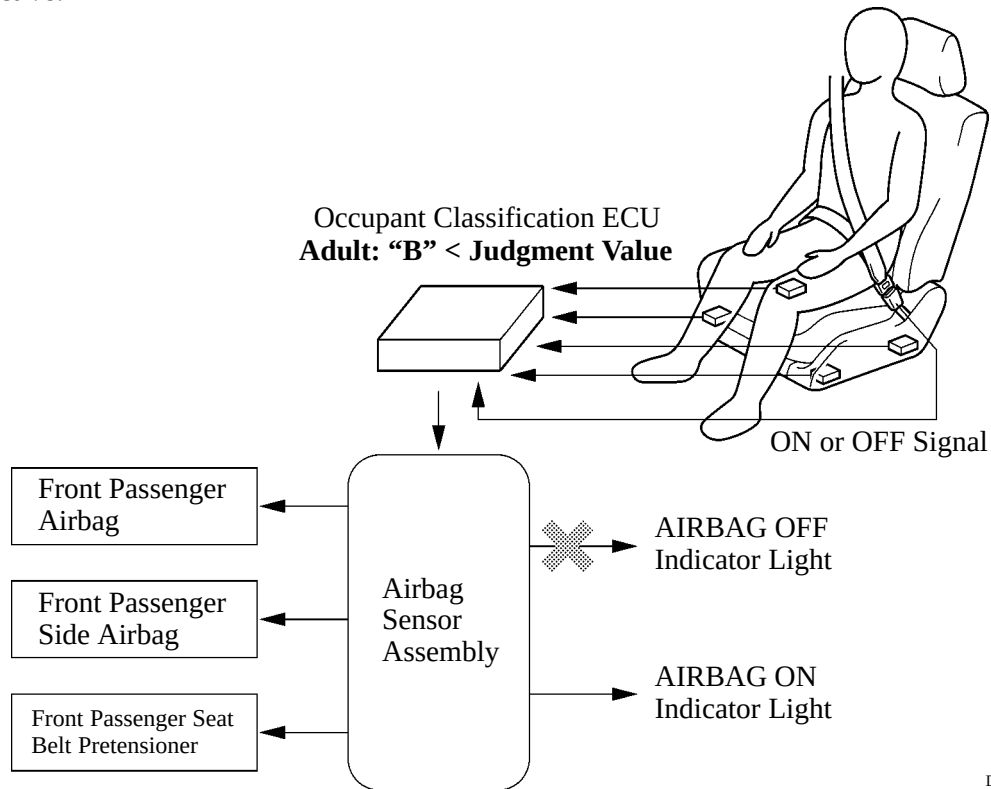


D13N56

- After the occupant classification ECU judges that child seat is installed, the AIRBAG OFF indicator light does not go off unless the seat belt buckle switch is turned off.

Adult Judgment

- When the judgment value is higher than criteria value “B”, the occupant classification ECU judges that the seat is being occupied by an adult.
- If the ignition switch is turned ON in this state, the system performs an initial check and illuminates the AIRBAG ON indicator light, indicating that the front passenger airbag and front passenger side airbag are active.

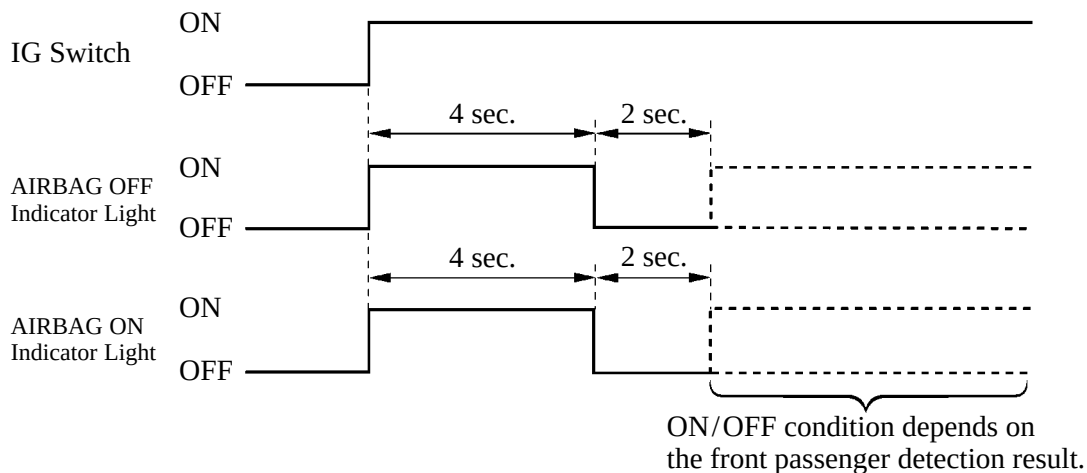


D13N57

- After the occupant classification ECU judges that the occupant is an adult, if the judgment value is determined as criteria value “B” or less according to occupant load movement, the ECU continues adult judgment for approximately 10 seconds before switching to the child judgment.

Initial Check

After the ignition switch is turned ON, the occupant classification ECU lights up the AIRBAG ON/OFF indicator lights via the airbag sensor assembly based on the timing chart below in order to check the indicator light circuits.



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5. Precaution for Occupant Classification System Operation

To avoid potential death or serious injury when the front passenger occupant classification system does not detect the conditions correctly, observe the following.

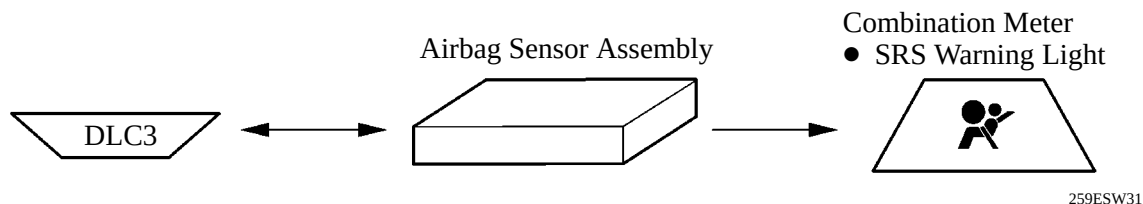
- Wear the seat belt properly.
- Make sure the front passenger seat belt tab has not been left inserted into the buckle before someone sits in the front passenger seat.
- Make sure the AIRBAG ON indicator light is illuminated when using the seat belt extender for the front passenger seat. If the AIRBAG OFF indicator light is illuminated, disconnect the extender tongue from the seat belt buckle, then reconnect the seat belt. Reconnect the seat belt extender after making sure the AIRBAG ON indicator light is illuminated. If you use the seat belt extender while the AIRBAG OFF indicator light is illuminated, the front passenger airbag and front passenger side airbag may not activate correctly, which could cause death or serious injury in the event of collision.
- Do not put a heavy load in the front passenger seatback pocket or attach a seatback table to the front passenger seatback.
- Do not put weight on the front passenger seat by putting your hands or feet on the front passenger seatback from the rear passenger seat.
- Do not let a rear passenger lift the front passenger seat with his/her feet or press on the seatback with his/her legs.
- Do not put objects under the front passenger seat.
- Do not recline the front passenger seatback so far that it touches a rear seat. This may cause the AIRBAG OFF indicator light to be illuminated, which indicates that the front passenger airbags will not deploy in the event of a severe accident. If the seatback touches the rear seat, return the seatback to a position where it does not touch the rear seat.
Keep the front passenger seatback as upright as possible when the vehicle is moving. Reclining the seatback excessively may lessen the effectiveness of the seat belt system.
- Make sure the AIRBAG ON indicator light may be illuminated when an adult sits in the front passenger seat. If the AIRBAG OFF indicator light is illuminated, ask the passenger to sit properly with back upright and against the seat, with legs comfortably extended and wear the seat belt correctly. Nonetheless, if the AIRBAG OFF indicator light remains illuminated, let the passenger sit in the rear seat. When it is unavoidable to sit in the front passenger seat, ask the passenger to move the seat as far back as possible, remain properly seated.
- When it is unavoidable to install the forward-facing child restraint system on the front passenger seat, install the child restraint system on the front passenger seat in the proper order.
- Do not kick the front passenger seat or subject it to severe impact. Otherwise, the SRS warning light may come on to indicate a malfunction of the detection system.
- Child restraint systems installed on the rear seat should not contact the front seatbacks.

■ DIAGNOSIS

1. General

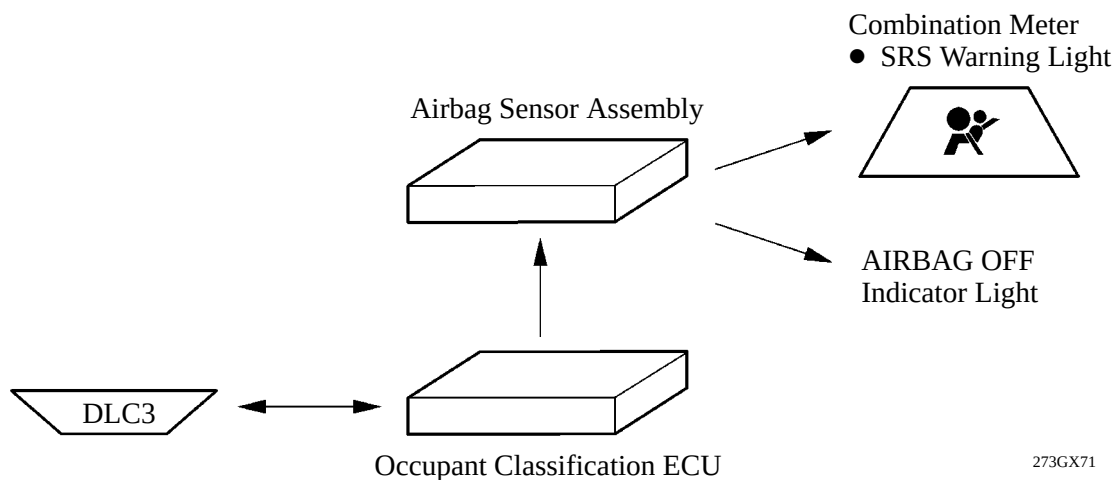
If the airbag sensor assembly detects a malfunction in the SRS airbag system, the airbag sensor assembly stores the malfunction data in memory, in addition to illuminating the SRS warning light.

- The airbag sensor assembly outputs malfunction data, 5-digit DTCs (Diagnostic Trouble Codes) or 2-digit DTCs, to the hand-held tester or the SRS warning light.



If the occupant classification ECU detects a malfunction in the occupant classification system, it stores the malfunction data in memory via the airbag sensor assembly, illuminating the SRS warning light and AIRBAG OFF indicator light.

- The occupant classification ECU outputs 5-digit DTCs to the hand-held tester.



2. DTC of SRS Airbag System

There are 2 types of DTCs of the SRS airbag system: 5-digit and 2-digit.

- The 5-digit DTC can be read by connecting a hand-held tester to the DLC3 terminal.
- The 2-digit DTC can be read through the blinking of the SRS warning light with the SST(09843-18040) connected to the TC and CG terminals of the DLC3.
- If the SRS airbag deploys, the airbag sensor assembly will turn on the SRS warning light. However, it is different from the ordinary diagnosis function that a DTC will not be memorized. The SRS warning light can be turned off only by changing the airbag sensor assembly to a new one.

3. DTC of Occupant Classification System

There is only a 5-digit DTC for the occupant classification system.

- The 5-digit DTC can be read by connecting a hand-held tester to the DLC3 terminal.

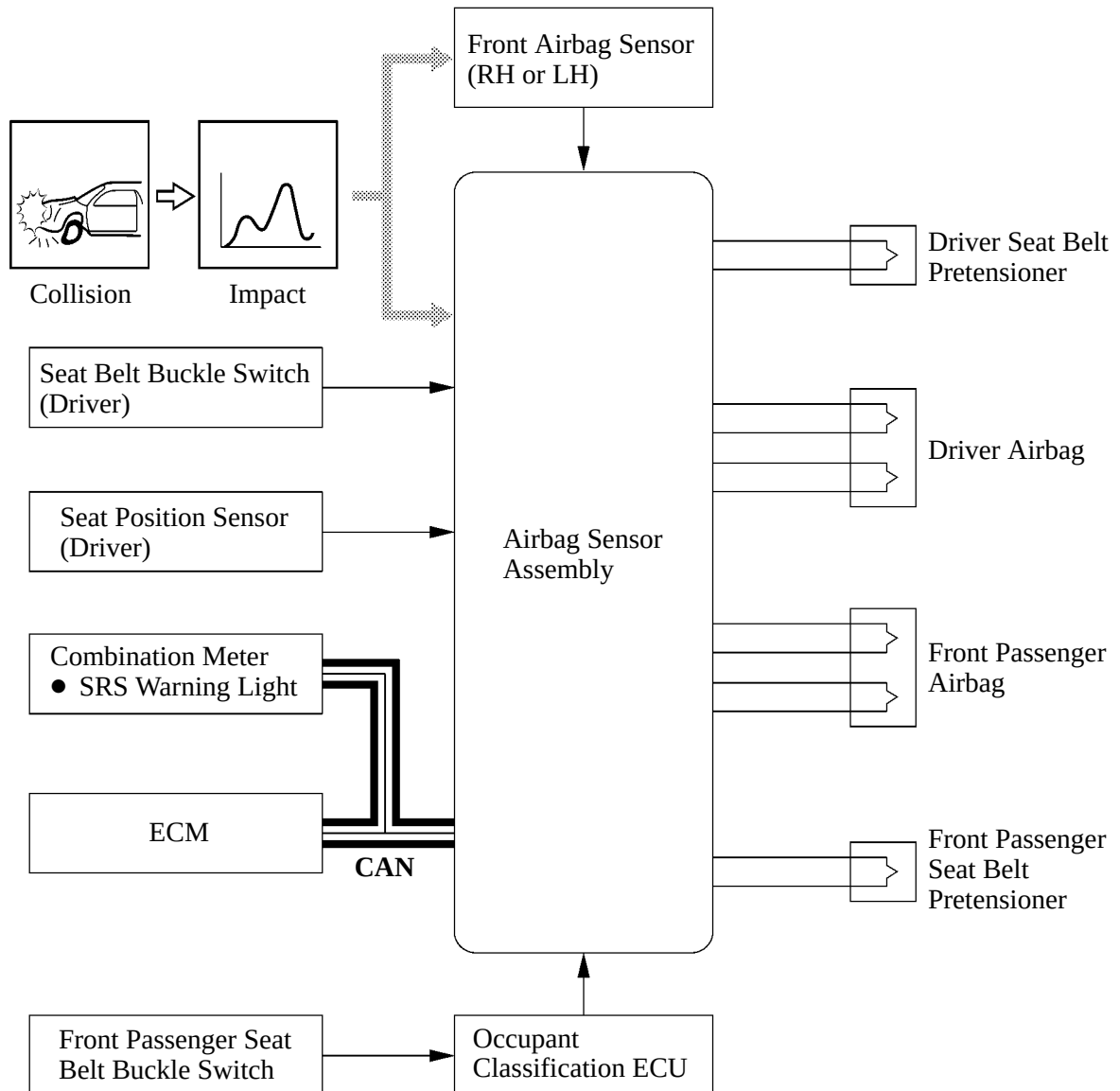
For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

■ AIRBAG FOR FRONTAL COLLISION

1. General

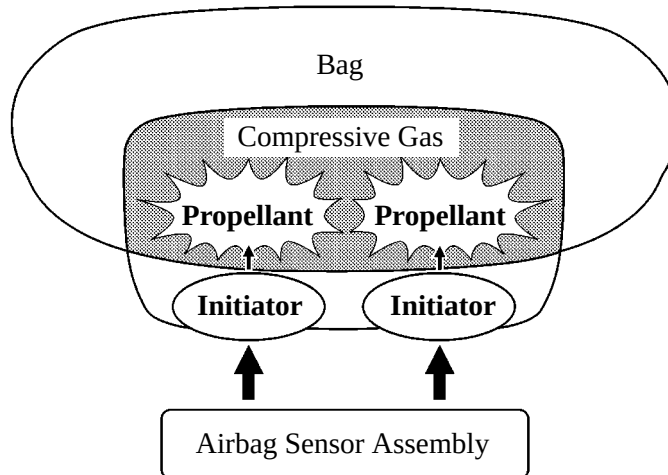
In conjunction with impact absorbing structure for front collision, the driver and front passenger dual-stage SRS airbags and the driver knee airbag have been designed to help reduce injury to the head, chest and leg in the event of a front collision. These airbags all deploy with the same timing, and are supplements to the seat belts.

► System Operation ◀



2. Dual-stage SRS Airbags

To support the dual-stage control, these airbag assemblies contain 2 sets of initiators and propellants. The airbag sensor assembly helps optimize the airbag inflation output by delaying the inflation timing of these initiators.



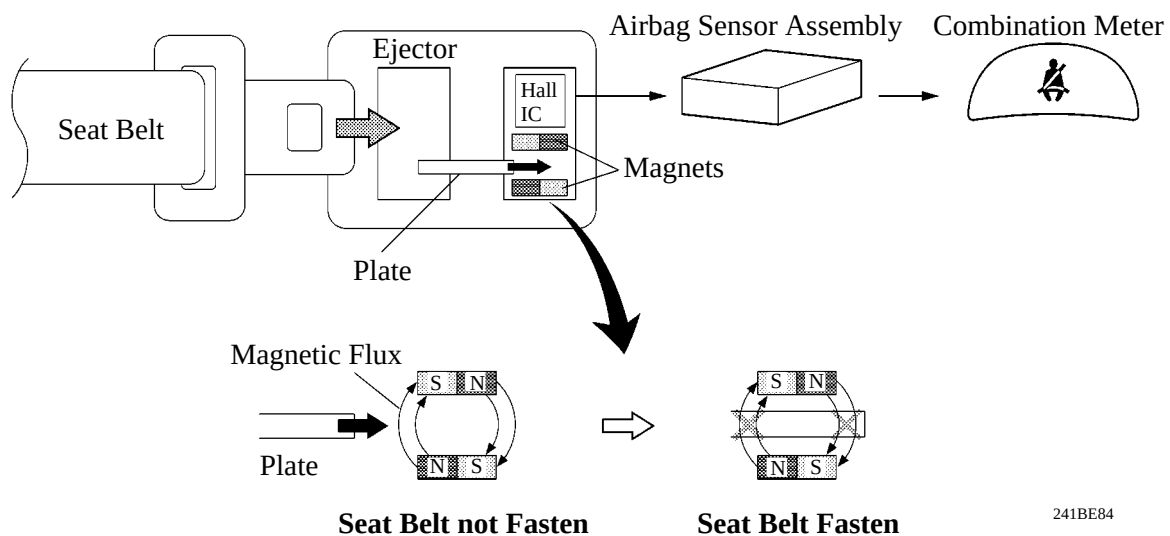
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3. Front Airbag Sensor

- The electrical (acceleration sensor) type airbag sensor is used for front airbag sensor.
- The acceleration sensor is enclosed in the front airbag sensor. Based on the deceleration of the vehicle during a front collision, a distortion is created in the sensor and converted into an electrical signal. Accordingly, the extent of the initial collision can be detected in detail.

4. Seat Belt Buckle Switch (for Driver)

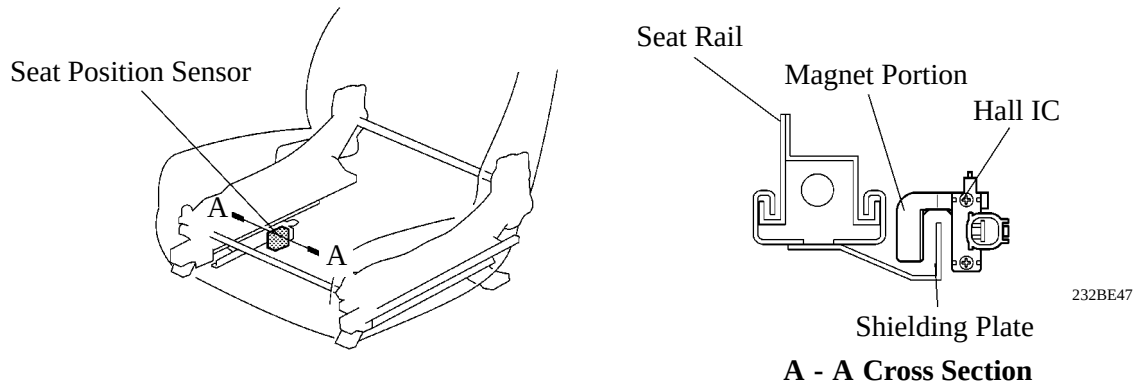
- The seat belt buckle switch which consists of an ejector with a plate, a Hall IC, and two magnets is integrated in the front seat inner belt assembly.
- The ejector with plate blocks the magnetic flux density between the two magnets. The Hall IC outputs this change to the airbag sensor assembly.



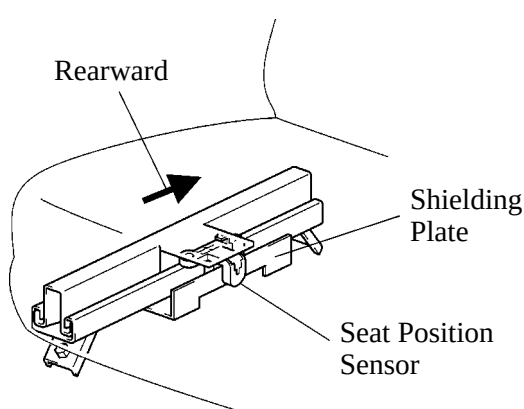
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5. Seat Position Sensor (for Driver)

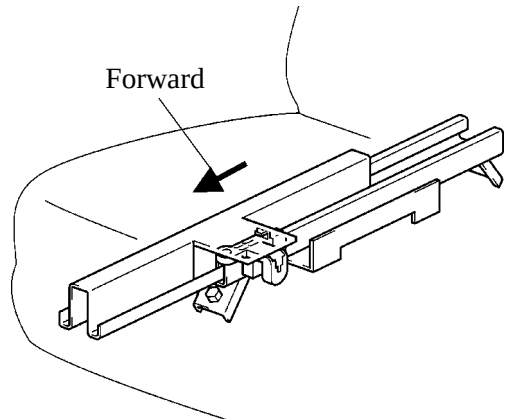
- The seat position sensor which is attached to the seat rail of the driver seat detects the sliding position of the seat. In addition, the shielding plate is installed on this seat rail to make the seat position sensor judge the seat position.
- The seat position sensor uses a Hall IC for its sensor and has a magnet portion on its opposite side.



- The seat position sensor judges that the seat position is rearward if the sensor is located over the shielding plate, and the seat position is forward if the shielding plate is not located over the sensor.



Seat position is rearward



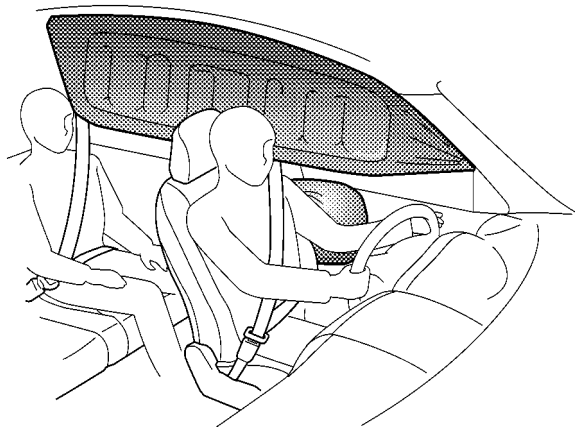
Seat position is forward

SRS AIRBAG SYSTEM

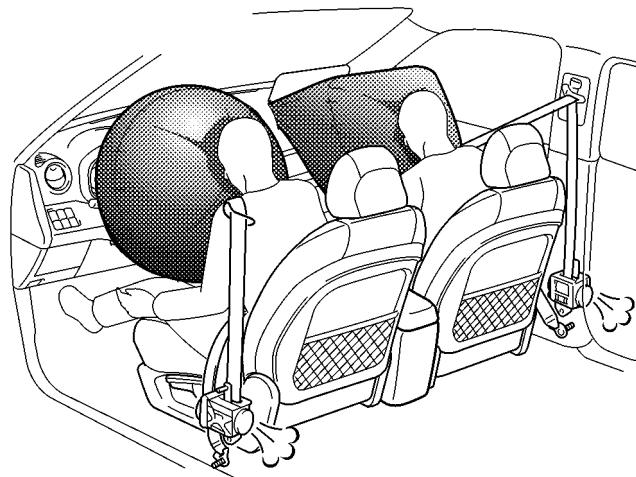
DESCRIPTION

- The dual-stage SRS (Supplemental Restraint System) driver and front passenger airbags are used to help reduce the shocks to the heads and chests of the driver and front passenger in the event of frontal collision as supplements to the seat belts. The dual-stage SRS airbag system controls the airbag inflating output by judging the extent of impact, seat position and whether or not the seat belt is fastened.
- The SRS side and curtain shield airbags are used to help reduce the shocks to the heads and the chests of the driver, front passenger, and outer rear passengers in the event of a side collision.
- The RSCA (Roll Sensing of Curtain shield Airbag) control is used in order to deploy the curtain shield airbag and the driver and front passenger seat belt pretensioners, in the event that the vehicle rolls over.
- As a countermeasure against an interruption in the power supply in the event of a collision involving the vehicle, a backup power supply which consists of a power supply capacitor and a voltage boost circuit (DC-DC converter) is provided in the airbag sensor assembly.
- The airbag sensor assembly uses a fuel cut control that stops the fuel pump if any airbag is deployed.
- The '06 models have the SRS airbag system with the following equipments:

Destination		U.S.A & Canada
Airbag Type	Driver and Front Passenger Airbags	Standard
	Driver, Front Passenger, Side and Roll Sensing of Curtain Shield Airbags	Option

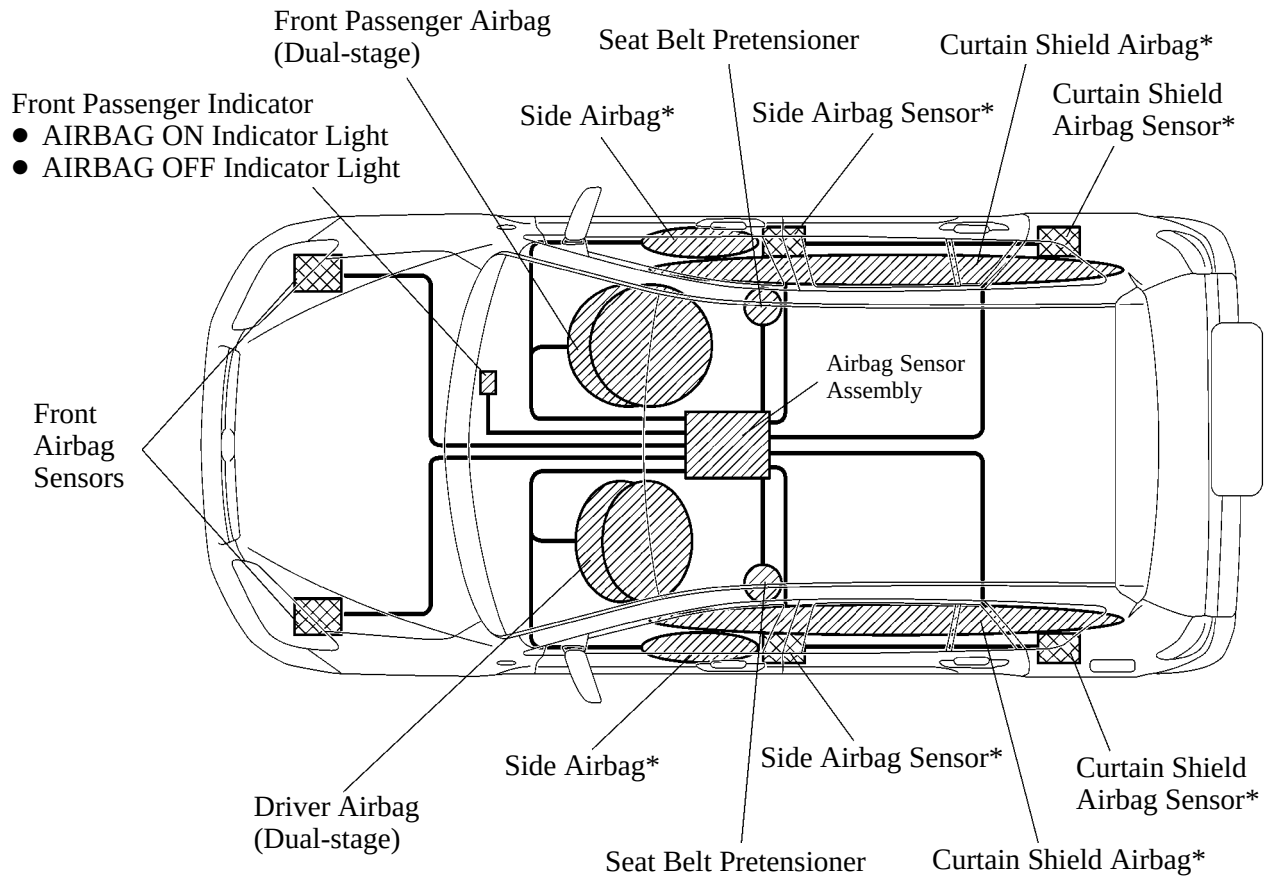


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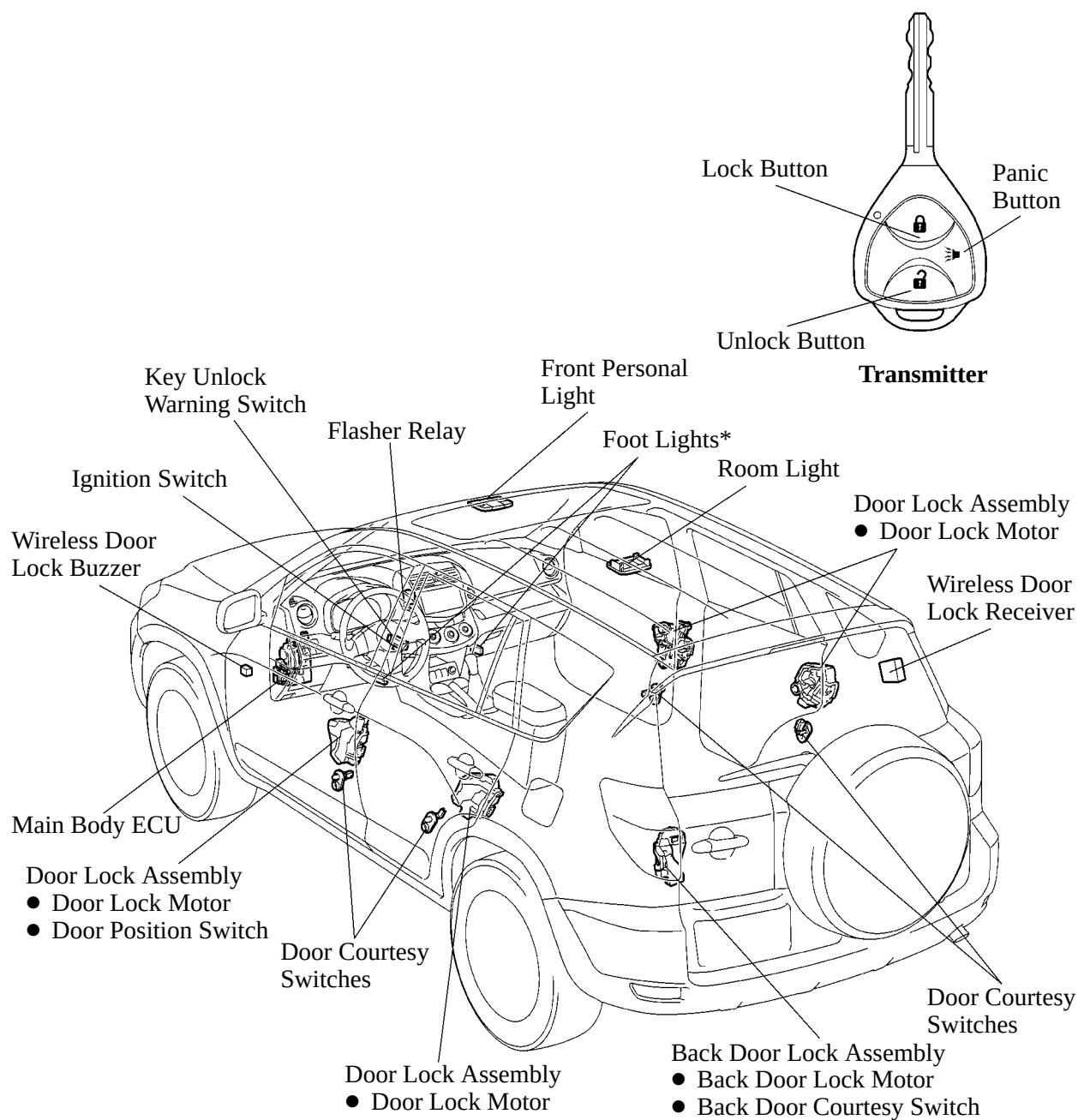
► System Diagram ◀



01MBE15Y

*: Only for Models with Driver, Front Passenger, Side and Roll Sensing of Curtain Shield Airbags

■ LAYOUT OF MAIN COMPONENTS



*: Models with Foot Lights

01MBE25Y

WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

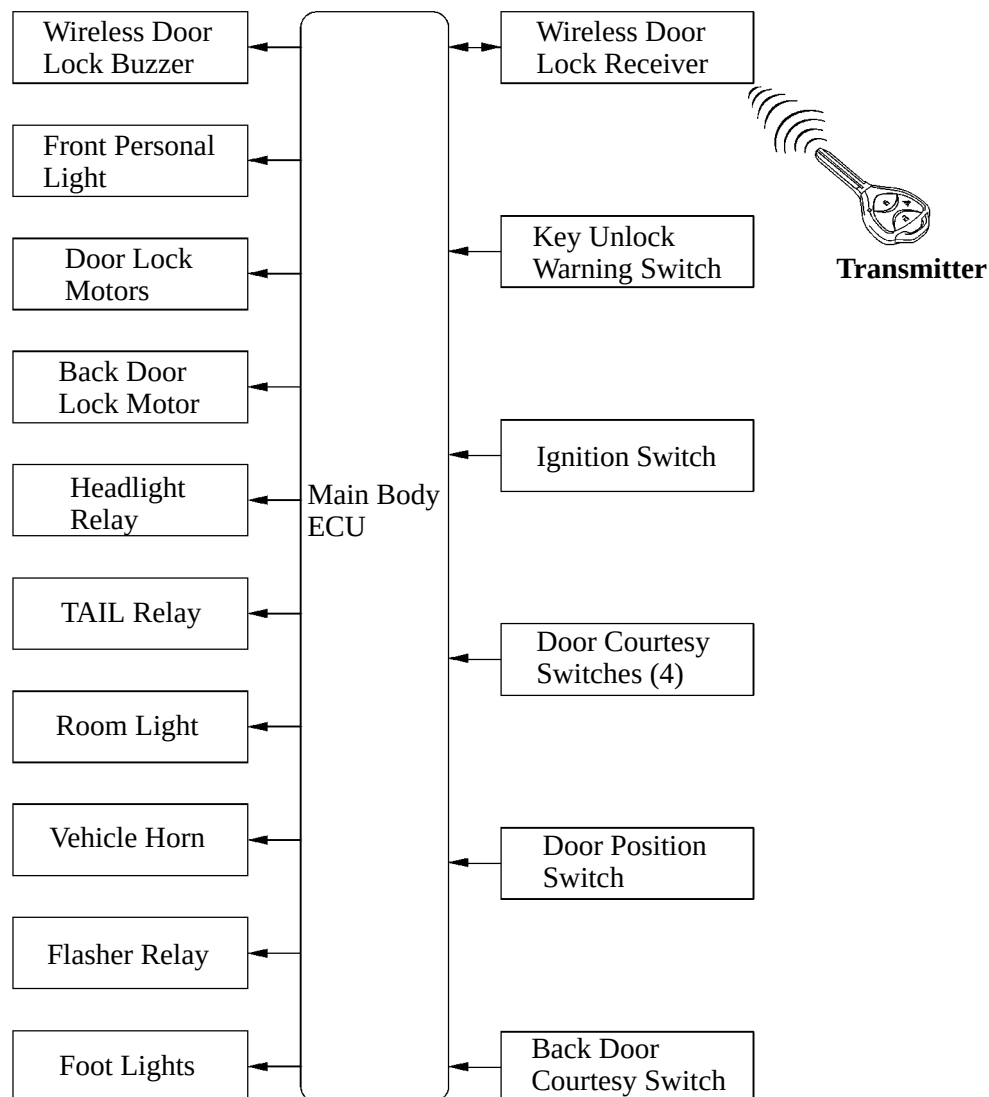
DESCRIPTION

The wireless door lock remote control system has been provided as standard equipment on all models.

This system is a convenient system for locking and unlocking all doors at a distance. This system in the '06 models has the following features:

- In this system, the wireless door lock receiver performs the code identification process and sends the lock or unlock signal to the main body ECU, then the main body ECU effects the door lock control.
- A key-integrated, three-button (lock, unlock, panic) type transmitter is used.
- To inform the user that the locking or unlocking of the doors has been completed through the operation of the transmitter, an answer back operation, which flashes the hazard lights and sounds the wireless door lock buzzer, has been provided.
- A panic alarm operation is provided that activates alarms when the panic button on the transmitter is pressed and held for approximately 0.8 seconds.
- A door ajar warning function, which sounds the wireless door lock buzzer if a lock button is pressed while any one of the doors is ajar, has been provided.

System Diagram ◀



01MBE01Y

*: Models with Foot Lights

■ FUNCTION

1. General

The wireless door lock remote control system has the following functions:

Function	Outline
All Doors Lock	Pressing the lock button on the transmitter locks all doors.
All Doors Unlock (2-step Unlock)	Pressing the unlock button on the transmitter once unlocks the driver's door. If the unlock button is pushed again within 3 seconds, all doors unlock.
Automatic Lock Function	If no door is opened for 30 seconds and the ignition key is not in the ignition key cylinder after unlocking the doors by pushing the unlock button on the transmitter, all doors are locked again automatically.
Answer Back Operation	The hazard light flashes once when locking, and the hazard light flashes twice when unlocking, to inform that the operation has been completed.
	The wireless door lock buzzer sounds once when locking, and the wireless door lock buzzer sounds twice when unlocking, to inform that the operation has been completed.
Panic Alarm Operation	Pressing and holding the panic button on the transmitter for approximately 0.8 seconds activates alarms. Pushing any button on the transmitter during the alarms cancels the alarms.
Door Ajar Warning Function	If any door is open or ajar, pressing the lock button of the transmitter will cause the wireless door lock buzzer to sound for about 10 seconds.
Transmitter Recognition Code Registration Function	● A maximum of 4 types of transmitter recognition codes can be registered in the wireless door control receiver. ● When 4 codes are already registered and a new code is registered, it is written over the oldest of the already registered codes.
Customized Body Electronics	For details, see page BE-7

2. Transmitter Recognition Code Registration Function

The table below shows the 4 special coded ID registration function modes through which up to 4 different codes can be registered. The codes are electronically registered (written and stored) in the EEPROM. For details of the recognition code registration procedure, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

Mode	Function
Rewrite Mode	Erases all previously registered codes and registers only the newly received codes.
Add Mode	Adds a newly received code while preserving any previously registered codes. This mode is used when adding a new transmitter. If the number of codes exceeds 4, the oldest registered code is erased first.
Confirm Mode	Confirms how many codes are currently registered. When adding a new code, this mode is used to check how many codes already exist.
Prohibit Mode	Deletes all the registered codes and prohibits the wireless door lock function. This mode is used when the transmitter is lost.

4WD SYSTEM

■ DESCRIPTION

- The 4WD system of the '06 RAV4 uses an active torque control 4WD system.
- It is a compact, lightweight, and high performance 4WD system that optimally controls the torque distribution to the front and rear wheels through the electric control coupling in the rear differential.

■ ACTIVE TORQUE CONTROL 4WD SYSTEM

1. General

- Based on information provided by various sensors, the 4WD ECU controls the amperage that is applied to the electric control coupling, in order to transmit drive torque to the rear wheels when needed, and in the amount needed. The following describes the features of the active torque control 4WD system.

Traction performance	Realizes stable start-off and acceleration performance
Driving stability performance	Realizes stable cornering performance
Fuel economy	Realizes better fuel economy by transmitting drive torque to the rear wheels when needed, in the amount needed.

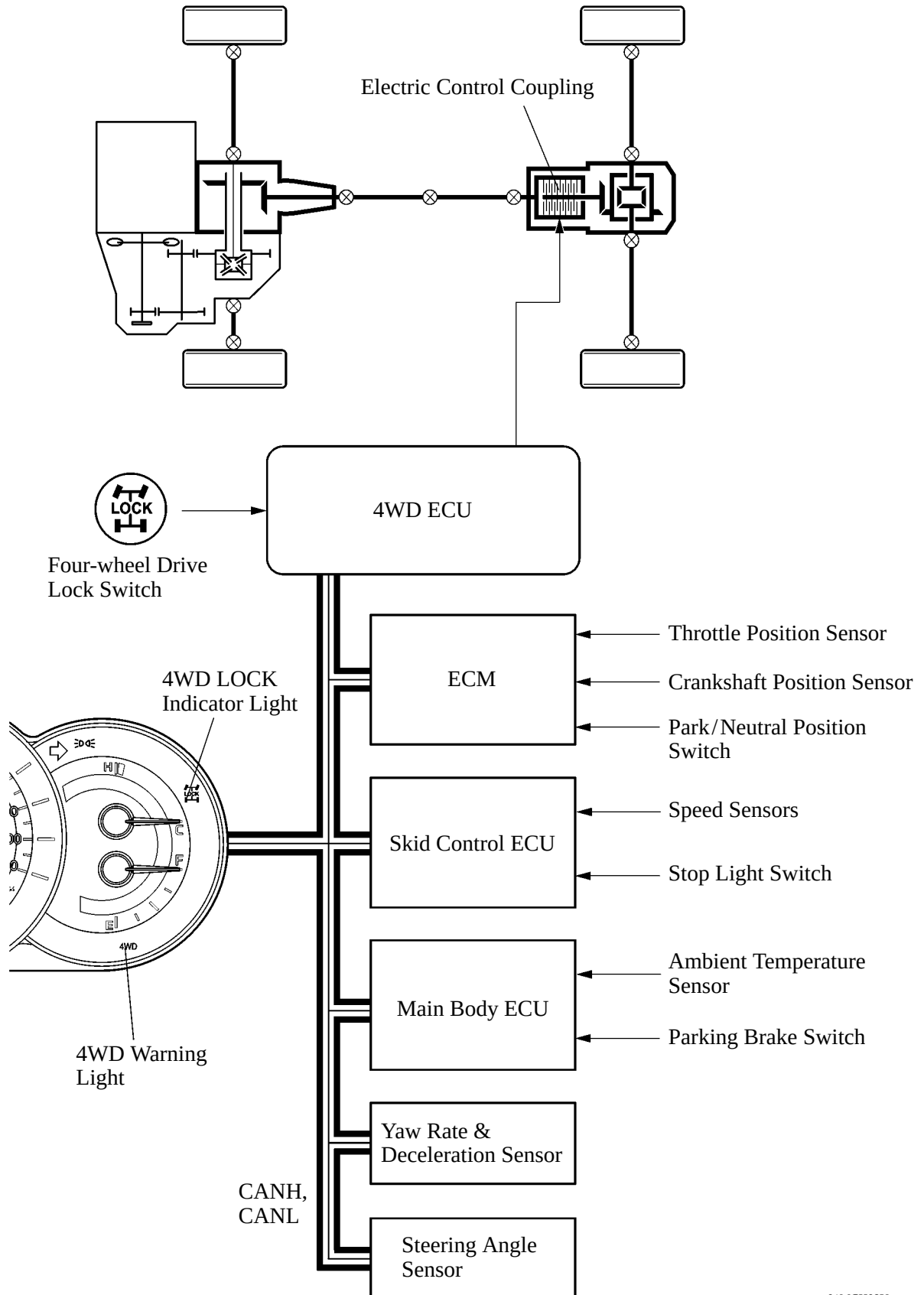
- A four-wheel drive lock switch has been provided. This enables the driver to select between the AUTO and LOCK modes by operating the switch. The system optimally controls the torque distribution to the front and rear wheels in the respective modes.

Mode	Four-wheel Drive Lock Switch and Indicator Light	Outline
AUTO	OFF	● Optimally distributes drive torque to the front and rear wheels. ● Ensures optimal start-off performance during a start-off, based on information provided by various sensors. ● Suppresses the tight corner braking phenomenon* during low-speed cornering. ● Reduces the amount of torque distribution to the rear wheels and improves fuel economy when the system judges that the vehicle is traveling steadily. ● Disengages the 4WD during braking deceleration.
LOCK	ON	● Distributes the maximum torque limit to the rear wheels. ● Distributes the maximum torque limit to the rear wheels during start-off. ● Distributes optimal torque during low-speed cornering. ● Disengages the 4WD during braking deceleration. ● Disengages the LOCK mode and transfers to the AUTO mode when the vehicle speed exceeds 40 km/h (25 mph).

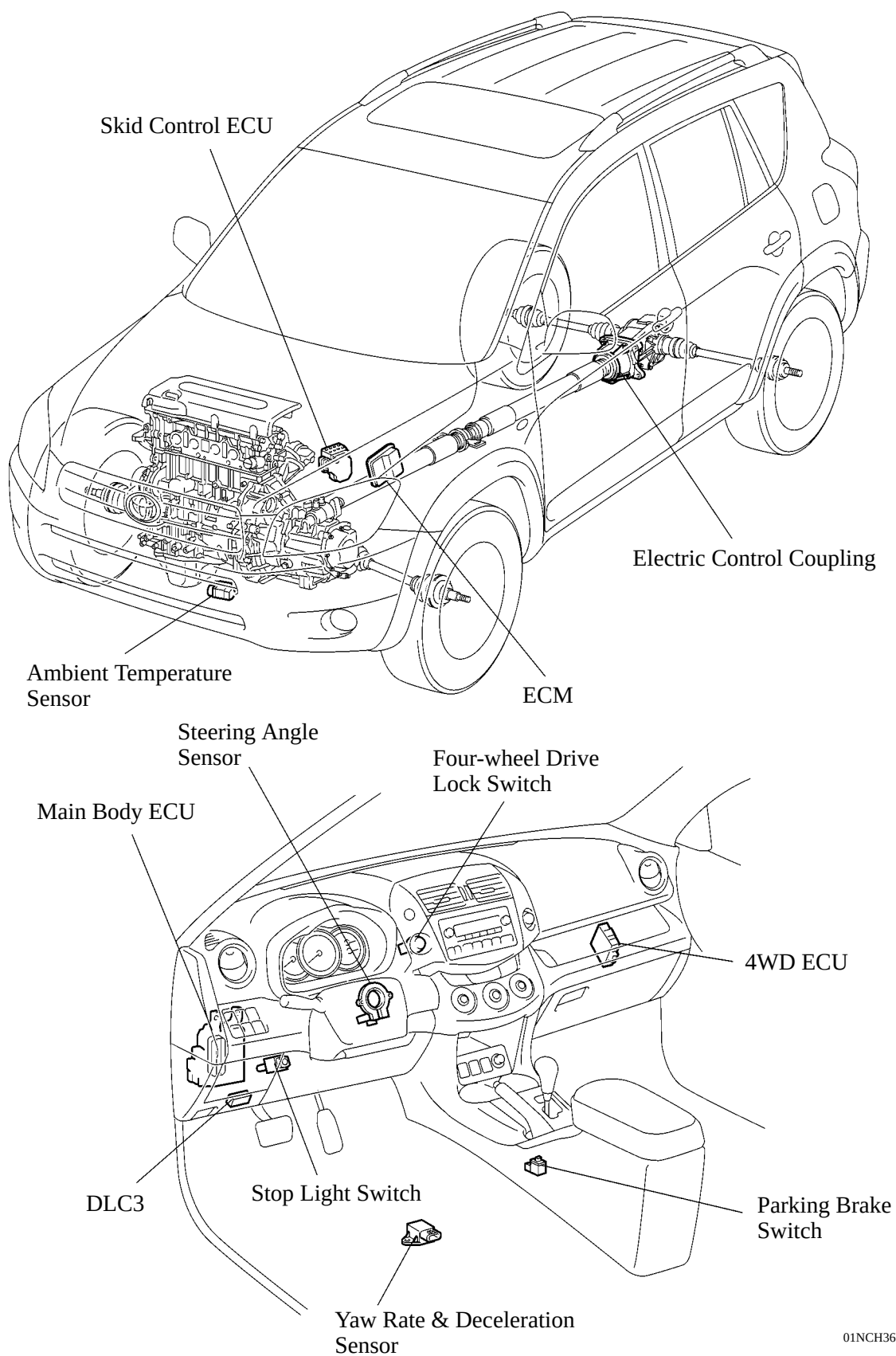
*: Tight corner braking phenomenon: a condition in which the brakes are applied due to a rotational difference between the front and rear wheels, such as during low-speed cornering in the 4WD mode.

- The 4WD ECU effects cooperative control with the skid control ECU, in order to control the drive torque distribution to the front and rear wheels in accordance with information received from the skid control ECU. These controls ensure a smooth acceleration and driving stability.

2. System Diagram



3. Layout of Main Components



4. Function of Main Components

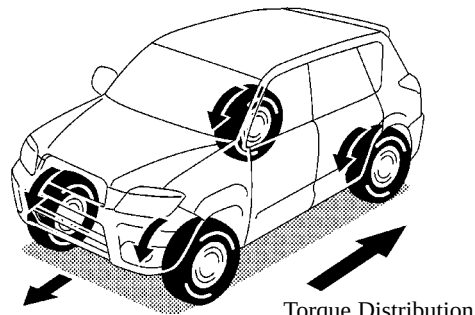
Component		Function
Combination Meter	4WD LOCK Indicator Light	Illuminates to inform the driver of the 4WD LOCK mode control.
	4WD Warning Light	Illuminates to warn the driver of a malfunction in the 4WD system.
Speed Sensor (4)		Detects the wheel speed of each 4 wheel.
Steering Angle Sensor		Detects the direction and angle of the steering wheel.
Yaw Rate & Deceleration Sensor		Detects the vehicle's longitudinal and lateral acceleration.
Crankshaft Position Sensor		Detects the engine speed and outputs it to the ECM.
Accelerator Pedal Position Sensor		Detects the accelerator pedal position and outputs it to the ECM.
Throttle Position Sensor		Detects the throttle valve position and outputs it to the ECM.
Park/Neutral Position Switch		Detects the neutral position of the transaxle and outputs it to the ECM.
Stop Light Switch		Detects the brake pedal depressing signal.
Parking Brake Switch		Detects when the parking brake lever is pulled up.
Four-wheel Drive Lock Switch		Switches between the AUTO and LOCK modes.
4WD ECU		Controls the amperage that is applied to the electromagnetic solenoid of the electric control coupling based on the signals provided by the sensors in order to optimally distribute drive torque in accordance with driving conditions.
ECM		Outputs signals such as the shift position signal, throttle position signal, and crankshaft position signal to the 4WD ECU.
Skid Control ECU		Outputs signals such as the vehicle speed signal and deceleration signal to the 4WD ECU.
Electric Control Coupling		Distributes drive torque in accordance with the amperage applied by the 4WD ECU.

5. System Operation

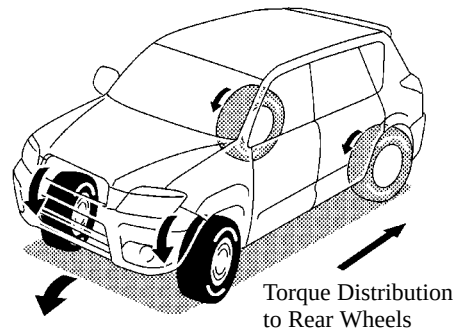
Auto Mode

1) Starting Off

- The system ensures start-off performance by optimally distributing the entire drive torque, which is transmitted by the engine, to the front and rear wheels.
- To prevent the tight corner braking phenomenon from occurring during low-speed cornering, the system reduces the amount of torque distribution to the rear wheels.



Straightline Driving

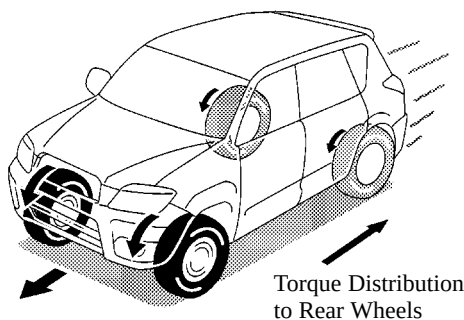


Low-Speed Cornering

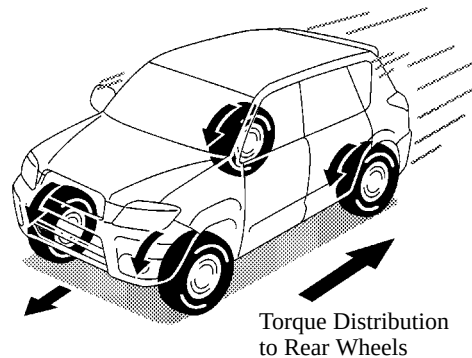
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2) Normal Driving

- During normal driving, when the system judges that the vehicle is traveling steadily, it reduces the amount of torque distribution to the rear wheels. This allows the vehicle to operate in conditions similar to front-wheel-drive, which improves fuel economy.
- To ensure excellent acceleration performance during straightline acceleration and excellent driving stability during cornering, the system controls the amount of torque distribution to the rear wheels.



Steady Driving



Straightline Acceleration

01NCH39Y

Lock Mode

When the vehicle is in a situation that poses difficulty for it to pull itself out, such as sand, the driver can switch to LOCK mode by operating the four-wheel drive lock switch. Thus, this mode effects optimal control in accordance with the driving conditions and transmits as much drive torque as possible to the rear wheels, in a mode that is similar to the locked 4WD mode.

NOTICE

In the LOCK mode after the four-wheel drive lock switch is pressed, the system starts control upon judging that the vehicle is operating in a stable manner. During this judgment, the 4WD LOCK indicator light blinks.

6. Diagnosis

- When the 4WD ECU detects a malfunction, the 4WD ECU makes a diagnosis and memorizes the failed section. Furthermore, the 4WD warning light in the combination meter illuminates to inform the driver.
- At the same time, the DTCs (Diagnosis Trouble Codes) are stored in memory. The DTCs can be read by connecting a hand-held tester, or by connecting the SST (09843-18040) to the TC and CG terminals of DLC3 and observing the blinks of the 4WD warning light.

For details of the DTCs that are stored in 4WD ECU memory, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

7. Fail-safe

When there is a possibility of causing damage to the drive system due to a malfunction in the 4WD system or rough driving, the system illuminates or blinks the 4WD warning light to inform the driver, stops the 4WD controls, and enables the vehicle to operate in the front-wheel-drive mode.

Malfunction	4WD Warning Light	
4WD System Malfunction	Illuminate	
Rough driving in 4WD	Pre-warning for stopping 4WD control	Slow blinking
	Stopping 4WD control	Fast blinking

Service Tip

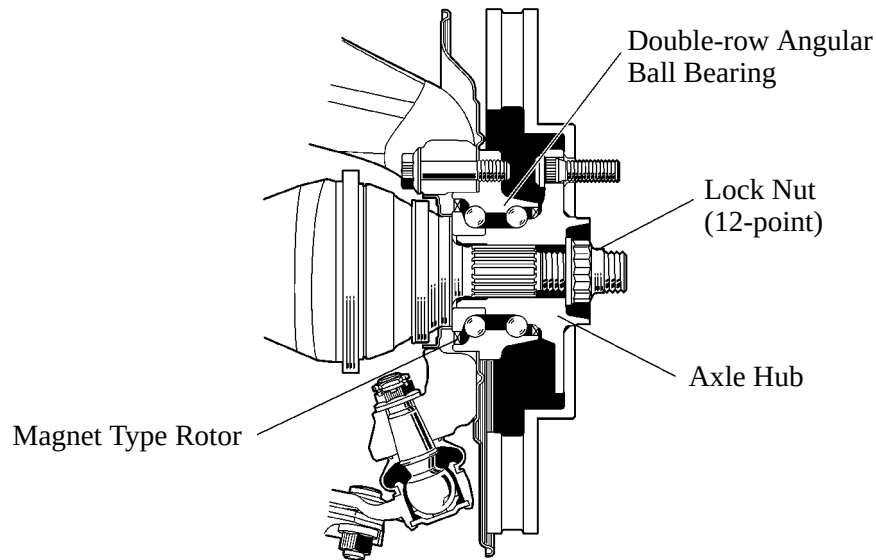
When the 4WD ECU judges that the vehicle has become stable, it cancels the stopping of the 4WD control and transfers to AUTO control. If the 4WD warning light blinks, take the following actions without turning the engine OFF:

- Drop the vehicle speed until the light goes out
- Stop the vehicle and stay there until the light goes out

■ AXLE

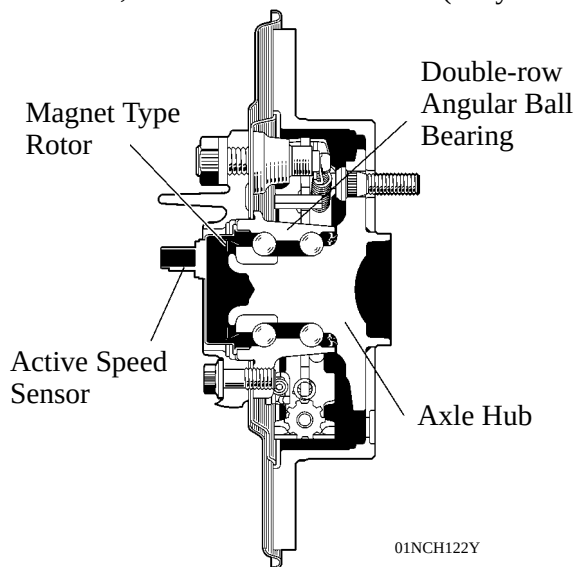
1. Front Axle

- Compact and highly rigid double-row angular ball bearings are used on the front axle. The double-row angular ball bearings and the axle hub have been integrated to ensure high rigidity, thus realizing excellent driving stability and braking stability.
- An active speed sensor, which is capable of detecting extremely low speeds, is used. The active speed sensor and the magnet type rotor are a built-in type.
- A 12-point lock nut is used and staked in order to ensure that the axle hub is properly tightened. Once removed, this nut cannot be reused.

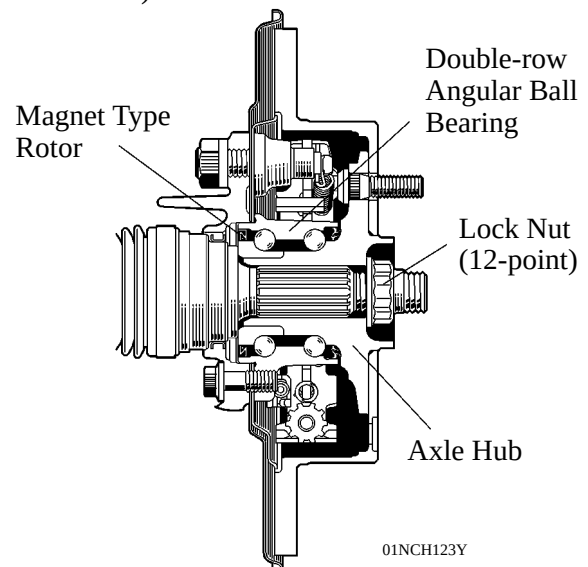


2. Rear Axle

- Compact and highly rigid double-row angular ball bearings are used on the rear axle. The bearings and the axle hub have been integrated to ensure high rigidity, thus realizing excellent driving and braking stability.
- An active speed sensor, which is capable of detecting extremely low speeds, is used. The active speed sensor and the magnet type rotor are a built-in type.
- A 12-point lock nut is used and staked in order to ensure that the axle hub is properly tightened. Once removed, this nut cannot be reused. (Only for the 4WD models)



2WD Models



4WD Models

■ BRAKE CONTROL SYSTEM

1. General

The '06 RAV4 brake control system (ABS with EBD, Brake Assist, TRAC, VSC, Auto LSD, Hill-start Assist Control and DAC) has the following functions:

Function	Outline	Drive Type	
		2WD	4WD
ABS (Anti-lock Brake System)	The ABS helps prevent the wheels from locking when the brake is applied firmly or applied on a slippery surface.	○	○
EBD (Electronic Brake force Distribution)	The EBD control utilizes the ABS, realizing the proper brake force distribution between the front and rear wheels in accordance with the driving conditions. In addition, during cornering braking, it also controls the brake forces of the right and left wheels, helping to maintain the vehicle behavior.	○	○
Brake Assist	The primary purpose of the Brake Assist is to provide an auxiliary brake force to assist the driver who cannot generate a large brake force during emergency braking, thus helping draw the vehicle's brake performance.	○	○
TRAC (Traction Control)	The TRAC helps prevent the drive wheels from slipping if the driver depresses the accelerator pedal excessively when starting off or accelerating on a slippery surface.	○	○
VSC (Vehicle Stability Control)	The VSC helps prevent the vehicle from slipping sideways as a result of strong front wheel skid or strong rear wheel skid during cornering.	○	○
Cooperative Control with EPS	Effects cooperative control with the EPS ECU in order to provide steering assist in accordance with the operating conditions of the vehicle.	○	○
Cooperative Control with 4WD System	Effects cooperative control with the 4WD ECU in order to control the drive torque of the front and rear wheels in accordance with the operating conditions of the vehicle.	—	○
Auto LSD*1 (Limited Slip Differential)	Auto LSD uses a TRAC to achieve LSD capability. It allows for greater traction control than the TRAC, ensuring startability and traction on sand or other road surfaces that present high degrees of drive resistance.	○	—
Hill-start Assist Control*2,3	When starting uphill, this control maintains the brake hydraulic pressure to the four wheels, in order to momentarily prevent the vehicle from descending backward.	○	○
DAC*2,3 (Downhill Assist Control)	This control is used when driving downhill on a sharp slope on which the engine brake alone will not adequately decelerate the vehicle. The driver can operate the DAC switch while the shift lever is in the L or R position, in order to automatically control the brake hydraulic pressure to the four wheels.	○	○

*1: Only for 2WD Models

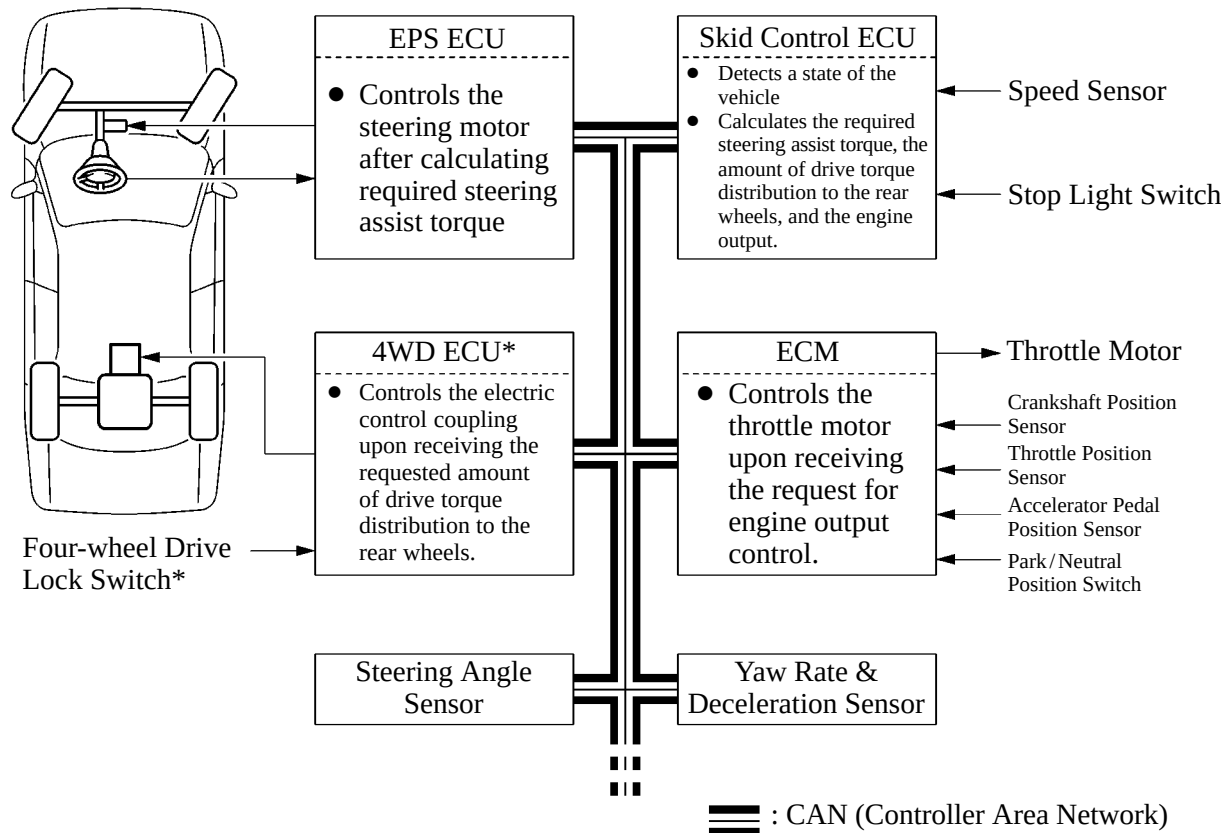
*2: Standard Equipment on 2GR-FE Engine Models

*3: Optional Equipment on Standard and Limited Grades for 2AZ-FE Engine Models with Rear No. 2 Seat

2. Enhanced VSC System

In the past, the brake control system (ABS, TRAC, VSC) and the EPS were controlled individually.

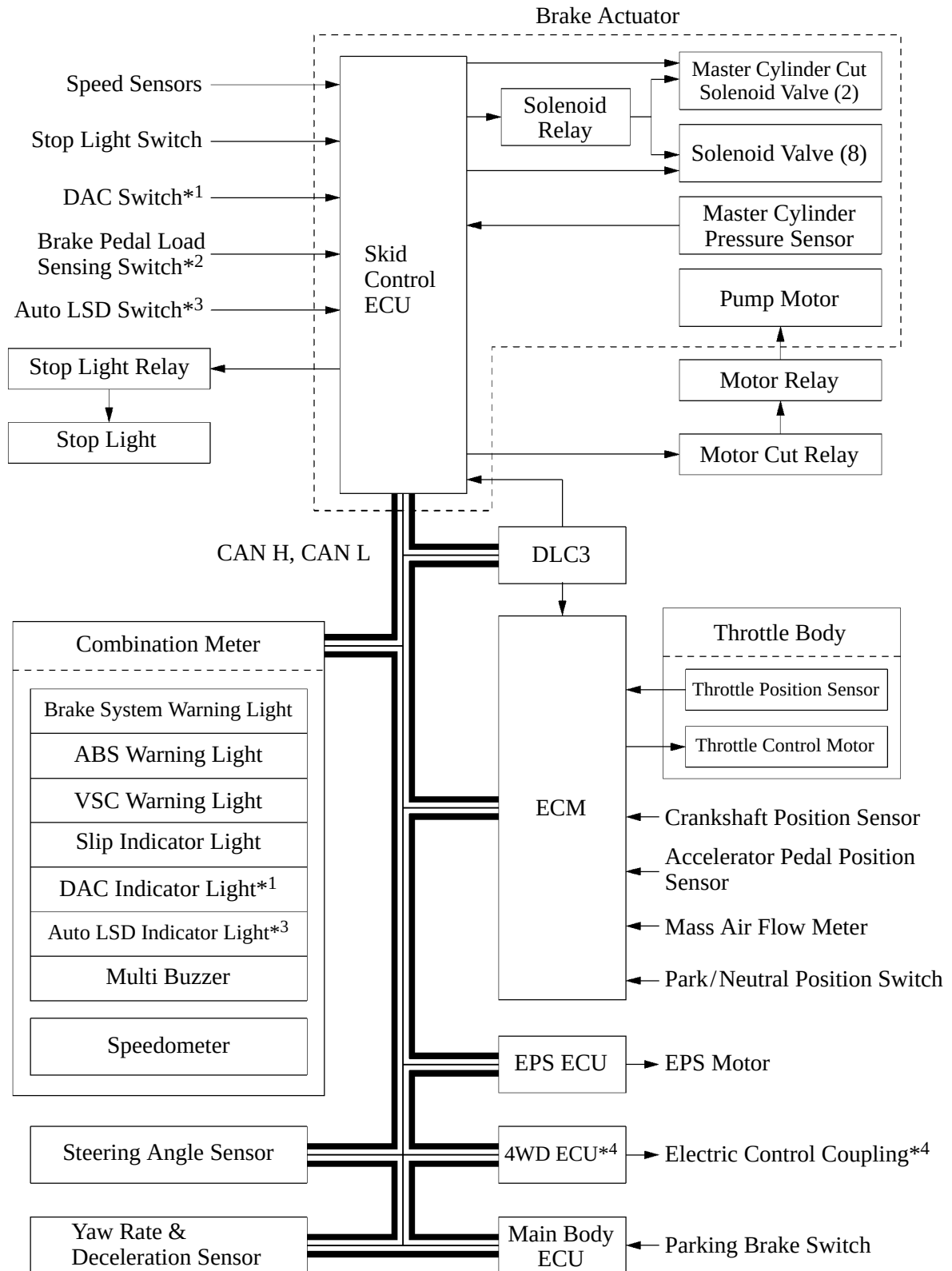
In contrast, the '06 RAV4 uses a new Enhanced VSC system. This system uses a cooperative control function that effects integrated control of the brake control system and the EPS in accordance with driving conditions. Thus, it improves the dynamic performance of the vehicle to “run, turn, and stop” and ensures excellent driving stability and drivability. On the 4WD models, this system effects cooperative control with the 4WD system to improve acceleration performance during cornering.



01NCH57Y

*: Only for 4WD Models

3. System Diagram



01MCH11Y

*1: Only for Models with DAC Function

*2: Only for Models with 16 in. Ventilated Disc

*3: Only for 2WD Models

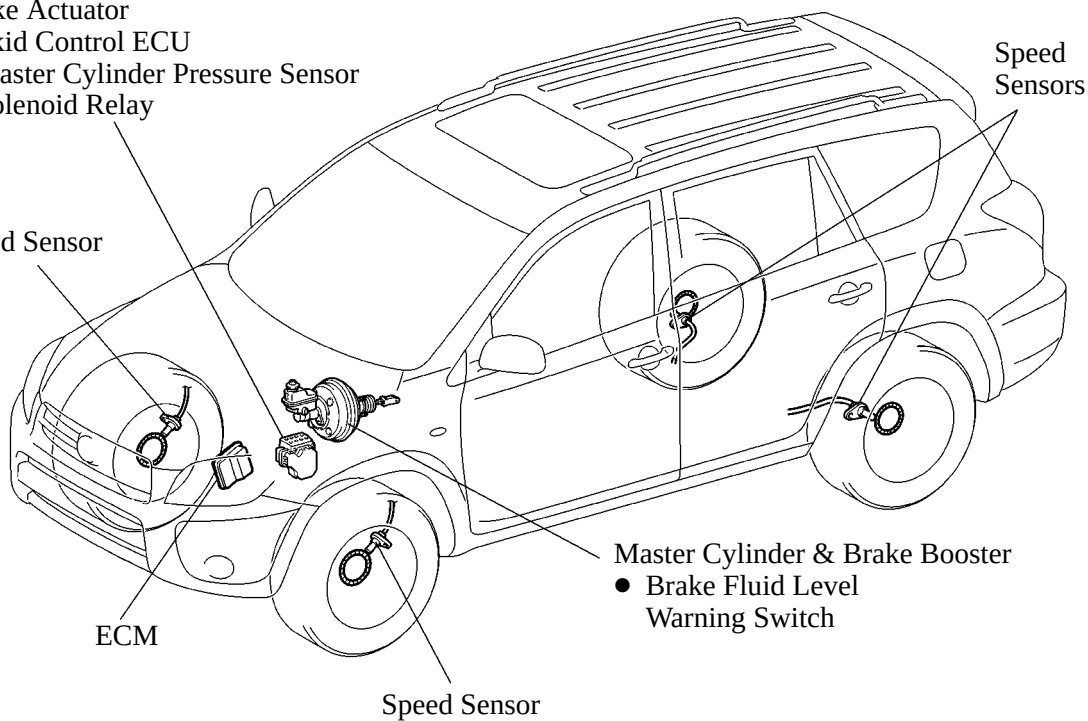
*4: Only for 4WD Models

4. Layout of Main Components

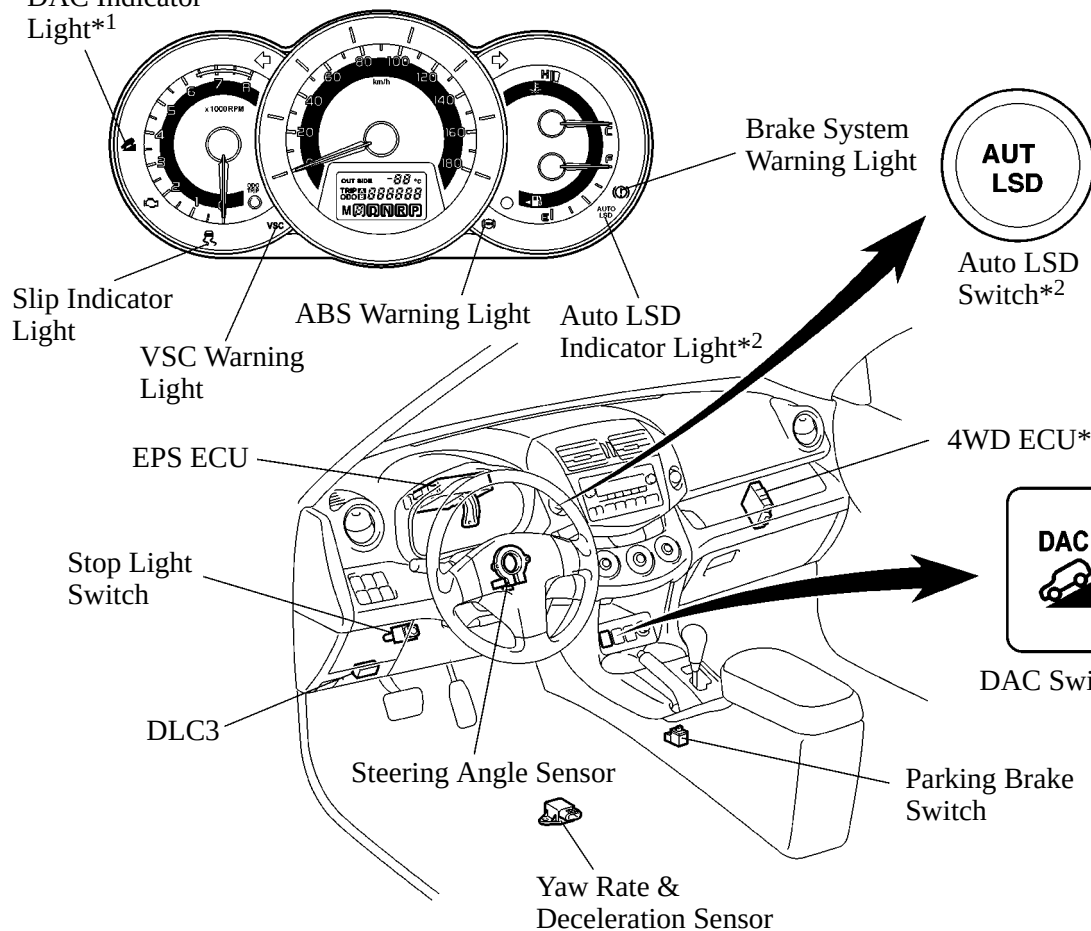
Brake Actuator

- Skid Control ECU
- Master Cylinder Pressure Sensor
- Solenoid Relay

Speed Sensor



DAC Indicator Light*1



*1: Only for Models with DAC Function *2: Only for 2WD Models *3: Only for 4WD Models

5. Function of Main Components

Component		Function
Combination Meter	ABS Warning Light	Lights up to alert the driver when the skid control ECU detects a malfunction in the ABS function.
	VSC Warning Light	Lights up to alert the driver when the skid control ECU detects the malfunction in the TRAC, VSC, Hill-start Assist Control or DAC function.
	Brake System Warning Light	• Lights up together with ABS warning light to alert the driver when the skid control ECU detects the malfunction not only in the ABS but also in the EBD. • Lights up to inform the driver when the parking brake lever is pulled up. • Lights up to alert the driver when the brake fluid level is low.
	Slip Indicator Light	Blinks to inform the driver when the TRAC, VSC, Auto LSD Hill-start Assist Control or DAC is operated.
	DAC Indicator Light* ¹	Lights up to inform the driver when DAC operation is possible.
	Auto LSD Indicator Light* ²	Lights up to inform the driver when Auto LSD operation is possible.
	Multi Buzzer	Located in the combination meter, the buzzer emits a warning sound to inform the driver during VSC operation, Hill-start Assist Control operation starting, etc.
Brake Actuator		Changes the fluid path based on the signals from the skid control ECU during the operation of the brake control system functions, in order to control the fluid pressure that is applied to the wheel cylinders.
	Master Cylinder Pressure Sensor	Assembled in the brake actuator, detects the master cylinder pressure.
	Solenoid Relay	Supply power to the solenoid valves.
	Skid Control ECU	Judges the vehicle driving condition based on the signals from each sensor, and sends the brake control signals to the brake actuator.
Stop Light Switch		Detects the brake pedal depressing signal.
DAC Switch* ¹		Allows the driver to turn DAC ON and OFF.
Auto LSD Switch* ²		Allows the driver to turn Auto LSD ON and OFF.
Brake Pedal Load Sensing Switch* ³		Detects the brake pedal load.
Parking Brake Switch		Detects when the parking brake lever is pulled up.
Brake Fluid Level Warning Switch		Detects the brake fluid level.
Speed Sensor		Detect the wheel speed of each of 4 wheels.

*¹: Only for Models with DAC Function

*²: Only for 2WD Models

*³: Only for Models with 16 in. Ventilated Disc

(Continued)

Steering Angle Sensor	Detects the direction and angle of the steering wheel.
Yaw Rate & Deceleration Sensor	• Detects the vehicle's yaw rate. • Detects the vehicle's longitudinal and lateral acceleration and deceleration.
Motor Relay	Supplies power to the pump motor in the brake actuator.
Motor Cut Relay	Cuts the power to the pump motor in the brake actuator.
ECM	• Sends the throttle position signal, accelerator pedal position signal, engine speed signal, etc., to the skid control ECU. • Based on the signals receives from the skid control ECU, controls the engine output.
EPS ECU	Operates cooperatively with the skid control ECU to control the steering assist torque.
4WD ECU*1	Operates cooperatively with the skid control ECU to control the torque distribution between the front and rear wheels.

*1: Only for 4WD Models

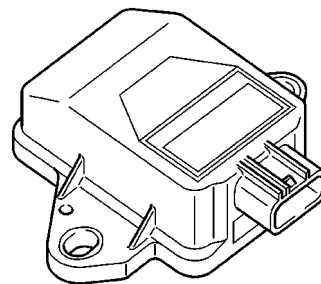
Yaw Rate & Deceleration Sensor

1) Yaw Rate Sensor

A yaw rate sensor has been provided under the driver seat. This sensor detects the vehicle's yaw rate.

2) Deceleration Sensor

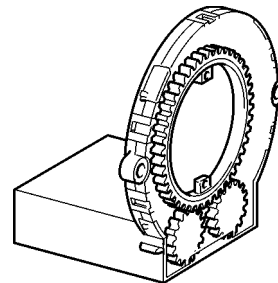
A deceleration sensor is built into the yaw rate sensor. This sensor detects the longitudinal and lateral acceleration and deceleration.



255CH141

Steering Angle Sensor

This steering angle sensor detects the steering direction and angle, and sends this signal to the skid control ECU.

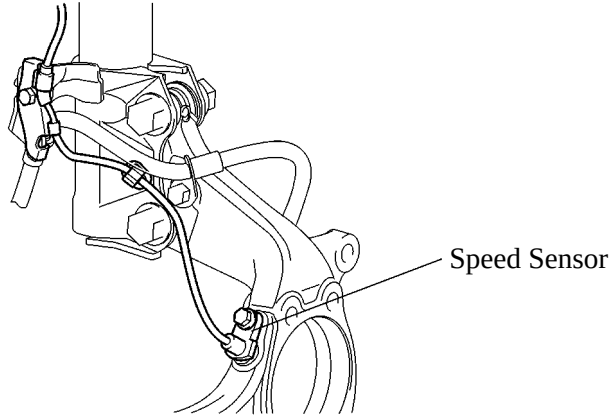


277CH126

Speed Sensor

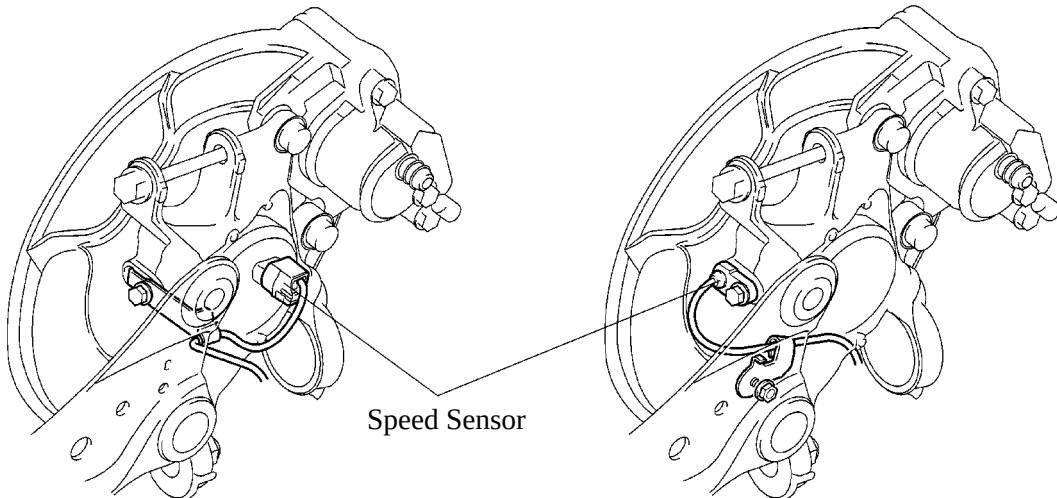
1) General

- An active type speed sensor is used. This sensor contains a sensor IC, which consists of two MREs (Magnetic Resistance Elements).
- The sensor rotor, which consists of N and S poles that are arranged in a circle, is integrated with the hub bearing inner race.



Front Axle

01MCH22Y

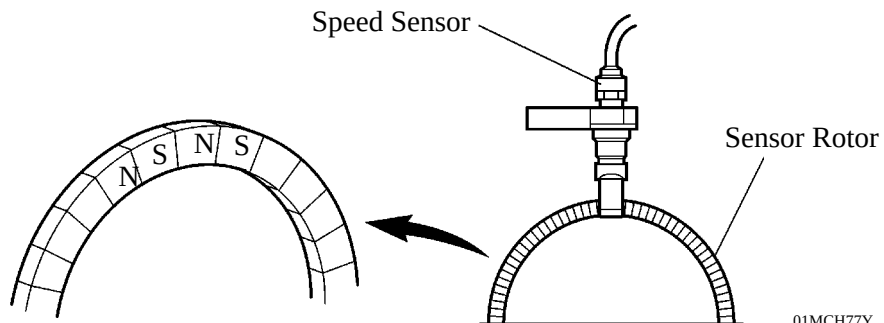


Rear Axle (2WD Model)

01MCH24Y

Rear Axle (4WD Model)

01MCH23Y



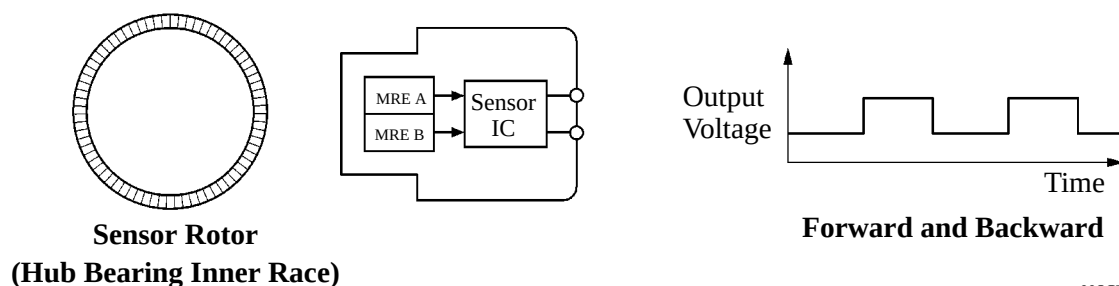
N and S Poles Arrangement

01MCH77Y

2) Operation

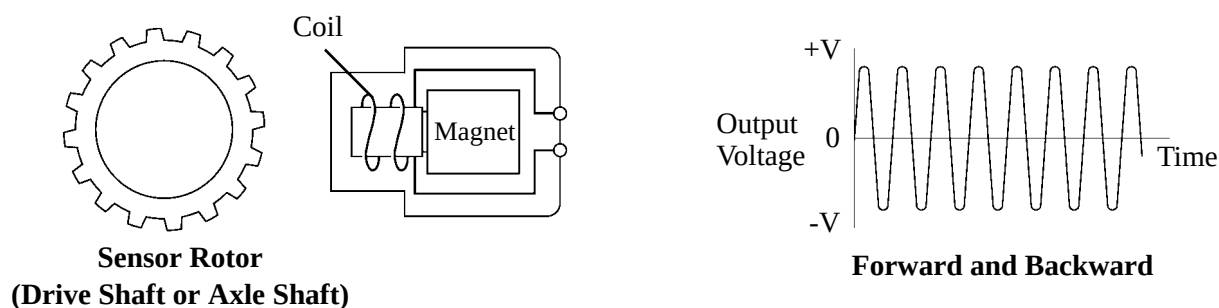
- Along with the rotational movement of the magnetic rotor, the N and S poles of the magnetic rotor pass alternately near the sensing portion of the speed sensor. This speed sensor outputs magnetic flux as a current value. The skid control ECU detects the changes in the output current to determine the wheel speed.
- Unlike the passive type speed sensors used on conventional models that output analog pulses, the active type speed sensor outputs digital pulses. Therefore, it can start detecting vehicle speeds at approximately 0 km/h.

► Active Type Speed Sensor ◀



00SCH97Y

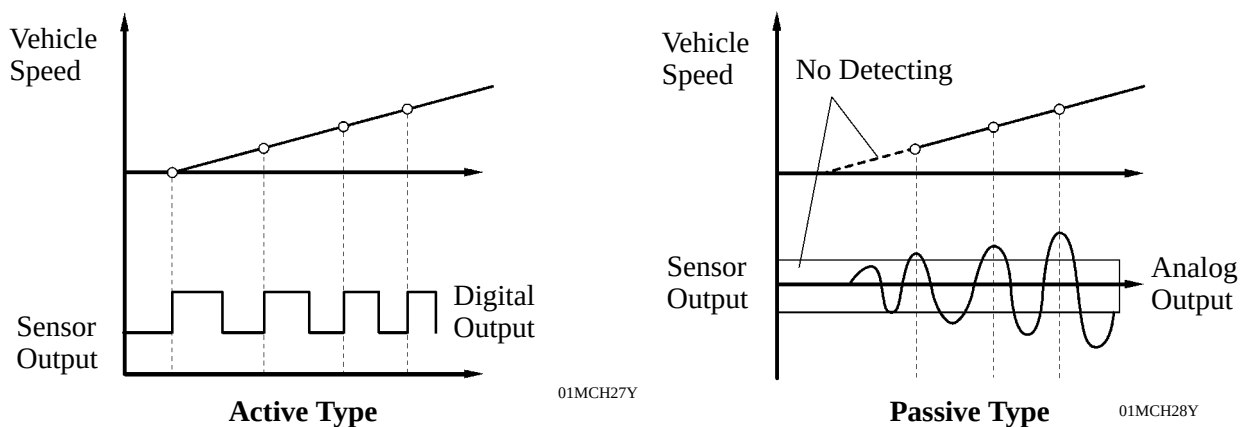
► Passive Type Speed Sensor ◀



232CH39

232CH147

► Comparison between Active Type and Passive Type Output Waveform Image ◀



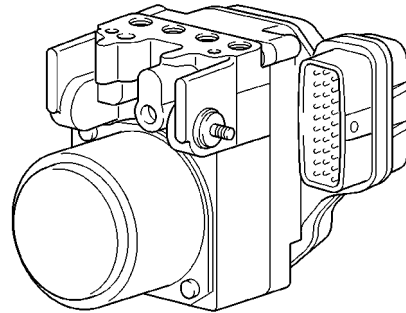
01MCH27Y

01MCH28Y

Brake Actuator

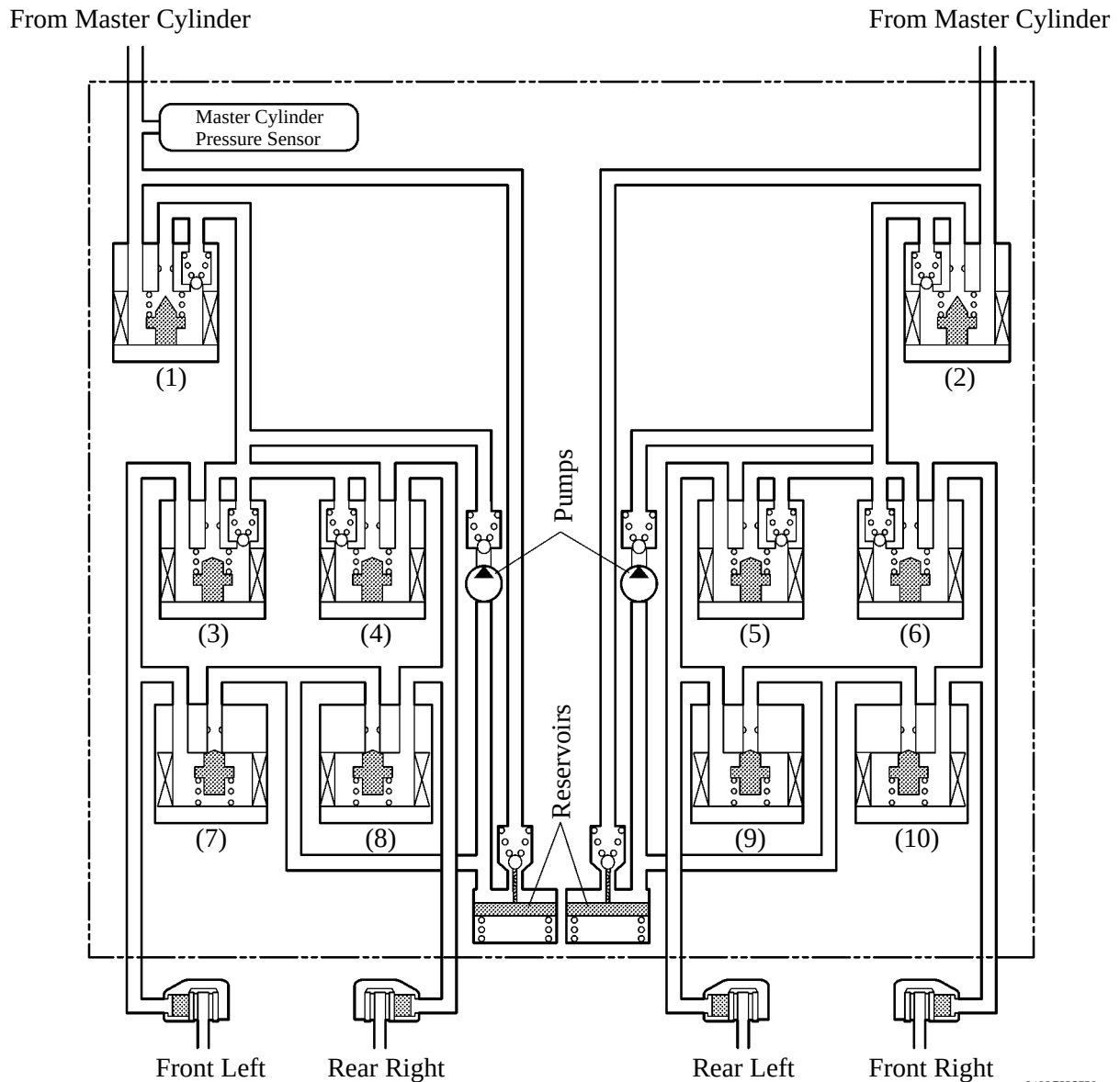
The brake actuator consists of the actuator portion, skid control ECU, solenoid relay, pump motor, and master cylinder pressure sensor.

- The actuator portion consists of 10 solenoid valves, 2 pumps, 2 reservoirs, and master cylinder pressure sensor.
- The 10 solenoid valves consist of 2 master cylinder cut solenoid valves [(1), (2)], 4 pressure holding solenoid valves [(3), (4), (5), (6)], and 4 pressure reduction solenoid valves [(7), (8), (9), (10)].



► Hydraulic Circuit ◀

01MCH29Y



01NCH65Y

6. ABS with EBD Function

Outline of EBD

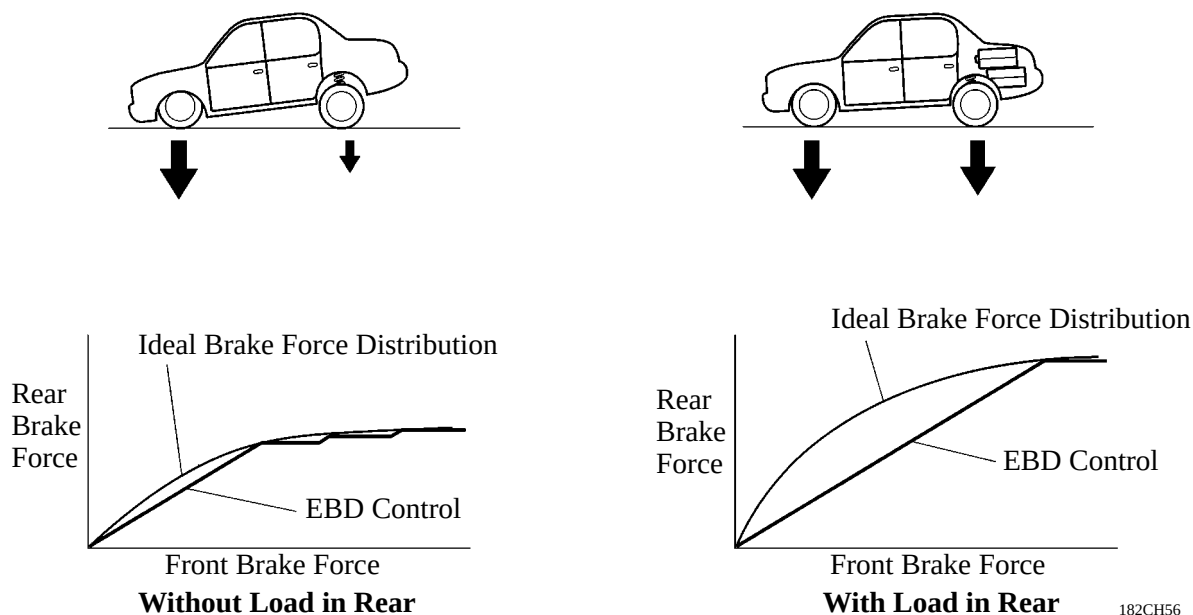
1) General

The distribution of the brake force, which was performed mechanically in the past, is now performed under electrical control of the skid control ECU, which controls the brake force in accordance with the vehicle's driving conditions.

2) Front/Rear Wheels Brake Force Distribution

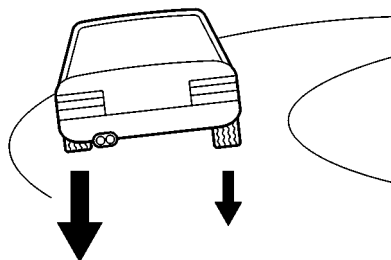
If the brakes are applied while the vehicle is moving straight forward, the transfer of the load reduces the weight that is applied to the rear wheels. The skid control ECU determines this condition by way of the signals from the yaw rate & deceleration sensor, and the brake actuator regulates the distribution of the brake force of the rear wheels to optimally control. For example, the amount of the brake force that is applied to the rear wheels during braking varies depending on whether the vehicle is carrying load or not. The amount of the brake force that is applied to the rear wheels also varies in accordance with the extent of the deceleration. Thus, the distribution of the brake force to the rear wheels is optimally controlled in order to effectively utilize the brake force of the rear wheels under these conditions.

► EBD Control Concept ◀



3) Right/Left Wheels Brake Force Distribution (During Cornering Braking)

When the brakes are applied while the vehicle is cornering, the load that is applied to the inner wheel decreases as the load to the outer wheel increases. The skid control ECU determines this condition by way of the signals from the speed sensor, and the brake actuator regulates the brake force in order to optimally control the distribution of the brake force to the inner wheel and outer wheel.

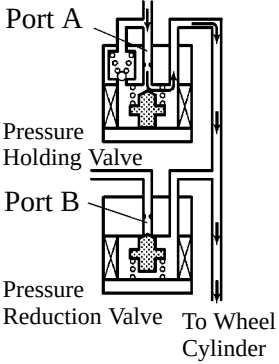
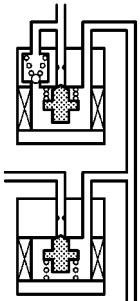
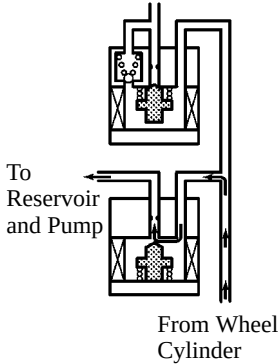


Normal Braking Operation

During normal braking, all solenoid valves are remained OFF.

ABS with EBD Operation

Based on the signals received from the 4 speed sensors, the skid control ECU calculates each wheel speed and deceleration, and checks wheel slipping conditions. According to the slipping condition, the skid control ECU controls the pressure holding valve and pressure reduction valve in order to adjust the fluid pressure of the each wheel cylinder in the following 3 modes: pressure reduction, pressure holding, and pressure increase modes.

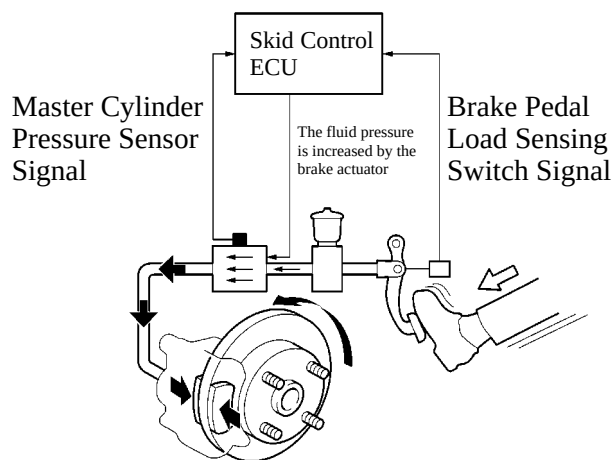
Not Activated	Normal Braking	—	—
Activated	Increase Mode	Holding Mode	Reduction Mode
Hydraulic Circuit	 169CH54	 169CH55	 169CH56
Pressure Holding Valve (Port A)	OFF (Open)	ON (Close)	←
Pressure Reduction Valve (Port B)	OFF (Close)	←	ON (Open)
Wheel Cylinder Pressure	Increase	Hold	Reduce

7. Brake Assist Function

Outline of Brake Assist

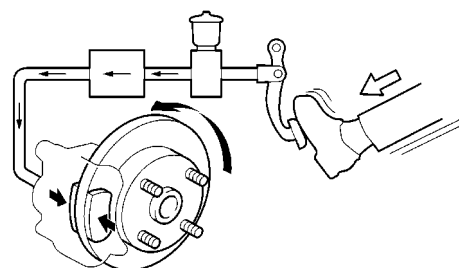
- The Brake Assist in combination with the ABS helps ensure the vehicle's brake performance.
- The Brake Assist interprets a quick push of the brake pedal as emergency braking and supplements the brake force applied if the driver has not depressed hard enough the brake pedal. In emergencies, drivers, especially inexperienced ones, often panic and do not apply sufficient pressure on the brake pedal.
- A key feature of Brake Assist is that the timing and the degree of braking assistance are designed to help ensure that the driver does not discern anything unusual about the braking operation. When the driver intentionally eases up on the brake pedal, the system reduces the amount of assistance it provides.
- Based on the signals from the master cylinder pressure sensor, the skid control ECU calculates the speed and the amount of the brake pedal application and then determines the intention of the driver to make an emergency braking. If the skid control ECU determines that the driver intends the emergency braking, the system activates the brake actuator to increase the brake fluid pressure, which increases the brake force.

► In case that the driver's depressing force is small when emergency braking is applied ◀



01MCH15Y

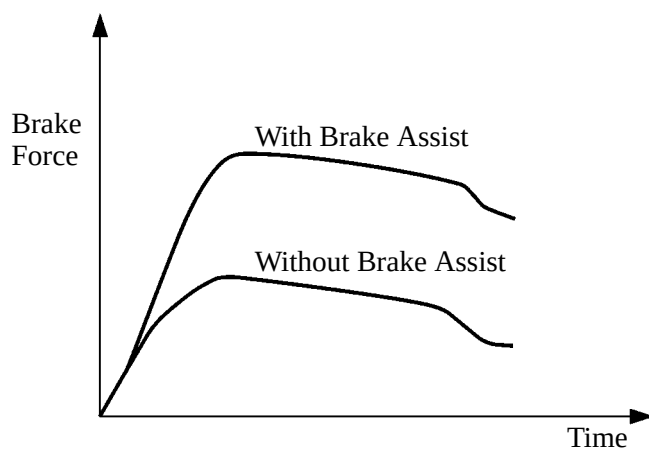
With Brake Assist



232CH139

Without Brake Assist*

*: The basic performance of the brake is the same as that of the models with the Brake Assist



170CH18

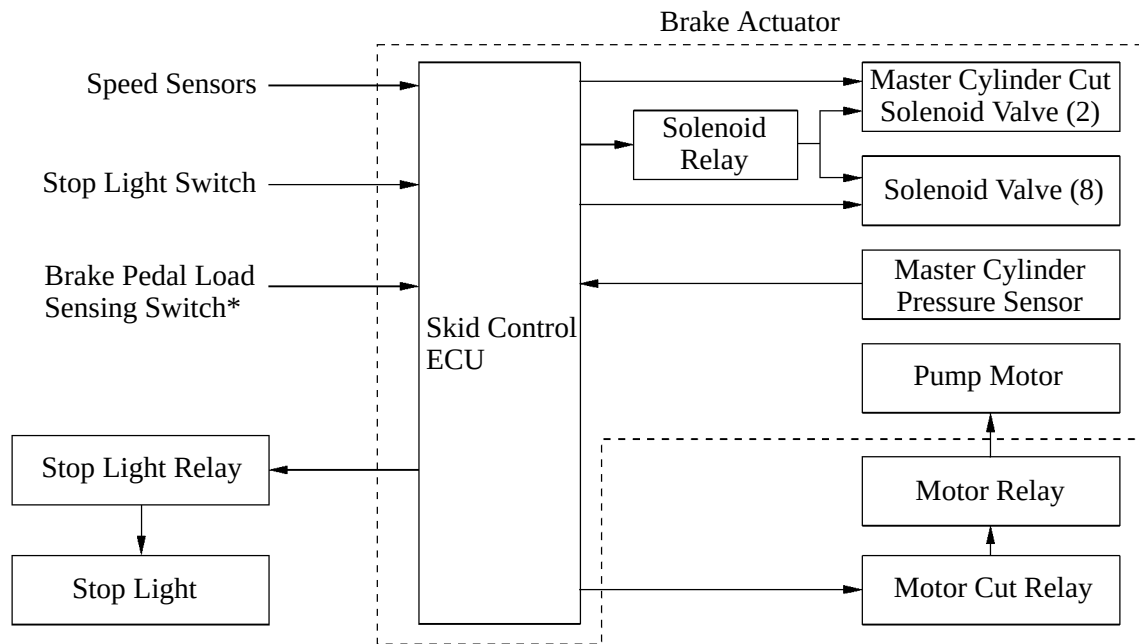
Brake Assist Operation

In the event of emergency braking, the skid control ECU detects the driver's intention based on the speed of the pressure increase in the master cylinder determined by the master cylinder pressure sensor signal. If the skid control ECU judges the need for additional brake assist, pressure is generated by the pump in the brake actuator and directed to the wheel cylinder to apply a greater fluid pressure than the master cylinder. Also in the following cases, the skid control ECU provides brake assist.

- In the event of a brake booster failure, the skid control ECU detects the failure based on the data from the brake load sensing switch and master cylinder pressure sensor.

When the brake assist is activated, each solenoid valve operates as shown in the table on the next page.

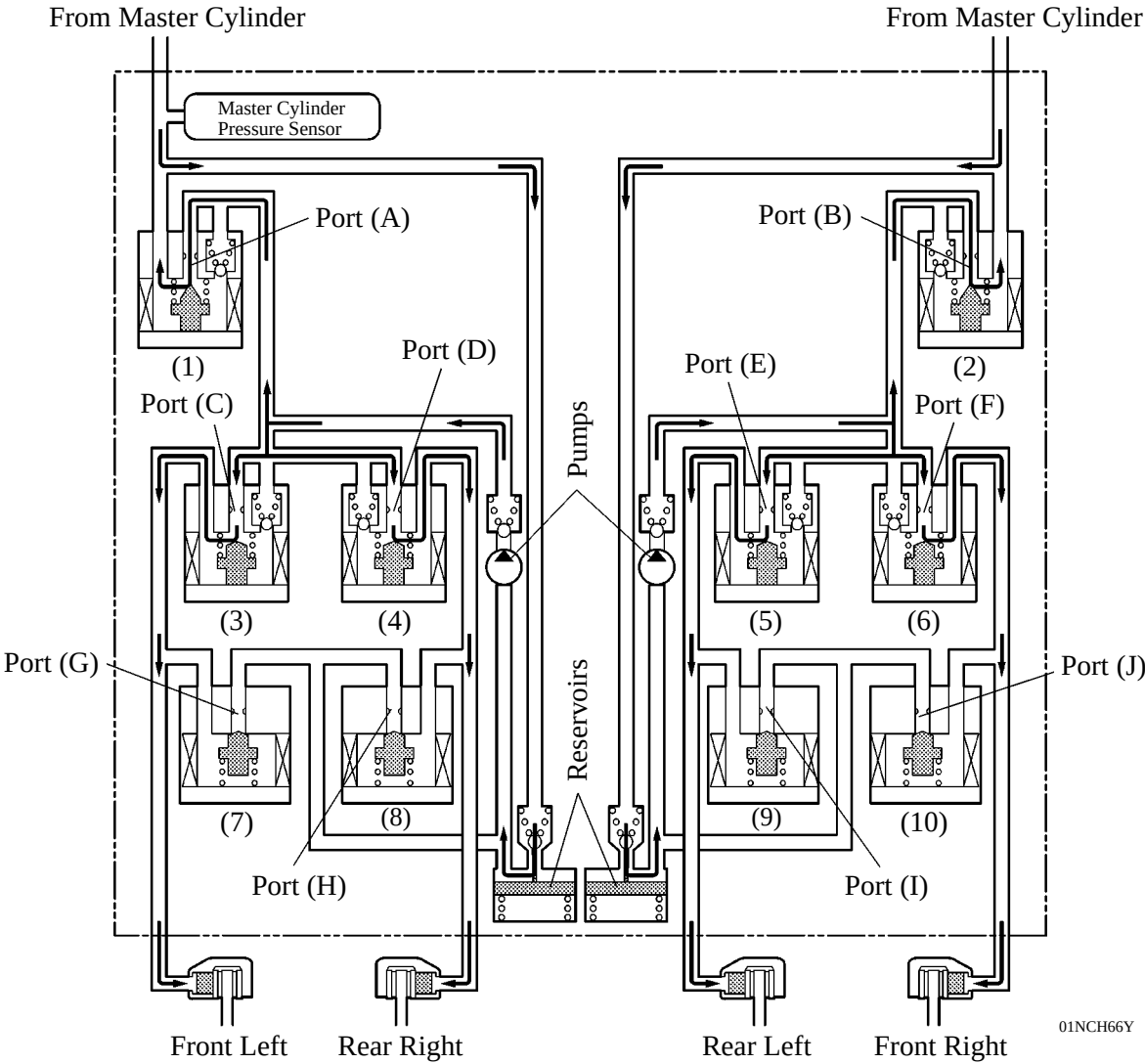
► System Diagram ◀



01NCH42Y

*: Only for Models with 16 in. Ventilated Disc

► Brake Assist Operation ◀



Item			Port	Brake Assist Not Activated	Brake Assist Activated
(1)	(2)				
(1)	Master Cylinder Cut Solenoid Valve	(A)	OFF	ON*	
(2)		(B)	(Open)		
(3)	Pressure Holding Solenoid Valve	(C)	OFF (Open)	←	
(4)		(D)			
(5)		(E)			
(6)		(F)			
(7)	Pressure Reduction Solenoid Valve	(G)	OFF (Close)	←	
(8)		(H)			
(9)		(I)			
(10)		(J)			
Pump			OFF	ON	

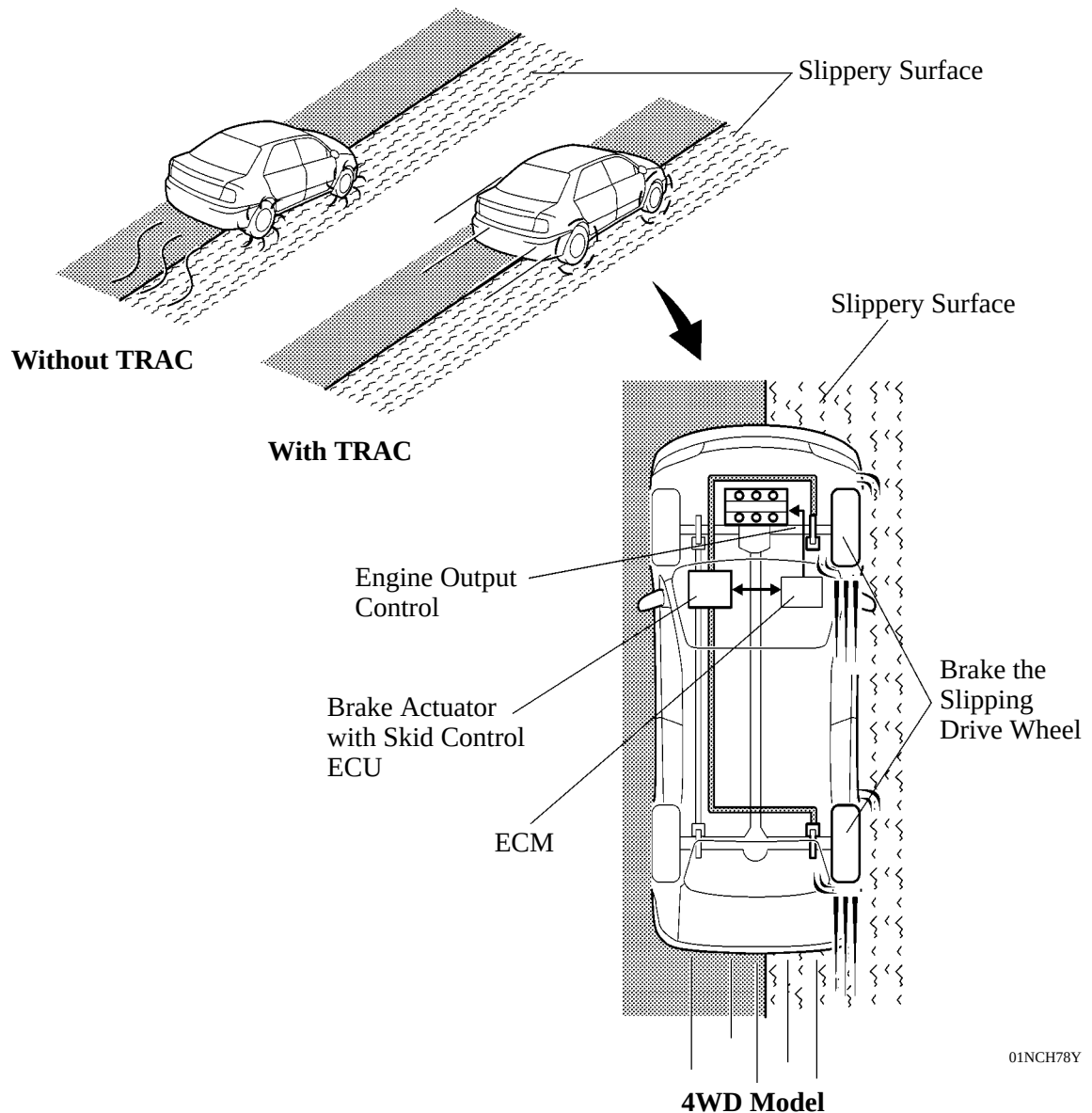
*: The solenoid valve controls the hydraulic pressure between “open” and “close” according to the operating condition by adjusting continually.

8. TRAC Function

Outline of TRAC

- If the driver depresses the accelerator pedal aggressively when starting off or accelerating on a slippery surface, the drive wheels could slip due to the excessive amount of torque that is generated. By applying hydraulic brake control to the drive wheels and engine output control, the TRAC helps minimize the slippage of the drive wheels, thus generating the drive force that is appropriate for the road surface conditions.
- For example, a comparison may be made between two vehicles, one with the TRAC and the other without. In the vehicle without the TRAC, if the accelerator pedal is operated in a rough manner while driving over a surface with different surface friction characteristics, the drive wheel on the slippery surface could slip as illustrated. As a result, the vehicle could become unstable. However, in the vehicle with the TRAC, the skid control ECU instantly determines the state of the vehicle and operates the brake actuator in order to apply to the slipping drive wheel. Furthermore, the ECM receives the signals from the skid control ECU and regulates the engine output. Thus, the function can constantly maintain a stable vehicle posture.

► Driving condition on road with different surface friction characteristics ◀



TRAC Operation

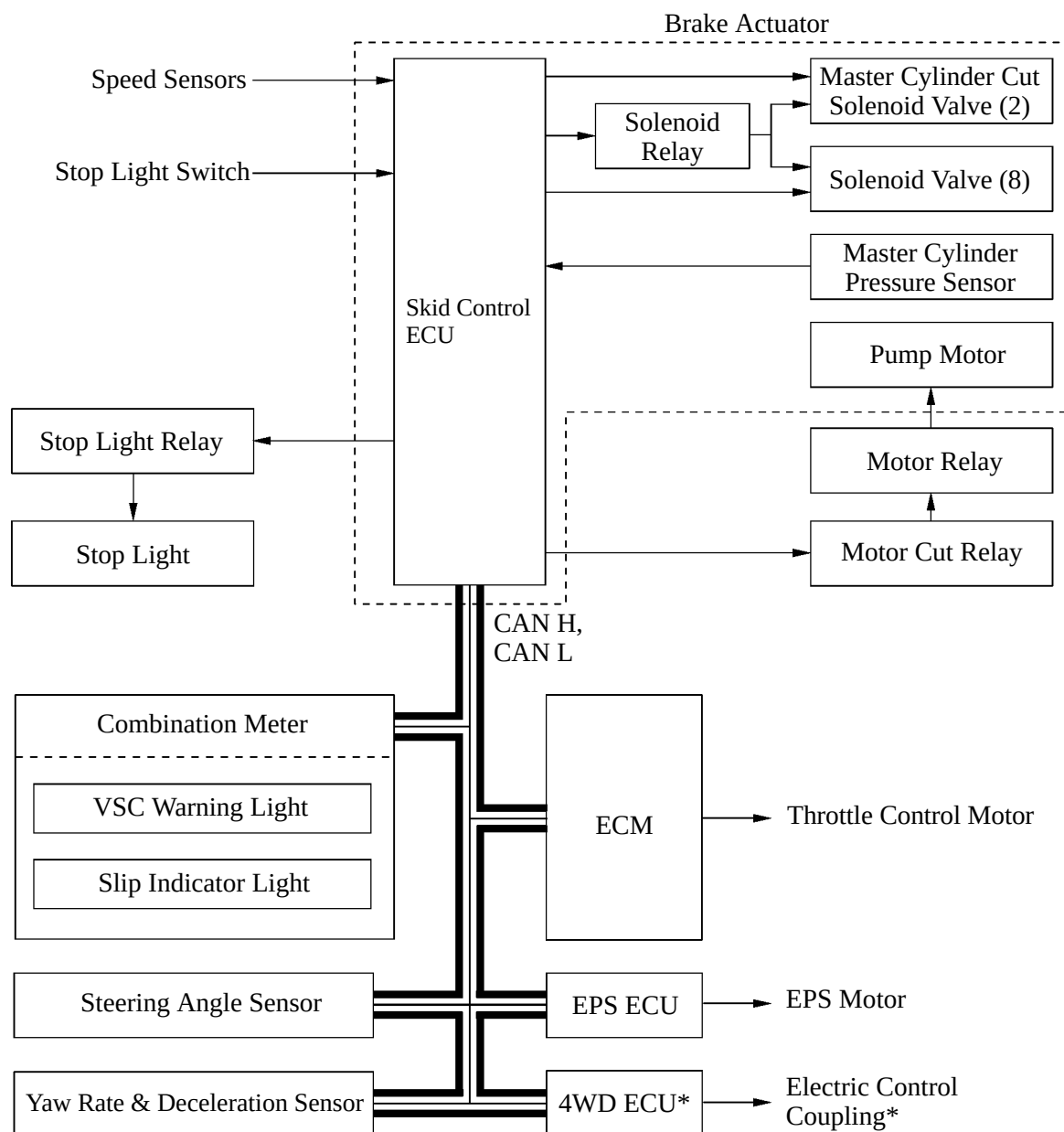
The fluid pressure generated by the pump is regulated by the master cylinder cut solenoid valve to the required pressure. Thus, the wheel cylinders of the drive wheels are controlled in the following 3 modes: pressure reduction, pressure holding, and pressure increase modes to control the slippage of the drive wheels.

The diagram next page shows the hydraulic circuit in the pressure increase mode when the TRAC is activated.

The pressure holding solenoid valve and the pressure reduction solenoid valve are turned ON/OFF according to the ABS with EBD operation pattern described on the previous page.

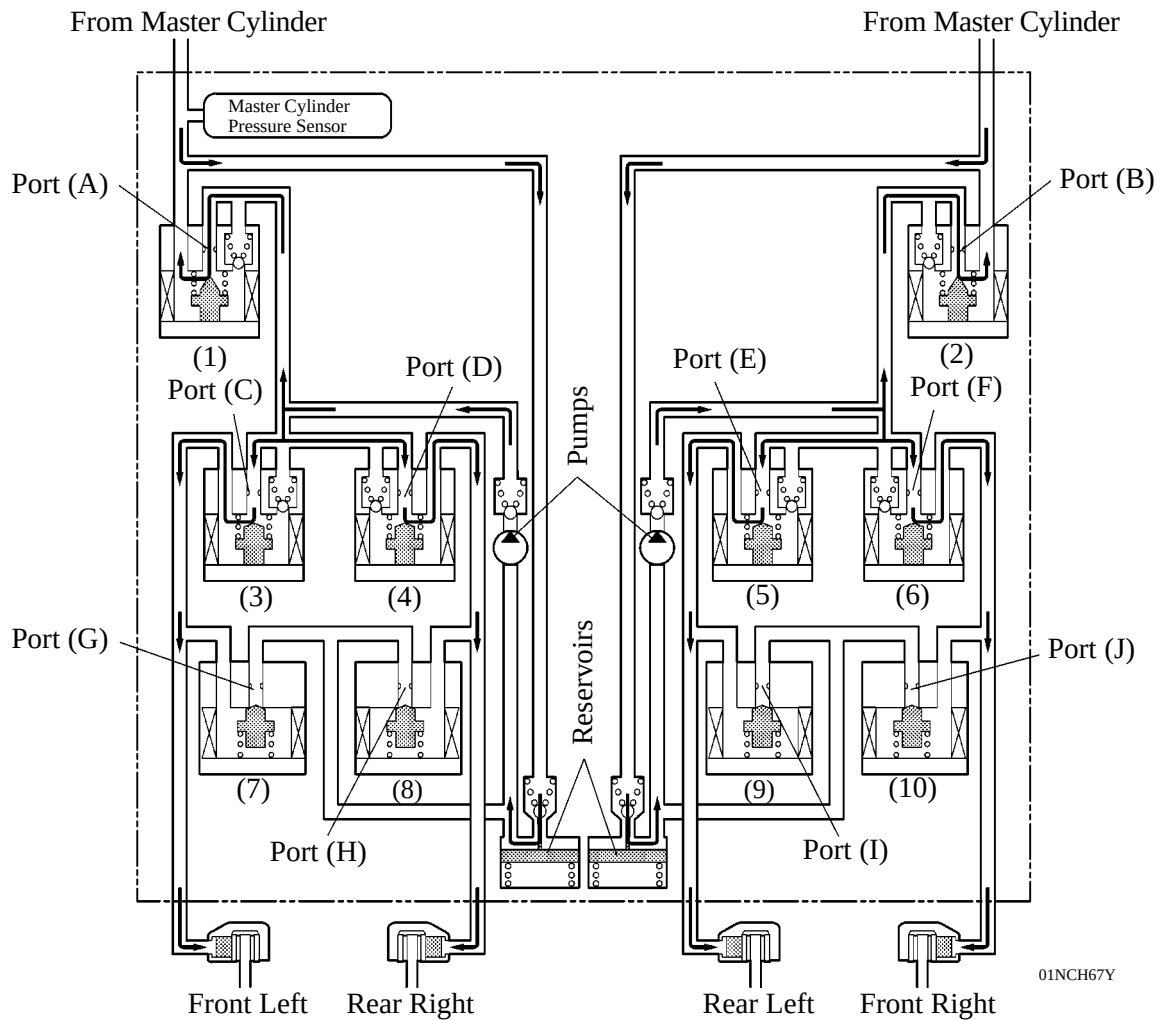
When the TRAC is activated, each solenoid valve operates as shown in the table on the next page.

► System Diagram ◀



*: Only for 4WD Models

► TRAC Operation (4WD Model) ◀



Item			Port	TRAC Not Activated	TRAC Activated		
					Increase Mode	Holding Mode	Reduction Mode
(1)	Master Cylinder Cut Solenoid Valve		(A)	OFF	ON*	←	←
(2)			(B)	(Open)			
Front Brake	(3)	Pressure Holding Solenoid Valve	(C)	OFF	←	ON (Close)	←
	(6)		(F)	(Open)			
	(7)	Pressure Reduction Solenoid Valve	(G)	OFF	←	←	ON (Open)
	(10)		(J)	(Close)			
	Wheel Cylinder Pressure	Right	—	—	Increase	Hold	Reduce
Rear Brake		Left	—	—	Increase	Hold	Reduce
	(4)	Pressure Holding Solenoid Valve	(D)	OFF	←	ON (Close)	←
	(5)		(E)	(Open)			
	(8)	Pressure Reduction Solenoid Valve	(H)	OFF	←	←	ON (Open)
	(9)		(I)	(Close)			
Wheel Cylinder Pressure	Right	—	—	—	Increase	Hold	Reduce
	Left	—	—	—	Increase	Hold	Reduce
Pump				OFF	ON	←	←

*: The solenoid valve controls the hydraulic pressure between “open” and “close” according to the operating condition by adjusting continually.

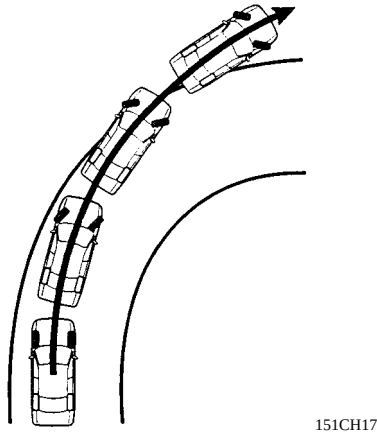
9. VSC Function

Outline of VSC

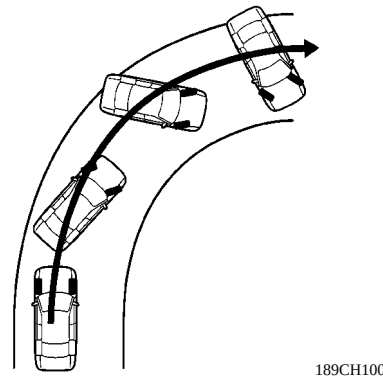
The followings are two examples that can be considered as circumstances in which the tires exceed their lateral grip limit.

The VSC is designed to help control the vehicle behavior by controlling the engine output and the brakes at each wheel when the vehicle is under one of the conditions indicated below.

- When the front wheels lose grip in relation to the rear wheels (front wheel skid tendency).
- When the rear wheels lose grip in relation to the front wheels (rear wheel skid tendency).



Front Wheel Skid Tendency



Rear Wheel Skid Tendency

1) Method for Determining the Vehicle Condition

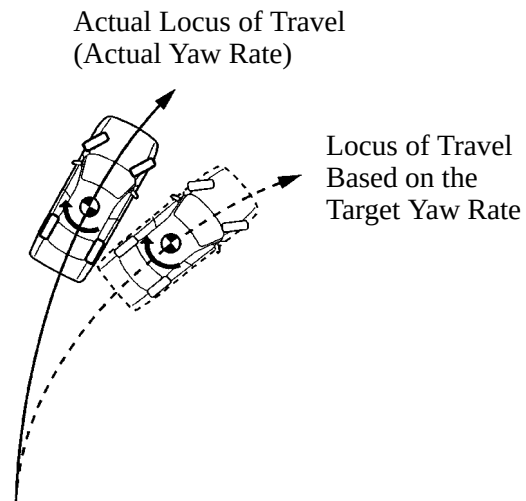
To determine the condition of the vehicle, sensors detect the steering angle, vehicle speed, vehicle's yaw rate, and vehicle's lateral acceleration, which are then calculated by the skid control ECU.

a. Determining Front Wheel Skid

Whether the vehicle is in the state of the front wheel skid or not is determined by the difference between the target yaw rate and the vehicle's actual yaw rate.

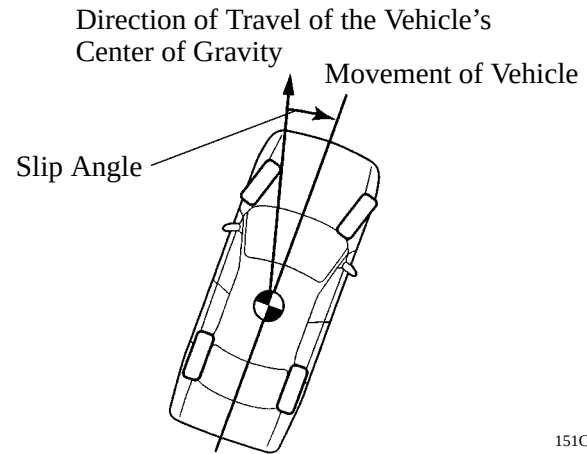
When the vehicle's actual yaw rate is smaller than the yaw rate (a target yaw rate that is determined by the vehicle speed and steering angle) that should be rightfully generated when the driver operates the steering wheel, it means the vehicle is making a turn at a greater angle than the locus of travel.

Thus, the skid control ECU determines that there is a large tendency to front wheel skid.



b. Determining Rear Wheel Skid

Whether the vehicle is in the state of the rear wheel skid or not is determined by the values of the vehicle's slip angle and the vehicle's slip angular velocity (time-dependent changes in the vehicle's slip angle). When the vehicle's slip angle and the slip angular velocity are large, the skid control ECU determines that the vehicle has a large rear wheel skid tendency.



151CH18

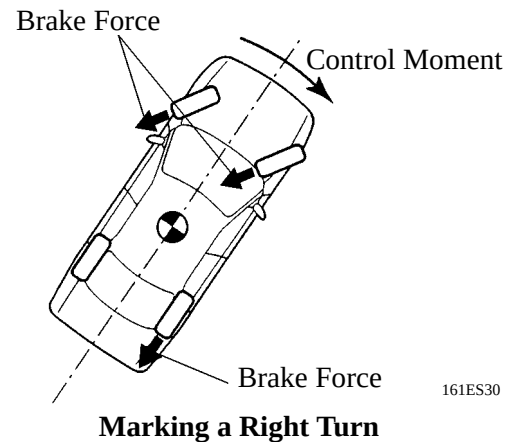
2) Method for VSC Operation

When the skid control ECU determines that the vehicle has a tendency to front wheel skid or rear wheel skid, it decreases the engine output and applies the brake of a front or rear wheel to control the vehicle's yaw moment.

The basic operation of the VSC is described below. However, the control method differs depending on the vehicle's characteristics and driving conditions.

a. Dampening a Front Wheel Skid

When the skid control ECU determines that there is a large front wheel skid tendency, it counteracts in accordance with the extent of that tendency. The skid control ECU controls the engine output and applies the brakes of the front wheels and rear wheel of the inner circle of the turn in order to help restrain the front wheel skid tendency.

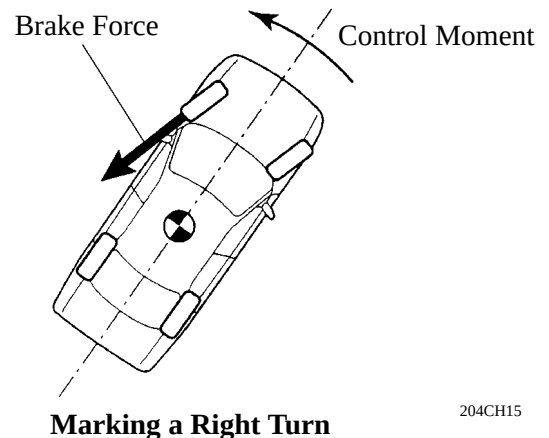


161ES30

b. Dampening a Rear Wheel Skid

When the skid control ECU determines that there is a large rear wheel skid tendency, it counteracts in accordance with the extent of that tendency. It applies the brakes of the front wheel of the outer circle of the turn, and generates an outward moment of inertia in the vehicle, in order to help restrain the rear wheel skid tendency. Along with the reduction in the vehicle speed caused by the brake force, the excellent vehicle's stability is ensured.

In some cases, the skid control ECU applies the brake of the rear wheels as necessary.

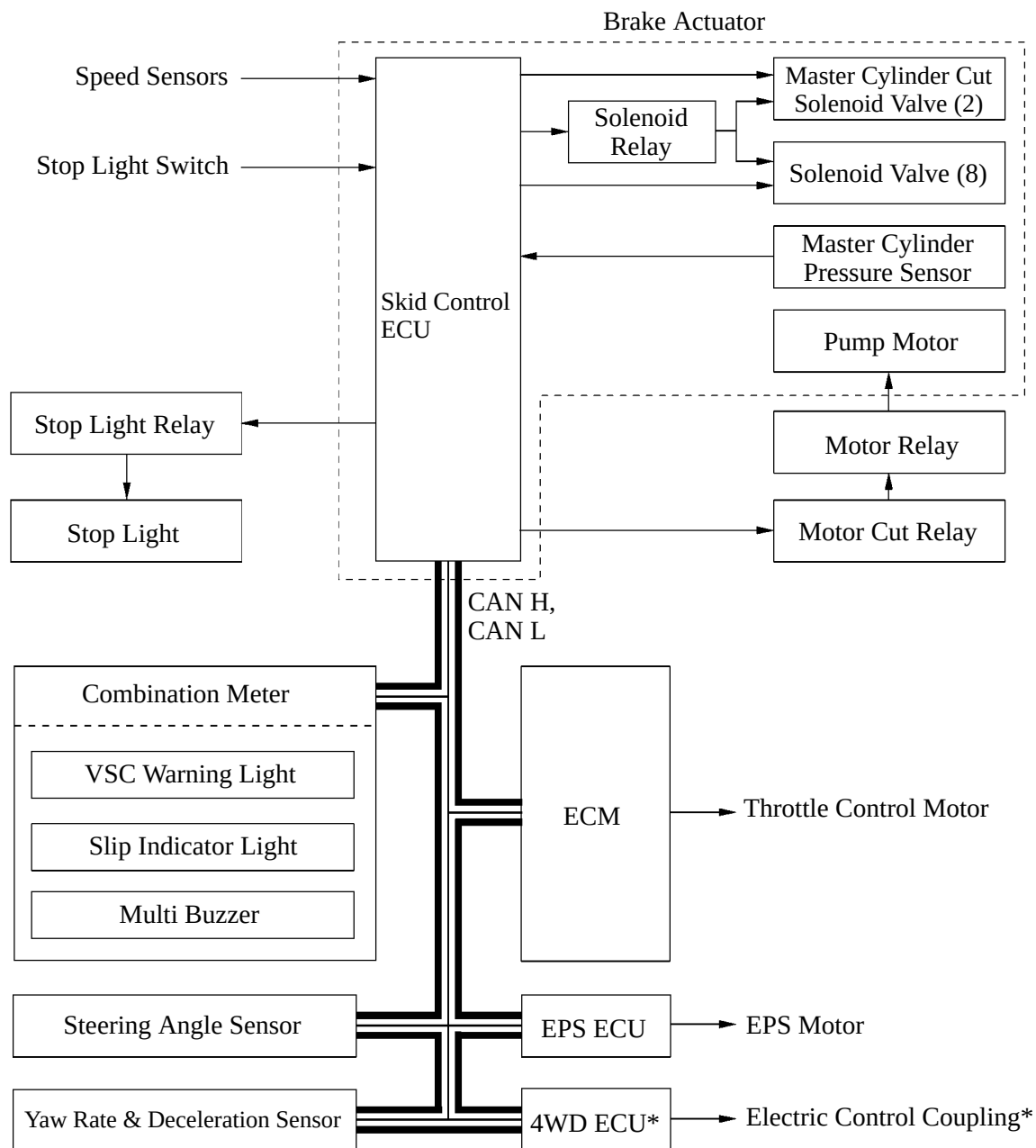


204CH15

VSC Operation

The VSC, by way of solenoid valves, controls the fluid pressure that is generated by the pump and applies it to the brake wheel cylinder of each wheel in the following 3 modes: pressure reduction, pressure holding, and pressure increase modes. As a result, the tendency to front wheel skid or rear wheel skid is controlled.

► System Diagram ◀



*: Only for 4WD Models

01MCH17Y

1) Front Wheel Skid Restraining Control (Making a Right Turn)

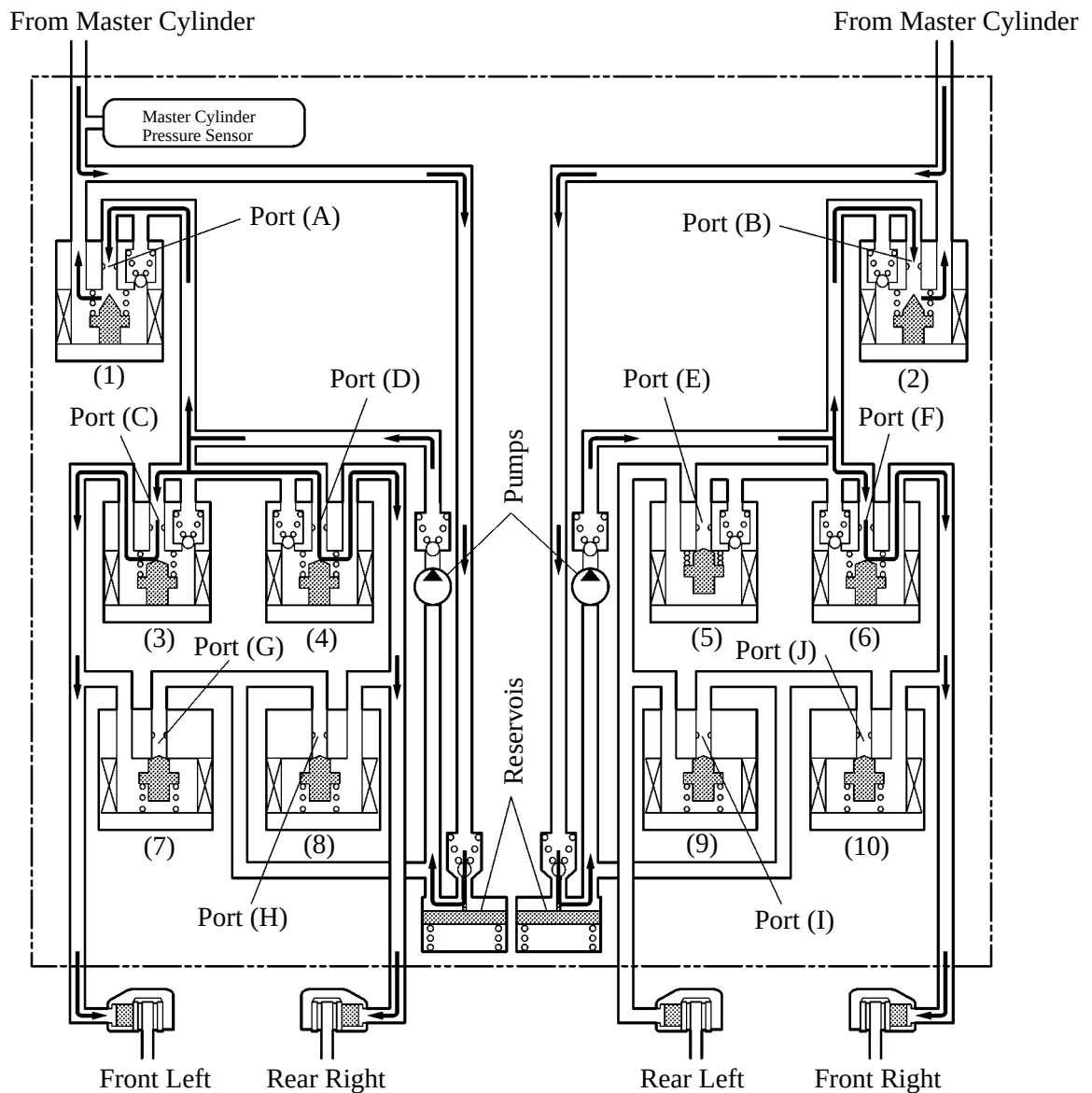
In the front wheel skid restraining control, the brakes of the front wheels and the rear wheel of the inner circle of the turn are applied. Also, depending on whether the brake is ON or OFF and the condition of the vehicle, there are circumstances in which the brake might not be applied to the wheels even if those wheels are targeted for braking.

The diagram below shows the hydraulic circuit in the pressure increase mode, as it controls the front wheel skid condition while the vehicle makes a right turn.

In other operating mode, the pressure holding valve and the pressure reduction valve are turned ON/OFF according to the ABS operation pattern.

When the front wheel skid restraining control is activated, each solenoid valve operates as show in the table on the next page.

► VSC Operation (Front Wheel Skid Restraining) ◀



Item			Port	VSC Not Activated	VSC Activated		
					Increase Mode	Holding Mode	Reduction Mode
(1)		Master Cylinder Cut Solenoid Valve	(A)	OFF	ON*	←	←
(2)			(B)	(Open)			
Front Brake	(3)	Pressure Holding Solenoid Valve	(C)	OFF (Open)	←	ON (Close)	←
	(6)		(F)	OFF (Open)	←	ON (Close)	←
	(7)	Pressure Reduction Solenoid Valve	(G)	OFF (Close)	←	←	ON (Open)
	(10)		(J)	OFF (Close)	←	←	ON (Open)
	Wheel Cylinder Pressure	Right	—	—	Increase	Hold	Reduce
		Left	—	—	Increase	Hold	Reduce
Rear Brake	(4)	Pressure Holding Solenoid Valve	(D)	OFF (Open)	←	ON (Close)	←
	(5)		(E)	OFF (Open)	ON (Close)	←	←
	(8)	Pressure Reduction Solenoid Valve	(H)	OFF (Close)	←	←	ON (Open)
	(9)		(I)	OFF (Close)	←	←	←
	Wheel Cylinder Pressure	Right	—	—	Increase	Hold	Reduce
		Left	—	—	—	—	—
Pump				OFF	ON	←	←

*: The solenoid valve controls the hydraulic pressure between “open” and “close” according to the operating condition by adjusting continually.

2) Rear Wheel Skid Restraining Control (Making a Right Turn)

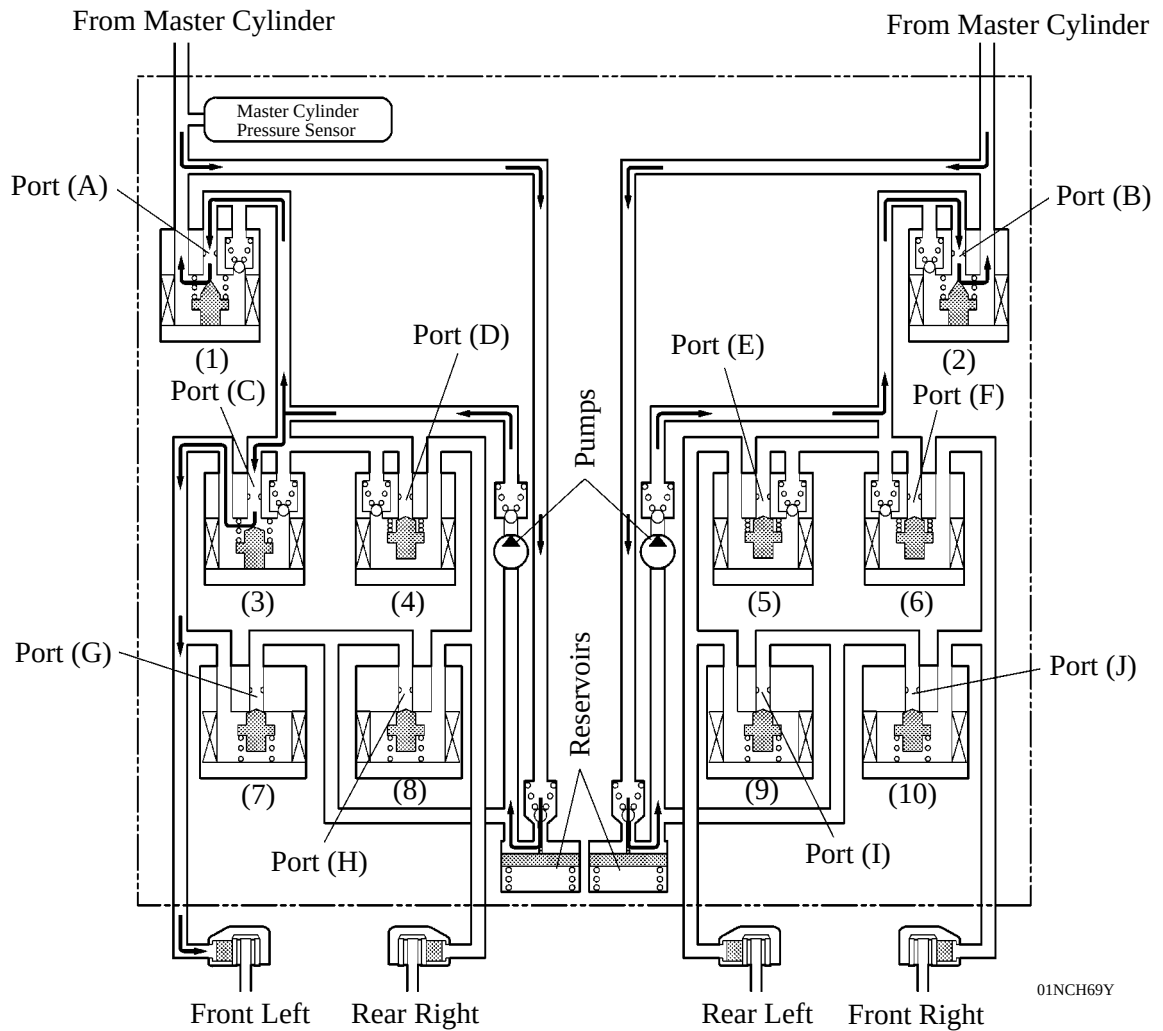
In the rear wheel skid restraining control, the brake of the front wheel of the outer circle of the turn is applied. Also, depending on whether the brake is ON or OFF and the condition of the vehicle, there are circumstances in which the brake might not be applied to the wheels even if those wheels are targeted for braking.

The diagram on the next page shows the hydraulic circuit in the pressure increase mode, as it controls the rear wheel skid condition while the vehicle makes a right turn.

In other operating mode, the pressure holding valve and the pressure reduction valve are turned ON/OFF according to the ABS operation pattern.

When the rear wheel skid restraining control is activated, each solenoid valve operates as shown in the table on the next page.

► VSC Operation (Rear Wheel Skid Restraining) ◀



Item				Port	VSC Not Activated	VSC Activated		
						Increase Mode	Holding Mode	Reduction Mode
(1) (2)		Master Cylinder Cut Solenoid Valve	(A)	OFF (Open)	ON*	←	←	
			(B)	OFF (Open)	←	←	←	
Front Brake	(3)	Pressure Holding Solenoid Valve	(C)	OFF (Open)	←	ON (Close)	←	
	(6)		(F)	OFF (Open)	ON (Close)	←	←	
	(7)	Pressure Reduction Solenoid Valve	(G)	OFF (Close)	←	←	ON (Open)	
	(10)		(J)	OFF (Close)	←	←	←	
	Wheel Cylinder Pressure	Right	—	—	—	—	—	
		Left	—	—	Increase	Hold	Reduce	
Rear Brake	(4)	Pressure Holding Solenoid Valve	(D)	OFF (Open)	ON (Close)	←	←	
	(5)		(E)	OFF (Open)	ON (Close)	←	←	
	(8)	Pressure Reduction Solenoid Valve	(H)	OFF (Close)	←	←	←	
	(9)		(I)	OFF (Close)	←	←	←	
	Wheel Cylinder Pressure	Right	—	—	—	—	—	
		Left	—	—	—	—	—	
Pump				OFF	ON	←	←	

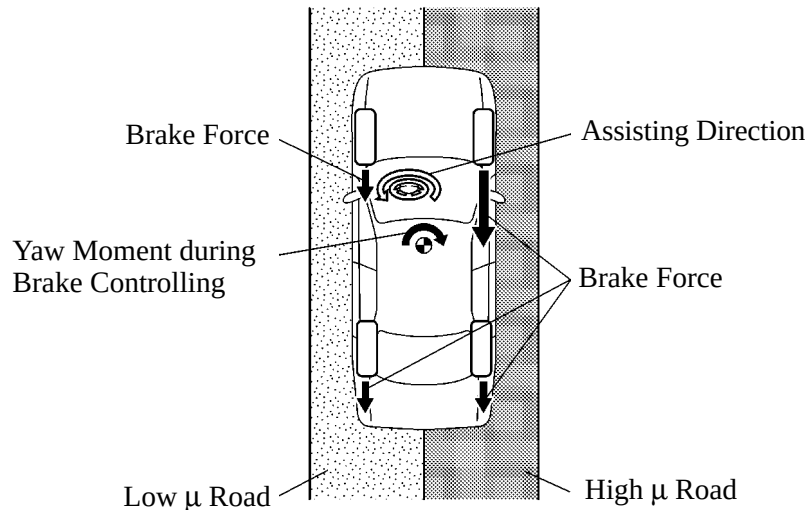
*: The solenoid valve controls the hydraulic pressure between “open” and “close” according to the operating condition by adjusting continually.

10. Cooperative Control Function

Outline of Cooperative Control

1) Braking when Surface Resistance Differs between Both Sides of Wheels

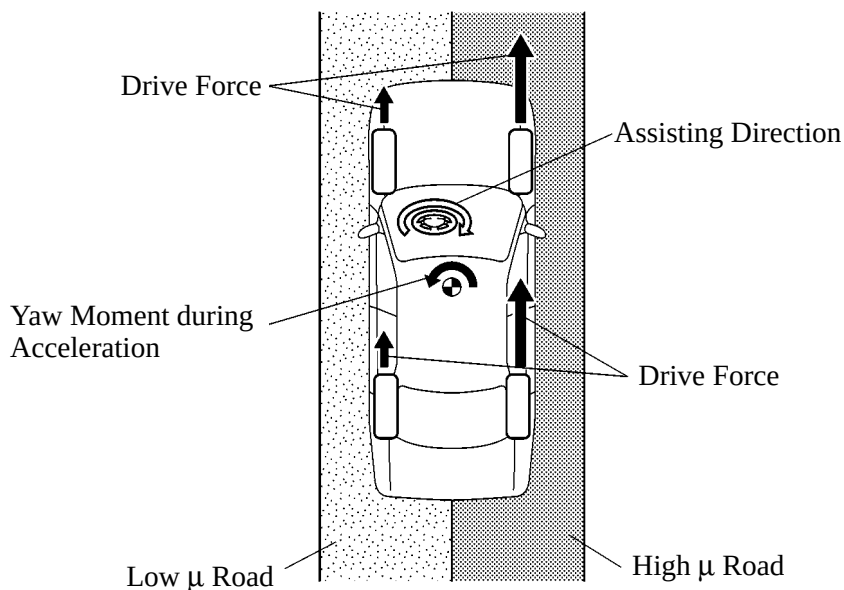
If the driver suddenly applies the brakes on a road surface with a considerable difference in friction coefficient between the right and left wheels, the difference in the brake force between the right and left wheels will cause the vehicle posture to become unstable and create a yaw moment. In this state, the skid control ECU controls the VSC to stabilize the vehicle posture. At the same time, it effects cooperative control with the EPS to provide steering torque assist, which facilitates the driver's steering maneuvers to stabilize the vehicle posture.



01NCH58Y

2) Accelerating when Surface Resistance Differs between Both Sides of Wheels

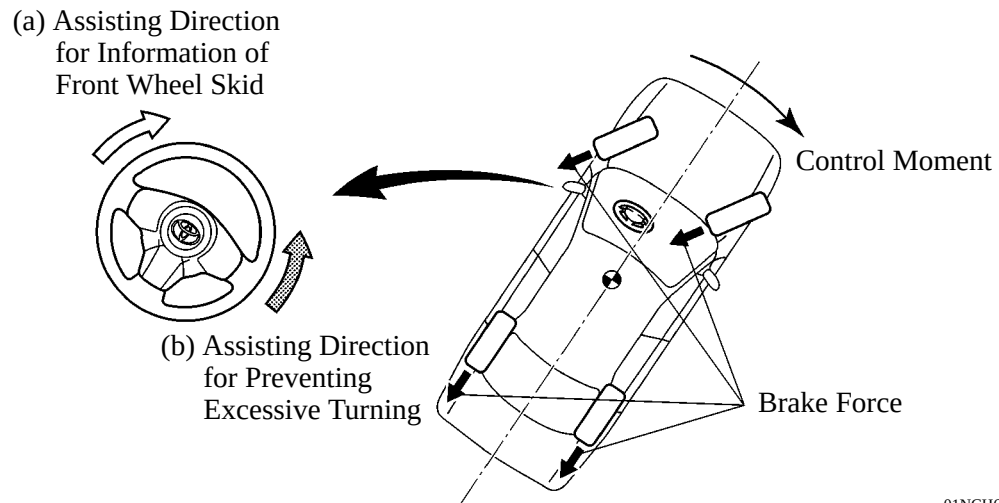
If the driver suddenly starts off or accelerates on a road surface with a considerable difference in friction coefficient between the right and left wheels, the slippage of a drive wheel will cause the vehicle posture to become unstable and negatively affect its acceleration performance. In this state, the skid control ECU causes the TRAC to control the hydraulic brake of the slipping drive wheel, and requests the ECM to effect engine output control. At the same time, it effects cooperative control with the EPS to provide steering torque assist, which facilitates the driver's steering maneuvers to stabilize the vehicle posture.



01NCH59Y

3) Front Wheel Skid Tendency

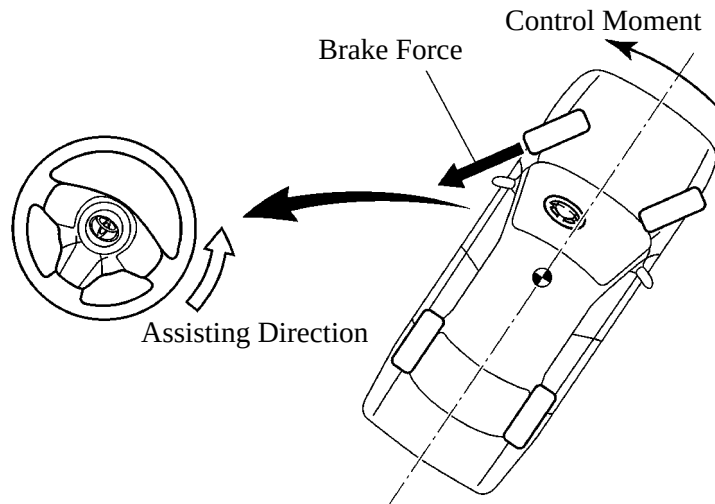
When the skid control ECU determines a front wheel skid tendency (see page CH-108), it controls the VSC to dampen the front wheel skid (see page CH-109). At the same time, it effects the cooperative control with the EPS to provide steering torque assists, which controls the driver's steering maneuvers to stabilize the vehicle posture. Steering torque assists are provided to inform the driver of the front wheel skid (a), and to prevent the driver's excessive turning of the steering wheel (b). In the assist for preventing excessive turning (b), it increases the resistance to counter the driver's steering effort, if the driver turns the steering wheel excessively.



01NCH60Y

4) Rear Wheel Skid Tendency

When the skid control ECU determines a rear wheel skid tendency (see page CH-109), it controls the VSC to dampen the rear wheel skid (see page CH-109). At the same time, it effects cooperative control with the EPS to provide steering torque assist, which facilitates the driver's steering maneuvers in the direction to correct the rear wheel skid.

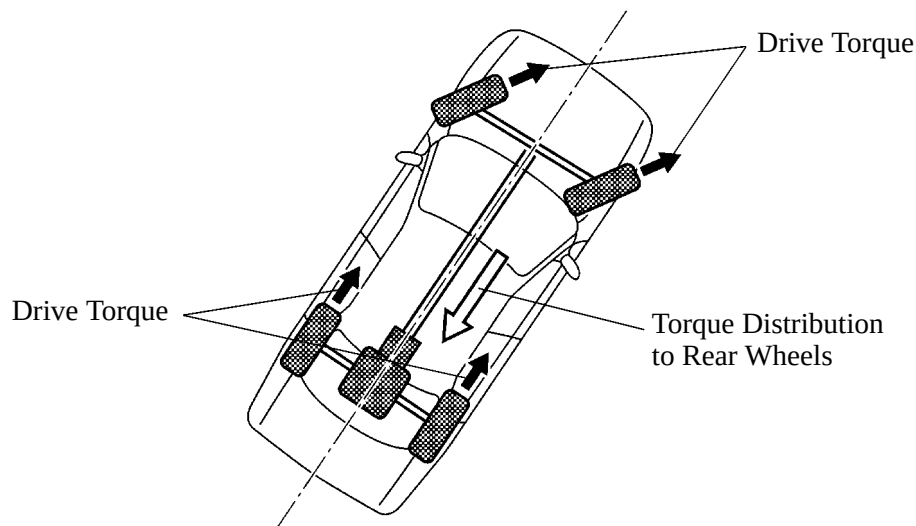


01NCH61Y

5) Acceleration During Cornering (Only for 4WD Models)

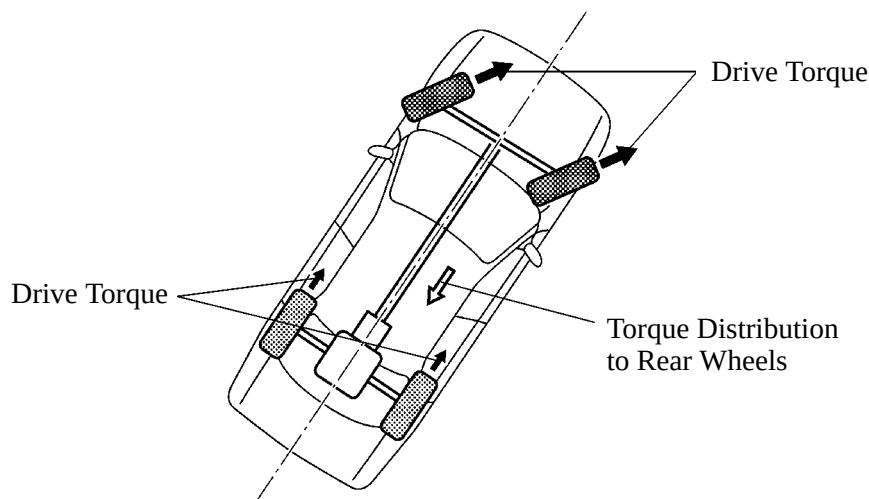
A sudden acceleration of the vehicle during cornering may cause a drive wheel to freewheel, which could cause the front wheels or rear wheels to skid. If the skid control ECU determines the freewheeling of a drive wheel, a front wheel skid tendency, or a rear wheel skid tendency, it effects cooperative control with the 4WD system to optimally control the drive torque distribution to the front and rear wheels. Furthermore, it controls the TRAC and the VSC as needed to ensure driving stability and acceleration performance.

► Front Wheel Skid Tendency ◀



01NCH62Y

► Rear Wheel Skid Tendency ◀



01NCH63Y

Cooperative Control Operation

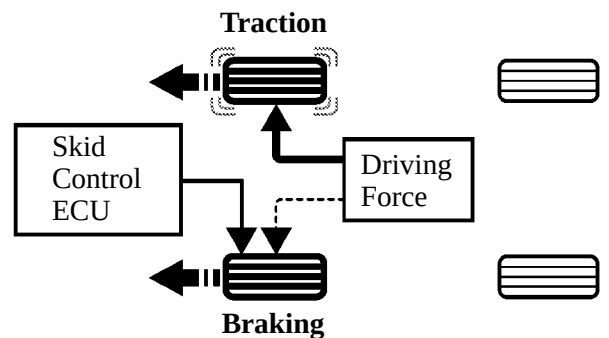
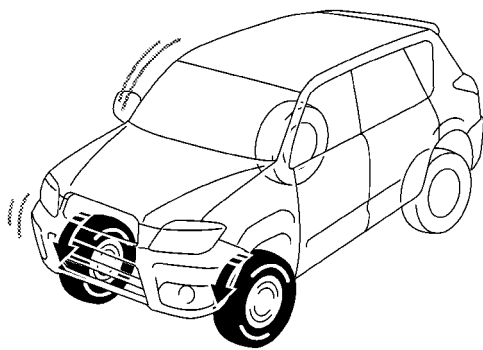
The operation of the solenoid valves under the cooperative control is the same as the TRAC or VSC operation.

11. Auto LSD Function (Only for 2WD models)

Outline of Auto LSD

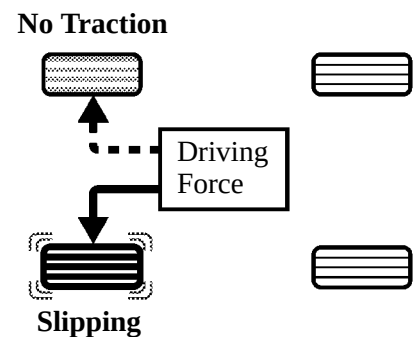
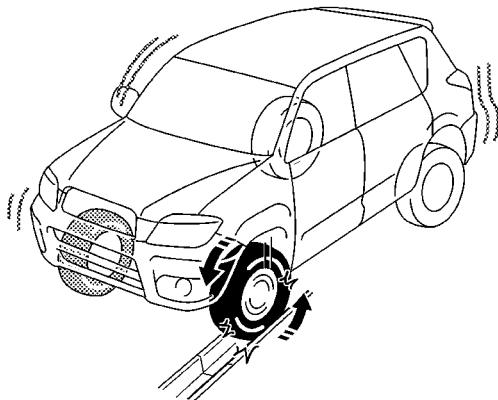
- The Auto LSD achieves the equivalent functions of an LSD (Limited Slip Differential) through the use of a traction control function. For this reason, the contents of brake control are the same between Auto LSD and TRAC. When the driver presses the Auto LSD switch, this function achieves the LSD effect by regulating the hydraulic pressure that acts on the drive wheels and controlling the engine output in accordance with the amount of pedal effort applied on the accelerator.
- TRAC enhances the start off performance of the vehicle during low-resistance surface conditions, such as snow or mud, by restricting the acceleration effort during a start off in order to prevent the wheels from spinning.
- On the other hand, the Auto LSD tends to enhance the acceleration effort somewhat in order to apply greater drive torque to the wheel that is making contact with the ground. Thus, this function helps the vehicle get unstuck if a wheel loses its grip, and enhances the vehicle's start off performance on high-resistance surface conditions such as gravel roads.

► With Auto LSD Function ◀



01MCH19Y

► Without Auto LSD Function ◀



01MCH20Y

- The following conditions are required for operating the Auto LSD function.

Auto LSD Switch	ON
Accelerator Pedal	ON

Auto LSD Operation

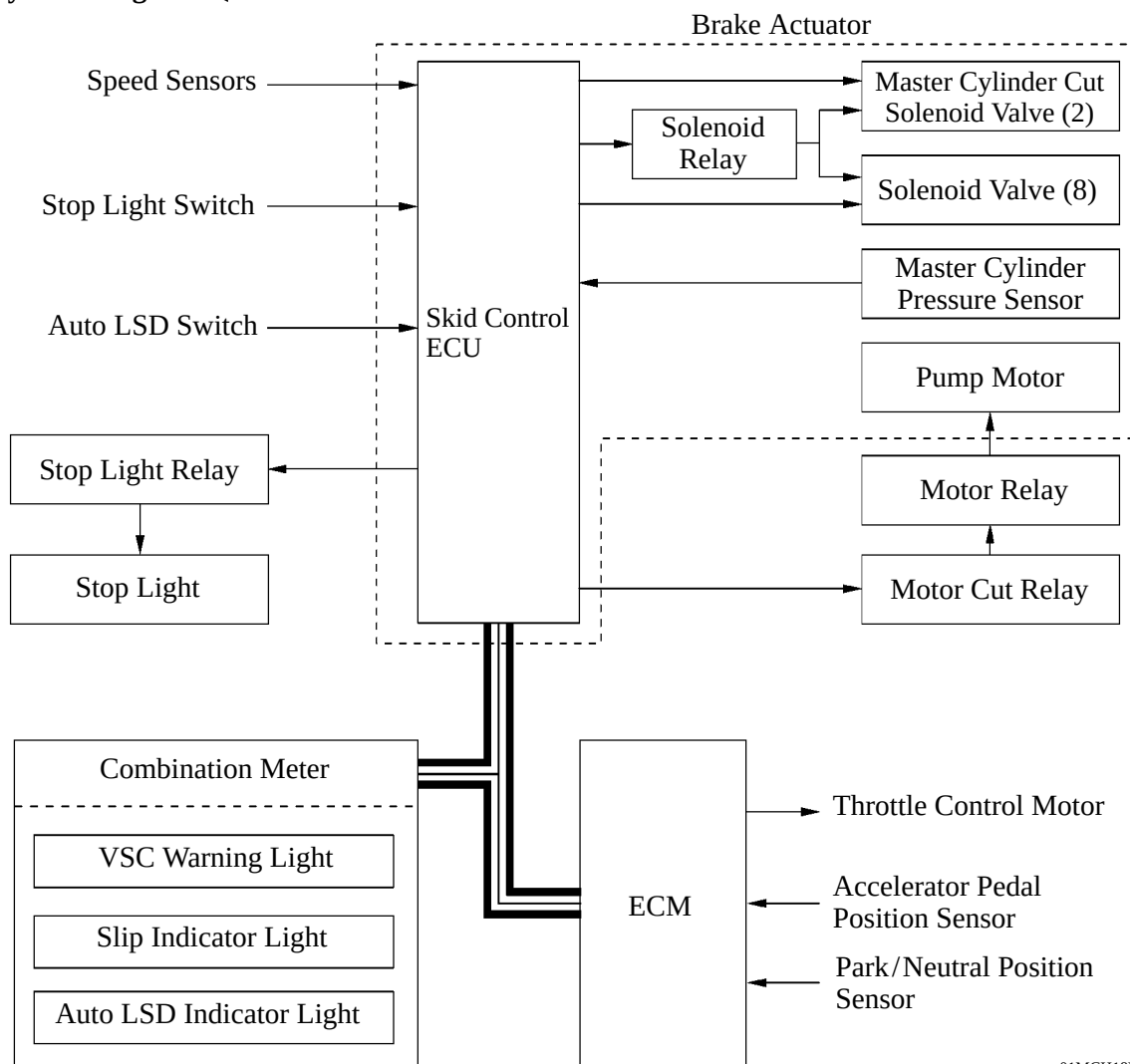
- The skid control ECU determines that the vehicle is in a state in which the Auto LSD can operate, by using various sensors and switches to detect the operating conditions of the Auto LSD switch, shift position, accelerator pedal, and brake pedal.
- When the vehicle is in a state in which the Auto LSD can operate, the skid control ECU effects hydraulic pressure control of the wheel cylinder at the wheel with the faster wheel speed so that the wheel speeds of the right and left drive wheels will become equal.
- The Auto LSD indicator light illuminates when the vehicle is in a state in which the Auto LSD can operate, and the slip indicator light flashes during Auto LSD control.

If the Auto LSD function operates due to the slippage of the left drive wheel, see the next page for the operation of the solenoid valves.

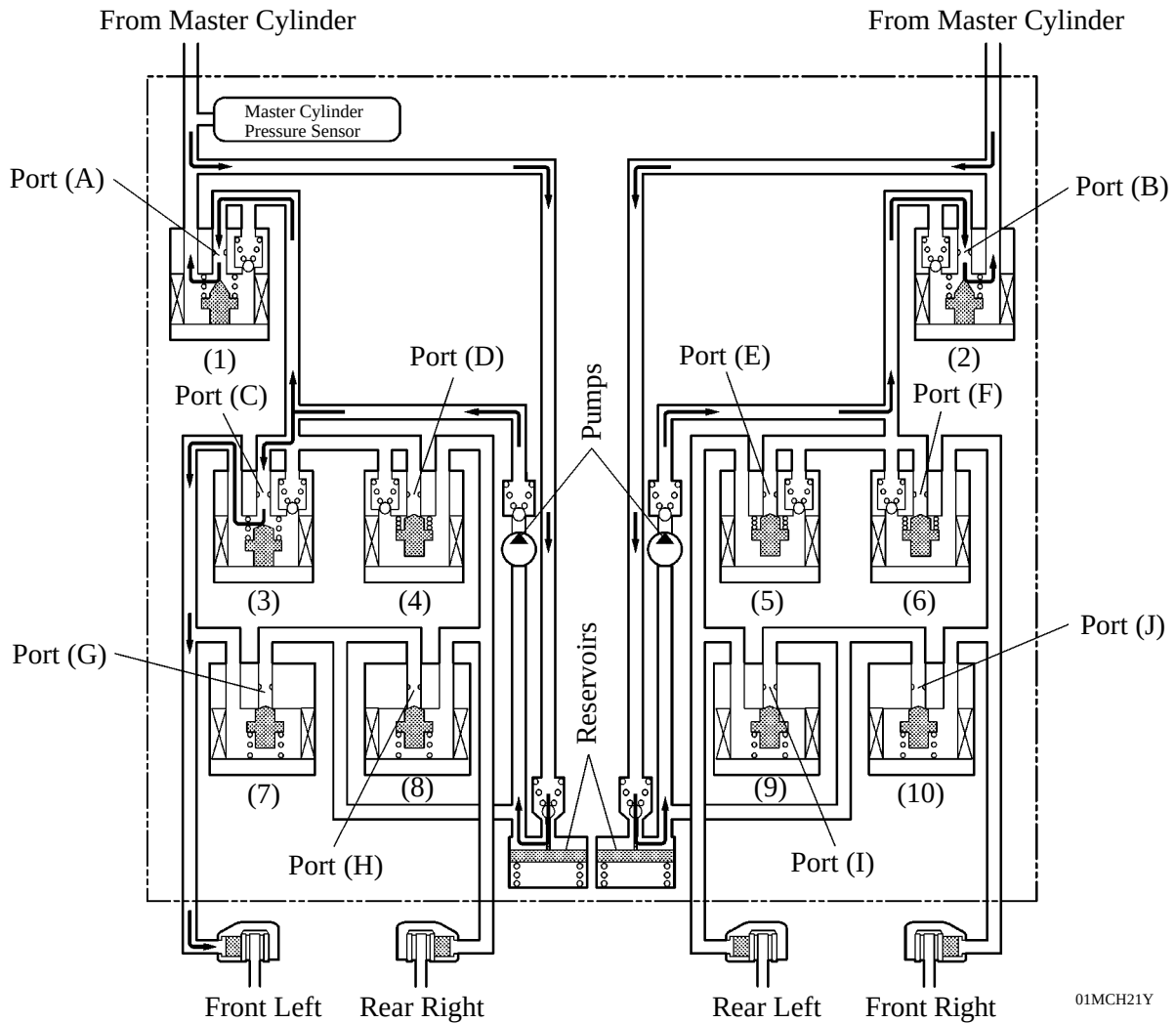
NOTICE

- Use the Auto LSD only if a wheel comes off or while driving on a road surface with high driving resistance such as sand or mud. Do not use it for normal driving. After using the Auto LSD, make sure the Auto LSD indicator light is off before resuming driving.
- To operate the Auto LSD switch, make sure the wheels are not spinning.

► System Diagram ◀



► Auto LSD Operation (Front Left Drive Wheel Slipping) ◀



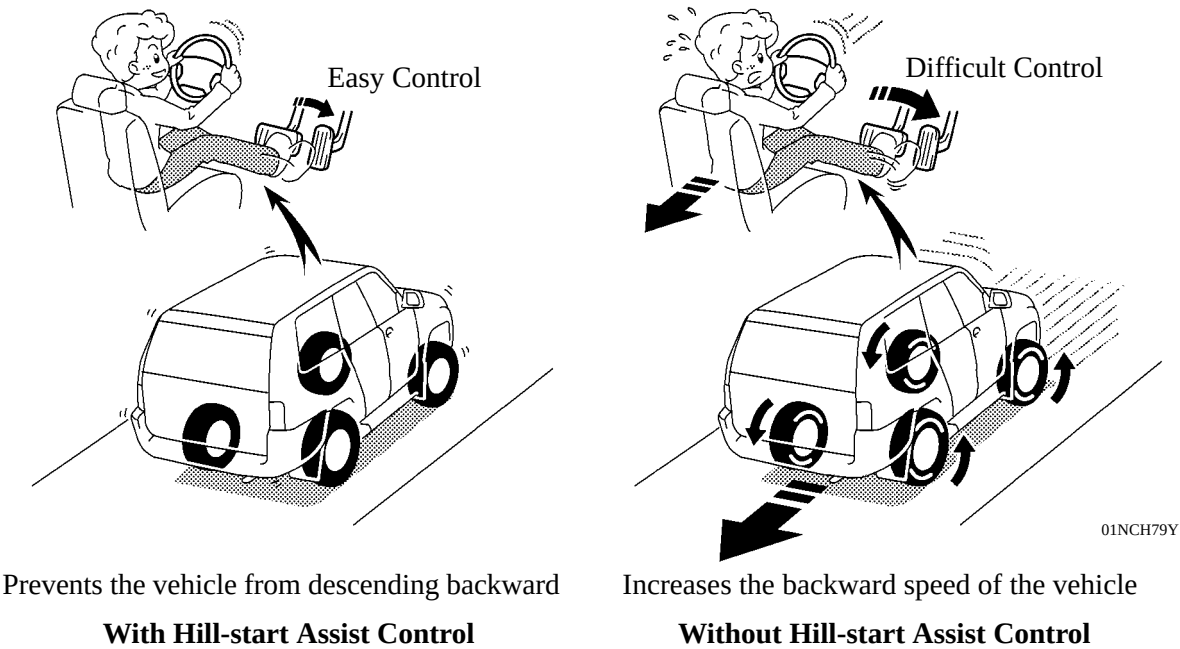
Item		Port	Auto LSD Not Activated	Auto LSD Activated		
				Increase Mode	Holding Mode	Reduction Mode
(1)	Master Cylinder Cut Solenoid Valve	(A)	OFF (Open)	ON*	←	←
(2)		(B)	OFF (Open)	←	←	←
Front Brake	(3) Pressure Holding Solenoid Valve	(C)	OFF (Open)	←	ON (Close)	←
	(6) Pressure Holding Solenoid Valve	(F)	OFF (Open)	ON (Close)	←	←
	(7) Pressure Reduction Solenoid Valve	(G)	OFF (Close)	←	←	ON (Open)
	(10) Pressure Reduction Solenoid Valve	(J)	OFF (Close)	←	←	←
	Wheel Cylinder Pressure	Right	—	—	—	—
	Left	—	—	Increase	Hold	Reduce
Rear Brake	(4) Pressure Holding Solenoid Valve	(D)	OFF (Open)	ON (Close)	←	←
	(5) Pressure Holding Solenoid Valve	(E)	OFF (Open)	ON (Close)	←	←
	(8) Pressure Reduction Solenoid Valve	(H)	OFF (Close)	←	←	←
	(9) Pressure Reduction Solenoid Valve	(I)	OFF (Close)	←	←	←
	Wheel Cylinder Pressure	Right	—	—	—	—
	Left	—	—	—	—	—
Pump			OFF	ON	←	←

*: The solenoid valve controls the hydraulic pressure between “open” and “close” according to the operating condition by adjusting continually.

12. Hill-start Assist Control Function

Outline of Hill-start Assist Control

- When the vehicle starts off a steep or slippery hill, the vehicle could descend backward while the driver switches from the brake pedal to the accelerator pedal, thus making it difficult for the vehicle to start off. To prevent this from occurring, the Hill-start Assist Control temporarily (approximately 2 seconds at the maximum) applies the brakes to the 4 wheels in order to prevent the vehicle from descending backward.
- Without the Hill-start Assist Control, the driver must quickly and precisely switch from the brake pedal to the accelerator pedal. With the Hill-start Assist Control, however, the driver can start off easily and operate the pedal in a relaxed manner because the Hill-start Assist Control prevents the vehicle from descending backward.



- Provided that all the conditions listed below have been met, and the driver depresses the brake pedal further while the vehicle is stopped, the system starts the Hill-start Assist Control.

Hill-start Assist Control Operation Condition	● Shift lever is in the position other than P. ● The accelerator pedal is not depressed. ● The vehicle is at standstill. ● The parking brake is not pulled up.
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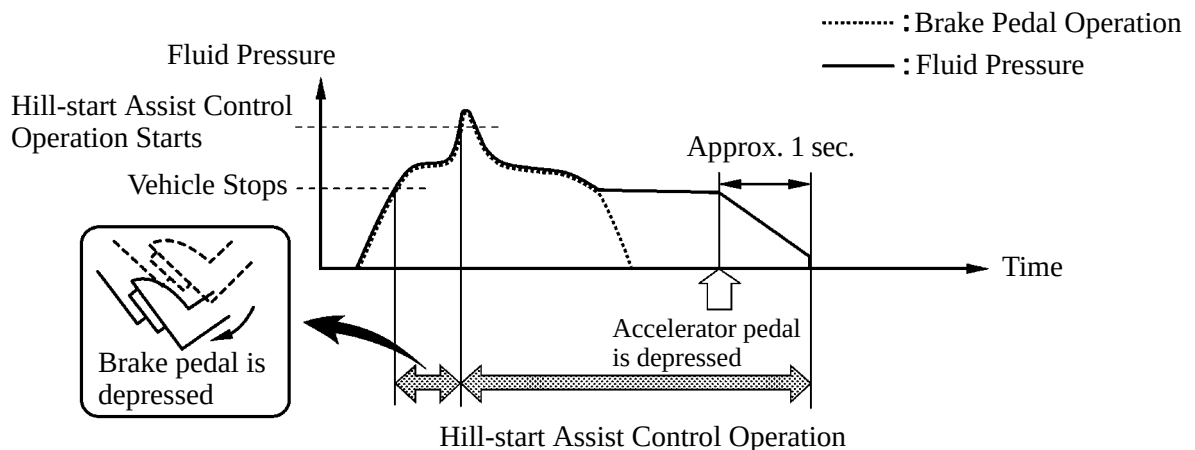
Hill-start Assist Control Operation

The skid control ECU determines the starting of the Hill-start Assist Control operation in accordance with information provided by various sensors, switches, and the ECM. At this time, the skid control ECU controls the fluid pressure that is generated by the pump and applies it by way of the solenoid valves to the brake wheel cylinder of each wheel in the following 2 modes: pressure reduction and pressure holding modes.

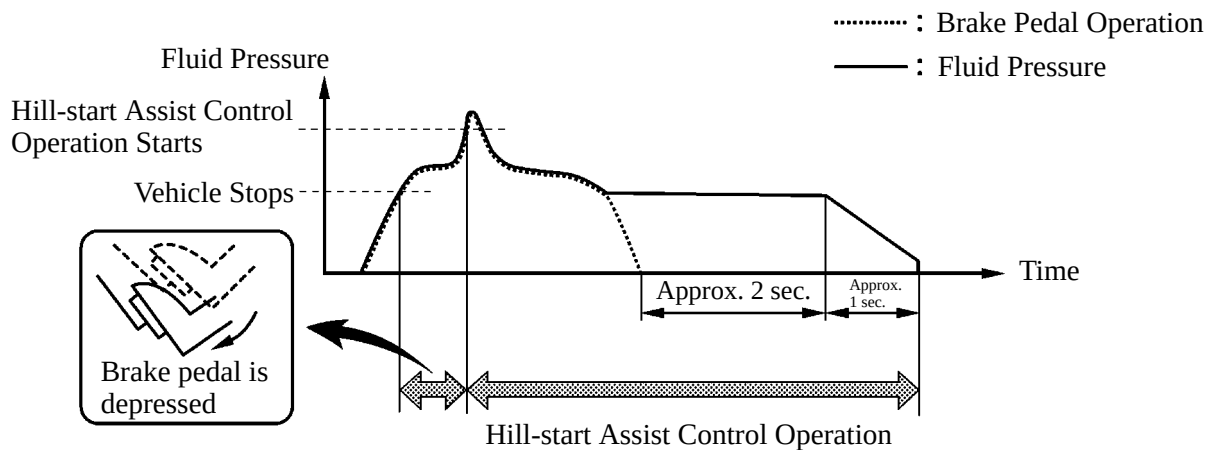
- The skid control ECU computes that the vehicle is in a state in which the Hill-start Assist Control can start operating in accordance with the signals provided by the speed sensor, yaw rate & deceleration sensor, park/neutral position switch, stop light switch, accelerator pedal position sensor, and parking brake switch. In this state, if the driver depresses the brake pedal further, causing the master cylinder pressure sensor signal to be input into the skid control ECU, the skid control ECU starts the Hill-start Assist Control operation.
- During the Hill-start Assist Control operation, the skid control ECU outputs signals to the stop light relay to cause the stop light to turn ON, to the combination meter to cause the slip indicator light to blink, and to sound the multi buzzer in the combination meter once.
- If a signal indicating one of the conditions listed below has been input into the skid control ECU, the skid control ECU turns OFF the slip indicator light, sounds the multi buzzer twice, and cancels the Hill-start Assist Control operation.
 - The driver takes no action for 2 seconds or longer after the Hill-start Assist Control operation has started.
 - The driver has moved the shift lever to the P position.
 - The driver has depressed the accelerator pedal*.
 - The driver has pulled up the parking brake lever.
 - The driver has depressed the brake pedal.

*: This will not cause the multi buzzer to sound.

► After the Hill-start Assist Control operation, the driver depresses the accelerator pedal to start off the vehicle ◀

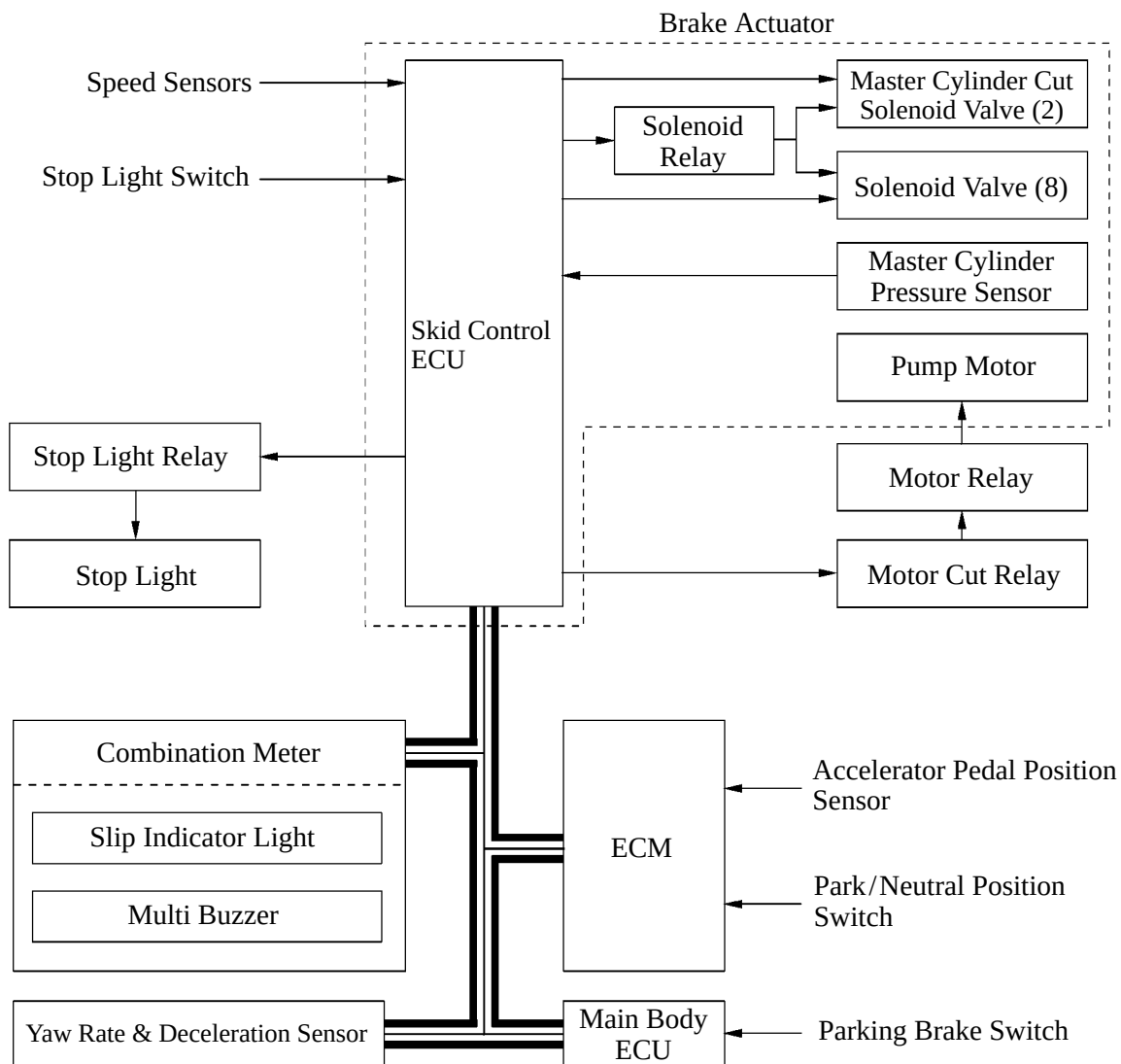


► After the Hill-start Assist Control operation, the driver takes no action ◀



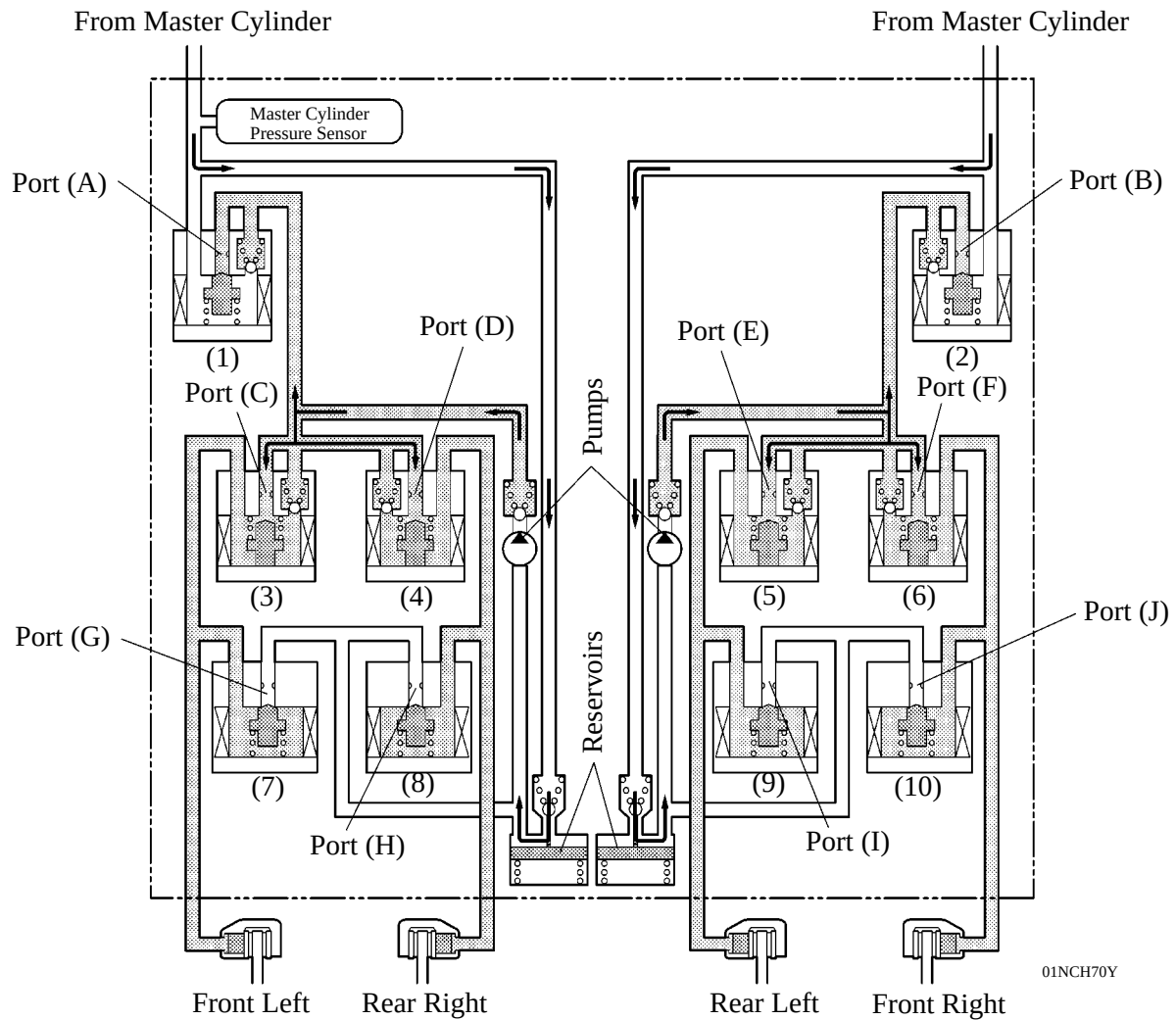
01NCH46Y

► System Diagram ◀



01NCH47Y

► Hill-start Assist Control Operation ◀

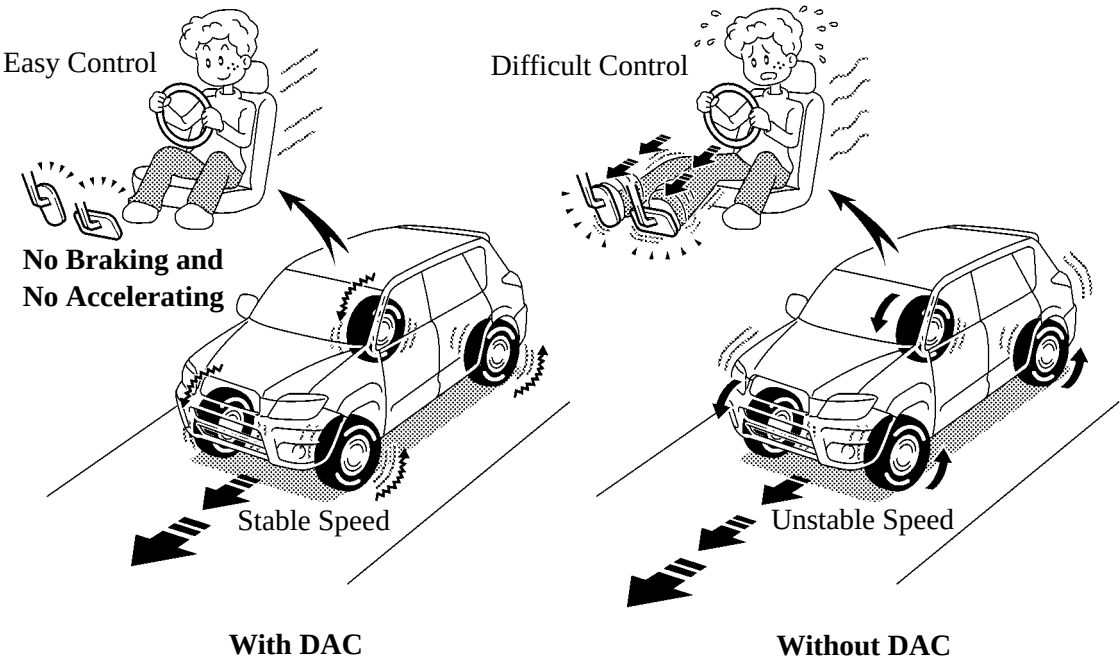


Item			Hill-start Assist Control Not Activated	Hill-start Assist Control Activated	
				Holding Mode	Reduction Mode
(1)	Master Cylinder Cut Solenoid Valve	Port (A)	OFF (Open)	ON	OFF (Open)
(2)		Port (B)	OFF (Open)	ON	OFF (Open)
Front Brake	(3) Pressure Holding Solenoid Valve	Port (C)	OFF (Open)	←	←
	(6) Pressure Holding Solenoid Valve	Port (F)	OFF (Open)	←	←
	(7) Pressure Reduction Solenoid Valve	Port (G)	OFF (Close)	←	←
	(10) Pressure Reduction Solenoid Valve	Port (J)	OFF (Close)	←	←
	Wheel Cylinder Pressure	Right	—	Hold	Reduce
		Left	—	Hold	Reduce
Rear Brake	(4) Pressure Holding Solenoid Valve	Port (D)	OFF (Open)	←	←
	(5) Pressure Holding Solenoid Valve	Port (E)	OFF (Open)	←	←
	(8) Pressure Reduction Solenoid Valve	Port (H)	OFF (Close)	←	←
	(9) Pressure Reduction Solenoid Valve	Port (I)	OFF (Close)	←	←
	Wheel Cylinder Pressure	Right	—	Hold	Reduce
		Left	—	Hold	Reduce
Pump			OFF	←	←

13. DAC Function

Outline of DAC

- When the vehicle is descending a steep hill and engine brake alone cannot provide a sufficient deceleration force while the transaxle is in the L or R range, the DAC effects 4-wheel brake control to maintain a constant, low vehicle speed. Thus, the vehicle is able to descend in a stable manner without causing the wheels to become locked.
- When the vehicle descends a steep hill without the DAC, the driver must pay close attention to the brake and accelerator pedals operation. However, with the DAC, the driver can concentrate on the steering operation, without accelerator and brake pedals operation.
- The DAC enables the vehicle to realize a high level of stability because it can descend a slippery hill at low speeds without causing the wheels to become locked.



- The DAC operates when all of the following conditions have been met:

01NCH80Y

DAC Operation Condition	• DAC switch is ON.
	• Shift lever is in the L or R position.
	• Accelerator pedal and brake pedal are not depressed.
	• Descending a hill at a vehicle speed of 25 km/h (16 mph) or less.

DAC Operation

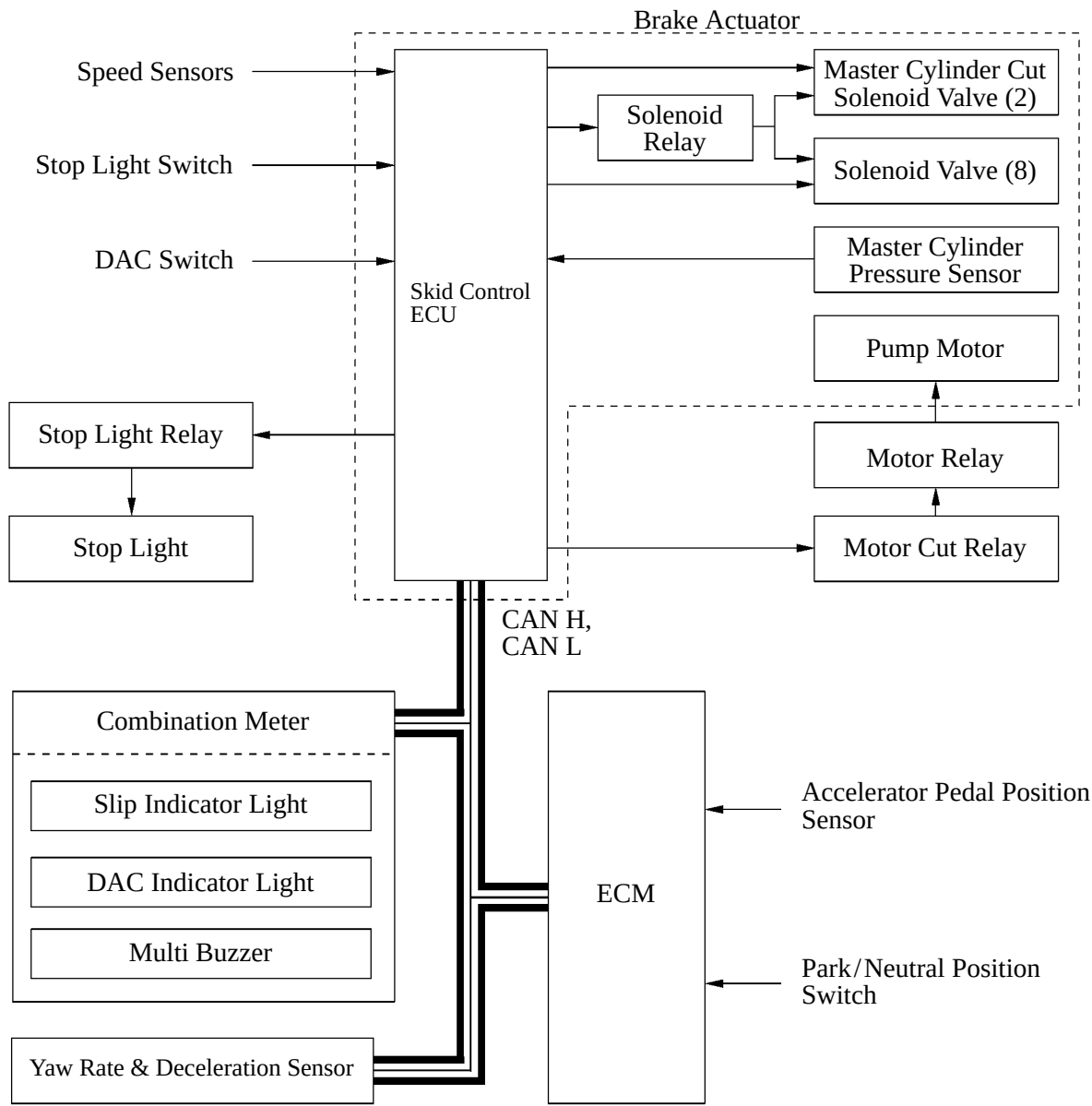
Based on the information provided by various sensors, switches, and ECM, the skid control ECU determines the conditions that enable the DAC operation. Then, the skid control ECU controls the fluid pressure that is generated by the pump and applies it by way of the solenoid valve to the brake wheel cylinder of each wheel in the following 3 modes: pressure reduction, pressure holding and pressure increase modes.

- The skid control ECU computes the vehicle speed, travel direction, and the gradient of the hill in accordance with the signals that are input by the speed sensor and the yaw rate & deceleration sensor, and effects brake control to attain the target vehicle speed. The target vehicle speed is determined by the direction of the vehicle.

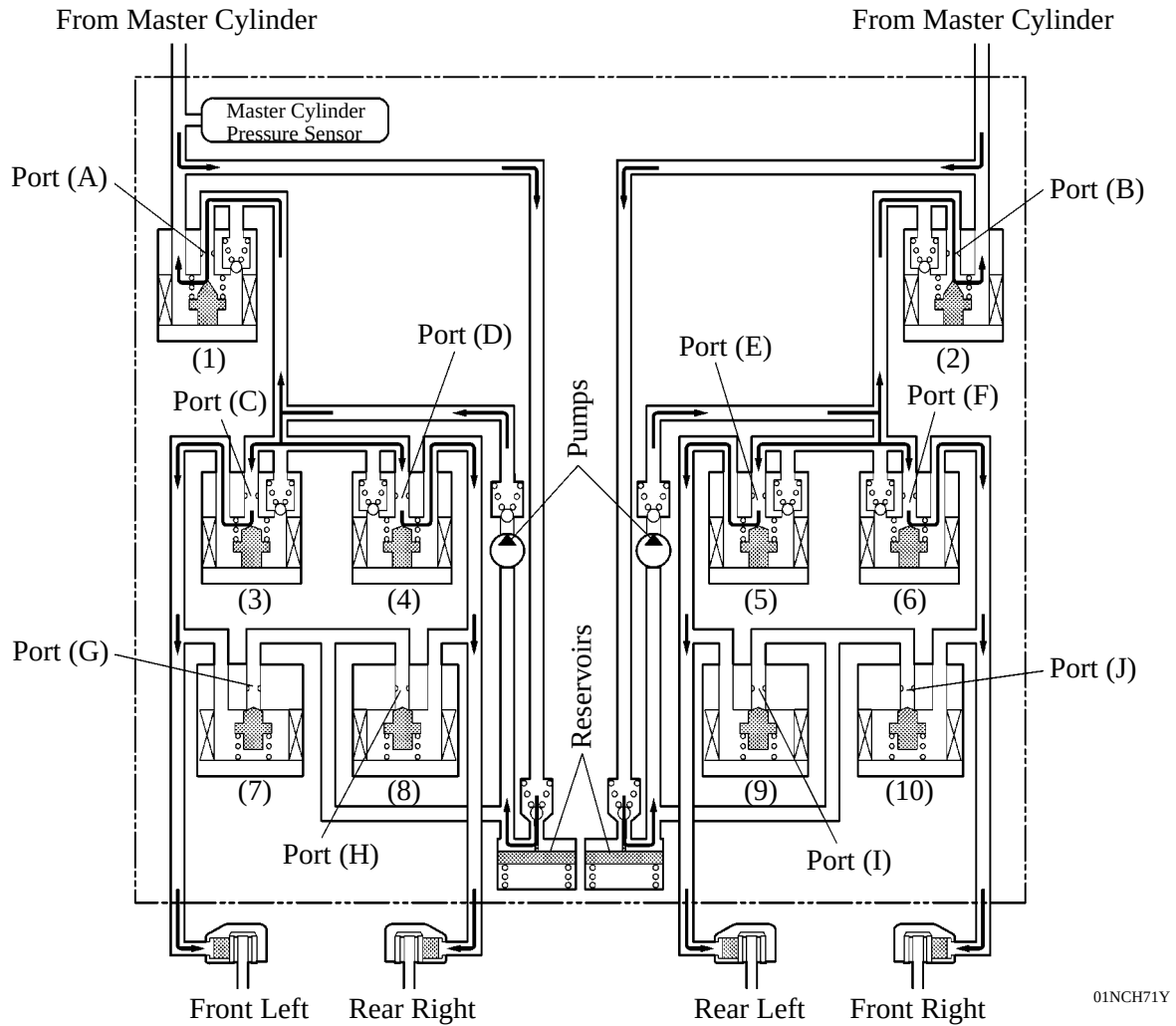
Travel Direction	Target Vehicle Speed
Forward	5 - 7 km/h (3 - 4 mph)
Backward	3 - 5 km/h (2 - 3 mph)

- During the DAC operation, the skid control ECU outputs signals to the stop light relay to cause the stop light to turn ON, and to the combination meter to cause the slip indicator light to blink.
- The DAC does not operate under the condition described below even if the DAC switch is turned ON; In this case, the DAC indicator light blinks to alert the driver.
 - The shift lever is in a position other than L or R.
 - In the event of malfunction in the DAC system.
 - The temperature of the brake actuator rises, causing the DAC operation to stop.
- Under the conditions described below, the DAC operates. However, the DAC indicator light blinks to alert the driver.
 - If the DAC switch is turned OFF during the DAC operation, the hydraulic pressure decreases gradually to stop the DAC operation.

► System Diagram ◀



► Pressure Increase Mode ◀



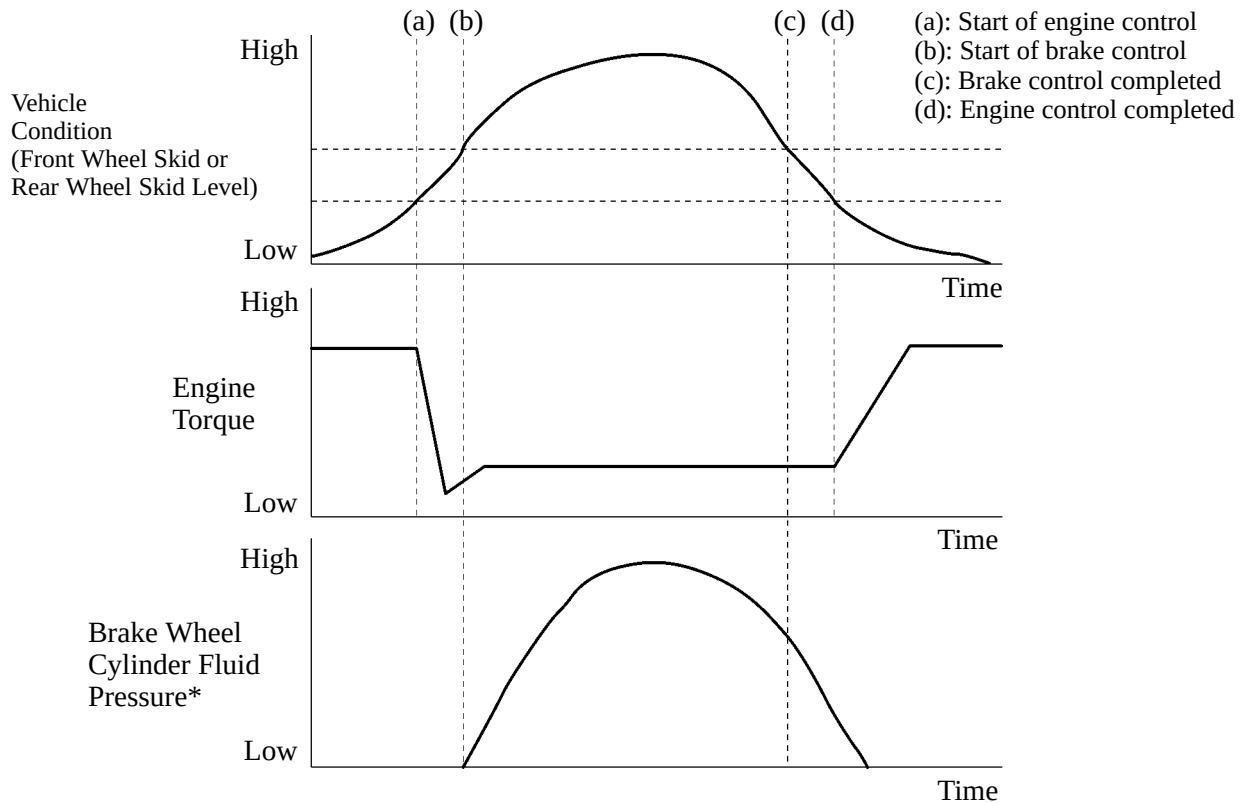
01NCH71Y

Item			Port	DAC Not Activated	DAC Activated		
					Increase Mode	Holding Mode	Reduction Mode
(1)		Master Cylinder Cut	(A)	OFF (Open)	ON*	z	←
(2)		Solenoid Valve	(B)	OFF (Open)	ON*	←	←
Front Brake	(3)	Pressure Holding Solenoid Valve	(C)	OFF (Open)	←	ON (Close)	←
	(6)	Solenoid Valve	(F)	OFF (Open)	←	ON (Close)	←
	(7)	Pressure Reduction Solenoid Valve	(G)	OFF (Close)	←	←	ON (Open)
	(10)	Solenoid Valve	(J)	OFF (Close)	←	←	ON (Open)
	Wheel Cylinder Pressure	Right	—	—	Increase	Hold	Reduce
		Left	—	—	Increase	Hold	Reduce
Rear Brake	(4)	Pressure Holding Solenoid Valve	(D)	OFF (Open)	←	ON (Close)	←
	(5)	Solenoid Valve	(E)	OFF (Open)	←	ON (Close)	←
	(8)	Pressure Reduction Solenoid Valve	(H)	OFF (Close)	←	←	ON (Open)
	(9)	Solenoid Valve	(I)	OFF (Close)	←	←	ON (Open)
	Wheel Cylinder Pressure	Right	—	—	Increase	Hold	Reduce
		Left	—	—	Increase	Hold	Reduce
Pump				OFF	ON	←	←

*: The solenoid valve controls the hydraulic pressure between “open” and “close” according to the operating condition by adjusting continually.

14. Engine Output Control

During a TRAC, Auto LSD or VSC operation, the skid control ECU outputs a engine output control signal to the ECM. Upon receiving this signal, the ECM affects throttle control to regulate the engine output.



151CH31

*: The wheel cylinder that activates varies depending on the condition of the vehicle.

15. Initial Check

After the ignition switch is turned ON, and the vehicle attains an approximate speed of 6 km/h (4 mph) or more, the skid control ECU performs the initial check.

The functions of each solenoid valve and pump motor in the brake actuator are checked in order.

16. Self-diagnosis

General

- If the skid control ECU detects a malfunction in the brake control system (ABS with EBD, Brake Assist, TRAC, Auto LSD, VSC, Hill-start Assist Control and DAC), the ABS, brake system, VSC warning lights or slip indicator light that corresponds to the function in which the malfunction has been detected indicates or lights up as indicated in the table below to alert the driver of the malfunction.

○: Light ON —: Light OFF

Item	ABS	EBD	Brake Assist	TRAC	VSC	Auto LSD*1	Hill-start Assist Control*2	DAC*3
ABS Warning Light	○	○	○	—	—	—	—	—
Brake System Warning Light	—	○	○*4	—	—	—	—	—
VSC Warning Light	○	○	○	○	○	○	○	○
Slip Indicator Light	○	○	○	○	○	○	○	○

*1: Only for 2WD Models

*2: Only for Models with Hill-start Assist Control Function

*3: Only for Models with DAC Function

*4: Only for Models with 16 in. Ventilated Disc

- At the same time, the DTCs (Diagnostic Trouble Codes) are stored in memory. The DTCs can be read by connecting a hand-held tester, or by connecting the SST (09843-18040) to the TC and CG terminals of the DLC3, and observing the blinking of the ABS warning light and VSC warning light.
- This system has a sensor signal check (test mode) function. This function is activated by connecting a hand-held tester, or by connecting the SST (09843-18040) to the TS and CG terminal of the DLC3. This check function performs yaw rate sensor zero point calibration, deceleration sensor zero point calibration, yaw rate sensor check, master cylinder pressure sensor check, steering angle sensor check, and speed sensor check.
- If the skid control ECU detects a malfunction during a sensor signal check, it stores the DTCs in its memory. These DTCs can be read during a sensor check operation by connecting a hand-held tester or connecting the SST (09843-18040) to the TC and CG terminals of the DLC3 and observing the blinking of the ABS warning light or the VSC warning light.
- If the CAN has a communication error at ECUs or sensors, multiple DTCs are output simultaneously to indicate the malfunction location.

For details of the DTCs that are stored in skid control ECU memory and the DTCs that are output through the sensor signal check functions, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

Fail-safe

- In the event of a malfunction in the ABS and/or Brake Assist controls, the skid control ECU prohibits the ABS, Brake Assist, TRAC, VSC, Auto LSD, Hill-start Assist Control and DAC operations.
- In the event of a malfunction in the TRAC, Auto LSD and/or VSC, the skid control ECU prohibits the TRAC, Auto LSD and VSC operation.
- In the event of a malfunction in the EBD control, the brake system is operated as long as possible even if the ABS control is prohibited. If the EBD control becomes impossible, the brake system warning light illuminates to inform the driver of that. In this case, the brake system is operated in the same condition as the brake system without the brake control system (ABS with EBD, Brake Assist, TRAC, Auto LSD, VSC, Hill-start Assist Control and DAC).
- If a communication malfunction occurs between the skid control ECU and the steering angle sensor, the yaw rate & deceleration sensor or ECM, the skid control ECU stops the TRAC, Auto LSD, VSC, Hill-start Assist Control and DAC.
- When the ECM detects the DTC, it will disable the TRAC, Auto LSD, VSC, Hill-start Assist Control and DAC control.

BRAKE

DESCRIPTION

1. General

The '06 RAV4 brake system has the following settings and specifications:

●: Standard OP: Option

Engine Type		2AZ-FE			2GR-FE		
Grade		Standard	Limited	Sport	Standard	Limited	Sport
Front Brake	15 in. Ventilated Disc	●	●	●	—	—	—
	16 in. Ventilated Disc	OP*1	OP*1	—	●	●	●
Rear Brake	15 in. Solid Disc	●	●	●	●	●	●
Brake Control	ABS with EBD, Brake Assist, TRAC, VSC and Auto LSD*2	●	●	●	●	●	●
	Hill-start Assist Control	OP*1	OP*1	—	●	●	●
	DAC	OP*1	OP*1	—	●	●	●
Lever Type Parking Brake		●	●	●	●	●	●

*1: Only for Models with Rear No. 2 Seat

*2: Only for 2WD models

► Specifications ◀

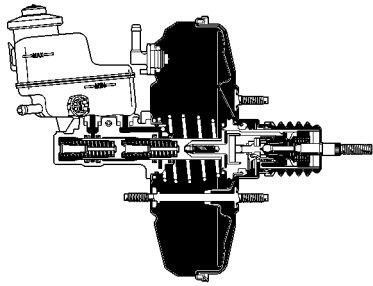
Brake Booster	Type	Single
	Size in.	10
Master Cylinder	Type	Tandem
	Diameter mm (in.)	20.64 (0.81)*1, 22.22 (0.89)*2
Front Disc Brake	Pad Area cm ² (in. ²)	49 (7.8) x 2*1, 53 (8.5) x 2*2
	Wheel Cylinder Diameter mm (in.)	63.5 (2.50)
	Rotor Size (D x T)*3 mm (in.)	275 x 25 (10.82 x 0.87)*1, 296 x 28 (11.84 x 1.10)*2
Rear Disc Brake	Pad Area cm ² (in. ²)	30 (4.8) x 2
	Wheel Cylinder Diameter mm (in.)	38.1 (1.52)
	Rotor Size (D x T)*3 mm (in.)	281 x 12 (11.24 x 0.48)
Parking Brake	Type	Duo Servo
	Drum Inner Diameter mm (in.)	173 (6.81)
Brake Actuator Manufacturer		ADVICS

*1: 15 in. Ventilated Disc

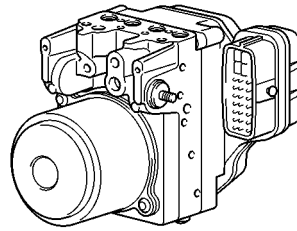
*2: 16 in. Ventilated Disc

*3: (Diameter x Thickness)

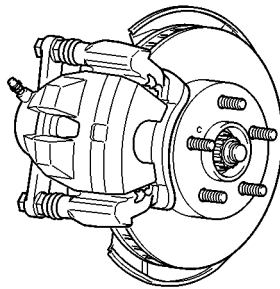
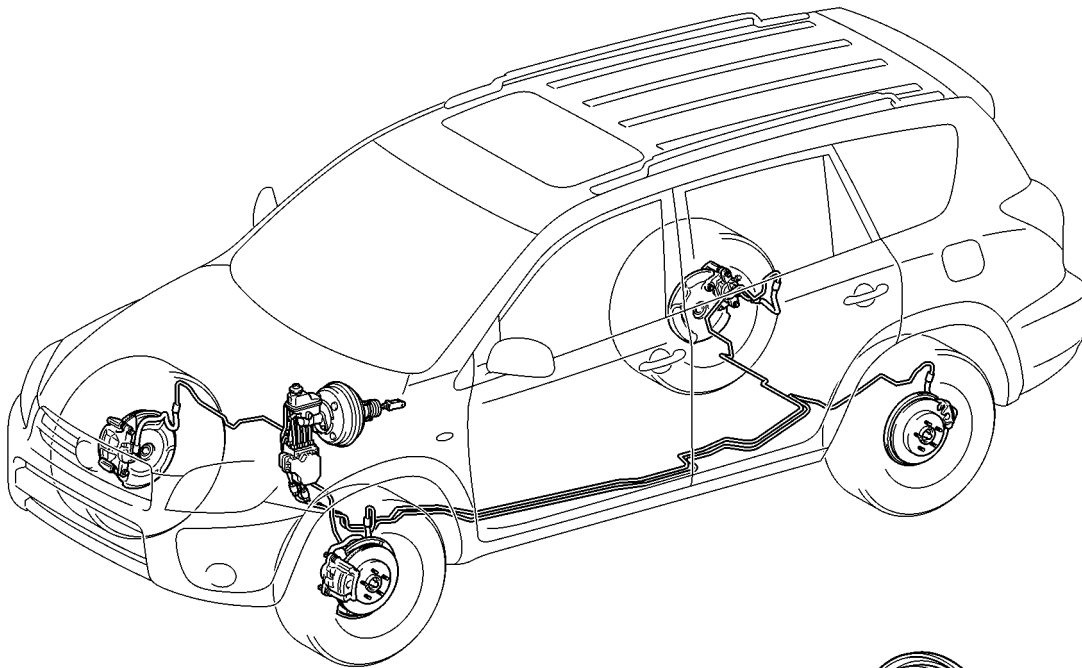
2. Components of Brake System



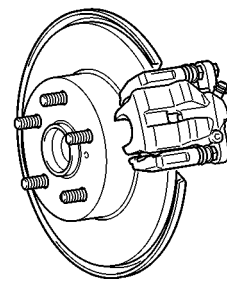
Master Cylinder & Brake Booster



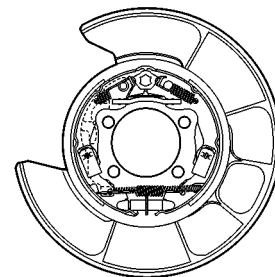
Brake Actuator



Front Disc Brake



Rear Disc Brake



Parking Brake

DRIVE SHAFT AND PROPELLER SHAFT

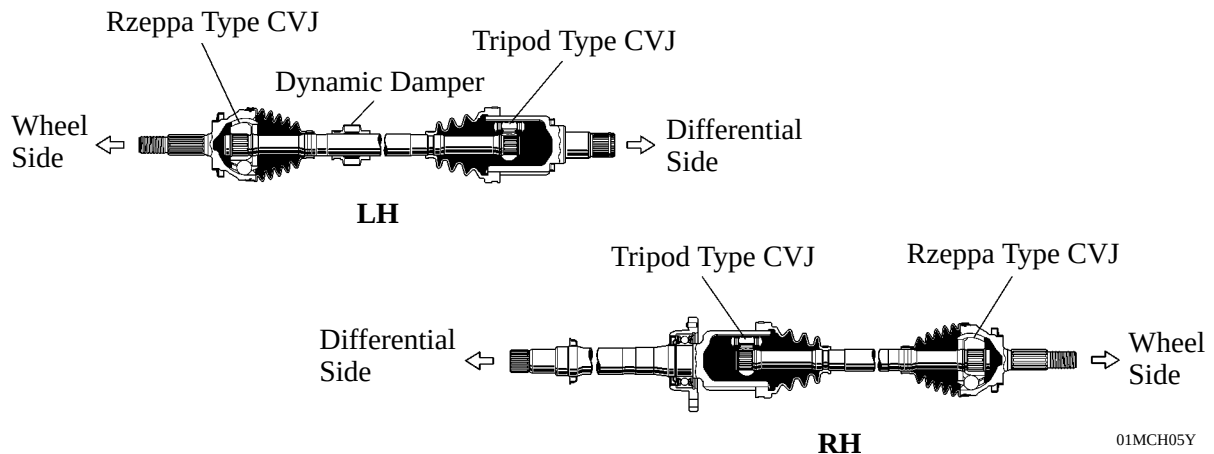
DESCRIPTION

- The front drive shaft for all models uses the tripod type CVJ (Constant Velocity Joint) on the differential side, and rzeppa type CVJ on the wheel side.
- The rear drive shaft for 4WD models uses the tripod type CVJ on the differential side, and rzeppa type CVJ on the wheel side. Both the right and left have the same length to ensure straightline stability.
- The propeller shaft for 4WD models uses the 3-joint, 2-shaft type.

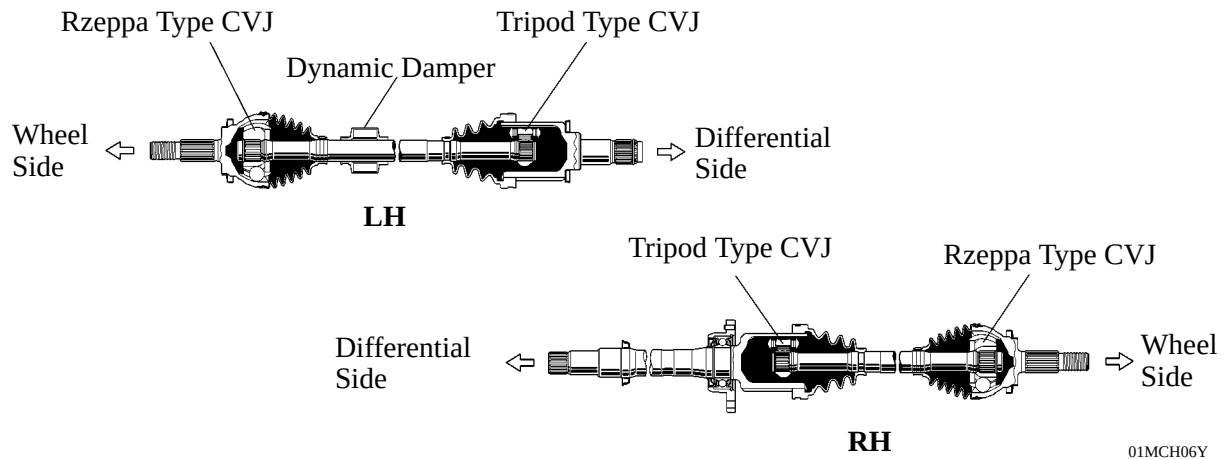
FRONT DRIVE SHAFT

1. 2WD Models

► For 2AZ-FE Engine Models ◀

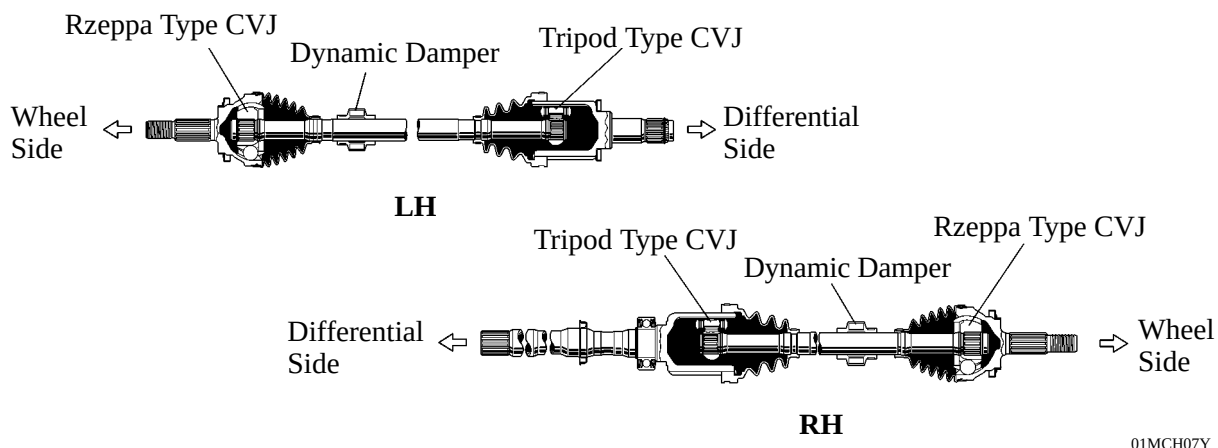


► For 2GR-FE Engine Models ◀

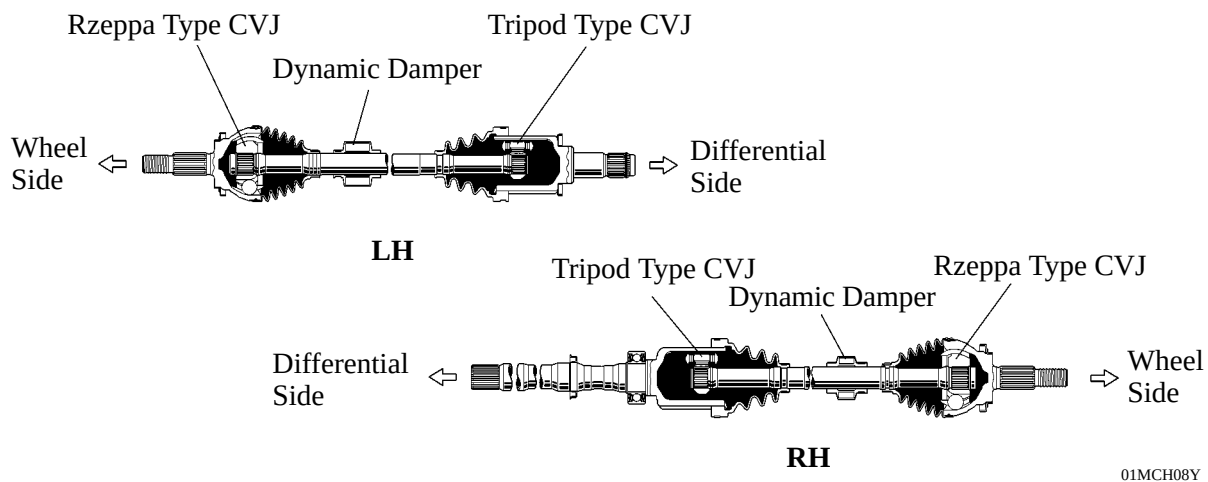


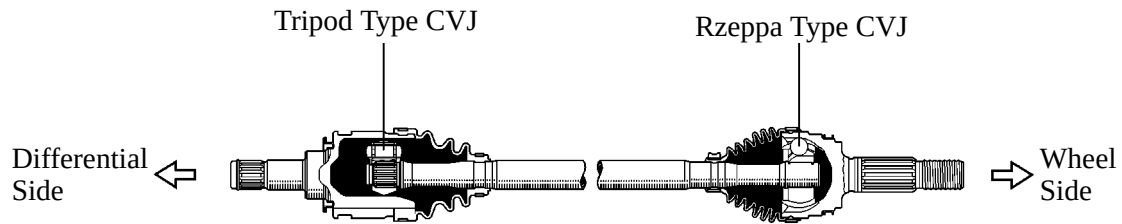
2. 4WD Models

► For 2AZ-FE Engine Models ◀



► For 2GR-FE Engine Models ◀

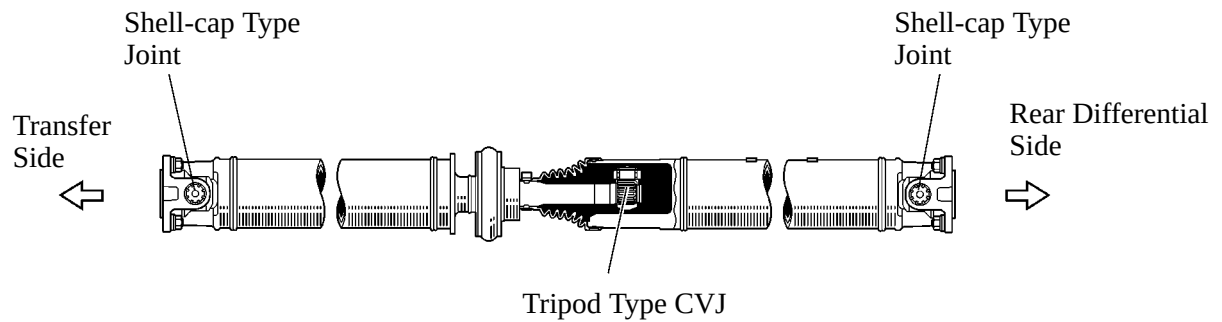


REAR DRIVE SHAFT (4WD MODEL)

01NCH25Y

PROPELLER SHAFT (4WD MODEL)

A tripod type CVJ, which is more compact and lightweight than the conventional cross-groove type CVJ, is used for the center constant velocity joint. Furthermore, a compact and lightweight shell-cap type joint is used at each end.



01NCH26Y

EQUIPMENT LIST

► U.S.A. ◀

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE				
Grade				—	Limited	Sport	—	Limited	Sport		
Exterior	Bumper	Colored		●	●	●	●	●	●		
		Radiator Grille	Material	●	—	●	●	—	●		
			Material Partially Plated	—	●	—	—	●	—		
	Outside Door Handle	Material		●	—	—	●	—	—		
		Colored		—	●	●	—	●	●		
	Back Door Handle	Colored		●	●	●	●	●	●		
	Outside Rear View Mirror	Material / Remote Control		●	—	—	●	—	—		
		Color / Remote Control / Heater		—	●	●	—	●	●		
	Roof Rail			OP	●	●	OP	●	●		
	Rear Spoiler			●	●	●	●	●	●		
Spats	Front & Rear			OP	●	●	●	●	●		
	Rear			●	—	—	—	—	—		
Chassis	Tire	215/70R16		●	—	—	—	—	—		
		225/65R17		OP	●	—	●	●	—		
		235/55R18		—	—	●	—	—	●		
	Disc Wheel	16 x 6 1/2 J Steel		●	—	—	—	—	—		
		17 x 6 1/2 J Steel		OP	—	—	●	—	—		
		17 x 7 J Aluminum		OP	●	—	OP	●	—		
		18 x 7 1/2 J Aluminum		—	—	●	—	—	●		
	Tire Pressure Warning System			●	●	●	●	●	●		
	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & VSC (Vehicle Stability Control) *1			●	●	●	●	●	●		
	Hill-start Assist Control			OP*2	OP*2	—	●	●	●		
	DAC (Downhill Assist Control)			OP*2	OP*2	—	●	●	●		
	Steering	Wheel	3-spoke Urethane	●	—	●	●	—	●		
			3-spoke Urethane with Steering Pad Switch (Audio)	—	—	OP	—	—	OP		
			3-spoke Leather with Steering Pad Switch (Audio)	—	●	—	—	●	—		
		Column	Manual Tilt &Telescopic	●	●	●	●	●	●		
	EPS (Electrical Power Steering)		●	●	●	●	●	●			
Shift Knob	PVC (Polyvinyl Chloride)		●	—	●	●	—	●			
	Leather		—	●	—	—	●	—			
Body	Seat	Cover	Fabric		●	●	●	●	●	●	
			Leather		—	OP*3	—	—	OP*3	—	
		Front	Driver	6-way Manual	●	—	●	●	—	●	
				8-way Power	—	●	—	—	●	—	
			Passenger	4-way Manual	●	●	●	●	●	●	
		Rear	No. 1	60/40 Split Retractable*4		●	●	●	●	●	●
			No. 2			OP	OP	—	OP	OP	—
		Seat Heater			—	OP*5	—	—	OP*5	—	
	Seat Belt	Front	Driver	3-point, Pretensioner & Force Limiter	●	●	●	●	●	●	
			Passenger	3-point, Pretensioner & Force Limiter & ALR*6	●	●	●	●	●	●	
		Rear	Rear No.1	3-point ELR*7, ALR*6	●	●	●	●	●	●	
			Rear No.2		OP*2	OP*2	—	OP*2	OP*2	—	

*1: 2WD models have been provided with Automatic LSD (Limited Slip Differential).

(Continued)

*2: Only for Models with Rear No. 2 Seat

*3: Except Models with Rear No.2 Seat

*4: Models with rear No. 2 seat have been provided with walk-in function.

*5: Models with Leather Seat

*6: Automatic Locking Retractor

*7: Emergency Locking Retractor

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE			
Grade				—	Limited	Sport	—	Limited	Sport	
Body Electrical	Headlight		Halogen		●	●	●	●	●	●
	Light Auto Turn-OFF System				●	●	●	●	●	●
	Front Fog Light				—	●	●	—	●	●
	Daytime Running Lighting System				OP	OP	OP	OP	OP	OP
	Windshield Wiper		Intermittent Type		●	●	●	●	●	●
	Rear Wiper		Intermittent Type		●	●	●	●	●	●
	Audio System		Radio/CD, 6 Speakers		●	—	●	●	—	●
			Radio/In-dash CD Changer, 6 Speakers		OP	●	OP	OP	●	OP
			Radio/In-dash CD Changer, 9 Speakers		—	OP	OP	—	OP	OP
			Rear Seat Entertainment System		—	—	—	—	OP	—
	Air Conditioning		Manual Type		●	—	●	●	—	●
			Automatic Type		—	●	—	—	●	—
			Clean Air Filter		●	●	●	●	●	●
	Heater		Conventional Type		●	●	●	●	●	●
	Cruise Control System				●	●	●	●	●	●
	Illuminated Entry System		Key Illumination & Room Light & Front Personal Light		●	—	●	●	—	●
			Key Illumination & Room Light & Front Personal Light & Foot Light		—	●	—	—	●	—
	Power Window System		All Door Power Type Only for Driver's Seat: One Motion Auto Up-and-down, Jam Protection Function		●	●	●	●	●	●
	Door Lock Control		Power Door Lock Control System		●	●	●	●	●	●
			Wireless Door Lock Remote Control System		●	●	●	●	●	●
	Engine Immobilizer System				—	●	—	—	●	—
	Sliding Roof				—	OP	OP	—	OP	OP
	SRS*8 Airbag System		Driver	Dual-stage	●	●	●	●	●	●
			Front Passenger	Dual-stage with Occupant Classification System	●	●	●	●	●	●
			Side & Roll Sensing Type Curtain Shield		OP	OP	OP	OP	OP	OP

*⁸: Supplemental Restraint System

► Canada ◀

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE					
Grade				—	Limited	Sport	—	Limited	Sport			
Exterior	Bumper		Colored		●	●	●	●	●	●		
	Radiator Grille		Material		●	—	●	●	—	●		
			Material Partially Plated		—	●	—	—	●	—		
	Outside Door Handle		Material		●	—	—	●	—	—		
			Colored		—	●	●	—	●	●		
	Back Door Handle		Colored		●	●	●	●	●	●		
	Outside Rear View Mirror		Color/Remote Control/Heater		●	●	●	●	●	●		
	Roof Rail			OP	●	●	OP	●	●			
	Rear Spoiler			●	●	●	●	●	●			
Spats		Front & Rear		OP	●	●	OP	●	●			
Chassis	Tire		215/70R16		●	—	—	—	—	—		
			225/65R17		OP	●	—	●	●	—		
			235/55R18		—	—	●	—	—	●		
	Disc Wheel		16 x 6 1/2 J Steel		●	—	—	—	—	—		
			17 x 6 1/2 J Steel		OP	—	—	●	—	—		
			17 x 7 J Aluminum		OP	●	—	OP	●	—		
			18 x 7 1/2 J Aluminum		—	—	●	—	—	●		
	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & VSC (Vehicle Stability Control) *1			●	●	●	●	●	●			
	Hill-start Assist Control			OP*1	OP*1	—	●	●	●			
	DAC (Downhill Assist Control)			OP*1	OP*1	—	●	●	●			
	Steering		Wheel	3-spoke Urethane		●	—	●	●	—	●	
				3-spoke Urethane with Steering Pad Switch (Audio)		—	—	OP	—	—	OP	
				3-spoke Leather with Steering Pad Switch (Audio)		—	●	—	—	●	—	
			Column	Manual Tilt &Telescopic		●	●	●	●	●	●	
			EPS (Electrical Power Steering)		●	●	●	●	●	●		
	Shift Knob		PVC (Polyvinyl Chloride)		●	—	●	●	—	●		
			Leather		—	●	—	—	●	—		
Body	Seat		Cover	Fabric		●	●	●	●	●	●	
				Leather		—	OP*2	—	—	OP*2	—	
			Front	Driver	6-way Manual		●	—	●	●	—	●
					8-way Power		—	●	—	—	●	—
				Passenger	4-way Manual		●	●	●	●	●	●
			Rear	No. 1	60/40 Split Retractable*3		●	●	●	●	●	●
				No. 2			OP	OP	—	OP	OP	—
			Seat Heater			—	OP*4	—	—	OP*4	—	
	Seat Belt		Front	Driver	3-point, Pretensioner & Force Limiter		●	●	●	●	●	●
				Passenger	3-point, Pretensioner & Force Limiter & ALR*5		●	●	●	●	●	●
			Rear	Rear No. 1	3-point ELR*6, ALR*5		●	●	●	●	●	●
				Rear No. 2			OP*1	OP*1	—	OP*1	OP*1	—

*1: Only for Models with Rear No. 2 Seat

*2: Except Models with Rear No.2 Seat

*3: Models with rear No. 2 seat have been provided with walk-in function.

*4: Models with Leather Seat

*5: Automatic Locking Retractor

*6: Emergency Locking Retractor

(Continued)

●: Standard OP: Option —: None

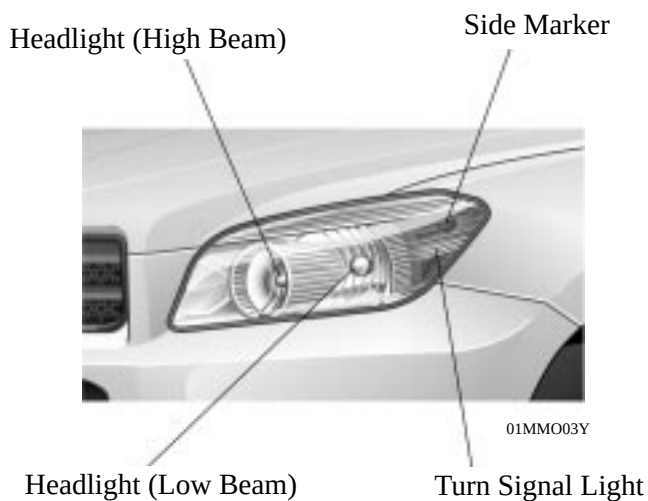
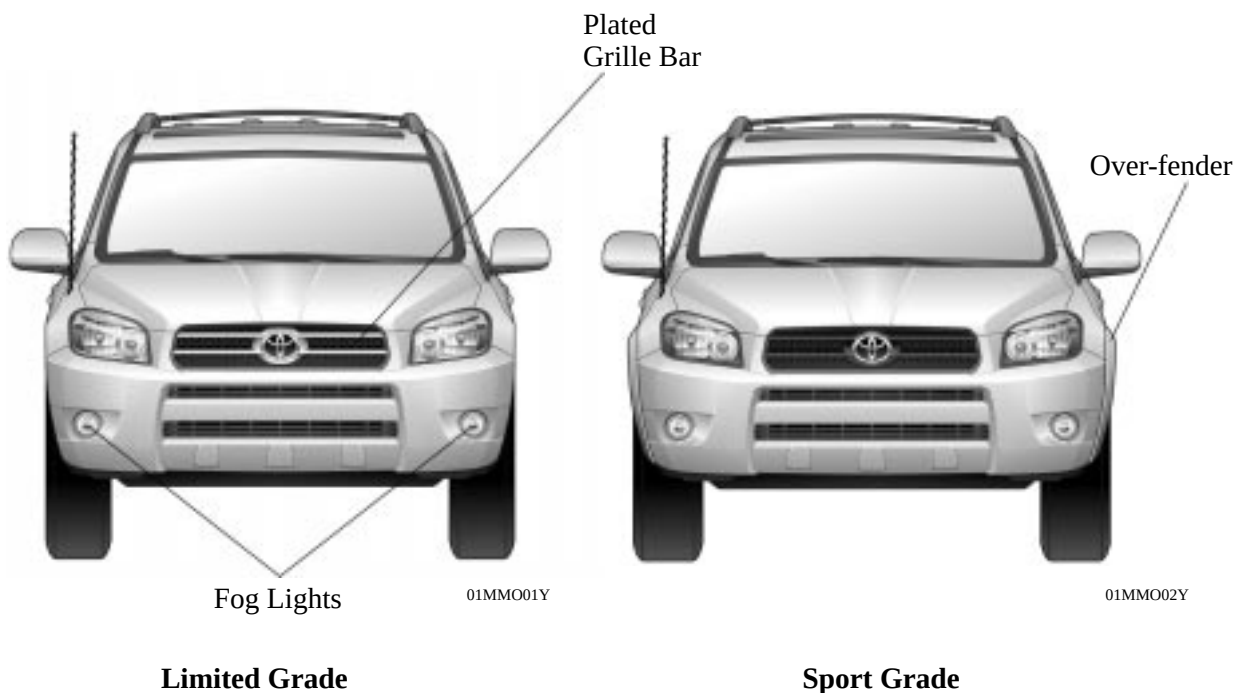
Engine				2AZ-FE			2GR-FE			
Grade				—	Limited	Sport	—	Limited	Sport	
Body Electrical	Headlight	Halogen		●	●	●	●	●	●	
	Light Auto Turn-OFF System			●	●	●	●	●	●	
	Front Fog Light			—	●	●	—	●	●	
	Daytime Running Lighting System			●	●	●	●	●	●	
	Windshield Wiper	Intermittent Type		●	●	●	●	●	●	
	Windshield Deicer			●	●	●	●	●	●	
	Rear Wiper	Intermittent Type		●	●	●	●	●	●	
	Audio System	Radio/CD, 6 Speakers		●	—	●	●	—	●	
		Radio/In-dash CD Changer, 6 Speakers		OP	●	OP	OP	●	OP	
		Radio/In-dash CD Changer, 9 Speakers		—	OP	OP	—	OP	OP	
		Rear Seat Entertainment System		—	—	—	—	OP	—	
	Air Conditioning	Manual Type		●	—	●	●	—	●	
		Automatic Type		—	●	—	—	●	—	
		Clean Air Filter		●	●	●	●	●	●	
	Heater	Conventional Type		●	●	●	●	●	●	
	Cruise Control System			●	●	●	●	●	●	
	Illuminated Entry System	Key Illumination & Room Light & Front Personal Light		●	—	●	●	—	●	
		Key Illumination & Room Light & Front Personal Light & Foot Light		—	●	—	—	●	—	
	Power Window System	All Door Power Type Only for Driver's Seat: One Motion Auto Up-and-down, Jam Protection Function		●	●	●	●	●	●	
	Door Lock Control	Power Door Lock Control System		●	●	●	●	●	●	
		Wireless Door Lock Remote Control System		●	●	●	●	●	●	
	Engine Immobilizer System			●	●	●	●	●	●	
	Sliding Roof			—	OP	OP	—	OP	OP	
	SRS* ⁷ Airbag System	Driver	Dual-stage		●	●	●	●	●	●
		Front Passenger	Dual-stage with Occupant Classification System		●	●	●	●	●	●
		Side & Roll Sensing Type Curtain Shield		OP	OP	OP	OP	OP	OP	

*⁷: Supplemental Restraint System

EXTERIOR

Front Design

- The front of the vehicle has been designed with a powerful look that emphasizes the large-diameter tires.
- The four-beam headlight that accommodates clearance light and turn signal light is used.
- The combination of the multi-reflector type reflectors and the see-through outer lenses is used in the headlight create a crystal appearance. Furthermore, smoke-painted extensions are used for the headlights of the Sport grade to achieve a sporty design.
- The radiator grille consists of a mesh portion and two grille bars to express powerfulness. The Limited grade uses plated grille bars to achieve an elegant design.
- The round front fog lights in the sides of the front bumper are available as standard equipment for the Limited and Sport grades.

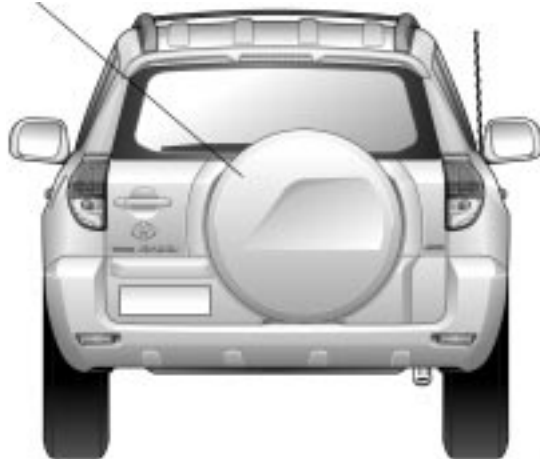


For Sport Grade

Rear Design

- The rear of the vehicle has been shaped to integrate with the spare tire cover, realizing a design that emphasizes its SUV-ness.
- The spare tire cover is standard equipment for the Limited grade.
- The combination lights are arranged vertically. LEDs (Light Emitting Diodes) are used for the stop light and taillight, for enhanced visibility and an elegant look.

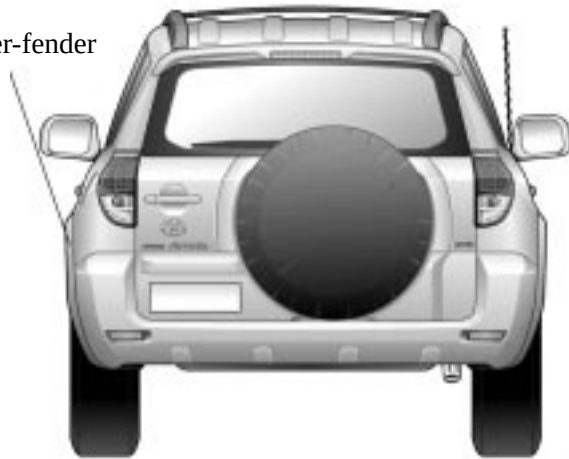
Spare Tire Cover



01MMO05Y

Limited Grade

Over-fender



01MMO06Y

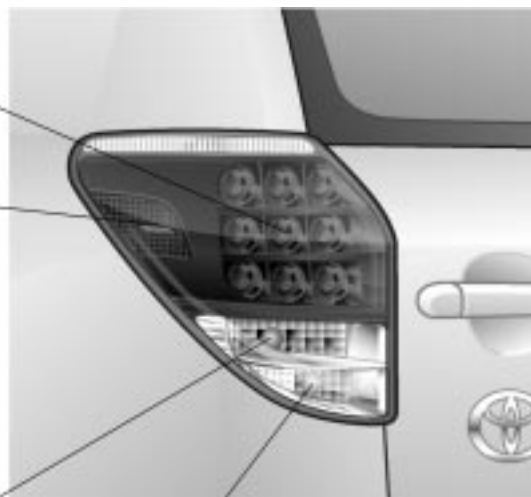
Sport Grade

Stop Light and Taillight

Side Marker

Turn Signal Light

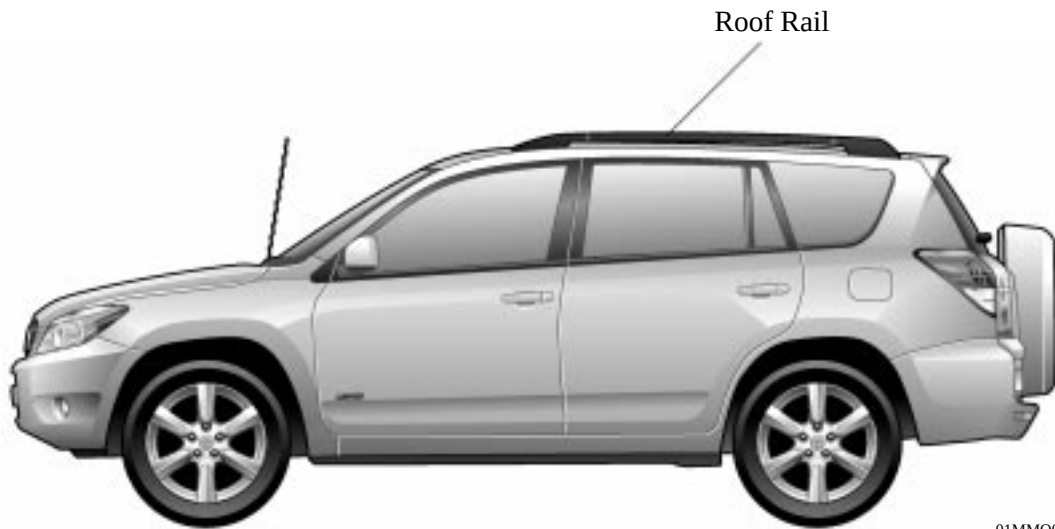
Back-up Light



01MMO07Y

Side Design

- The side of the vehicle portrays a unique cabin design consisting of a wedged surface composition and a dynamically drawn arc.
- Roof rails are available as optional equipment on the Standard grade, and provided as standard equipment on the Limited and Sport grades.
- Over-fenders are available as optional equipment on the Limited grade, and provided as standard equipment on the Sport grade.



01MMO08Y

Limited Grade

01MMO09Y

Over-fender

Sport Grade

Exterior Color

Exterior colors for new model are as follows:

Color No.	Color Name
040	Super White II
070	White Pearl Crystal Shine
1F7	Silver Metallic
1E0	Dark Gray Mica
202	Black
3R3	Red Mica Metallic
4R4	Beige Metallic
6T6	Light Green Metallic
8R3	Grayish Blue Metallic
8S6	Dark Blue Mica

Exterior Parts Color

Exterior parts colors are provided as follows:

●: Standard OP: Option —: None

Destination	U.S.A. and Canada					
Grade	Standard		High		High	
Color Parts Name	Material	Exterior Color	Material	Exterior Color	Material	Exterior Color
Front/Rear Bumper	—	●	—	●	—	●
Radiator Grille	●	—	●*1	—	●	—
Rear Spoiler	—	●	—	●	—	●
Spare Tire Cover	—	—	—	●	—	—
Roof Rail	●	—	●	—	●	—
Outside Rear View Mirror	●*2	●*3	—	●	—	●
Outside Door Handle	●	—	—	●	—	●
Back Door Handle	—	●	—	●	—	●
Over-fender	—	—	—	OP	—	●

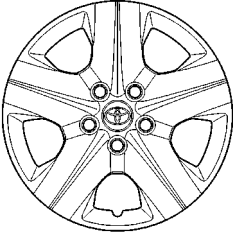
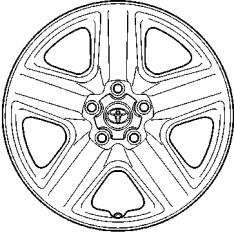
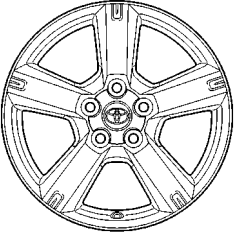
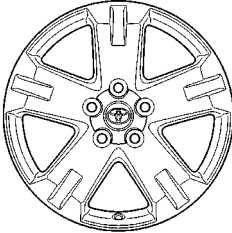
*1: Partially plated on the Limited Grade

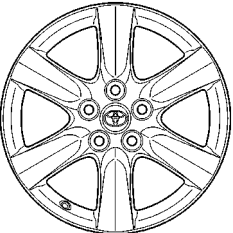
*2: U.S.A. Model

*3: Canada Model

Tire and Disc Wheel

Tires and disc wheels are provided as follows:

Destination	U.S.A and Canada				
Grade	Standard				Sport
Engine	2AZ-FE	2AZ-FE	2GR-FE	2AZ-FE & 2GR-FE	2AZ-FE & 2GR-FE
Provided	Standard	Option	Standard	Option	Standard
Tire Size	215/70R16	225/65R17		←	235/55R18
Disc Wheel Size	16 x 6 1/2 J	17 x 6 1/2 J		17 x 7 J	18 x 7 1/2 J
Disc Wheel Material	Steel	←		Aluminum	←
P.C.D.* mm (in.)	114.3 (4.5)	←		←	←
Offset mm (in.)	45 (1.8)	←		←	←
Wheel Design	Full Wheel Cap  01NMO10Y	Center Cap  01NMO11Y	Aluminum Wheel  01NMO12Y	Aluminum Wheel  01NMO13Y	

Destination	U.S.A and Canada
Grade	Limited
Engine	2AZ-FE & 2GR-FE
Provided	Standard
Tire Size	225/65R17
Disc Wheel Size	17 x 7 J
Disc Wheel Material	Aluminum
P.C.D.* mm (in.)	114.3 (4.5)
Offset mm (in.)	45 (1.8)
Wheel Design	Aluminum Wheel  01NMO14Y

*: Pitch Circle Diameter

PERFORMANCE

Power Train

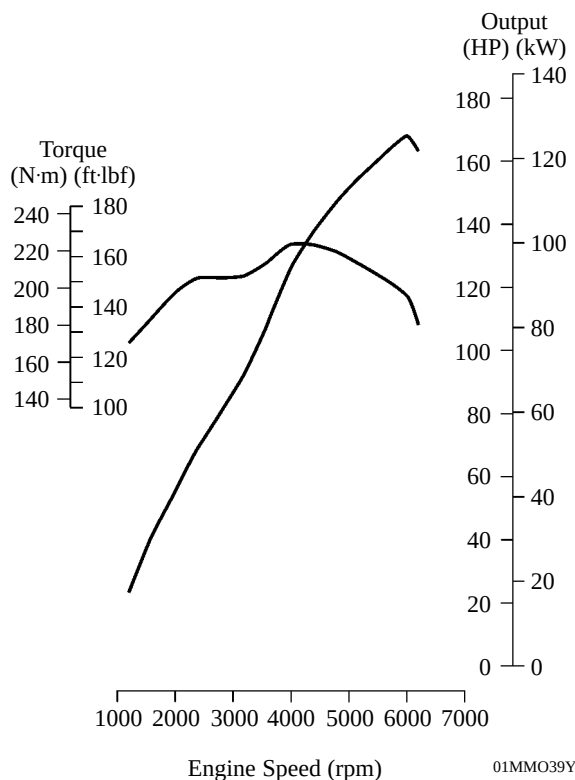
Engine

- The 2AZ-FE engine has been carried over from the '05 model. This engine realizes high performance, quietness, fuel economy, and clean emissions through the use of the VVT-i (Variable Valve Timing-intelligent) system, DIS (Direct Ignition System), and ETCS-i (Electronic Throttle Control System-intelligent).
- A new 2GR-FE engine is used. It realizes high performance, quietness, fuel economy, and clean emission through the use of the Dual VVT-i (Dual Variable Valve Timing-intelligent) system, DIS, and ETCS-i.

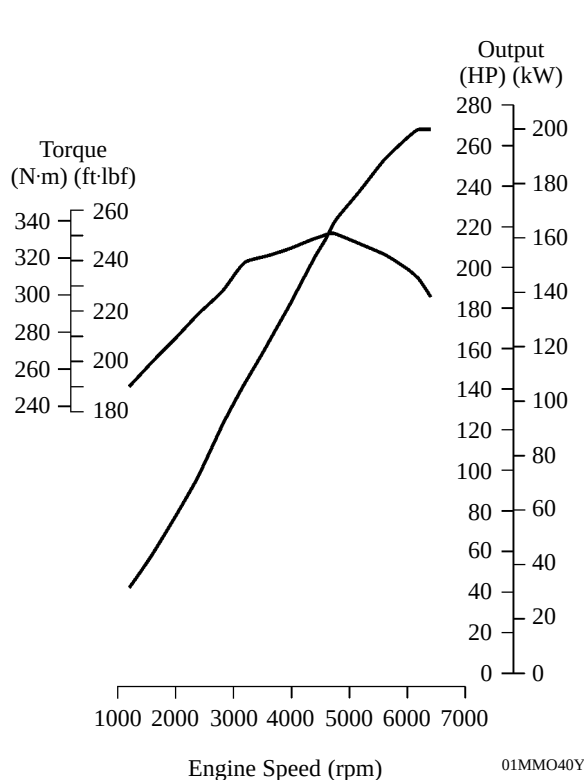
Engine Type	2AZ-FE	2GR-FE
No. of Cyls. & Arrangement	4-cylinder, In-line Type	6-cylinder, V Type
Valve Mechanism	16-valve DOHC, Chain Drive (with VVT-i)	24-valve DOHC, Chain Drive (with Dual VVT-i)
Displacement cm ³ (cu. in.)	2362 (144.2)	3456 (210.9)
Bore x Stroke mm (in.)	88.5 x 96.0 (3.48 x 3.78)	94.0 x 83.0 (3.70 x 3.27)
Compression Ratio	9.8 : 1	10.8 : 1
Maximum Output [SAE-NET]*	124 kW @ 6000 rpm (166 HP @ 6000 rpm)	200 kW @ 6200 rpm (268 HP @ 6200 rpm)
Maximum Torque [SAE-NET]*	224 N·m @ 4000 rpm (165 ft·lbf @ 4000 rpm)	336 N·m @ 4700 rpm (248 ft·lbf @ 4700 rpm)

*: Maximum output and torque rating are determined by revised SAE J1349 standard.

► 2AZ-FE Engine ◀



► 2GR-FE Engine ◀



Transaxle

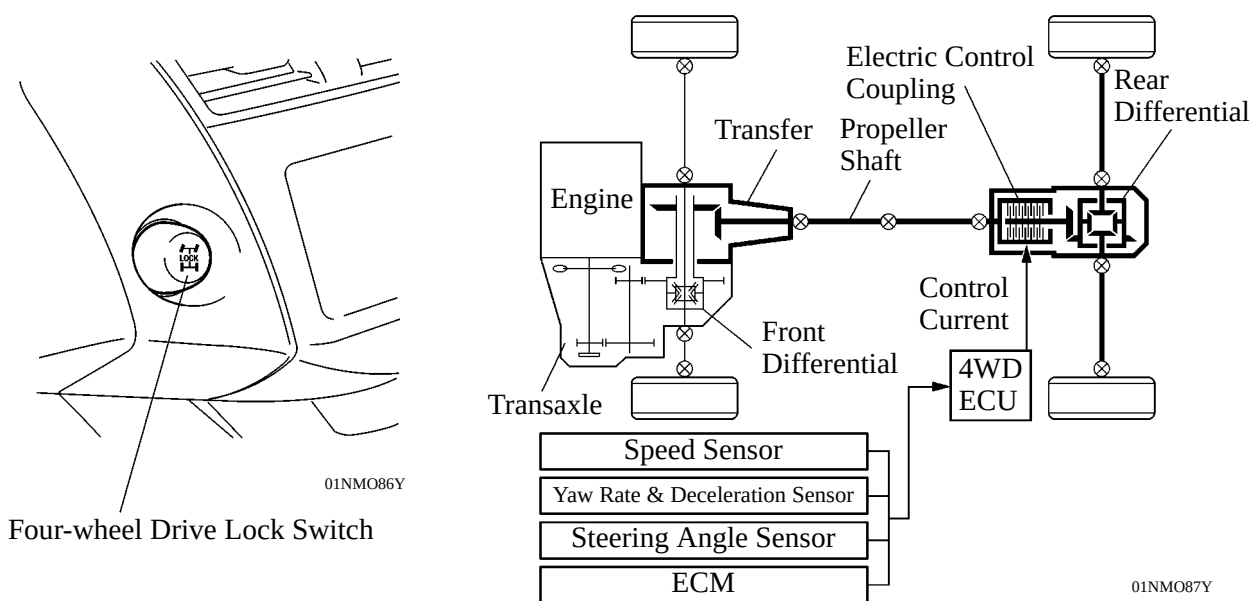
- The U140F and U241E 4-speed automatic transaxles have been carried over from the '05 model.
- New U151E and U151F 5-speed automatic transaxles are used.
- A new GF1A transfer is used.

Transaxle Type		4-speed Automatic		5-speed Automatic	
		U140F	U241E	U151F	U151E
Transfer Type		GF1A	—	GF1A	—
Combination with Engine		2AZ-FE		2GR-FE	
Drive Type		4WD	2WD	4WD	2WD
Gear Ratio*	1st	3.938	3.943	4.235	←
	2nd	2.194	2.197	2.360	←
	3rd	1.411	1.413	1.517	←
	4th	1.019	1.020	1.047	←
	5th	—	—	0.756	←
	Reverse	3.141	3.145	3.378	←

*: Counter Gear Ratio Included

Active Torque Control 4WD System

- A new active torque control 4WD system with an electric control coupling is used.
- The active torque control 4WD system, which has an electric control coupling in the front part of the rear differential, transmits torque to the rear wheels when needed, and only in the amount needed, based on information provided by various sensors.
- By operating the four-wheel drive lock switch provided on the instrument panel, the driver can select the following modes: the AUTO mode to optimally control the torque that is transmitted to the rear wheels, and the LOCK mode that locks the torque that is transmitted to the rear wheels to the maximum amount.



System Configuration Diagram

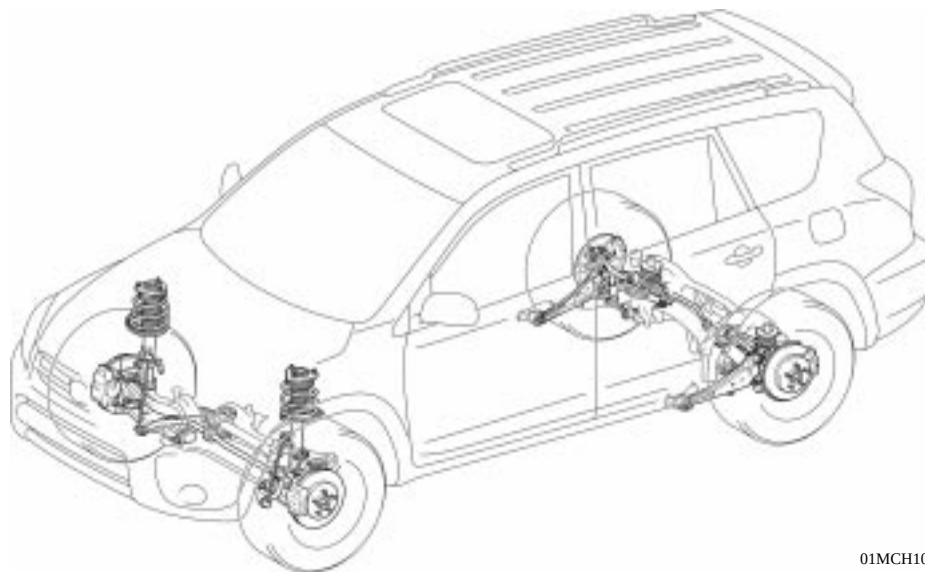
Chassis

Front Suspension

Type	MacPherson Strut Type Independent Suspension
------	---

Rear Suspension

Type	Double Wishbone Type Independent Suspension
------	--



01MCH100Y

Steering

Type	EPS (Electronic Power Steering)
Gear Type	Rack & Pinion

Brake

Front Brake Type	Ventilated Disc
Front Rotor Size	15 inch: 275 x 25 mm (10.82 x 0.87 in.)* ¹ 16 inch: 296 x 28 mm (11.84 x 1.10 in.)* ²
Rear Brake Type	Solid Disc
Rear Rotor Size	15 inch: 281 x 12 mm (11.24 x 0.48 in.)
Parking Brake Type	Lever Type
Brake Control	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & Hill-start Assist Control* ³ & DAC (Downhill Assist Control)* ³ & VSC (Vehicle Stability Control)* ⁴

*¹: 2AZ-FE Engine Models with Rear No. 1 Seat Only

*²: 2GR-FE Engine Models and Models with Rear No. 2 Seat

*³: Standard Equipment on 2GR-FE Engine Models and Models with Rear No. 2 Seat

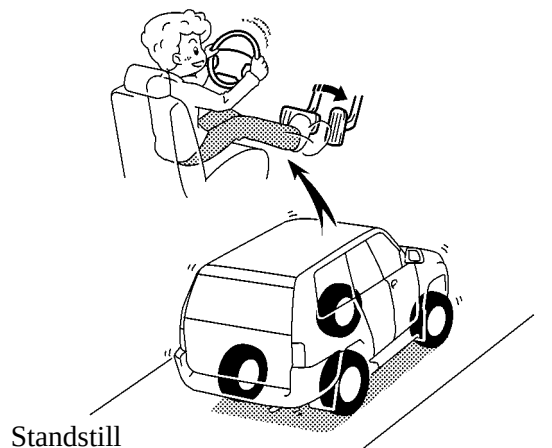
*⁴: 2WD models have been provided with Auto LSD (Limited Slip Differential).

Enhanced VSC System

- The enhanced VSC (Vehicle Stability Control) system is standard equipment on all models.
- In addition to the ABS, TRAC, and VSC controls provided by the conventional system, the enhanced VSC system effects cooperative control with the EPS (Electric Power Steering) and active torque control 4WD system in order to realize excellent driving stability and maneuverability.
- See CH-92 for details on the enhanced VSC system.

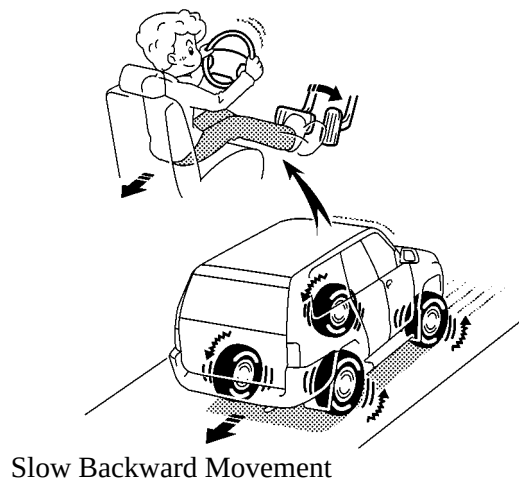
Hill-start Assist Control

- The hill-start assist control is standard equipment on the 2GR-FE engine models and the models with rear No. 2 seat.
- When the driver transfers his/her foot from the brake pedal to the accelerator pedal while starting off on an uphill, the hill-start assist control momentarily maintains the hydraulic pressure in the wheel cylinders of the four wheels, in order to prevent the vehicle from rolling backward.
- The hill-start assist control used on the '06 model effects control to prevent the vehicle from rolling backward. This control has evolved further from the hill-start assist control of the '05 model, which slowed the backward rolling of the vehicle while starting off on a hill.
- See CH-120 for details on the hill-start assist control.



'06 Model

01NMO88Y



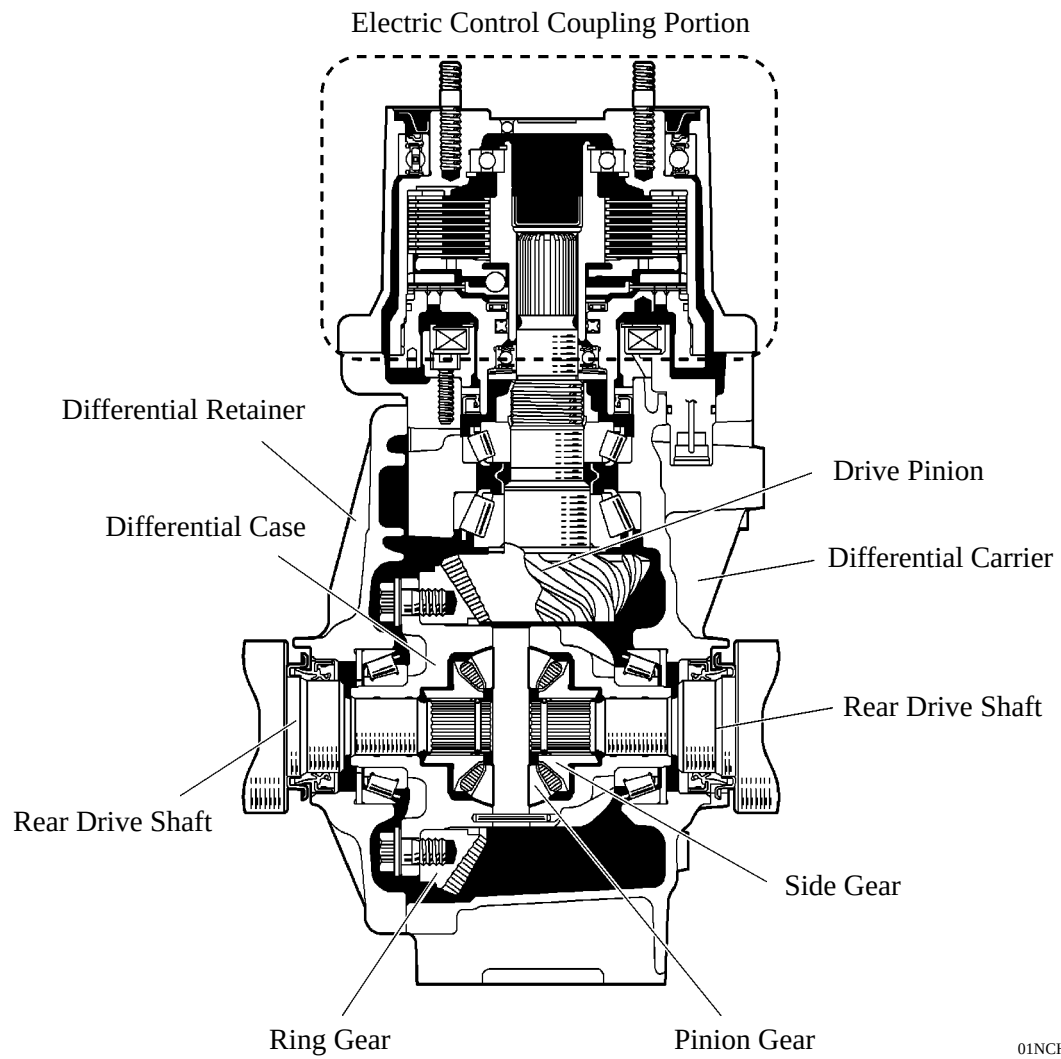
'05 Model

01NMO89Y

■ CONSTRUCTION

1. General

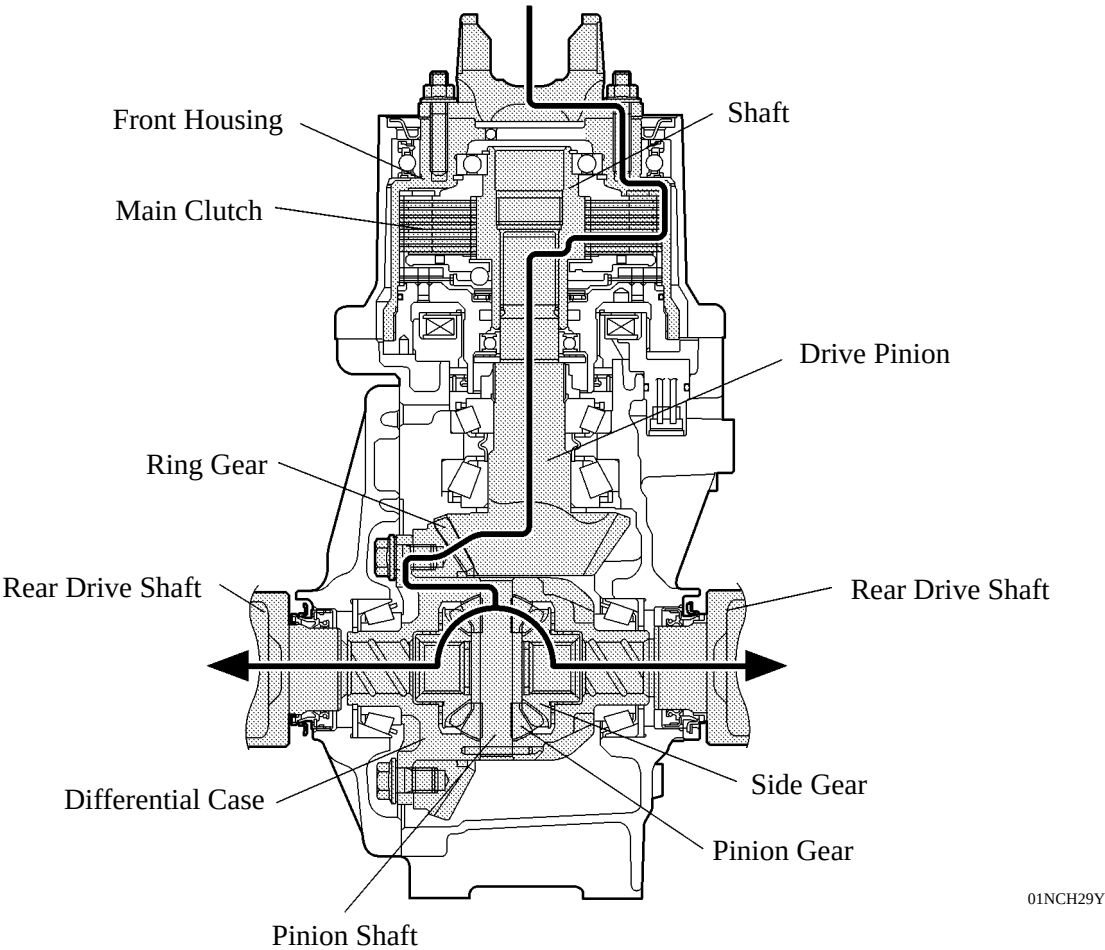
- The electric control coupling is placed forward of the differential.
- A carrier and a retainer made of aluminum are used for weight reduction.



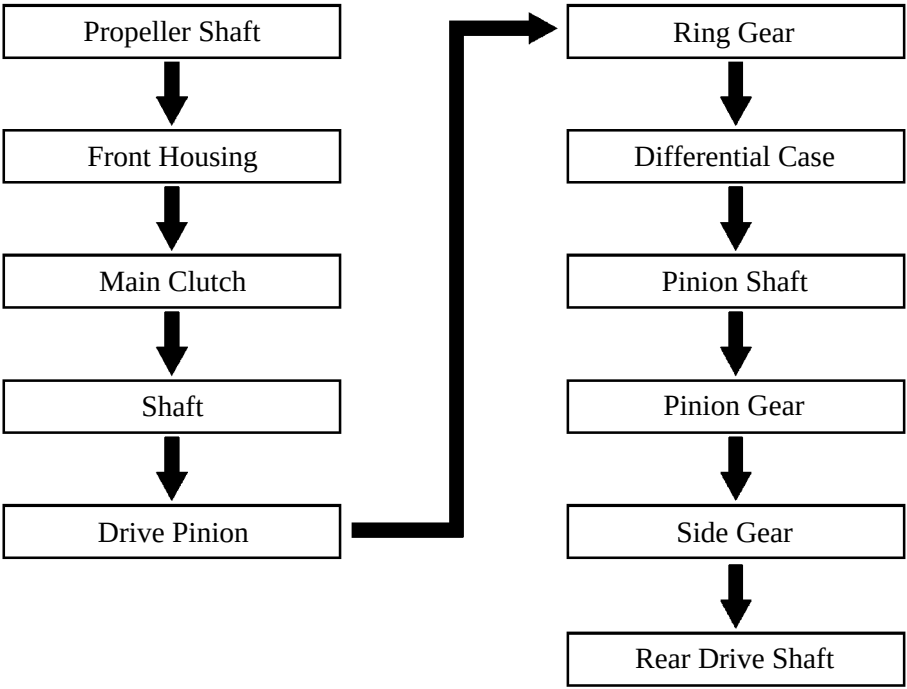
01NCH27Y

2. Rear Differential Power Flow

The illustration below shows the flow of power transmitted from the propeller shaft.



01NCH29Y

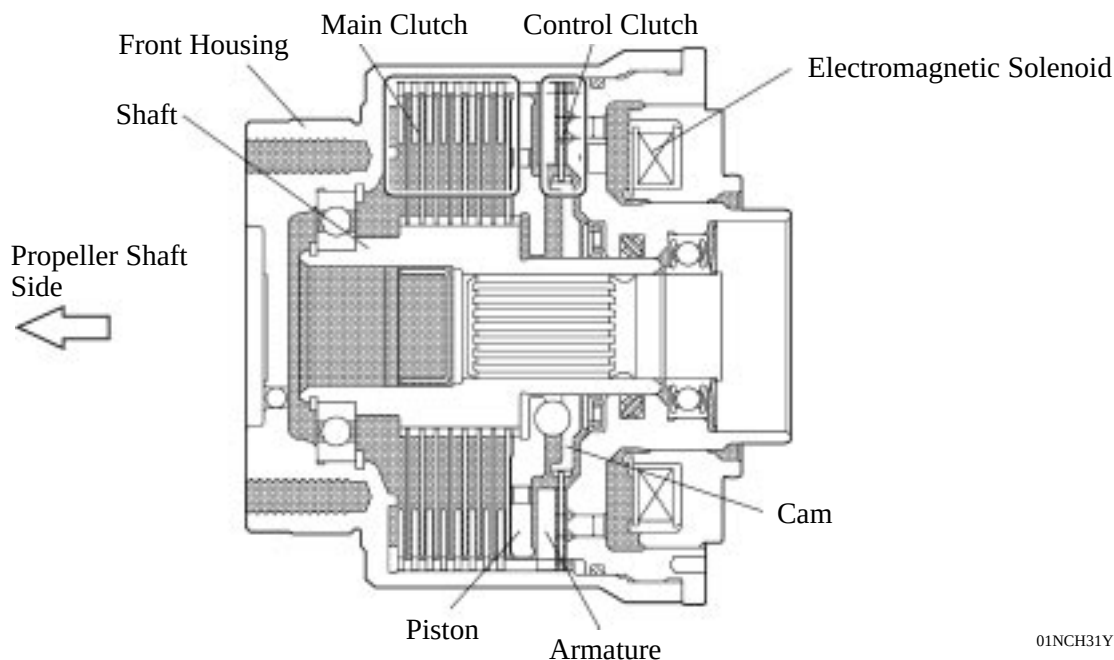


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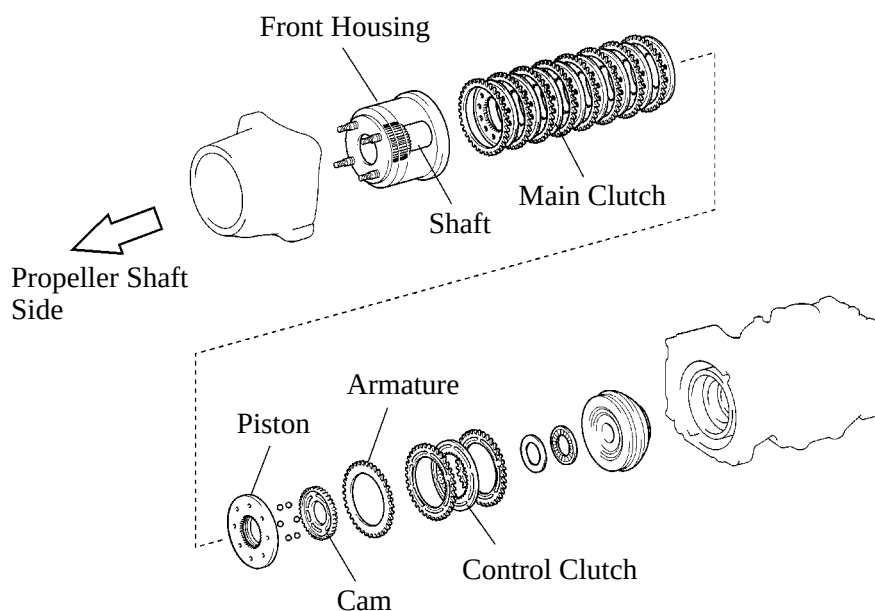
3. Electric Control Coupling

General

- The electric control coupling consists of a control clutch, main clutch, front housing, shaft, armature, cam, piston, and electromagnetic solenoid with a compact construction.
- The outer sides of the main clutch and control clutch are coupled to the front housing. The inner side of the main clutch is coupled to the shaft, and the inner side of the control clutch is coupled to the cam.
- The control clutch uses a multiple metal plate type clutch, and the main clutch uses a multiple wet plate type clutch.



01NCH31Y



01NCH81Y

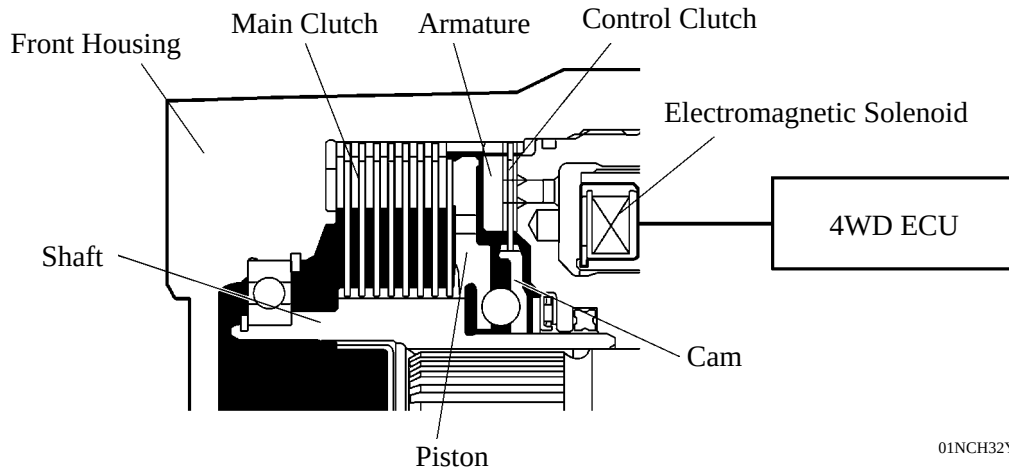
Service Tip

The electric control coupling cannot be disassembled. For replacement, replace the electric control coupling assembly. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

Operation

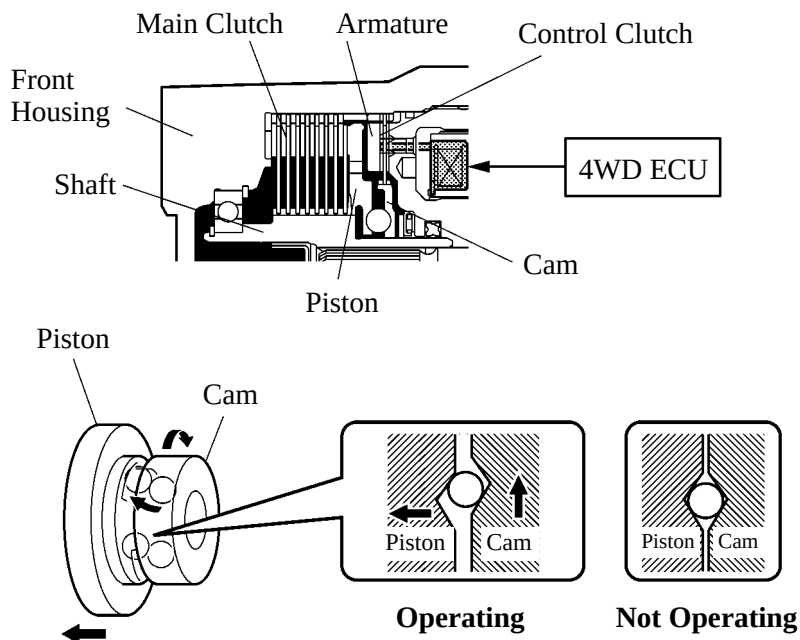
1) Not Operating

The drive force is transmitted from the propeller shaft to the front housing. When the electromagnetic solenoid is not operating, the drive force of the front housing is not transmitted to the shaft because the control clutch is not engaged. Accordingly, the drive force of the propeller shaft is not transmitted to the rear wheels.

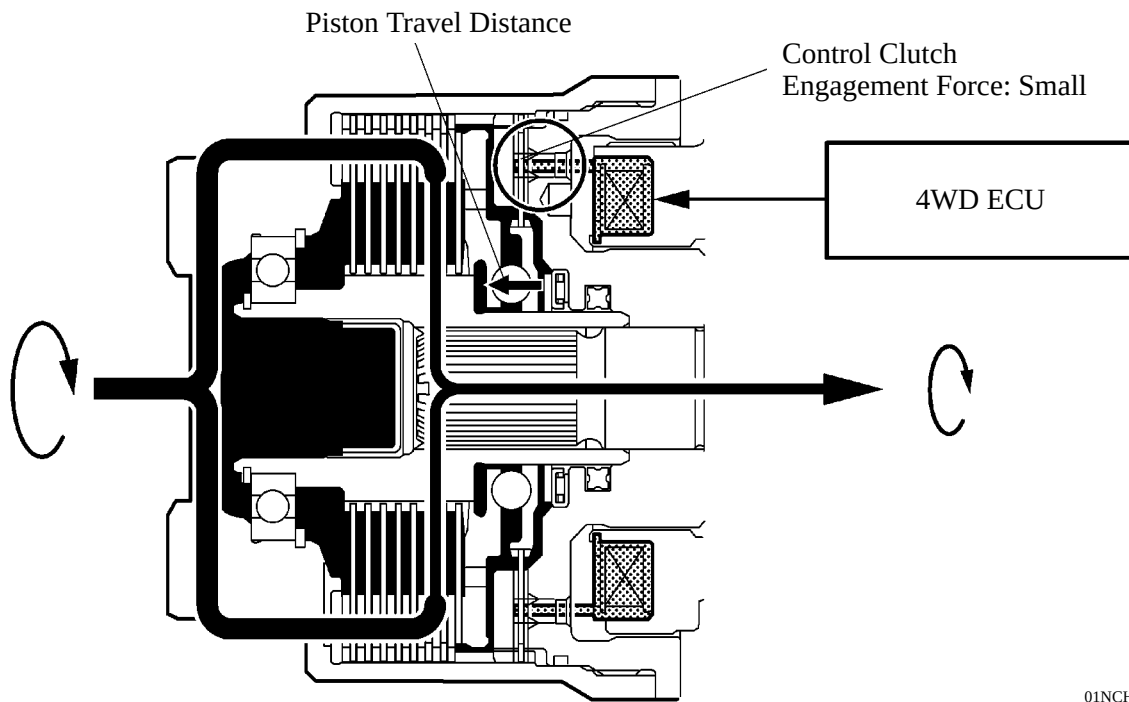
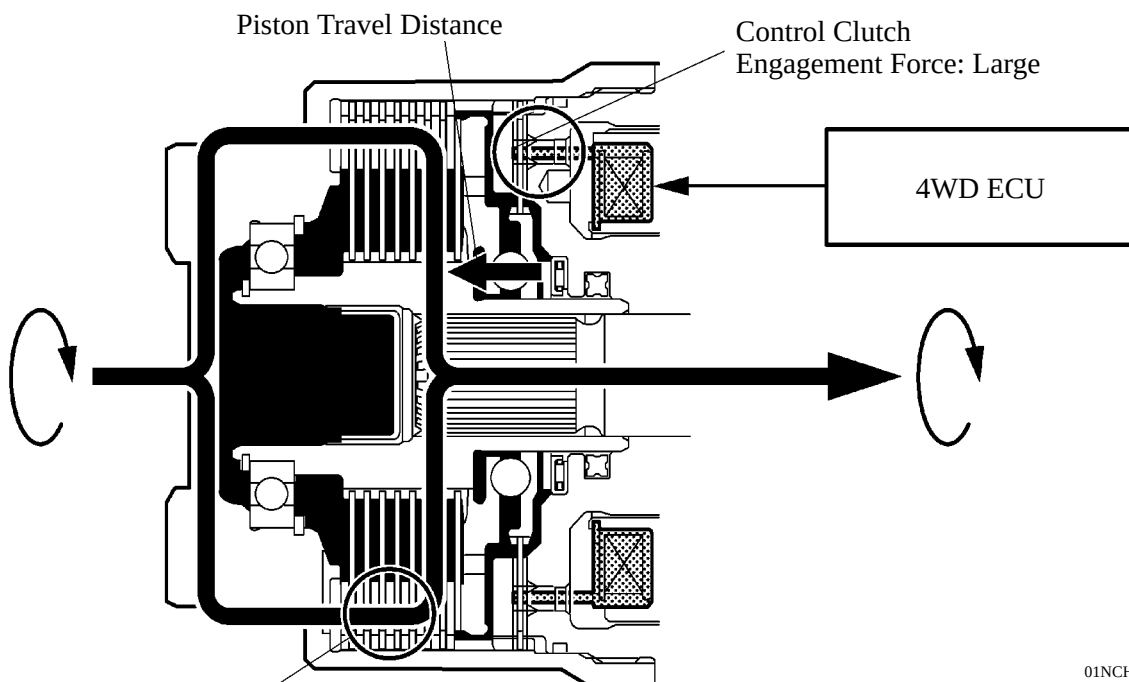


2) Operating

- When the 4WD ECU energizes the electromagnetic solenoid, it attracts the armature to the control clutch side. This causes the control clutch to engage and the cam to rotate.
- The rotational movement of the cam causes the piston to push on the main clutch, causing the main clutch to engage. Accordingly, the drive force of the propeller shaft is transmitted to the rear wheels.



- The amount of drive force that is transmitted to the rear wheels is controlled steplessly by controlling the amperage that is applied to the electromagnetic solenoid.

**Low Amperage**

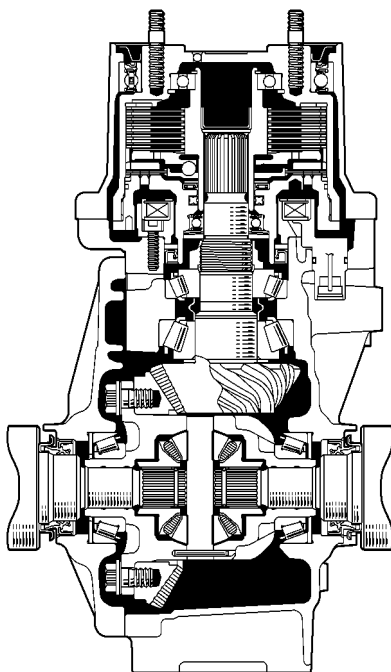
Main Clutch Engagement Force: Large

High Amperage

REAR DIFFERENTIAL

■ DESCRIPTION

- A compact and lightweight F13S rear differential with an integrated electric control coupling is used on the 4WD model.
- The electric control coupling, which is controlled by the 4WD ECU, controls the drive torque to the rear wheels.



01NCH27Y

F13S Rear Differential

► Specifications ◀

Differential Type		F13S
Differential Gear Ratio		2.277
Drive Pinion	The No. of Teeth	18
Ring Gear	The No. of Teeth	41
No. of Differential Pinion		2
Oil Viscosity		SAE 90
Oil Grade		API GL-5
Oil Type		Hypoid
Oil Capacity	Liters (US qts, Imp. qts)	0.5 (0.53, 0.46)
Weight (Reference)*	kg (lb)	17.2 (37.8)

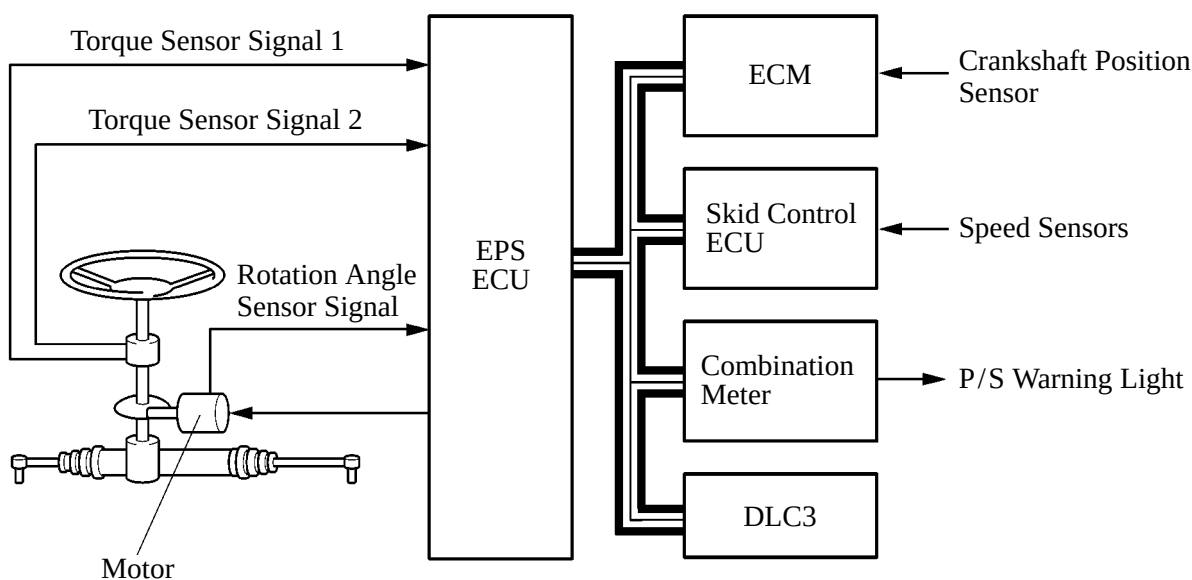
*: Weight shows the figure with the oil fully filled.

■ EPS (ELECTRIC POWER STEERING)

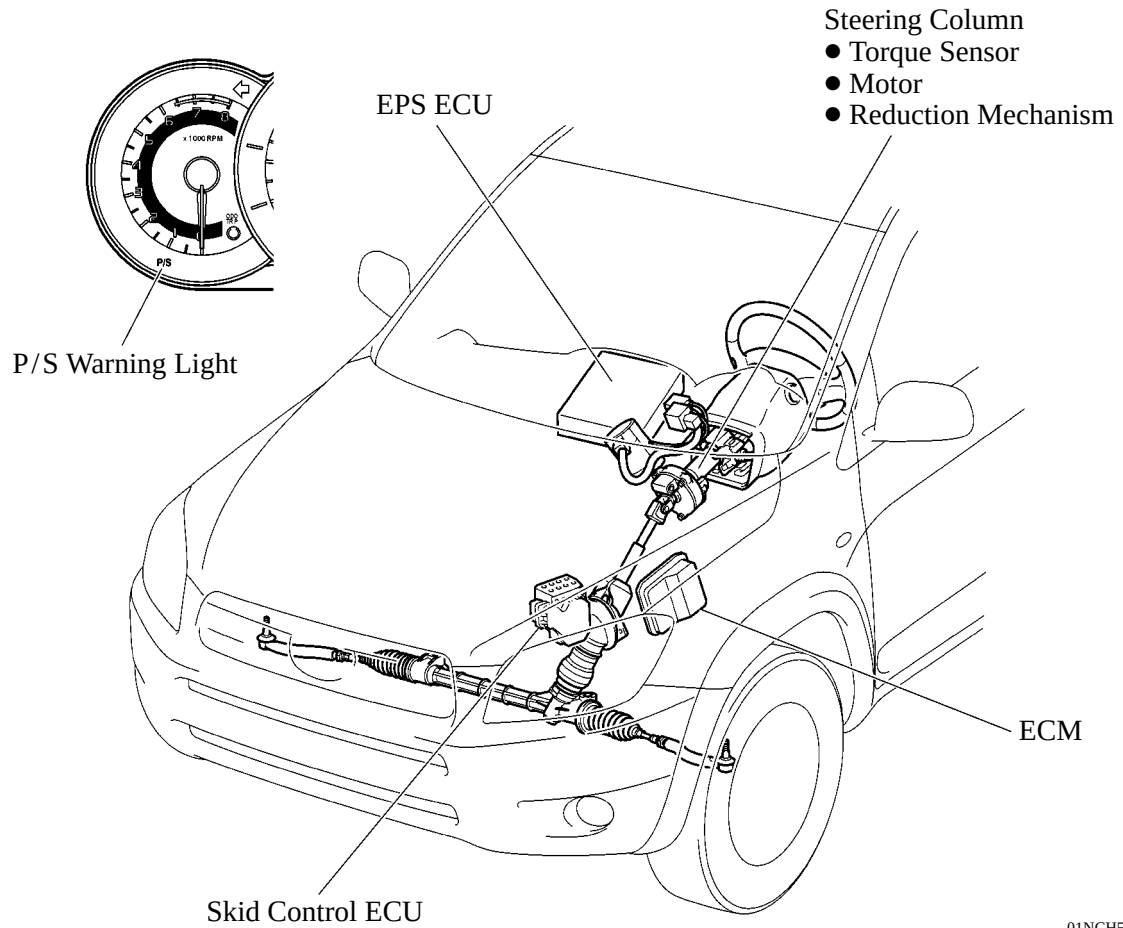
1. General

- This system generates torque using a motor and a reduction mechanism that are mounted on the steering column to assist the driver's steering. The amount of power assist is calculated by the EPS ECU.
- This system offers excellent fuel economy characteristics because the motor that is mounted on the steering column provides power assist, and this motor consumes energy only when power assist is required.
- Unlike the conventional hydraulic power steering system, this system excels in serviceability because it does not require pipes, vane pump, pulley and power steering fluid.

2. System Diagram



3. Layout of Main Components



01NCH51Y

4. Function of Main Components

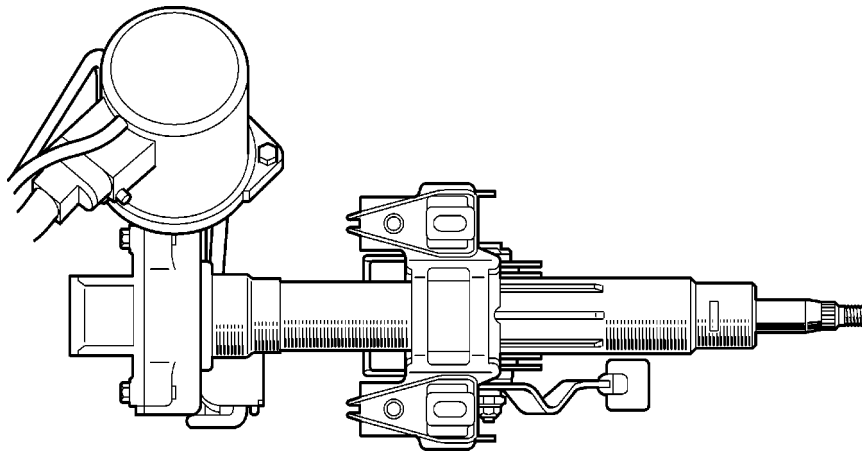
Component			Function
Steering Column	Torque Sensor		Detects the twist of the torsion bar, calculates the torque that is applied to the torsion bar by changing it into an electrical signal, and outputs this signal to the EPS ECU.
	Motor		Generates power assist in accordance with a signal received from the EPS ECU.
		Rotation Angle Sensor	Outputs the rotation angle of the motor to the EPS ECU.
	Reduction Mechanism		Reduces the speed of the motor through the use of a worm gear and a wheel gear and transmits it to the column shaft.
EPS ECU			Actuates the motor mounted on the steering column to provide power assist, based on the signals received from various sensors and vehicle speed.
ECM			Outputs the engine speed signal to EPS ECU.
Combination Meter			In case of a malfunction in the system, turns on the P/S warning light.
Skid Control ECU			Outputs the vehicle speed signal to EPS ECU.

5. Construction and Operation of Main Components

Steering Column

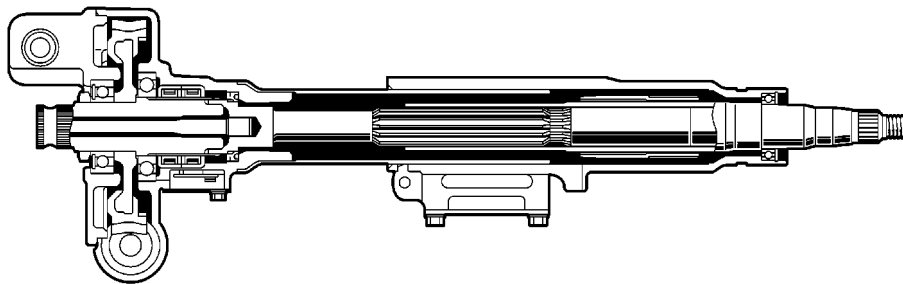
1) General

A motor, reduction mechanism, and torque sensor are mounted on the steering column.



01MCH30Y

Top View

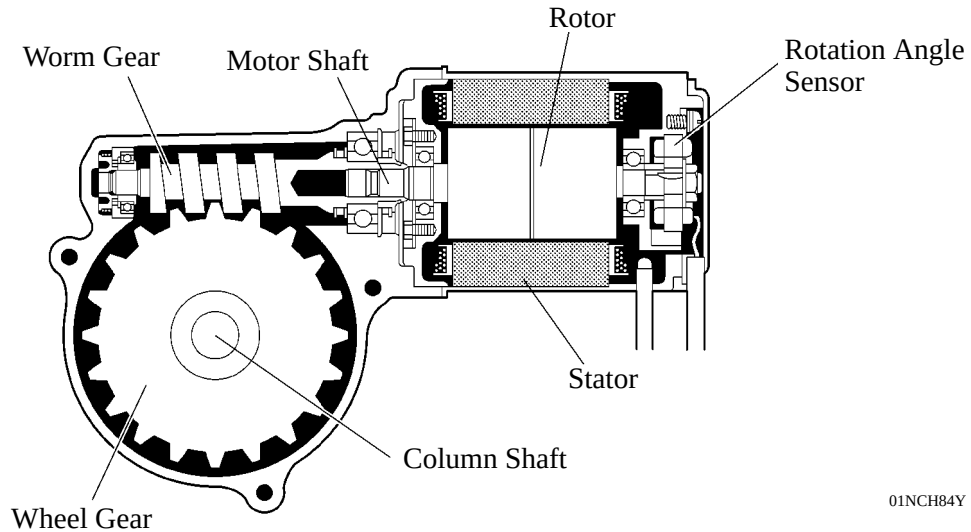


Cross Section

01NCH83Y

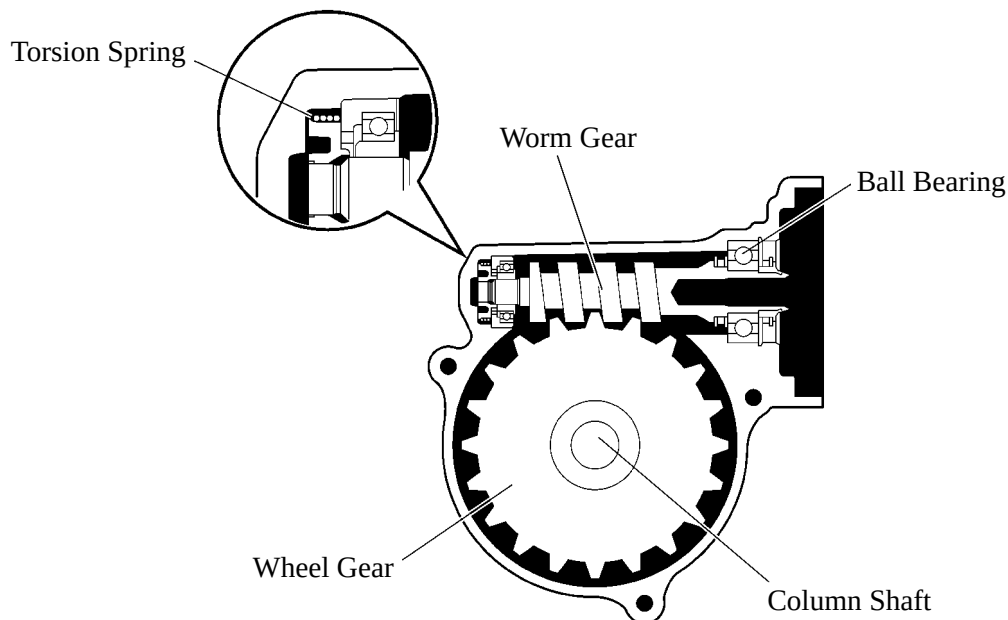
2) Motor

- A low inertia, low noise, and high power output motor is used.
- The motor consists of the rotor, stator, and motor shaft.
- The torque that is generated by the motor is transmitted via the joint to the worm gear. Then this torque is transmitted via the wheel gear to the column shaft.
- The rotation angle sensor consists of resolver sensor, which excels in reliability and durability. The rotation angle sensor detects the rotation angle of the motor and outputs it to the EPS ECU. As a result, it ensures efficient EPS control.



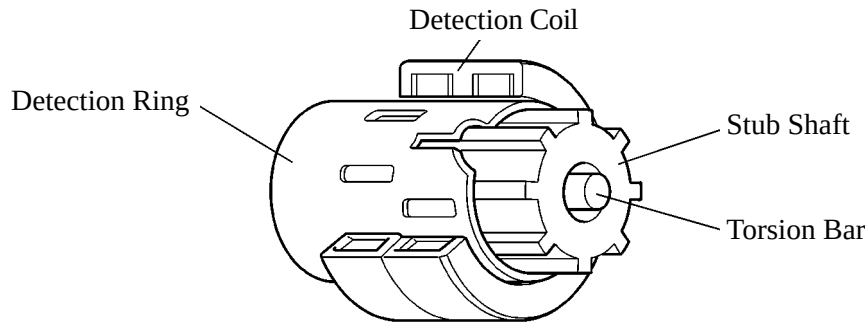
3) Reduction Mechanism

- This mechanism reduces the speed of the motor via the worm gear and the wheel gear, and transmits it to the column shaft.
- The wheel gear is made of a high strength, low friction, and low wear plastic material, to realize low noise and a lightweight construction.
- A worm gear supported by ball bearings is used. Also, a torsion spring is provided to ensure the optimal meshing of the gears at all times.



4) Torque Sensor

- The torque sensor detects the twist of the torsion bar, calculates the torque that is applied to the torsion bar by changing it into an electrical signal, and outputs this signal to the EPS ECU.
- Detection ring is mounted on the input shaft, and stub shaft is mounted on the output shaft. The input shaft and the output shaft are joined by the torsion bar. A detection coil is placed on the outside of the detection ring to complete an excitation circuit without making a contact.
- The detection coil consists of a dual circuit that outputs two signals, VT1 and VT2. The ECU controls the assist amount based on these two signals and at the same time detects a sensor malfunction.



218CH38

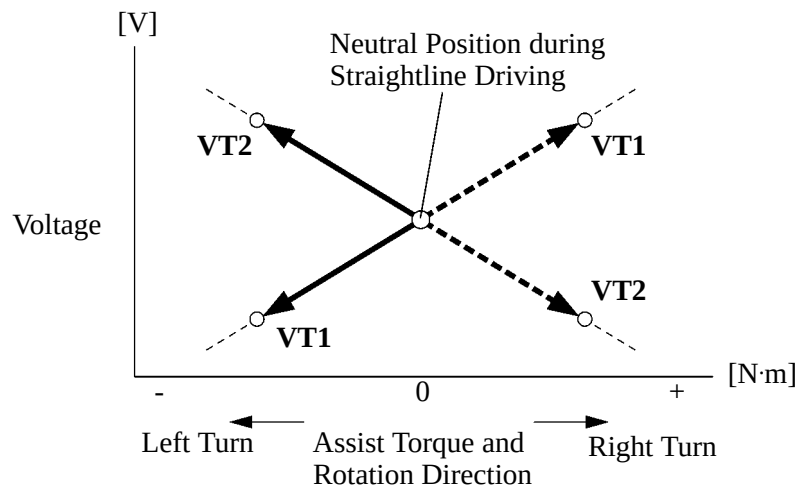
a. Straightline Driving

If the vehicle is driven straight and the driver does not turn the steering wheel, the specified voltage that is output at this time is determined by the EPS ECU to indicate the neutral position of the steering wheel. Therefore, it does not apply current to the motor.

b. When Steering

When a driver turns the steering wheel to the right or left, the twist that is created in the torsion bar creates a relative displacement between detection ring and the stub shaft. This change is then converted into two electrical signals, VT1 and VT2, and sent to the EPS ECU. When the steering wheel is turned to the right, VT1 outputs a voltage that is higher than that of the neutral position.

Conversely, VT2 outputs a voltage that is lower than that of the neutral position. The direction of the turn is thus detected according to these outputs. Furthermore, the amount of steering assist is determined by the magnitude of the output value.



218CH39

EPS ECU**1) General**

- The EPS ECU receives signals from various sensors, judges the current vehicle condition, and determines the assist current to be applied to the motor accordingly.
- In case a malfunction occurs in the system, the fail-safe function stops the output current and reverts the control to manual steering. At this time, a P/S warning light illuminates to alert the driver of the malfunction.
- The EPS ECU of new model has following functions:

Item	Function
Basic Control	Calculates the assist current from the steering torque valve and the vehicle speed, and actuates the motor.
Inertia Compensation Control	Ensures the starting movement of the motor when the driver starts to turn the steering wheel.
Recovery Control	During the short interval between the time the driver fully turns the steering wheel and the wheels try to recover, this control assists the recovery force.
Damper Control	Regulates the amount of assist when the driver turns the steering wheel while driving at high speeds, thus damping the changes in the yaw rate of the vehicle body.
System Overheat Protection Control	Estimates the motor temperature based on the amperage and the current duration. If the temperature exceeds the standard, it limits the amperage to prevent the motor from overheating.

- The EPS ECU effects cooperative control with the skid control ECU, in order to control the steering assist torque in accordance with information received from the skid control ECU. This facilitates the steering operation of the driver, thus realizing a high level of vehicle stability.

For an outline of Cooperative Control with EPS and 4WD System, refer to CH-114.

2) Fail-safe

- If the EPS ECU detects a malfunction in the EPS system, it turns on the warning light in the combination meter to inform the driver and stops the assist control. As a result, the EPS system operates in the same way as manual steering.
- In case of a malfunction, the fail-safe function activates and the EPS ECU effects various controls. For details, refer to the 2006 RAV4 Repair Manual (Pub No. RM01M1U).

3) Self-diagnosis

- If the EPS ECU detects a problem in the EPS system, the warning light that corresponds to the function in which the malfunction has been detected lights up to alert the driver of the malfunction.
- At the same time, the DTCs (Diagnosis Trouble Codes) are stored in memory. The DTCs can be read by connecting a hand-held tester, or by connecting the SST (09843-18040) to the TC and CG terminals of the DLC3 and observing the blinking of the power steering warning light.

For details of the DTCs that are stored in EPS ECU memory, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

■ TILT AND TELESCOPIC MECHANISM

The tilt and telescopic mechanism consists mainly of the tilt and telescopic lever, column bracket, breakaway bracket, and tilt and telescopic steering stoppers.

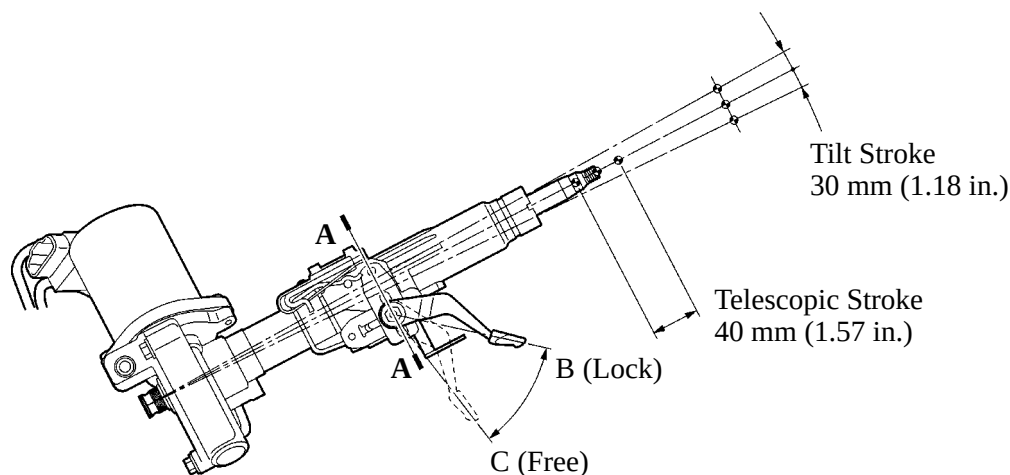
For the tilt and telescopic mechanism, the steering column main shaft is connected at the serration engagement.

1. When Locked

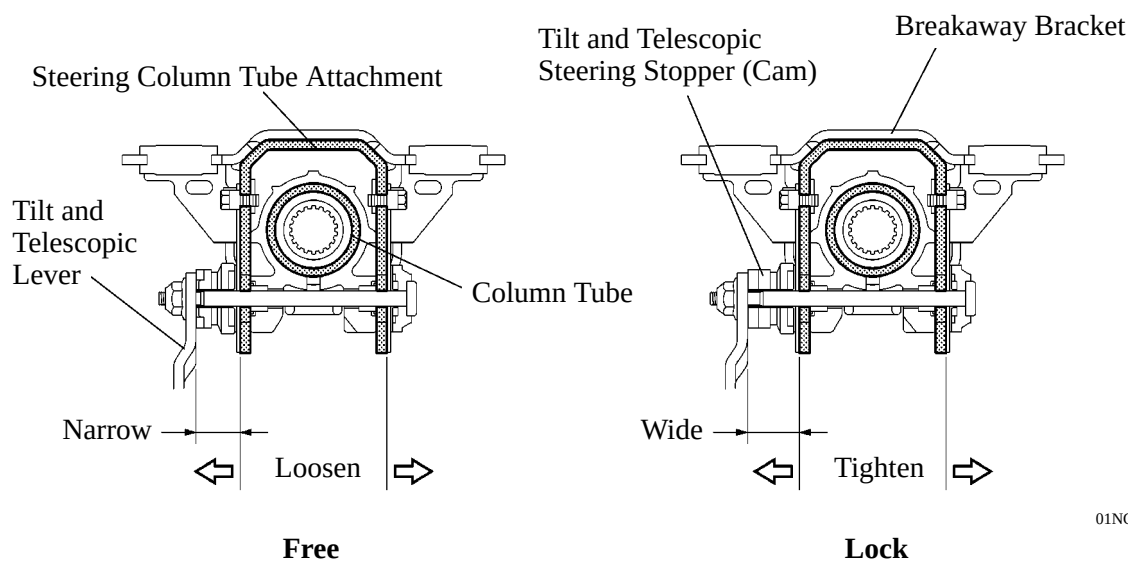
When the tilt and telescopic mechanism is in its locked state, the tilt and telescopic lever at B position causes the cam of the tilt and telescopic steering stopper to tighten the breakaway bracket and column bracket. This secures the breakaway bracket, column bracket, and column tube, so movement in the tilt direction and in the telescopic direction is locked.

2. When Free State

When the tilt and telescopic mechanism is in its free state, the tilt and telescopic lever at C position causes the cam of the tilt and telescopic steering stoppers to loosen the column bracket. This frees the column tube to move in the tilt direction and in the telescopic direction, enabling adjustment.



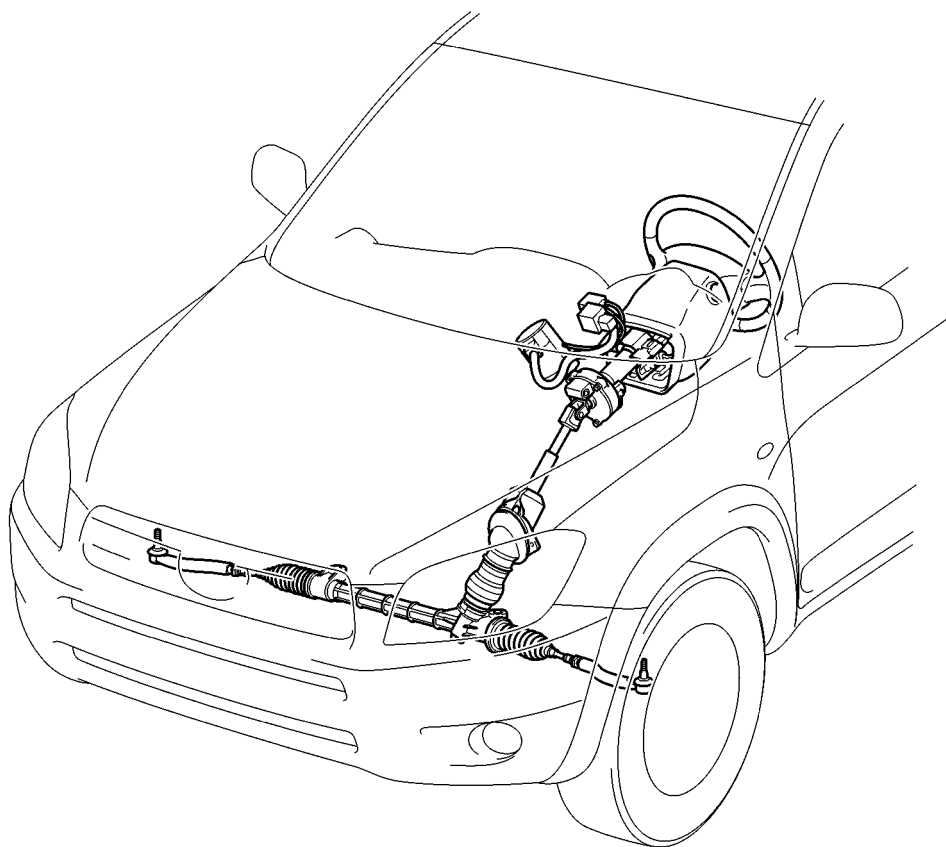
► A - A Cross Section ◀



STEERING

■ DESCRIPTION

- Rack and pinion type steering gear is used on all models.
- A vehicle speed sensing type EPS (Electric Power Steering) is provided as standard equipment on all models.
- An energy absorbing mechanism is used in the steering column.
- A tilt and telescopic mechanism is used on all models.



01NCH49Y

► Specifications ◀

Steering Type	Electric Power Steering	
Tire Size	215/70R16 225/65R17	235/55R18
Gear Ratio (Overall)	14.4	14.6
No. of Turns Lock to Lock	2.8	2.7
Rack Stroke	mm (in.)	142 (5.6)
		135 (5.3)

■ ENERGY ABSORBING MECHANISM

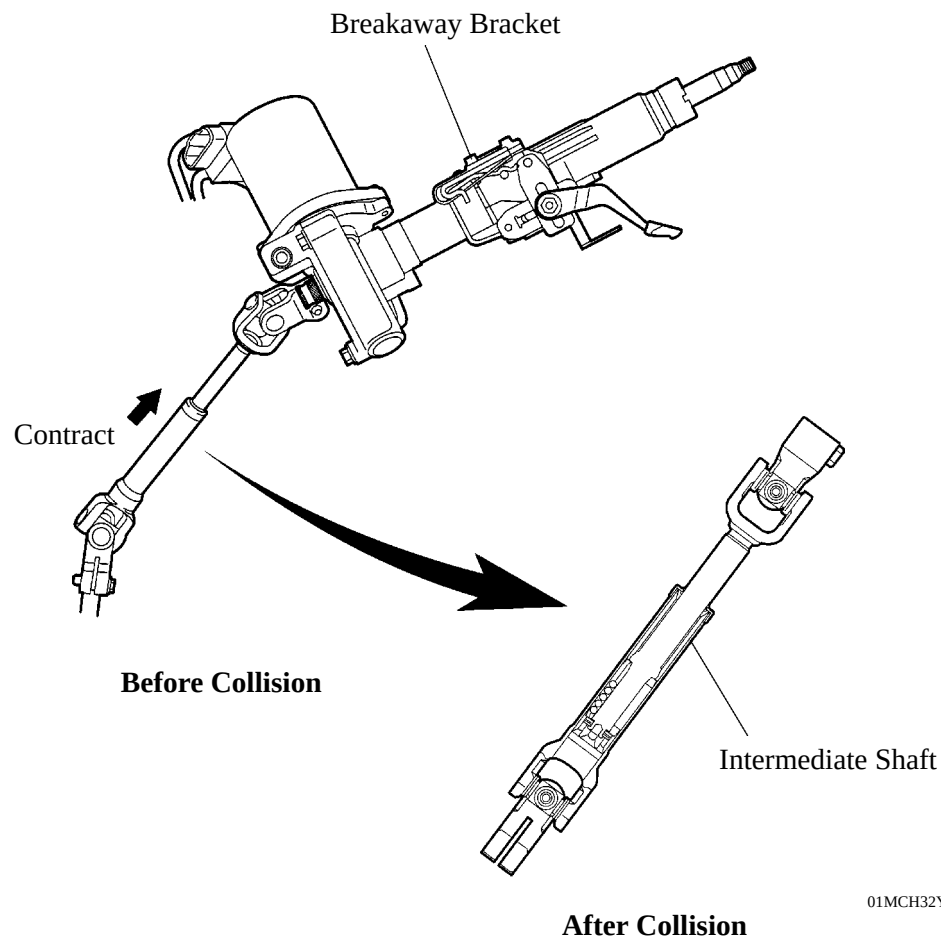
1. General

The energy absorbing mechanism in the steering column consists of the breakaway bracket, intermediate shaft, pinion shaft, and column tube. The steering column is mounted on the instrument panel reinforcement via a breakaway bracket. The steering column and the steering gear box are connected with a contractile intermediate shaft.

2. Operation

- When the steering box moves during a collision (primary collision), the intermediate shaft contracts, thus helping reduce the possibility of the steering column and the steering wheel protruding into the cabin.

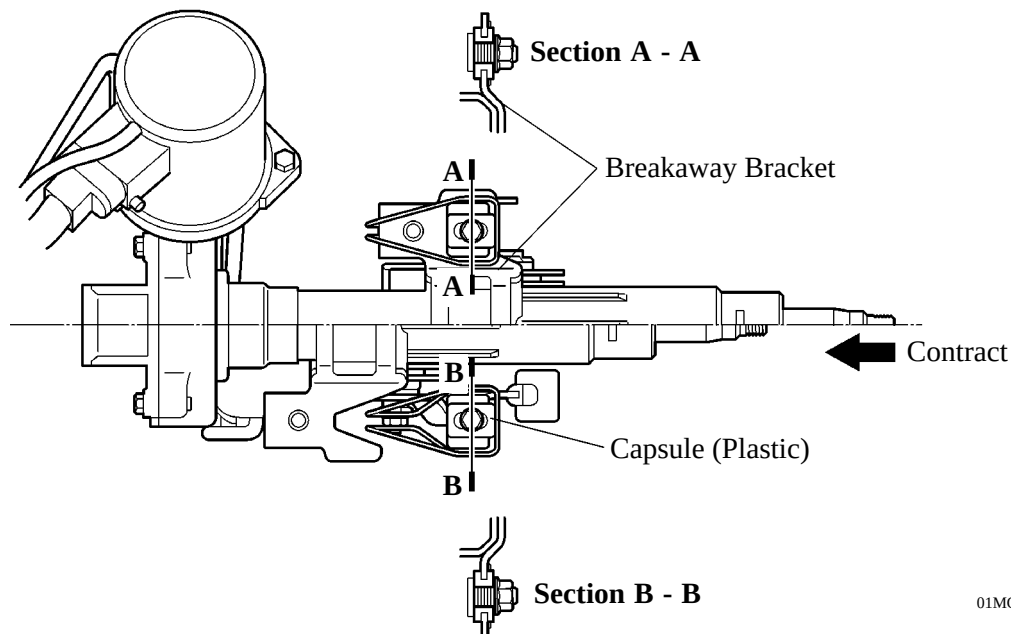
► Primary Collision ◀



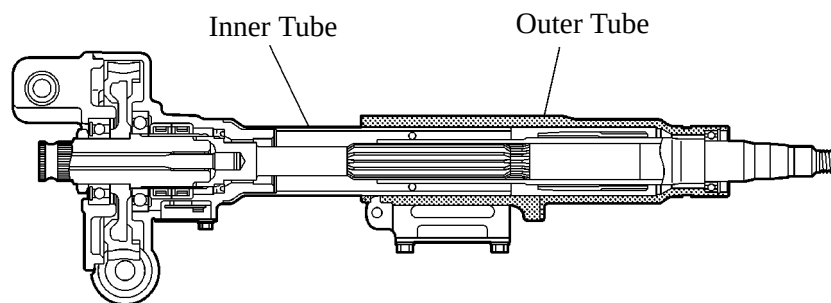
01MCH32Y

- When a collision impact is transmitted to the steering wheel (secondary collision), the steering wheel and the driver's airbag help absorb the impact. In addition, the breakaway bracket separates, and the column tube contracts. At this time, the friction resistance of the sliding portion, which is staked to the column tube, absorbs the energy. This sequential energy absorbing mechanism helps absorb the impact of the secondary collision.

► Secondary Collision ◀

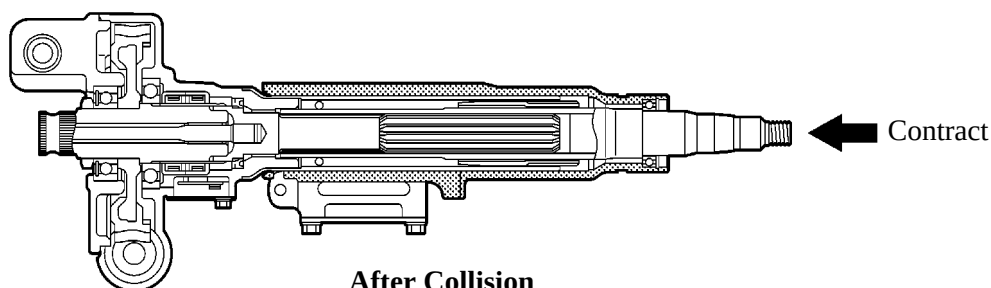


01MCH33Y



Before Collision

01NCH90Y



After Collision
(Maximum Contraction)

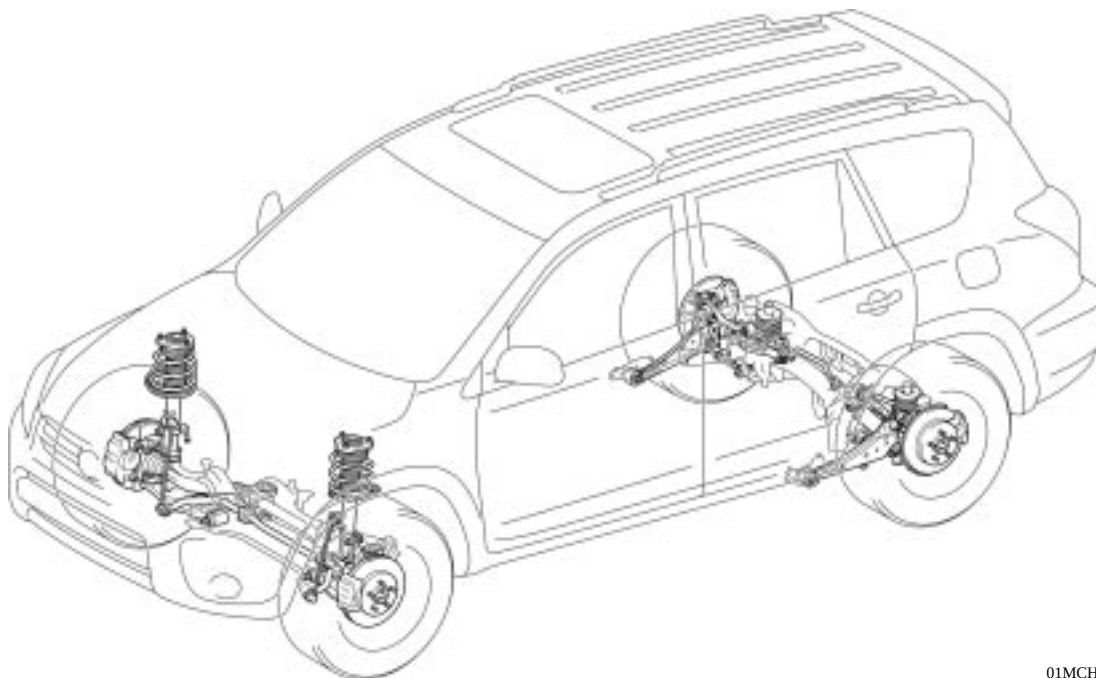
01NCH91Y

SUSPENSION AND AXLE

■ SUSPENSION

1. General

- For the front suspension, the MacPherson strut type suspension with L-shaped lower arms is used.
- For the rear suspension, the double-wishbone type suspension is used.



01MCH100Y

► Specification ◀

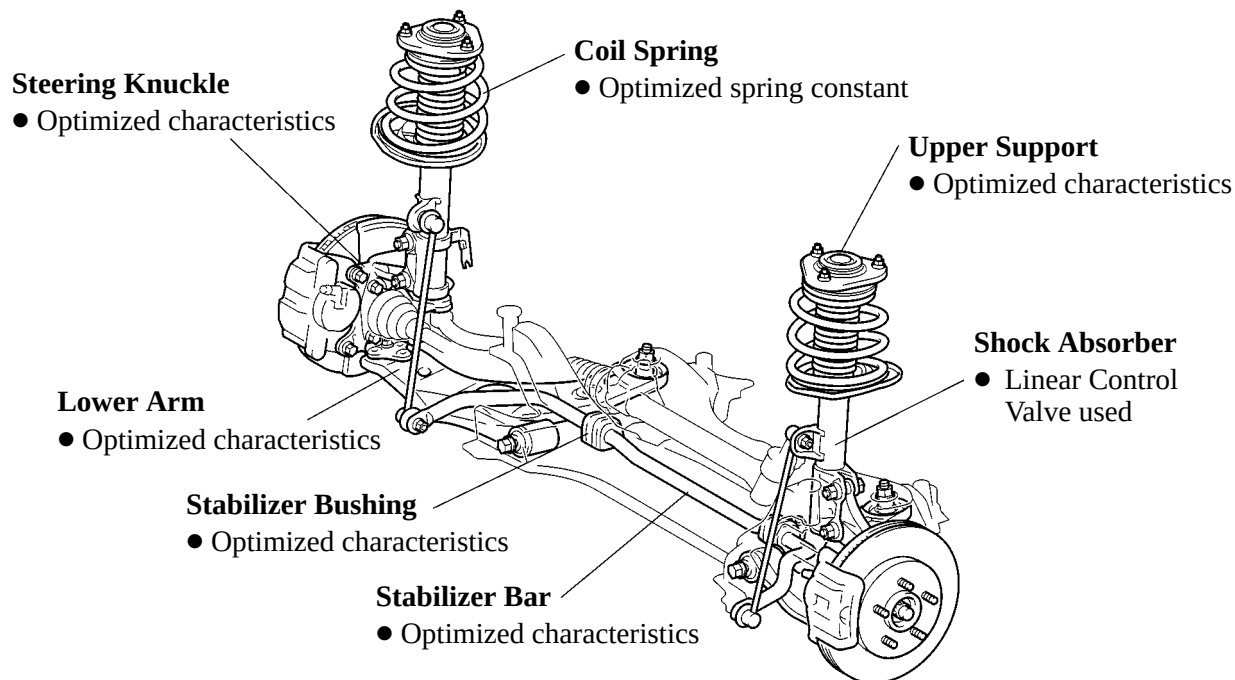
Destination		U.S.A./CANADA		
Model		Standard		With Rear No. 2 Seat
Tire Size		215/70R16	225/65R17 235/55R18	225/65R17
Front Wheel Alignment	Type	MacPherson Strut	←	←
	Tread* mm (in.)	1560 (61.42)	1560 (61.42)	1560 (61.42)
	Caster* degrees	5° 43'	5° 50'	5° 37'
	Camber* degrees	- 0° 08'	- 0° 11'	- 0° 11'
	Toe-in* mm (in.)	1 (0.039)	←	←
	King Pin Inclination* degrees	11° 16'	11° 26'	11° 26'
Rear Wheel Alignment	Type	Double-wishbone	←	←
	Tread* mm (in.)	1560 (61.42)	1560 (61.42)	1560 (61.42)
	Camber* degrees	- 0° 55'	- 1° 04'	- 0° 52'
	Toe-in* mm (in.)	2.3 (0.09)	←	←

*: Unloaded Vehicle Condition

2. Front Suspension

General

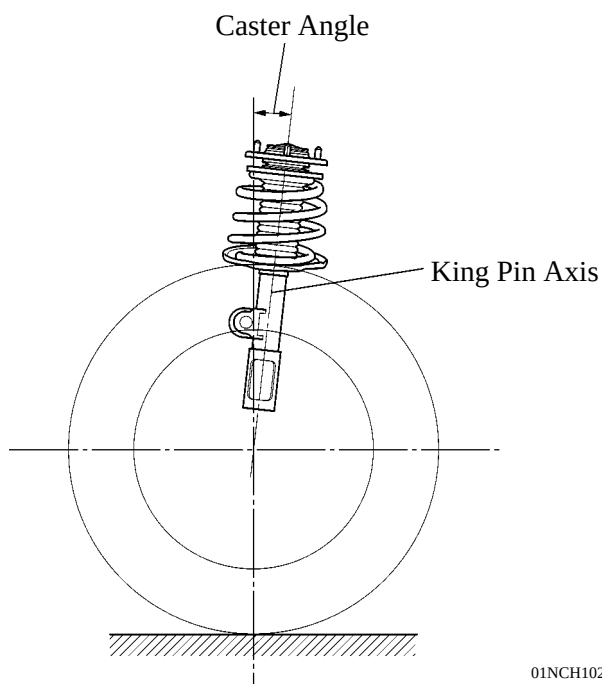
- The highly rigid and compact MacPherson strut with L-shaped lower arms is used.
- Excellent driving stability and ride comfort have been realized by enlarging the wheelbase and tread and optimizing the suspension geometry.
- Excellent vehicle stability has been ensured by optimizing the rolling rigidity.



01NCH101Y

Optimized Caster

Optimum caster angle and trail value are featured to provide straight-line stability during low-speed to high-speed ranges and assist steering response during high speed.

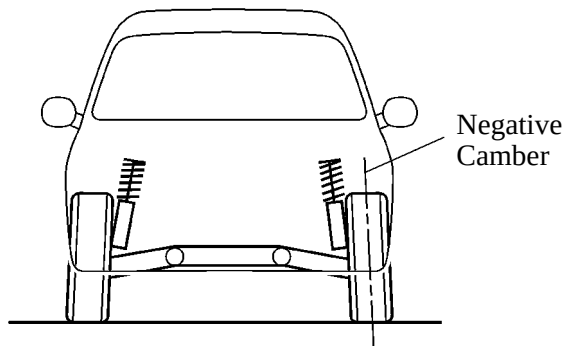


01NCH102Y

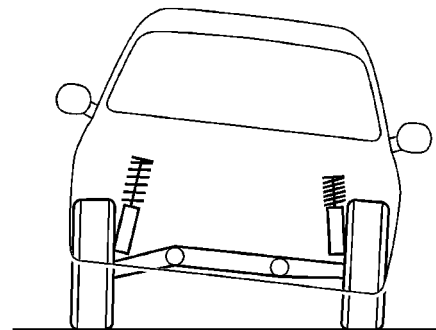
Optimized Camber

The front suspension adopts negative camber to reduce the ground contact camber angle of the outer wheel at the time of turning (cornering) which is caused when the vehicle posture changes during cornering, thus realizing excellent cornering performance.

► During Cornering ◀



181CH23

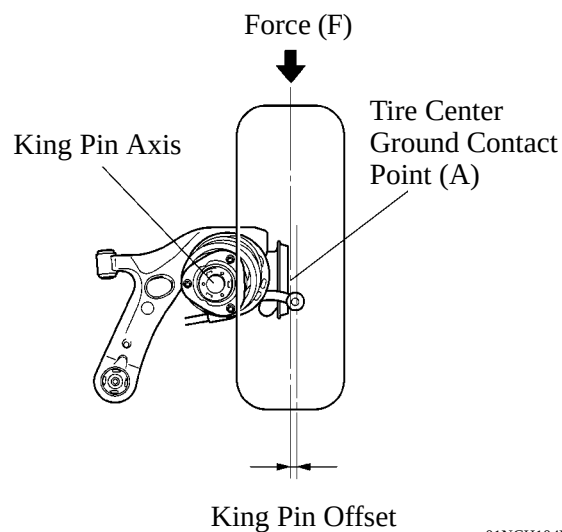
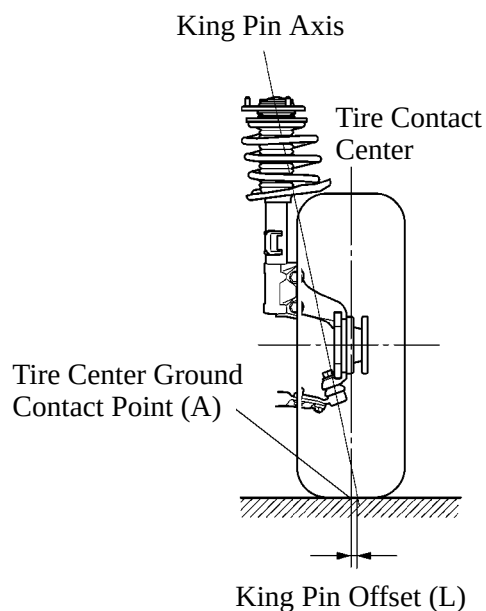


181CH24

Optimized King Pin Offset

A small king pin offset is used and the moment which occurs around the king pin axis is made small in order to realize excellent vehicle stability when braking.

When force (F) is applied to the wheel during braking etc., (F) is applied at the tire center ground contact point (A) and the king pin offset radius (L). The power of (F) multiplied by (L) tries to turn the king pin axis. In this way, making the king pin offset smaller produces smaller moment of the king pin axis to provide excellent vehicle stability during braking.



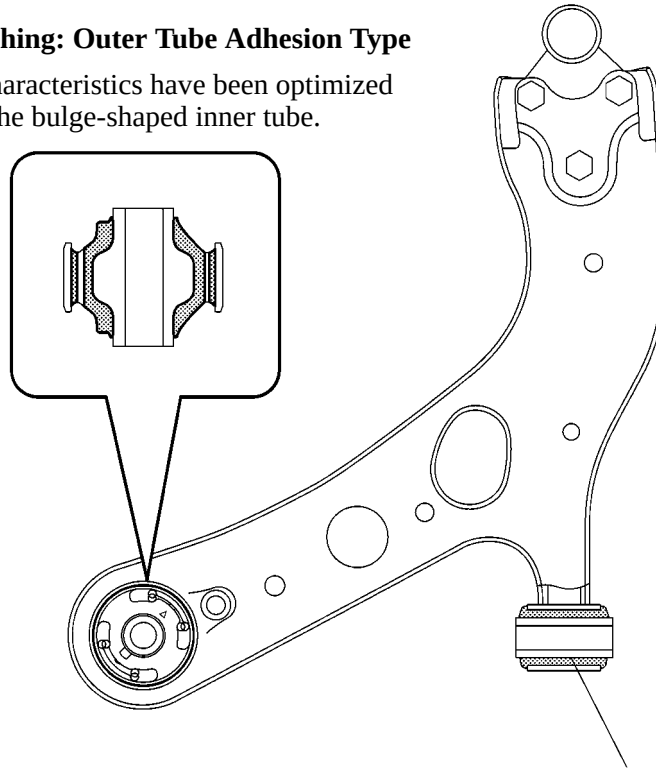
01NCH104Y

Lower Arm

- Closed cross section type lower arms that are lightweight and highly rigid are used.
- Along with the use of wider treads, the length of the lower arms has been extended.
- The installation point of the lower arm bushing and the bushing characteristics have been optimized to realize excellent ride comfort and steering characteristics.

No. 2 Bushing: Outer Tube Adhesion Type

Spring characteristics have been optimized through the bulge-shaped inner tube.

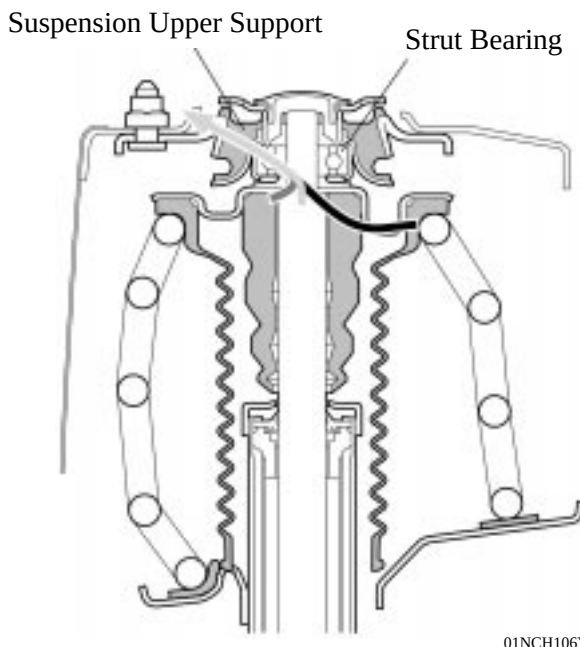
**No. 1 Bushing: without Outer Tube Type**

Suspension Upper Support

- Except for the Sport grade, an integrated input construction type suspension upper support is used, in which the pitch of the mounting bolts has been increased and the characteristics have been optimized.
- On the Sport grade, a separate input construction type suspension upper support is used. This construction transmits only the inputs from the shock absorber and the bound stopper via the suspension upper support to the body. Thus, it realizes superior quietness and ride comfort performance.

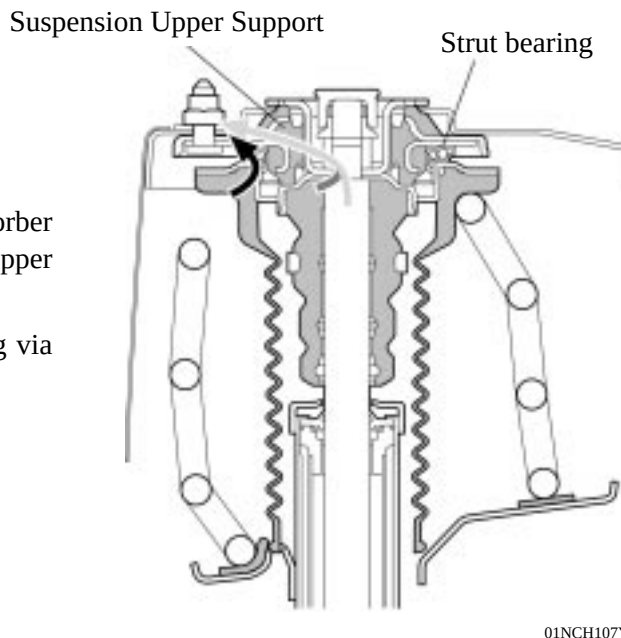
Integrated Input Construction Type:

Transmits all the inputs (from the shock absorber, bound stopper, and coil spring) from the strut bearing via the suspension upper support to the body.



Separate Input Construction Type:

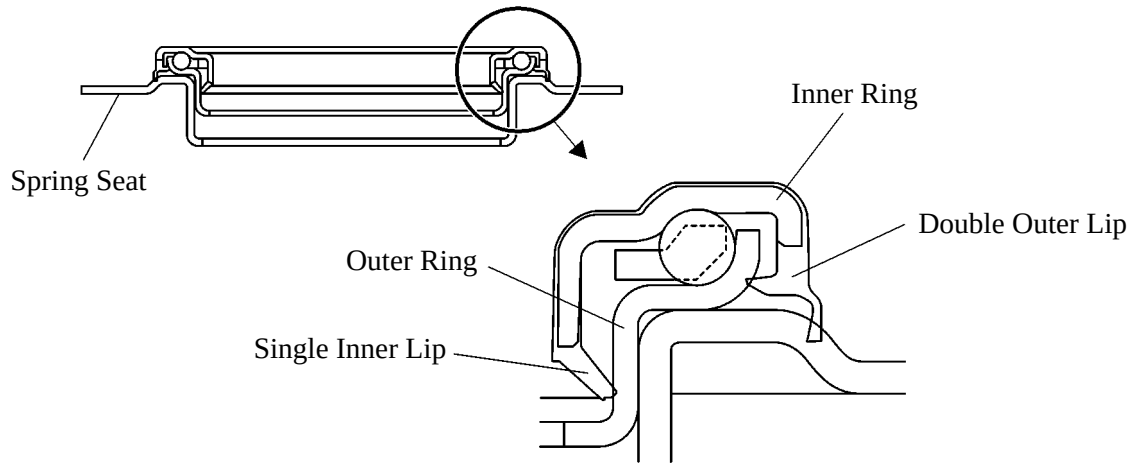
- Transmits the inputs from the shock absorber and bound stopper via the suspension upper support to the body.
- Transmits the input from the coil spring via the strut bearing to the body.



-  : Coil spring input
 : Shock absorber input
 : Bound stopper input

Strut Bearing (for Separate Input Construction Type Suspension Upper Support)

- A thrust type ball bearing is used in the strut bearing.
- It is an oil seal integrated type with a double outer lip and a single inner lip.
- The spring seat is an integrated type that is pressed-fit into the strut bearing.



01NCH109Y

Service Tip

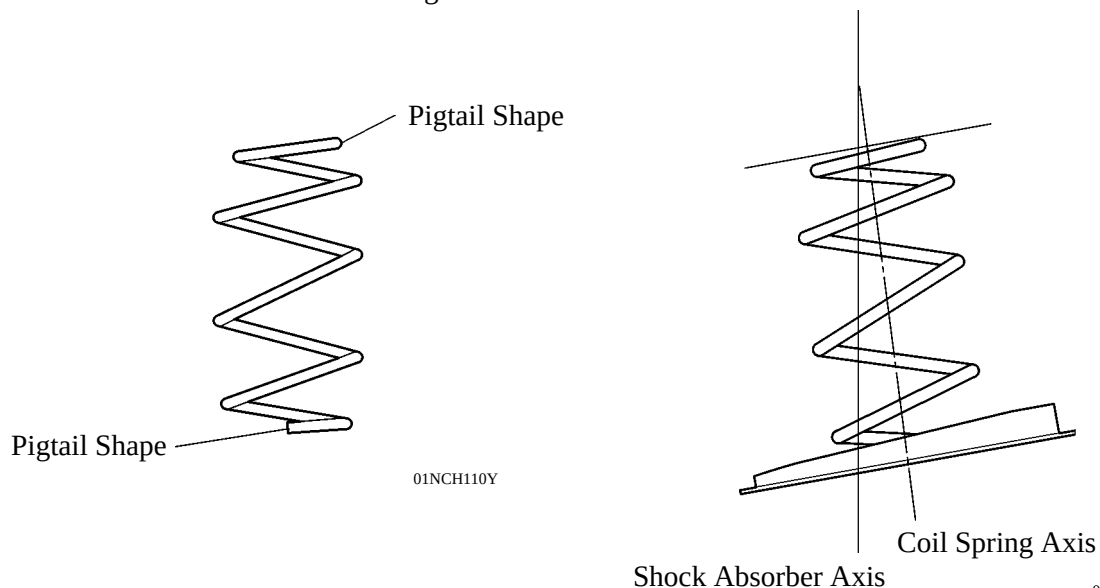
Double the removal and installation of the strut bearing, the inner ring can be easily disengaged from the outer ring. Be careful not to disengage the rings. In case that the rings are disengaged, install a new strut bearing as it cannot be reused.

Be careful not to tilt the bearing when installing it with the suspension upper support.

For details on the diagnostic methods and diagnostic items, refer to the RAV4 Repair Manual (Pub No. RM01M1U.)

Coil Spring

- Both ends of the coil spring are pigtail-shaped, and made compact and lightweight.
- The optimized shape of the spring and its installation position have reduced the lateral force that is applied to the shock absorber. Together with the smooth movement realized through reduced friction, excellent ride comfort and steering feel have been realized.

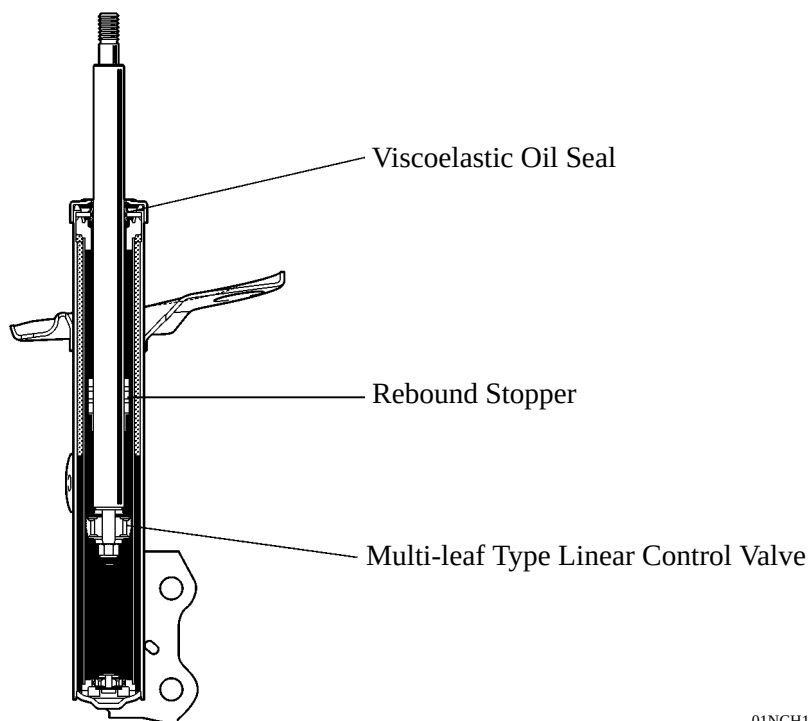


01NCH110Y

01NCH127Y

Shock Absorber

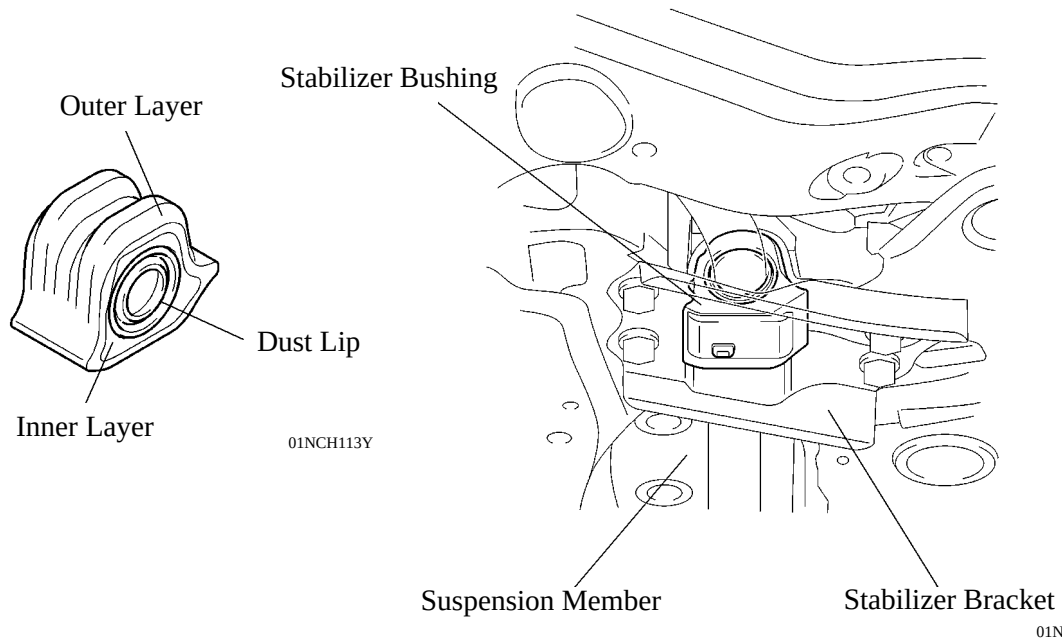
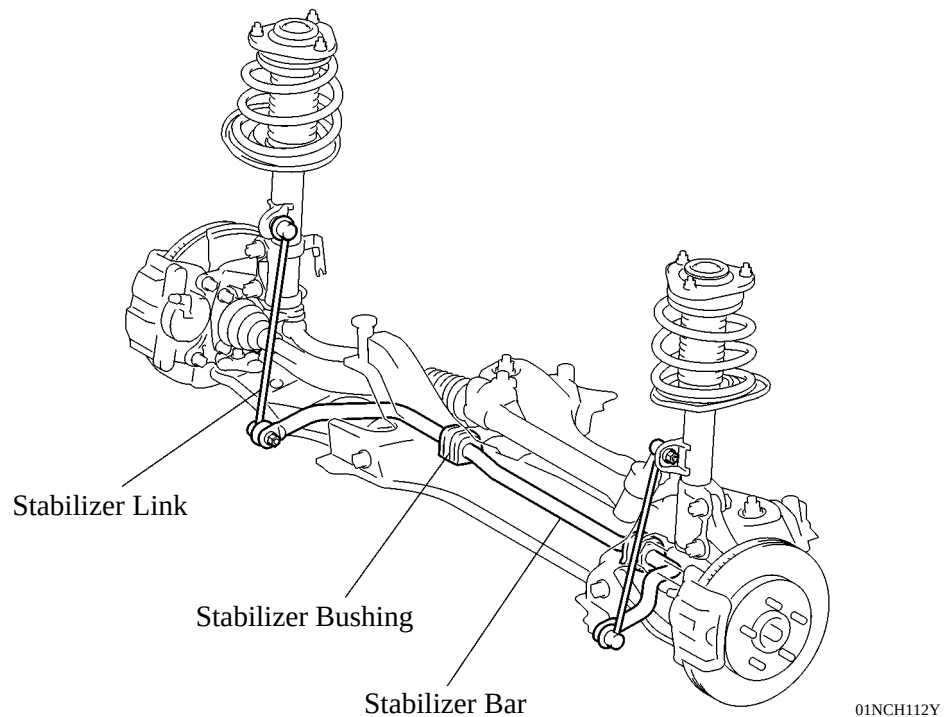
- The multi-leaf type linear control valve generates a smooth damping force characteristic to realize high-quality ride comfort.
- A viscoelastic oil seal is used and the hydraulic fluid has been optimized. These measures enable the shock absorber to generate damping force starting at an ultra-low speed range, and realize an excellent road holding feel and steering feel.
- The initial characteristic of the rebound stopper is set soft in order to ensure comfort when driving over a bump.



01NCH111Y

Stabilizer Bar

- The stabilizer bar is made of a hollow bar, reducing the weight. A ball joint is used between the stabilizer link and the stabilizer bar, and between the stabilizer link and the shock absorber. This helps reduce suspension friction and increase link rigidity. As a result, the ball joints perform effectively even for slight rolling and maintain stable roll feeling.
- The surface of the stabilizer bushing that is installed to the suspension member has a saddle shape. This construction, which is embedded into the cross section of the suspension member, ensures excellent support rigidity.
- The stabilizer bushing has a dual construction using the following materials: an outer layer made of highly rigid ordinary rubber, and an inner layer made of lowly rigid self-lubricating rubber. Thus, it realizes a high roll rigidity and ease of installation.
- The stabilizer bushing has been provided with a dust lip to prevent sand from entering.

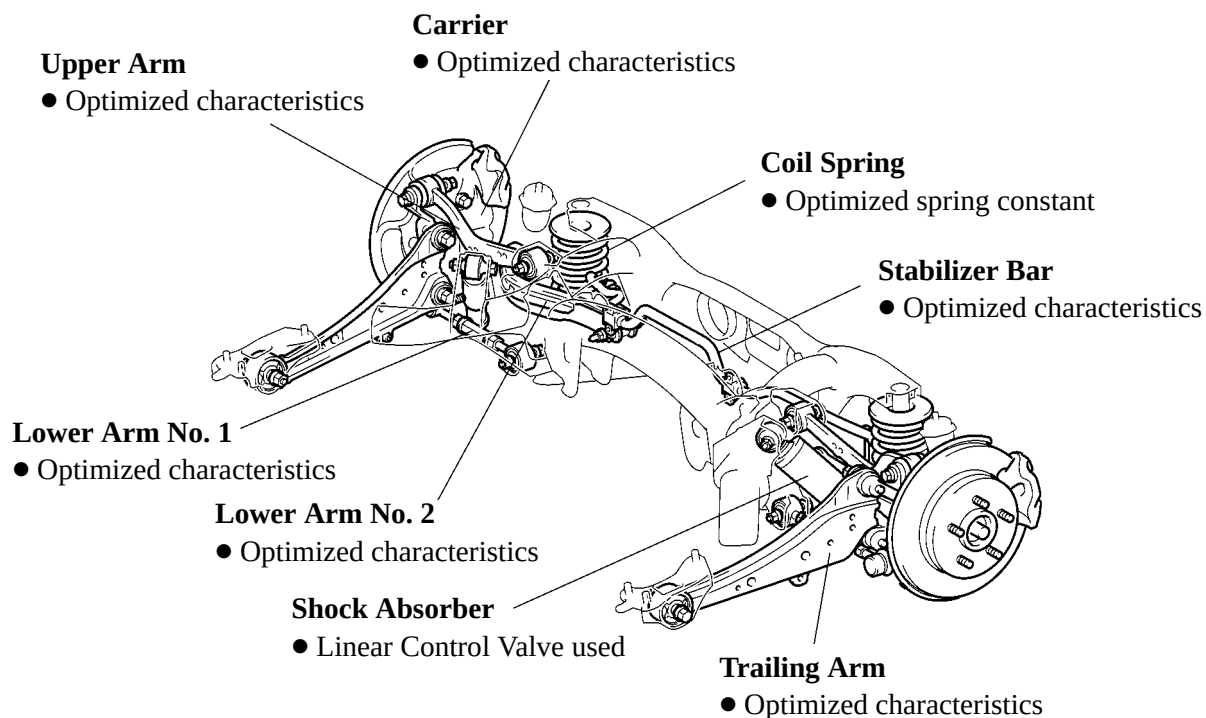


01NCH114Y

3. Rear Suspension

General

- A double-wishbone type suspension is used to realize excellent driving stability and ride comfort.
- The shock absorbers have been placed under the floor and the coil springs have been placed low to realize a more spacious cargo area and a lower floor.
- The parts have been made compact and lightweight to reduce unsprung weight and improve road holding.
- The suspension geometry has been optimized to realize excellent driving stability and ride comfort.
- The rolling rigidity has been optimized to realize excellent vehicle stability.



2WD Model

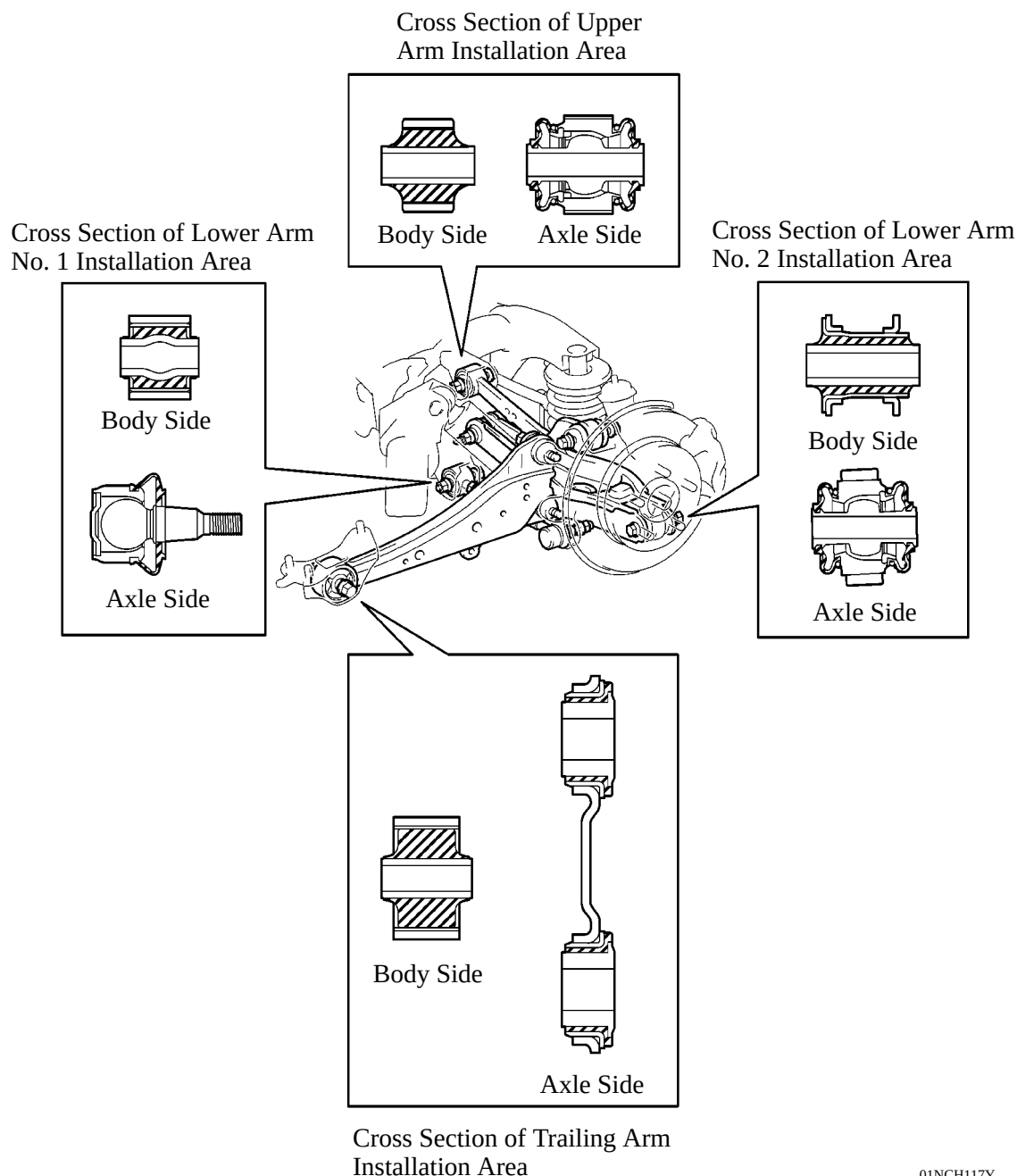
01NCH115Y

Optimized Camber

Both the initial camber and the camber change rate have been optimized to ensure excellent driving stability.

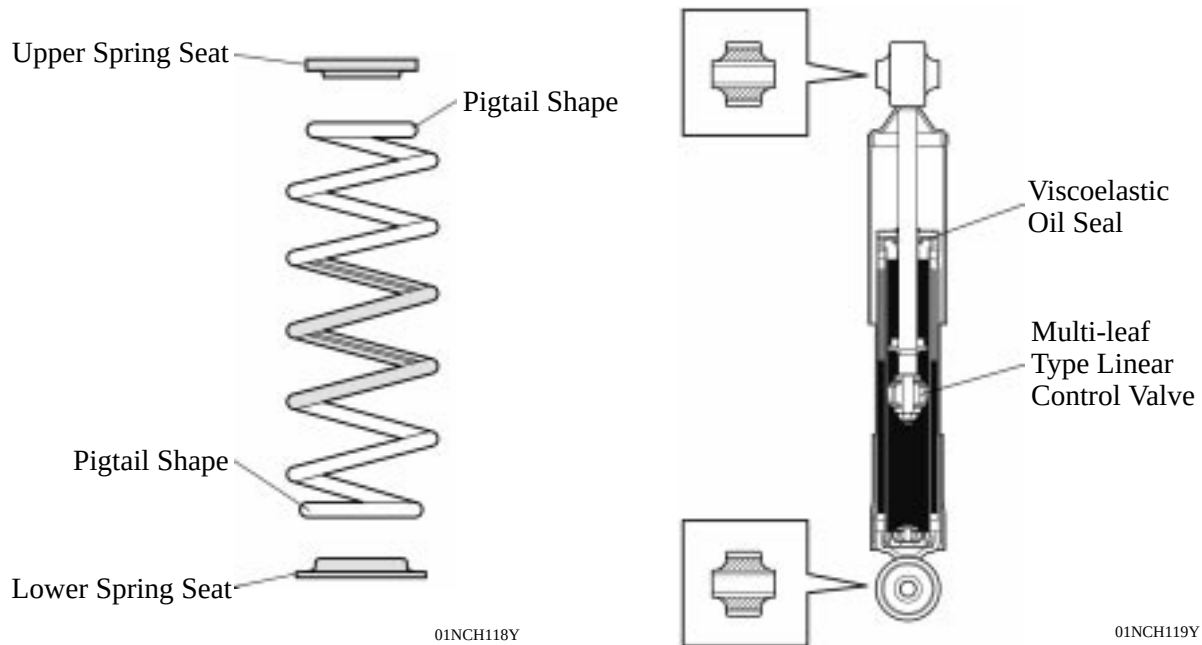
Trailing Arm, Upper Arm, and Lower Arm

- The trailing arm, upper arm, and lower arm No. 2 are made of stamped high-strength sheet steel to realize a highly rigid and lightweight construction.
- The trailing arm uses a bushing with an outer tube in order to provide ample compliance to counter the longitudinal force, and realize excellent ride comfort.
- The upper arm, lower arm No. 1, and lower arm No. 2 use a bushing with an outer tube at their suspension member side, and a ball bushing at their axle side, to ensure a high level of support rigidity.



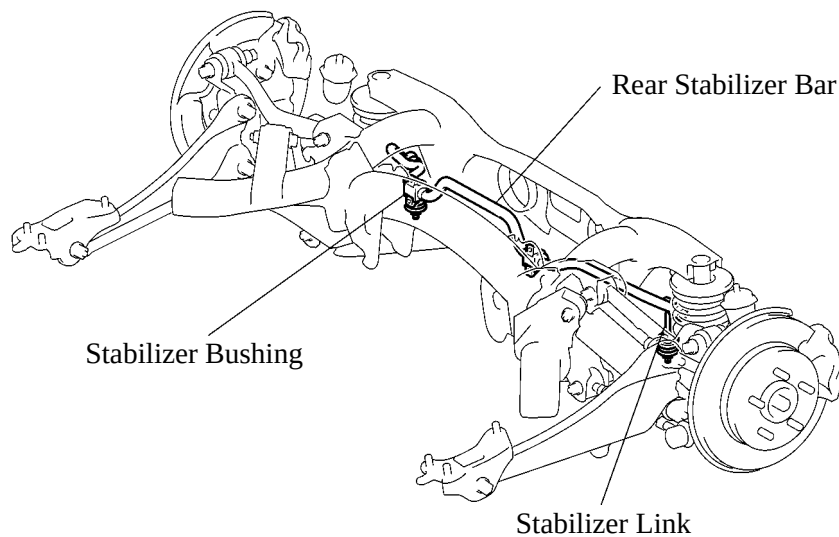
Coil Spring and Shock Absorber

- Both ends of the coil spring are pigtail-shaped, and made compact and lightweight.
- The shape of the upper spring seat has been optimized and a new lower spring seat is used to ensure a high level of vibration isolation performance.
- The multi-leaf type linear control valve generates a smooth damping force characteristic to realize high-quality ride comfort.
- A viscoelastic oil seal is used and the hydraulic fluid has been optimized. These measures enable the shock absorber to generate damping force starting at an ultra-low speed range, and realize an excellent road holding feel and steering feel.



Stabilizer Bar

- A highly rigid, solid type stabilizer bar is used.
- A ball joint is used between the stabilizer link and the stabilizer bar. This helps reduce suspension friction and increase link rigidity. As a result, the ball joints perform effectively even for slight rolling and maintain stable roll feeling.



01NCH120Y

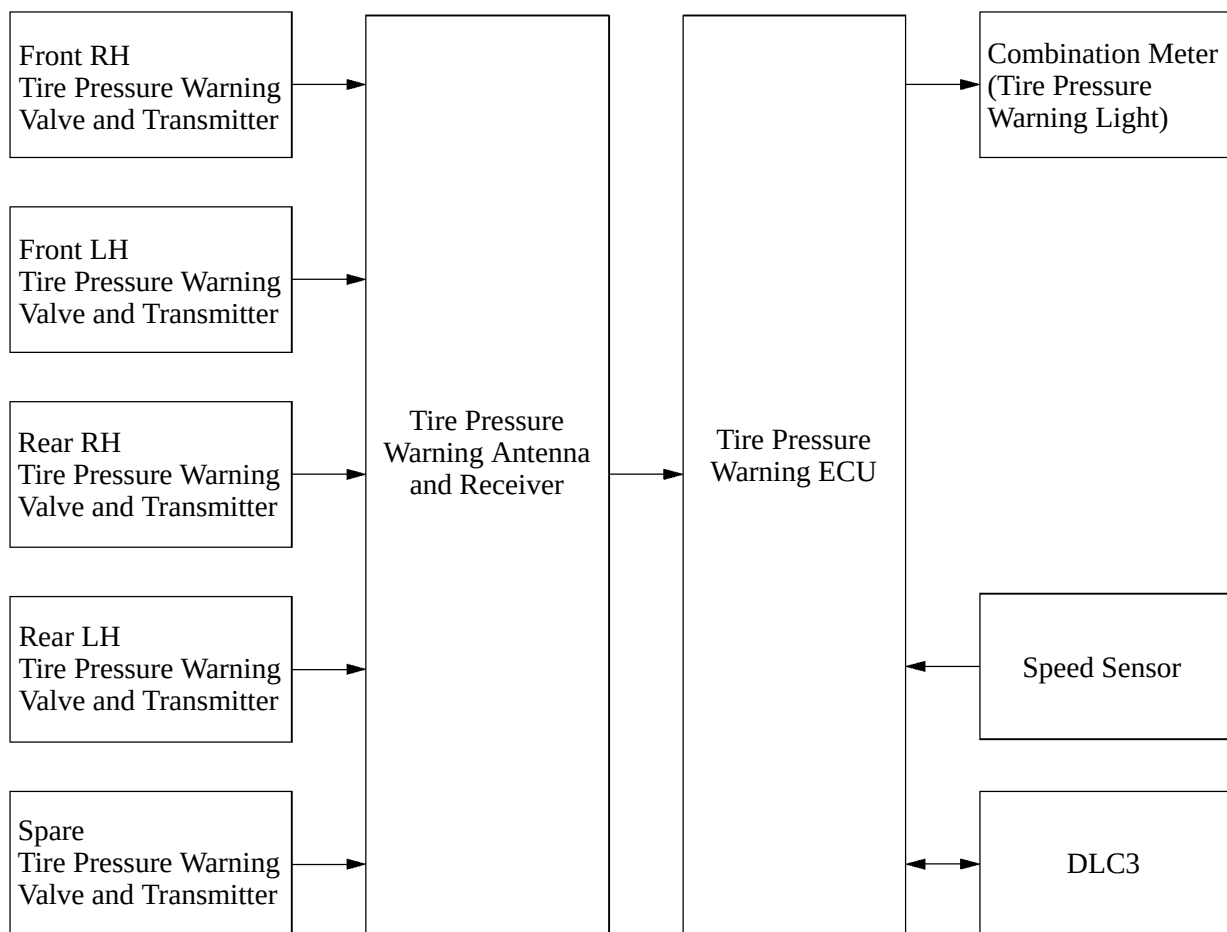
TIRE PRESSURE WARNING SYSTEM

DESCRIPTION

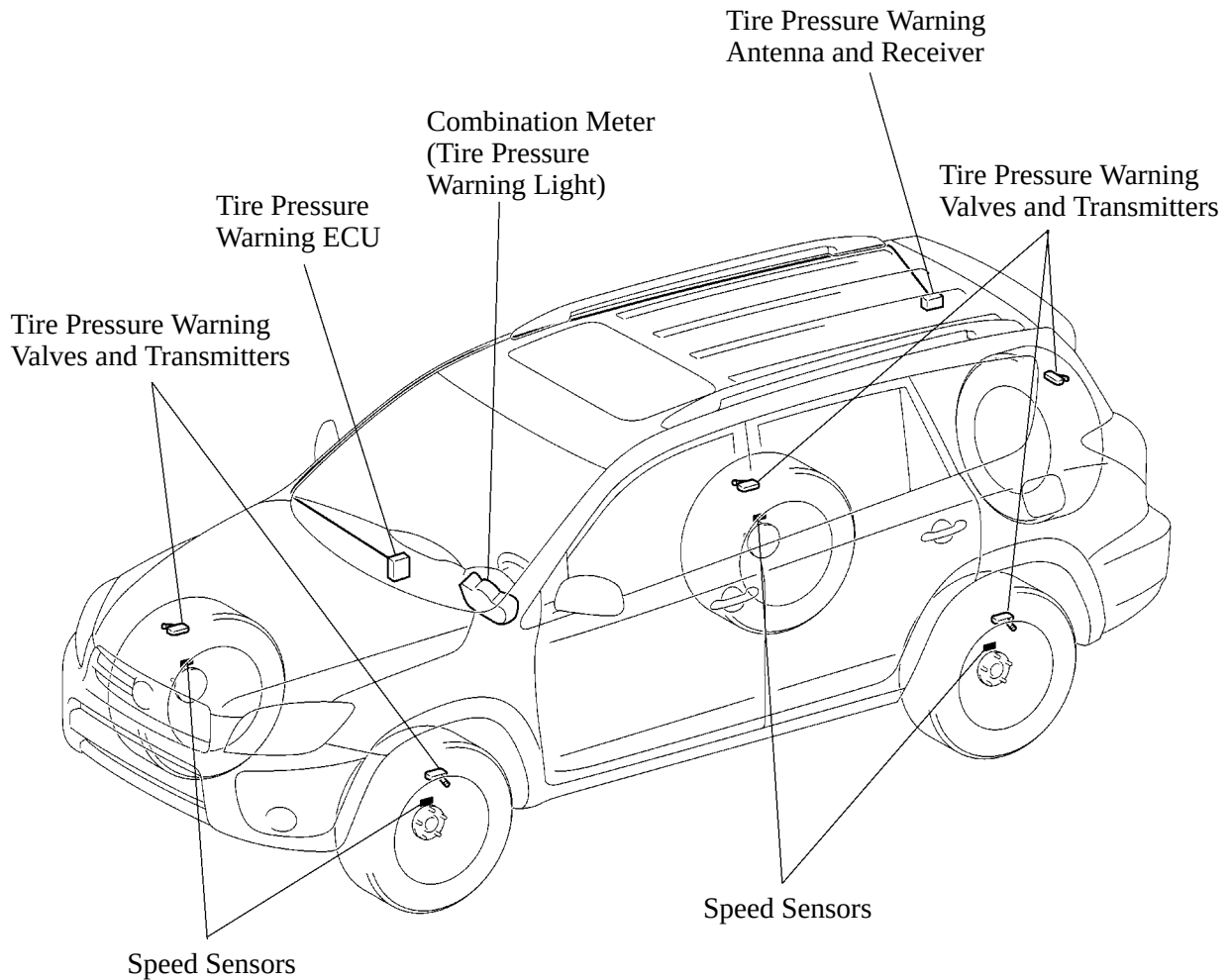
- A direct-sensing type tire pressure warning system has been newly provided as standard equipment on the U.S.A. models.
- If the vehicle continues to be driven with one or more of the five tires inflated to a low tire pressure that could cause problems in driving, this system will illuminate the tire pressure warning light to inform the driver of the low tire pressure.
- Furthermore, this system directly senses the each tire pressure through a tire pressure warning valve and transmitter that is attached to each wheel.

CONSTRUCTION AND OPERATION

1. System Diagram



2. Layout of Main Components



01MCH101Y

3. Function of Main Components

Component	Function
Tire Pressure Warning Valve and Transmitter	Integrated in the air valve on the disc wheel, this transmitter measures the tire pressure and transmits the measured value and an ID code for identifying the wheel.
Tire Pressure Warning Antenna and Receiver	Located inside the D pillar of right side, it receives signals from the transmitters, and transmits them to tire pressure warning ECU.
Tire Pressure Warning ECU	Recognizes that the signals are from the vehicle's own wheels based on the received ID code signals. If the measured values exceed a specified value, this ECU transmits signals to illuminate the tire pressure warning light in the combination meter.
Speed Sensor	Detects the wheel speed of each wheel.
Tire Pressure Warning Light	Located in the combination meter, this light informs the driver of a low tire pressure or a system failure.

4. Tire Pressure Warning System Composition

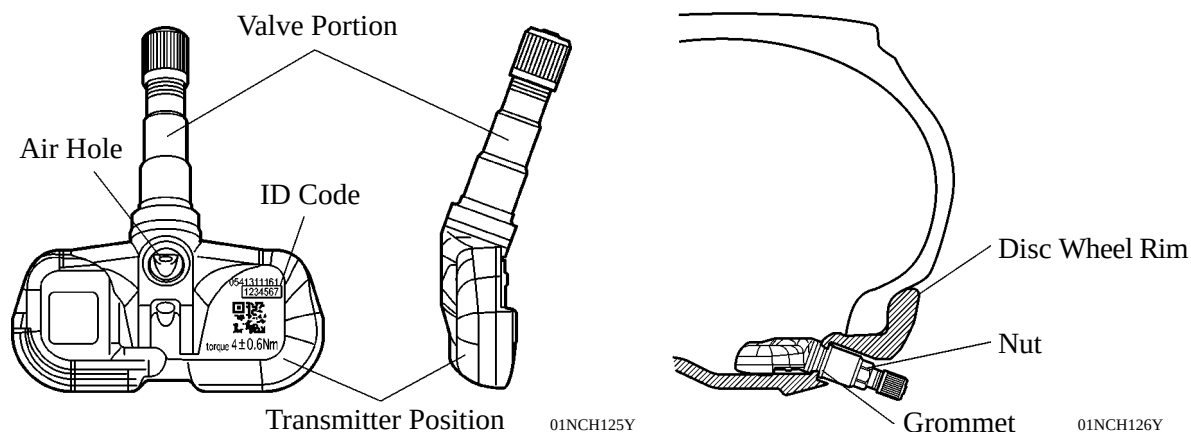
- The tire pressure warning system consists of the tire pressure warning valve and transmitter, tire pressure warning antenna and receiver, tire pressure warning ECU, and tire pressure warning light.
- The five tire pressure warning valves and transmitters measure the pressure of the respective tires, and transmit the ID codes of the transmitters and the measurement results through radio wave signals. The transmitted signals are received by tire pressure warning antenna and receiver, which is mounted inside D pillar of right side. The tire pressure warning antenna and receiver checks whether the received ID codes match those that are pre-registered. If the ID codes match, the tire pressure warning ECU compares the measurement results with the standard values, and illuminates the tire pressure warning light in the combination meter if the pressures are below the lower limit of the standard values.

5. Structure of Tire Pressure Warning Valve and Transmitter

- The tire pressure warning valve and transmitter is integrated in the air valve of a disc wheel.
- This transmitter operates with a lithium battery, which lasts approx. 10 years. If the battery voltage drops, the tire pressure warning antenna and receiver stores the DTC (Diagnostic Trouble Code) in its memory. If the voltage drops even further and the transmitter stops working, it stores the DTC in memory and illuminates the tire pressure warning light to alert the driver.
- Transmitters with five different ID code ranges are used on one vehicle.
- Each transmitter has a built-in semiconductor to directly measure the tire pressure.
- In addition to the measured pressure, the identification data of the transmitter is included in the data that is transmitted to the tire pressure warning antenna and receiver. This is to enable the tire pressure warning antenna and receiver to determine that the received data came from its own tires.
- Frequency of the sensor is 314.98 MHz.

—REFERENCE—

- Make sure to install the tire pressure warning valves and transmitters to the disc wheels in accordance with the prescribed procedure. Failure to do so could result in the incorrect measurement of the tire pressure.
- Make sure to replace the tires in accordance with the prescribed procedure. Failure to do so could damage the tire pressure warning valves and transmitters.
- For further details regarding the above, refer to the 2006 RAV4 Repair Manual (Pub No. RM01M1U).



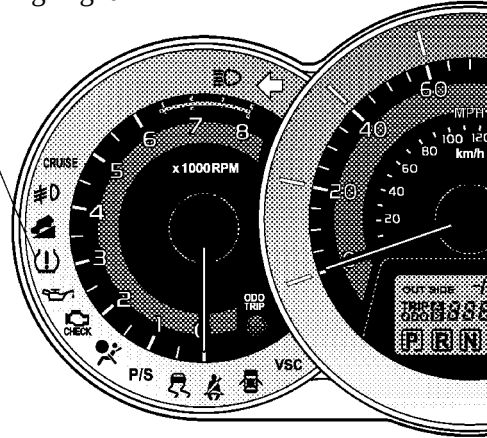
Service Tip

- If the lithium battery is depleted, replace the entire tire pressure warning valve and transmitter assembly.
- When replacing the tire pressure warning valve and transmitter, select them so that all the five transmitters will have different ID codes.
- A new tire pressure warning valve and transmitter that is available as a service part is in the sleep mode in its initial state to prevent the battery from depleting. After the tire pressure warning valve and transmitter and the tire are correctly mounted on the disc wheel, inflating the tire to the specified pressure causes the sleep mode to cancel.
- For further details regarding the above, refer to the 2006 RAV4 Repair Manual (Pub No. RM01M1U).

6. Tire Pressure Warning Light

- The tire pressure warning light is located in the combination meter.

Tire Pressure Warning Light



01MCH102Y

- This warning light illuminates or blinks in accordance with signals from the tire pressure warning ECU if the vehicle's own tires are inflated with low pressure or if a malfunction occurs in the system.
- The output operations of the tire pressure warning light are listed below.

Condition	Outline
System check	Illuminates 3 seconds (Power source mode selected to ON, when system is normal)
Low tire pressure detected	Illuminates
System failure	After blinking for 1 minute, illuminates

7. Diagnosis

The new diagnostic system features improved serviceability. For details on the diagnostic methods and diagnostic items, refer to the 2006 RAV4 Repair Manual (Pub No. RM01M1U).

8. Fail-safe

In the event of the malfunction in the tire pressure warning valve and transmitter circuits or tire pressure warning ECU, the tire pressure warning system is prohibited, and the tire pressure warning light illuminates or blinks to inform the driver of the failure.

9. Precautions on Tire Pressure Warning System

- If the tire pressure warning light illuminates, reduce the vehicle speed as soon as possible.
- Avoid making sudden steering or braking maneuvers because low-pressure tires could negatively affect handling and braking performance.
- Make sure to use only the supplied valve caps (made of aluminum) on the pressure warning valve and transmitter. If a metal cap (made of brass) is used, the cap could become seized.
- Do not use a flat tire sealant as it could cause the tire pressure warning valve and transmitter to malfunction.
- To protect the tire pressure warning valve and transmitter from damage, make sure to follow the instructions in the Repair Manual to dismount a tire from a wheel.
- Perform pre-driving inspection and regular inspection in the same manner as for ordinary vehicles.
- If the tire pressure warning light blinks when the power source mode is selected to ON, the tire pressure warning system is not working properly. The system will be disabled in the following conditions: (When the condition becomes normal, the system will work properly.)

Tires not equipped with tire pressure warning valves and transmitters are used.

The ID code on the tire pressure warning valves and transmitters is not registered.

Electric devices or facilities using similar radio wave frequencies are nearby.

If a radio set at similar frequencies is in use in the vehicle.

If a window tint that affects the radio wave signals is installed.
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There is a lot of snow or ice on the vehicle, in particular around the wheels or wheel housings.
--

Non-genuine Toyota wheels are used.

If a special set of tires is used.

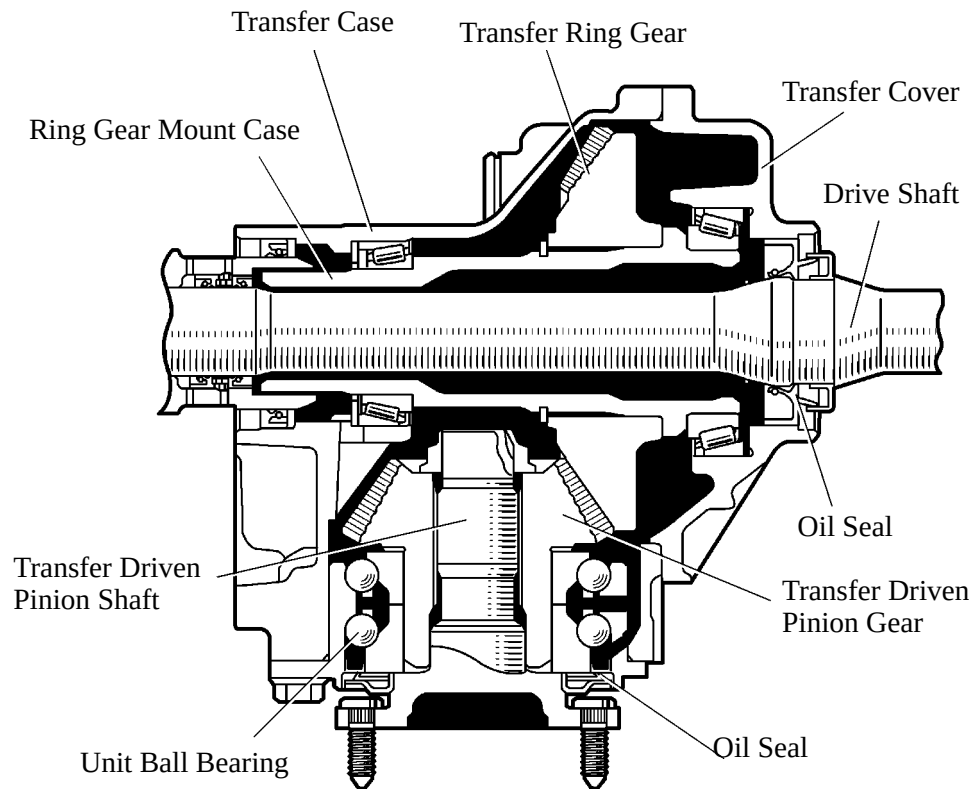
Tire chains are used.

The spare tire is in a location subject to poor radio wave signal reception.
--

■ CONSTRUCTION

1. General

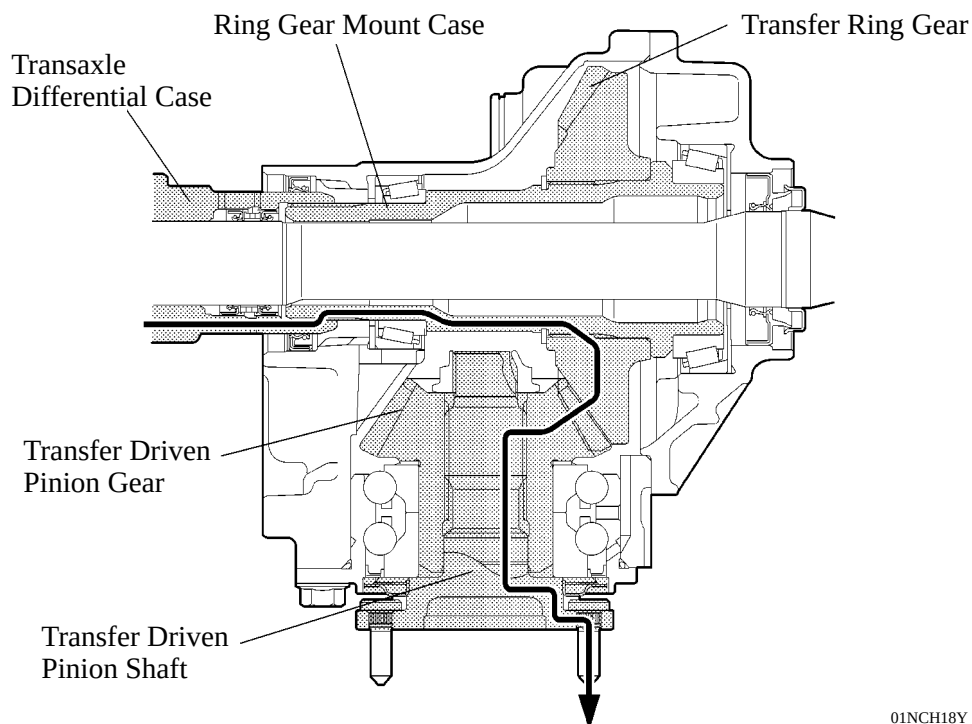
- A side-to-side split transfer case made of aluminum is used to realize a compact and lightweight construction.
- A unit ball bearing is used for supporting the driven pinion gear to realize a compact and lightweight construction.
- The ring gear and the ring gear mount case are joined with splines to realize a compact construction.



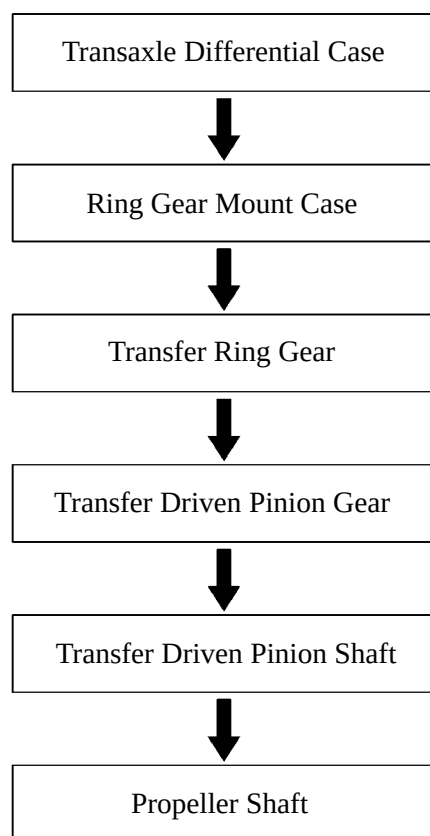
01NCH16Y

2. Transfer Power Flow

The illustration below shows the flow of power transmitted from the transaxle.



01NCH18Y

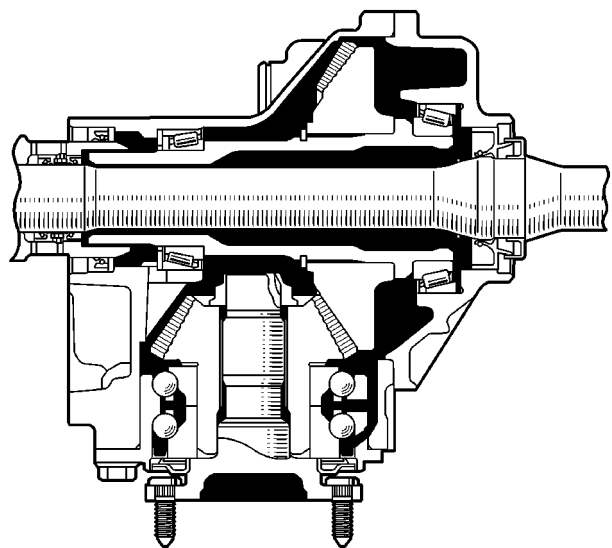


01NCH19Y

TRANSFER

■ DESCRIPTION

A GF1A type transfer that is compact and lightweight is used on the 4WD models.



01NCH16Y

GF1A Type Transfer

► Specifications ◀

Transfer Type		GF1A
Transaxle Type		U140F, U151F
Gear Type		Hypoid Gear
Gear Ratio		0.439
Ring Gear	The No. of Teeth	41
Pinion Gear	The No. of Teeth	18
Oil Viscosity		SAE90
Oil Grade		API GL-5
Oil Type		Hypoid
Oil Capacity	Liters (US qts, Imp. qts)	0.45 (0.48, 0.41)
Weight (Reference)*	kg (lb)	11.3 (24.9)

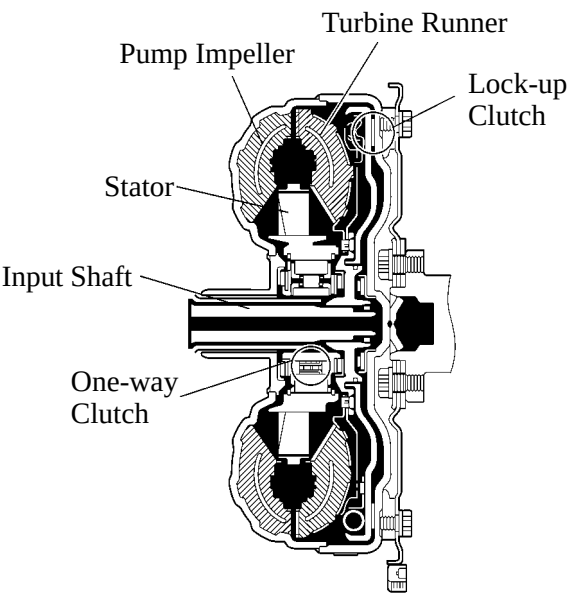
*: Weight shows the figure with the oil fully filled.

■ TORQUE CONVERTER

- These torque converters have optimally designed fluid passages and impeller configuration, resulting in substantially enhanced torque ratio and transmission efficiency to ensure good starting, acceleration and fuel economy.
- Furthermore, a hydraulically operated lock-up mechanism which cuts power transmission losses due to slippage at medium and high speeds is used.

► Specifications ◀

Transaxle Type	U140F	U241E
Torque Converter Type	3-element, 1-step, 2-phase (with Lock-up Mechanism)	←
Stall Torque Ratio	1.8	←



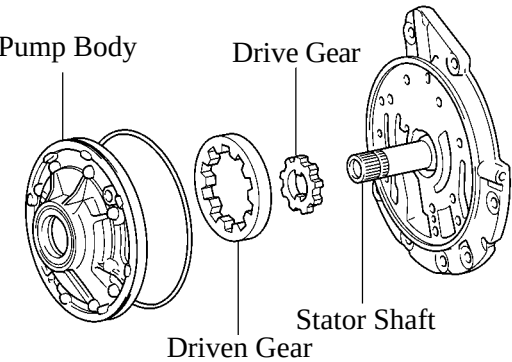
208CH02

■ OIL PUMP

The oil pump is combined with torque converter, lubricates the planetary gear units and supplies operating pressure to the hydraulic control.

► Specifications ◀

Transaxle Type	U140F	U241E
Drive Gear Teeth	9	←
Driven Gear Teeth	10	←

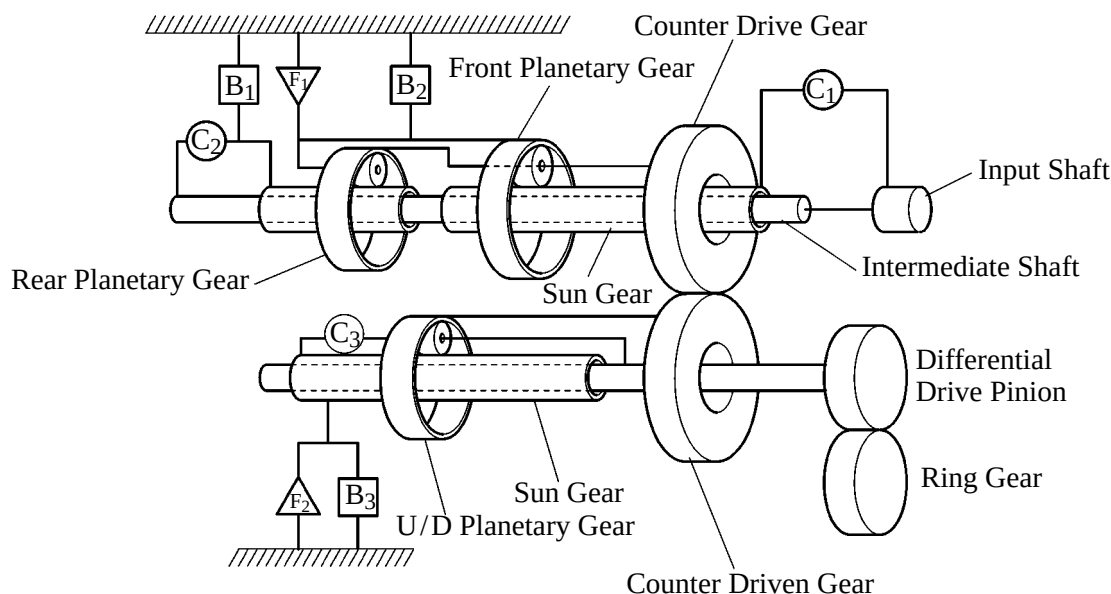


241CH85

PLANETARY GEAR UNIT

1. Construction

- The counter drive and driven gears are placed in front of the front planetary gear and under drive (U/D) planetary gear unit is placed above the counter shaft. Furthermore, the number of the brake and one-way clutch is minimized to realize the compact and high-capacity structure.
- A centrifugal fluid pressure canceling mechanism is used in the C_2 and C_3 clutches that are applied when shifting from 2nd to 3rd and from 3rd to 4th.



208CH04

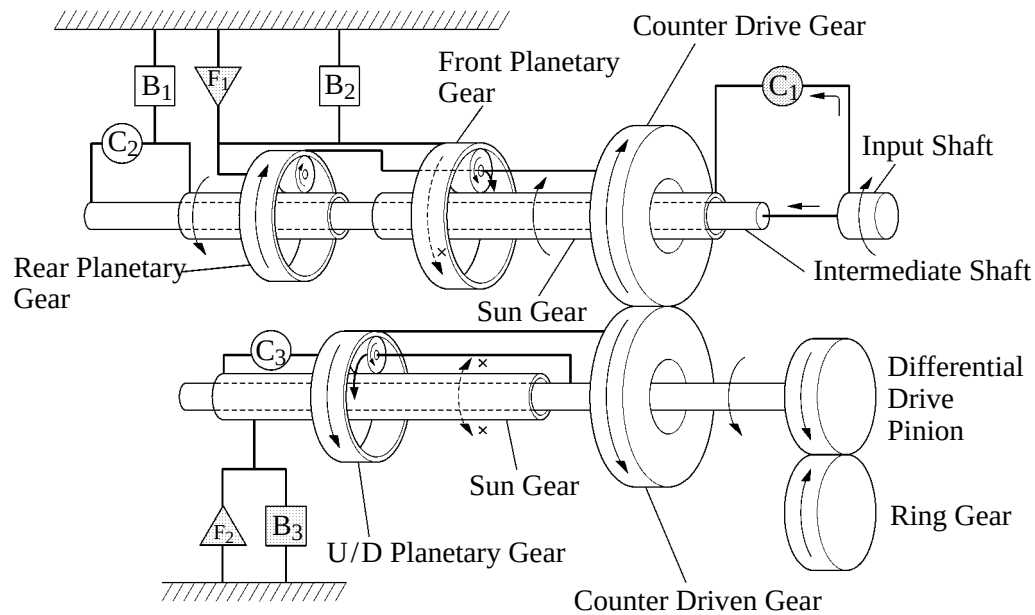
2. Function of Components

Component		Function
C ₁	Forward Clutch	Connects input shaft and front planetary sun gear.
C ₂	Direct Clutch	Connects intermediate shaft and rear planetary sun gear.
C ₃	U/D Direct Clutch	Connects U/D planetary sun gear and U/D planetary carrier.
B ₁	2nd Brake	Prevents rear planetary sun gear from turning clockwise or counterclockwise.
B ₂	1st & Reverse Brake	Prevents rear planetary carrier and front planetary ring gear from turning clockwise or counterclockwise.
B ₃	U/D Brake	Prevents U/D planetary sun gear from turning clockwise or counterclockwise.
F ₁	No. 1 One-way Clutch	Prevents front planetary ring gear and rear planetary carrier from turning counterclockwise.
F ₂	U/D One-way Clutch	Prevents U/D planetary sun gear from turning clockwise.
Planetary Gears		These gears change the route through which driving force is transmitted, in accordance with the operation of each clutch and brake, in order to increase or reduce the input and output speed.

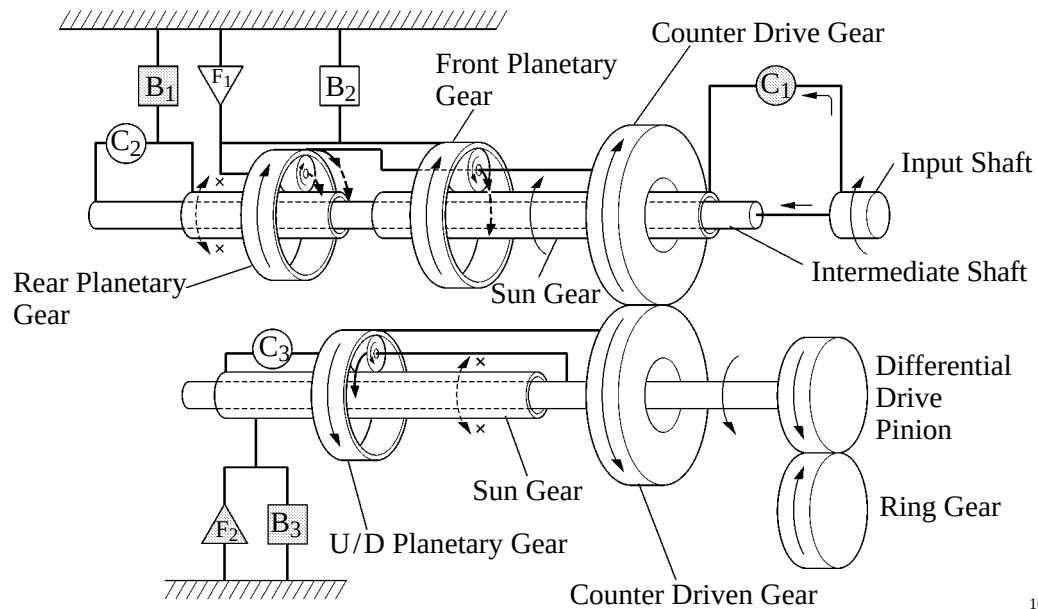
3. Transaxle Power Flow

Shift Lever Position	Gear	Solenoid Valve				C ₁	C ₂	C ₃	B ₁	B ₂	B ₃	F ₁	F ₂
		SL1	SL2	S4	DSL								
P	Park	ON	ON	OFF	OFF						○		
R	Reverse	ON	OFF	OFF	OFF		○			○	○		
N	Neutral	ON	ON	OFF	OFF						○		
D	1st	ON	ON	OFF	OFF	○					○	○	○
	2nd	OFF	ON	OFF	OFF	○			○		○		○
	3rd	OFF/ ON*	OFF	OFF	OFF/ ON*	○	○				○		○
	4th	OFF/ ON*	OFF	ON	OFF/ ON*	○	○	○					
3	1st	ON	ON	OFF	OFF	○					○	○	○
	2nd	OFF	ON	OFF	OFF	○			○		○		○
	3rd	OFF/ ON*	OFF	OFF	OFF/ ON*	○	○				○		○
2	1st	ON	ON	OFF	OFF	○					○	○	○
	2nd	OFF	ON	OFF	OFF	○			○		○		○
L	1st	ON	ON	OFF	ON	○				○	○	○	○

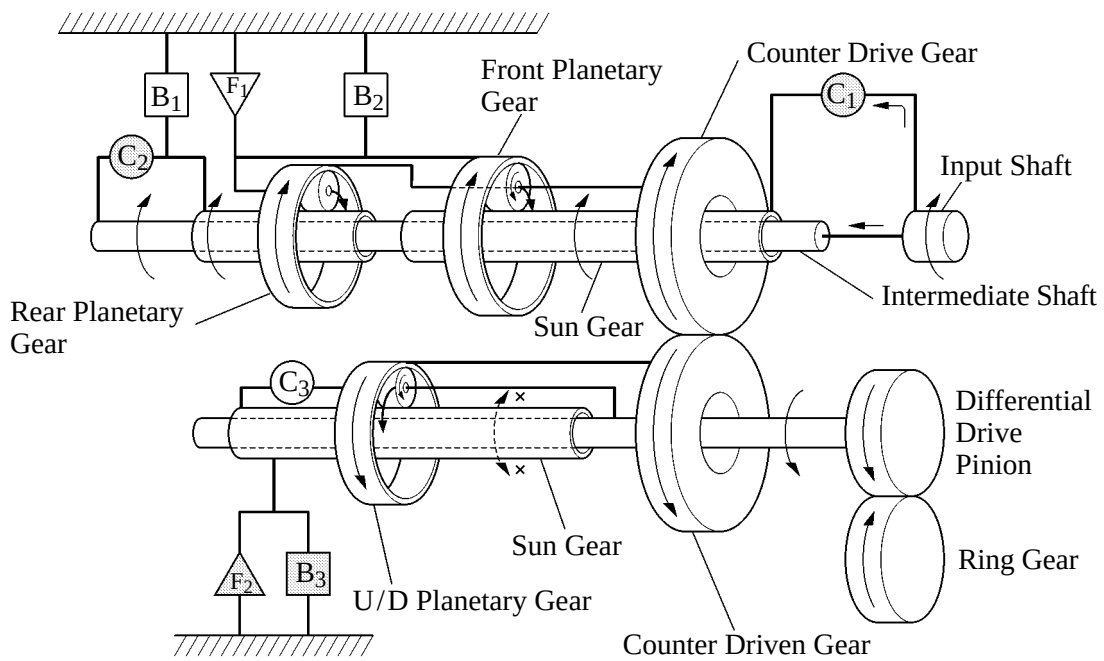
○: Operation *: Lock-up ON

1st Gear (D, 3 or 2 Position)

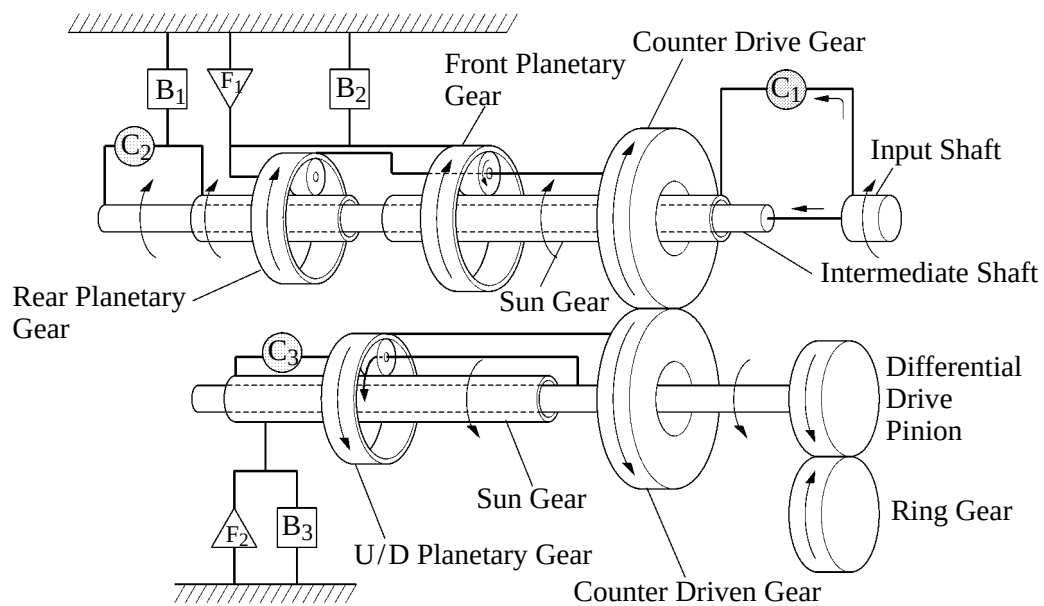
161ES09

2nd Gear (D, 3 or 2 Position)

161ES10

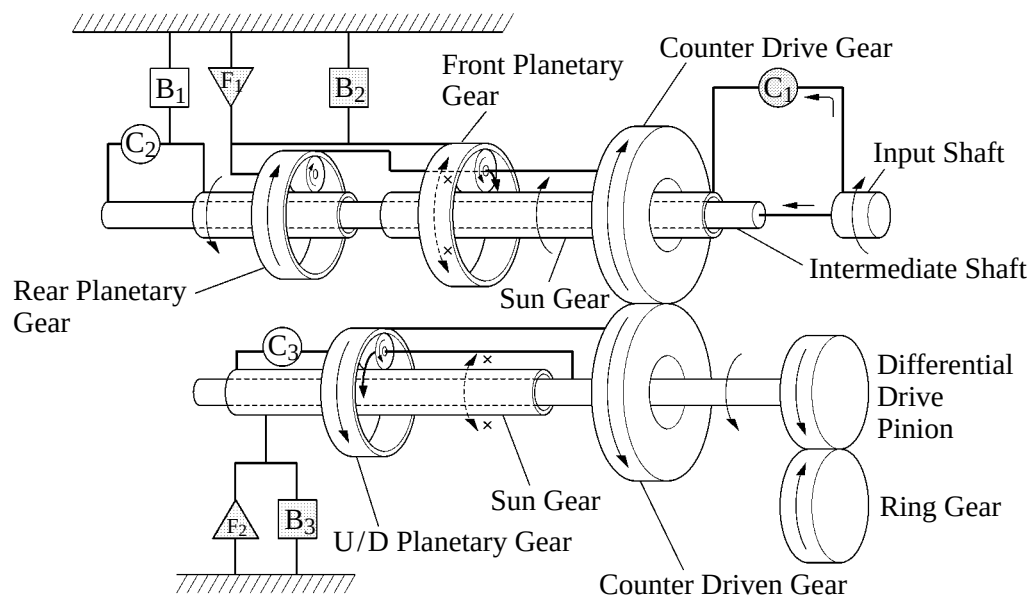
3rd Gear (D or 3 Position)

161ES11

4th Gear (D Position)

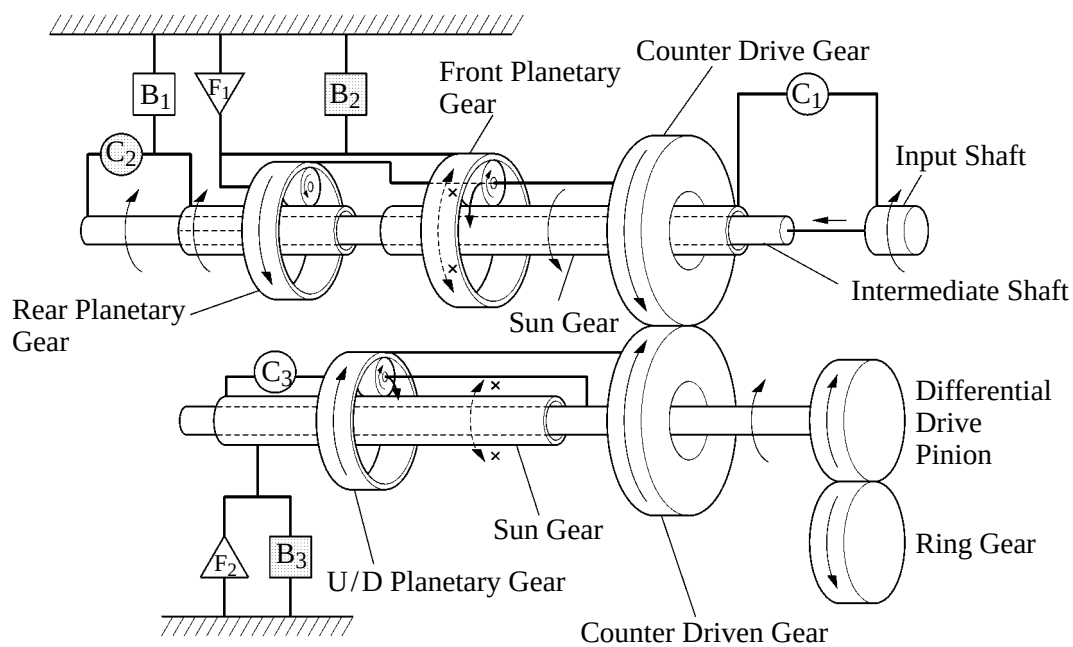
161ES12

1st Gear (L Position)



161ES13

Reverse Gear (R Position)



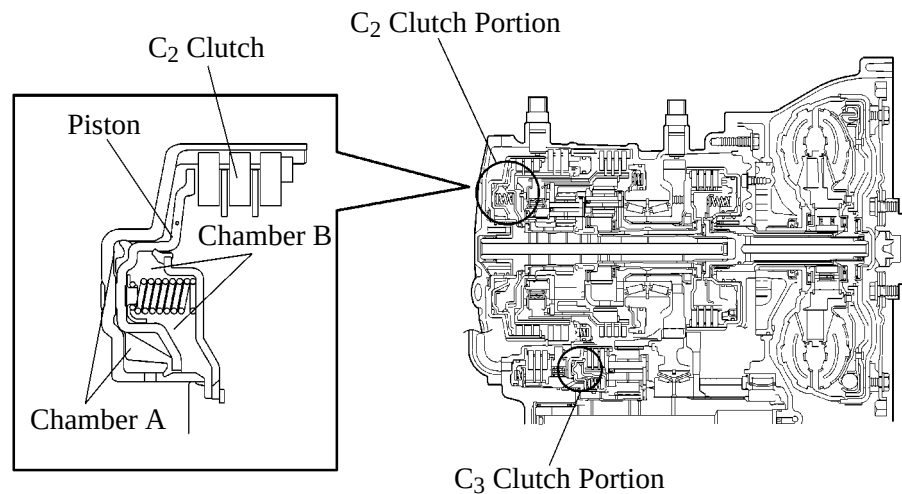
181CH66

4. Centrifugal Fluid Pressure Canceling Mechanism

There are two reasons for improving the conventional clutch mechanism:

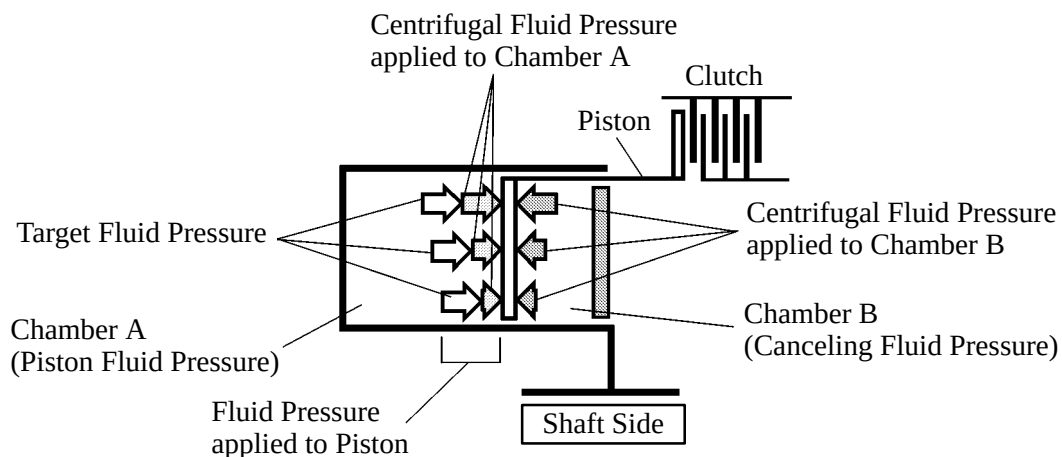
- To prevent the generation of pressure by the centrifugal force that applied to the fluid in piston fluid pressure chamber (hereafter referred to as “chamber A”) when the clutch is released, a check ball is provided to discharge the fluid. Therefore, before the clutch can be subsequently applied, it takes time for the fluid to fill the chamber A.
- During shifting, in addition to the original clutch pressure that is controlled by the valve body, the pressure that acts on the fluid in the chamber A also exerts influence, which is dependent upon revolution fluctuations.

To address these two needs for improvement, a canceling fluid pressure chamber (hereafter referred to as “chamber B”) has been provided opposite chamber A.



208CH05

By utilizing the lubrication fluid such as that of the shaft, the same amount of centrifugal force is applied, thus canceling the centrifugal force that is applied to the piston itself. Accordingly, it is not necessary to discharge the fluid through the use of a check ball, and a highly responsive and smooth shifting characteristic has been achieved.



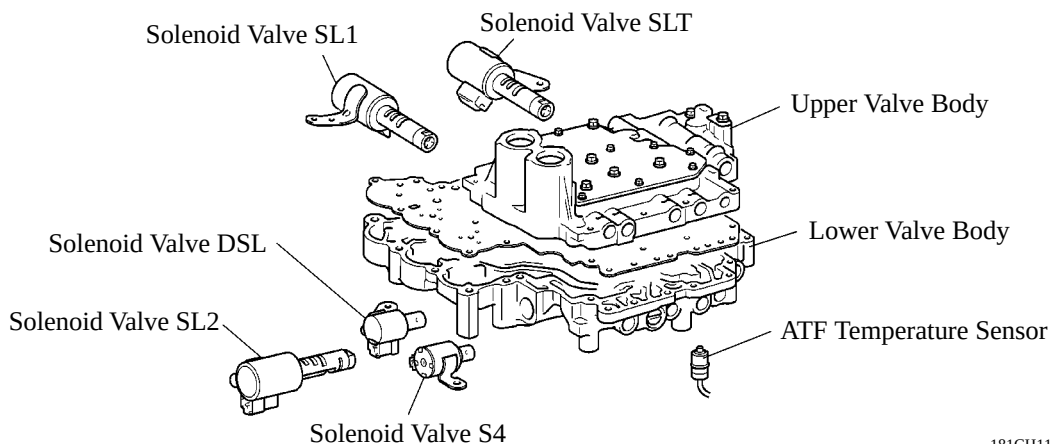
157CH17

Fluid pressure applied to piston	-	Centrifugal fluid pressure applied to chamber B	=	Target fluid pressure (original clutch pressure)
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■ VALVE BODY UNIT

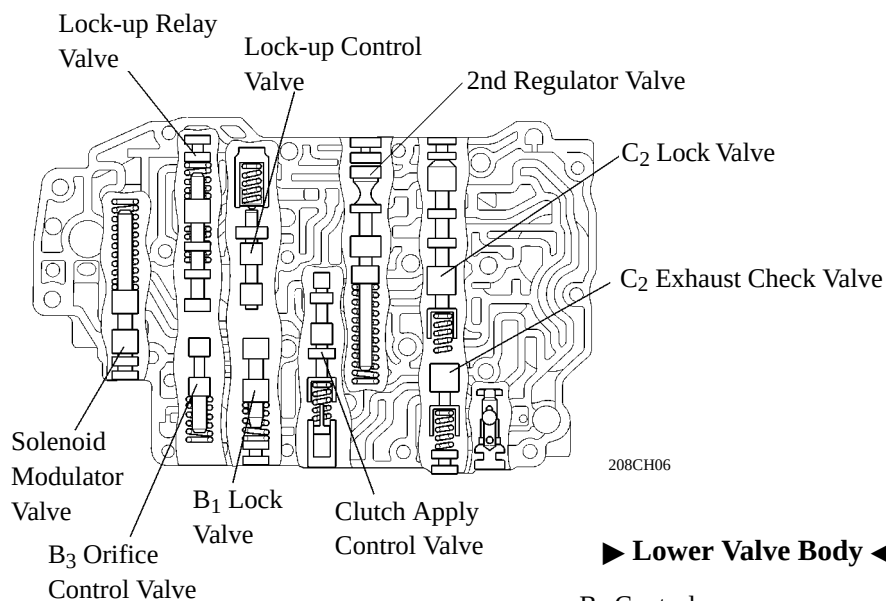
1. General

The valve body consists of the upper and lower valve bodies and 5 solenoid valves. Apply orifice control, which controls the flow volume to the B₃ brake, is used.



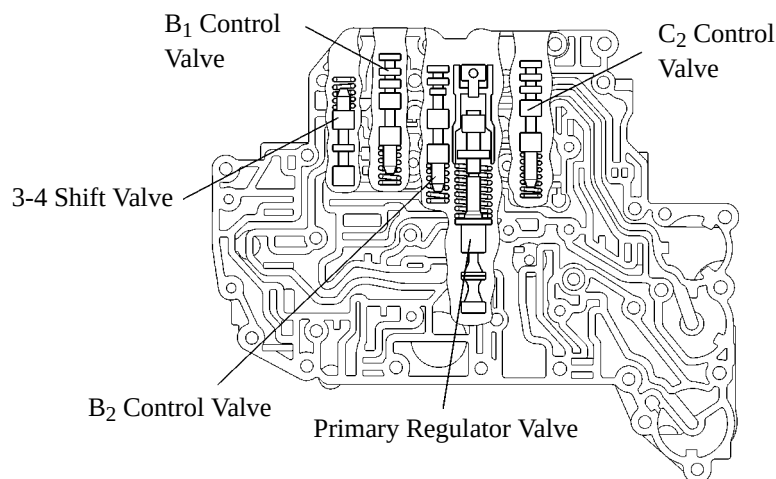
181CH11

► Upper Valve Body ◀



208CH06

► Lower Valve Body ◀



208CH07

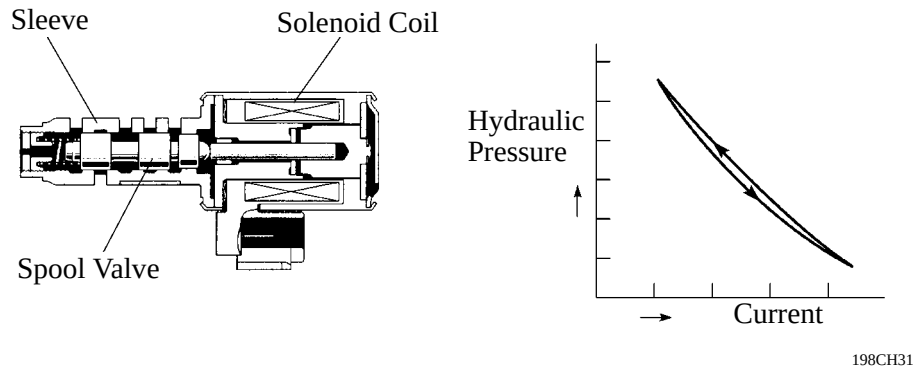
2. Solenoid Valves

Solenoid Valves SL1, SL2, and SLT

1) General

In order to provide a hydraulic pressure that is proportion to current that flows to the solenoid coil, the solenoid valves SL1, SL2, and SLT linearly control the line pressure and clutch and brake engagement pressure based on the signals from the ECM.

The solenoid valves SL1, SL2, and SLT have the same basic structure.



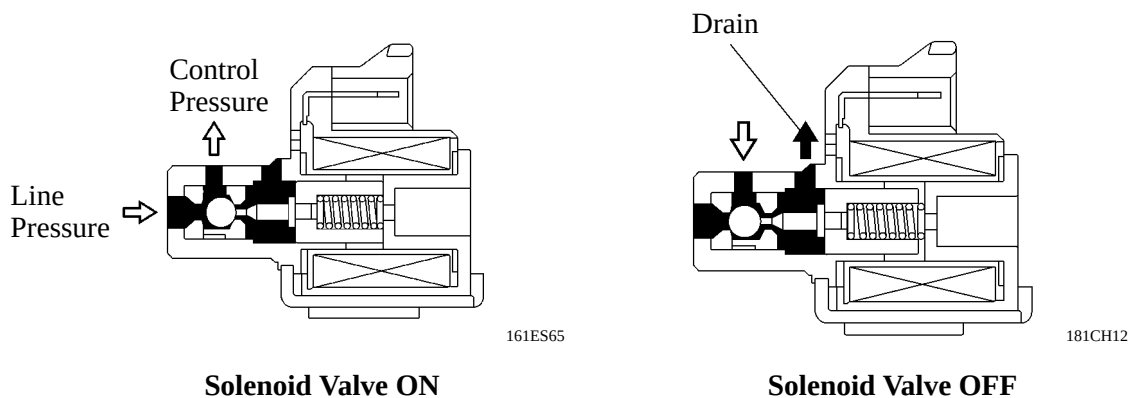
2) Function of Solenoid Valves SL1, SL2, and SLT

Solenoid Valve	Action	Function
SL1	Clutch and brake engagement pressure control	● B₁ brake pressure control ● Lock-up clutch pressure control
SL2		C ₂ clutch pressure control
SLT	Line pressure control	● Line pressure control ● Secondary pressure control

Solenoid Valves S4 and DSL

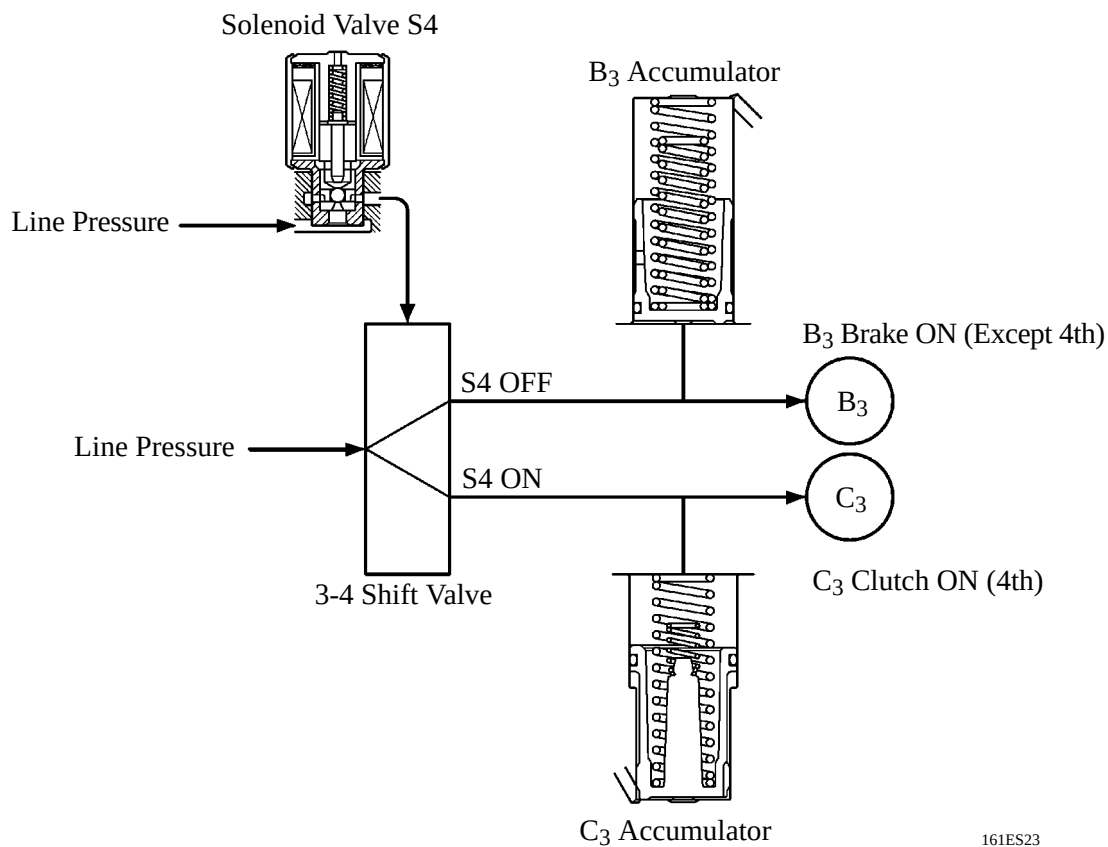
1) General

The solenoid valves S4 and DSL use a three-way solenoid valve.



2) Function of Solenoid Valve S4

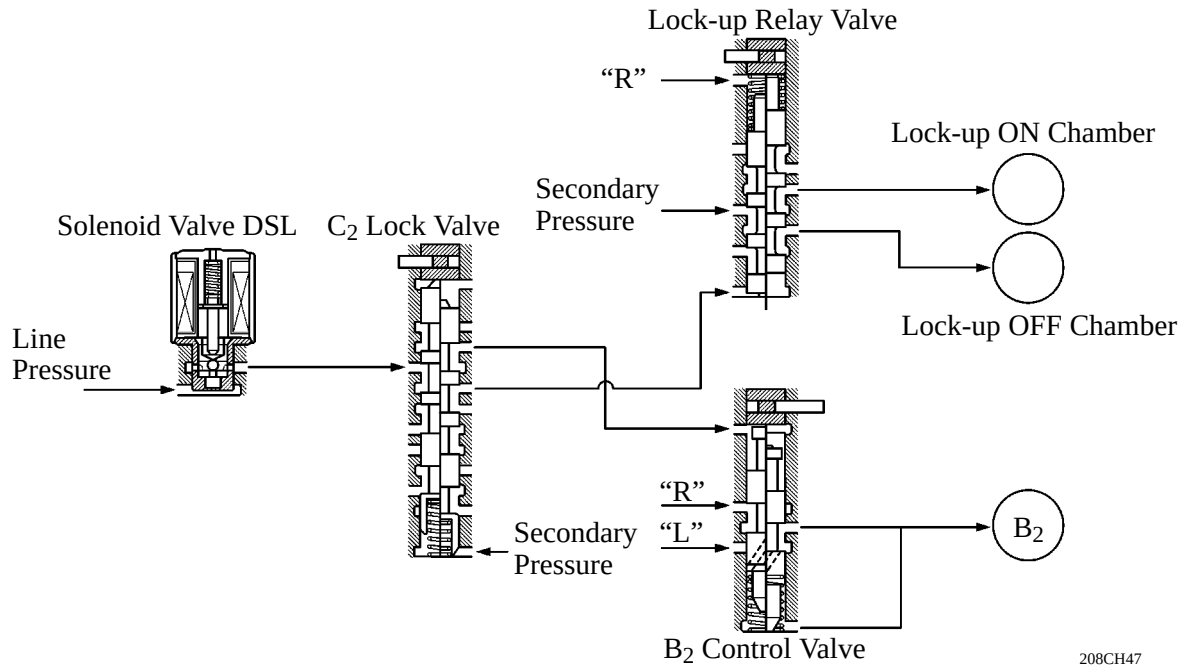
The solenoid valve S4 when set to ON controls the 3-4 shift valve to establish the 4th by changing over the fluid pressure applied to B₃ brake and C₃ clutch.



3) Function of Solenoid Valve DSL

The solenoid valve DSL controls the B₂ control valve via the C₂ lock valve when the transaxle is shifted in the R or L position.

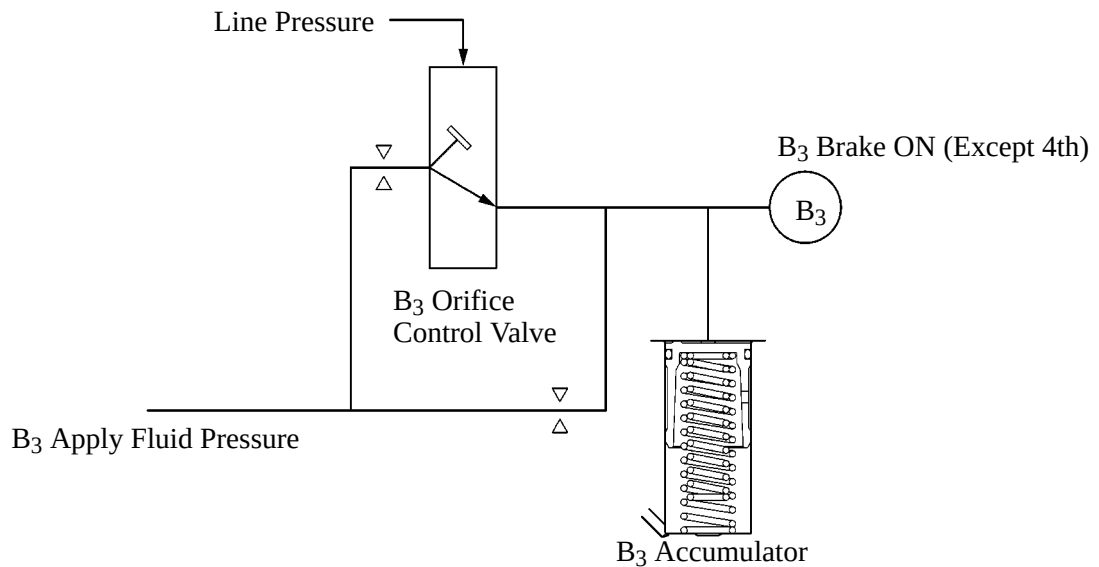
During lock-up, the lock-up relay valve is controlled via the C₂ lock valve.



208CH47

3. Apply Orifice Control

This control is effected by the B₃ orifice control valve. The B₃ orifice control valve has been provided for the B₃ brake, which is applied when shifting from the 4th to 3rd. The B₃ orifice control valve is controlled by the amount of the line pressure in accordance with shifting conditions, and the flow volume of the fluid that is supplied to the B₃ brake is controlled by varying the size of the control valve's apply orifice.



157CH19

■ ELECTRONIC CONTROL SYSTEM

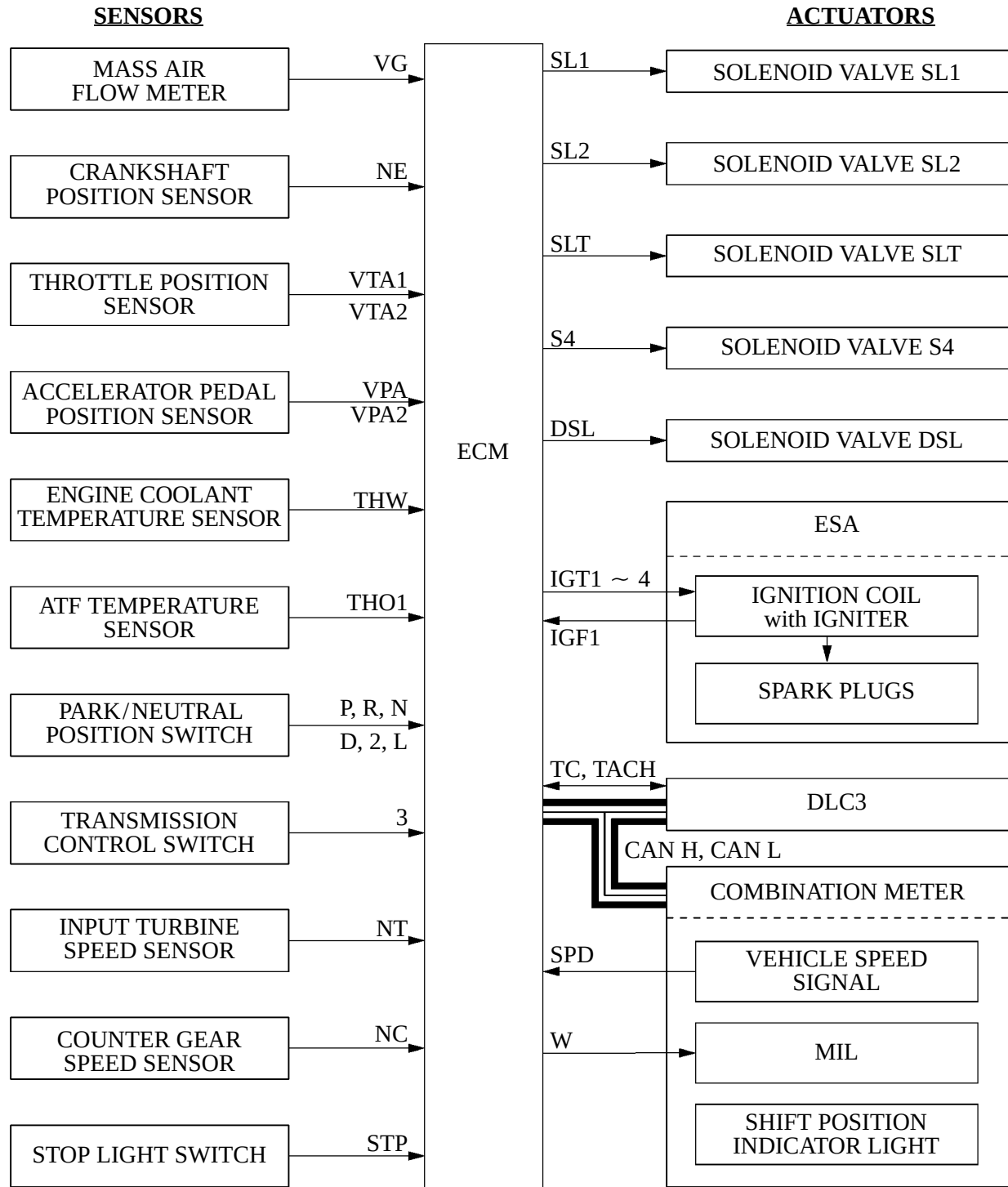
1. General

The electronic control system of the U140F and U241E automatic transaxles consists of the controls listed below.

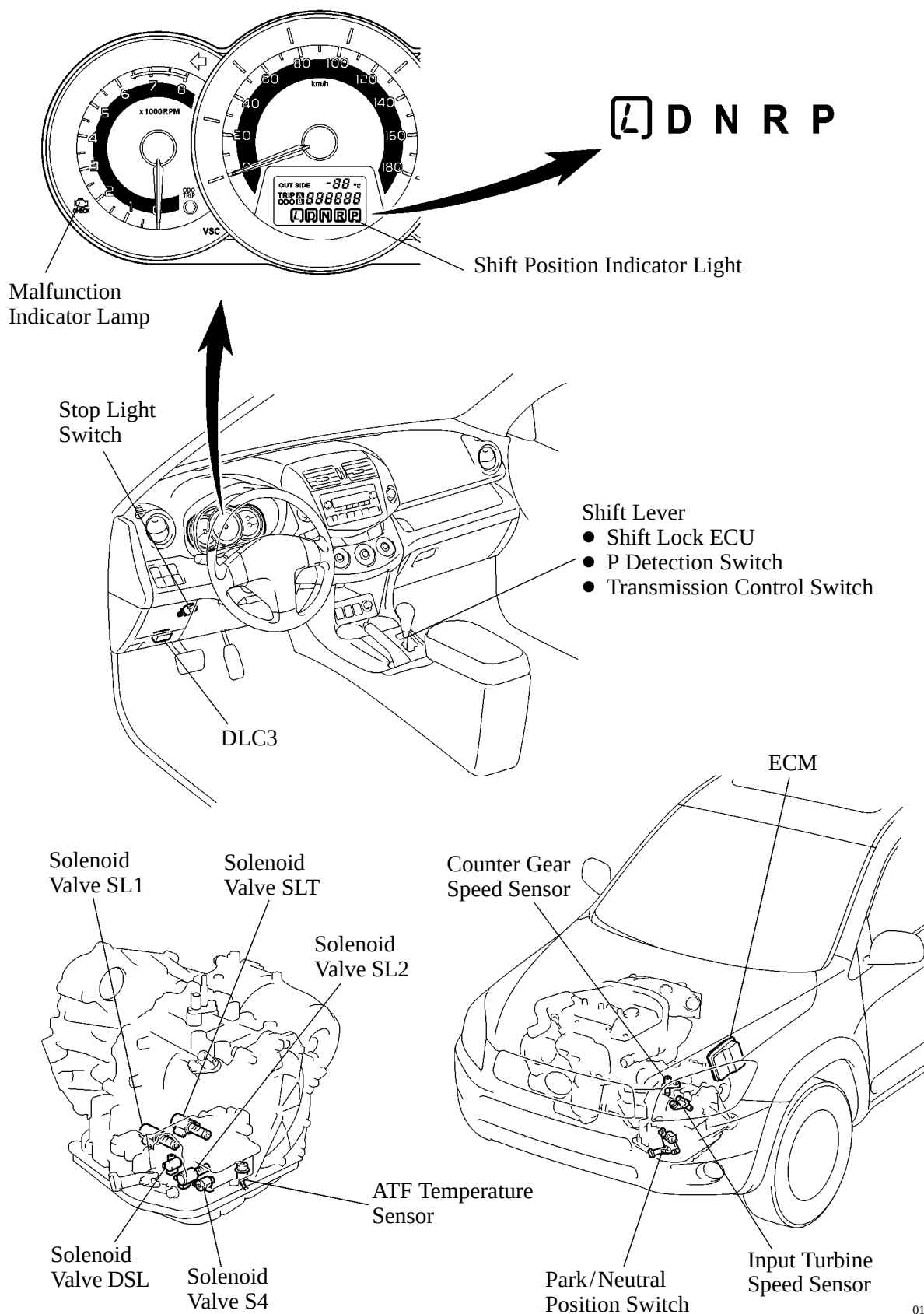
System	Function
Clutch Pressure Control (See page CH-20)	- Controls the pressure that is applied directly to B₁ brake and C₂ clutch by actuating the shift solenoid valves (SL1, SL2) in accordance with ECM signals. - The solenoid valve SLT minutely controls the clutch pressure in accordance with the engine output and driving conditions.
Line Pressure Optimal Control (See page CH-21)	Actuates the solenoid valve SLT to control the line pressure in accordance with information from the ECM and the operating conditions of the transaxle.
High Response Shift Control (See page CH-21)	The shift time lag has been reduced to half by the centrifugal fluid pressure canceling mechanism and clutch pressure optimal control.
Engine Torque Control	Retards the engine ignition timing temporarily to improve shift feeling during up or down shifting.
Shift Control in Uphill/ Downhill Traveling (See page CH-22)	Controls to restrict the 4th upshift or to provide appropriate engine braking by using the ECM to determine whether the vehicle is traveling on uphill or downhill.
Shift Timing Control	The ECM sends current to the solenoid valve SL1 and/or SL2 based on the signals from each sensor and shifts the gear.
Lock-up Timing Control	The ECM sends current to the solenoid valve DSL based on signals from each sensor and engages or disengages the lock-up clutch.
Flex Lock-up Clutch Control (See page CH-23)	Controls the solenoid valve DSL, provides an intermediate mode between the ON/OFF operation of the lock-up clutch, and increases the operating range of the lock-up clutch to ensure fuel economy.
“N” to “D” Squat Control	When the shift lever is shifted from the “N” to “D” position, the gear is temporarily shifted to the 2nd and then to the 1st to reduce vehicle squat.
Diagnosis (See page CH-25)	When the ECM detects a malfunction, the ECM makes a diagnosis and memorizes the failed section.
Fail-safe (See page CH-25)	Even if a malfunction is detected in the sensors or solenoids, the ECM effects fail-safe control to prevent the vehicle's drivability from being affected significantly.

2. Construction

The configuration of the electronic control system in the U140F and U241E automatic transaxles is as shown in the following chart.



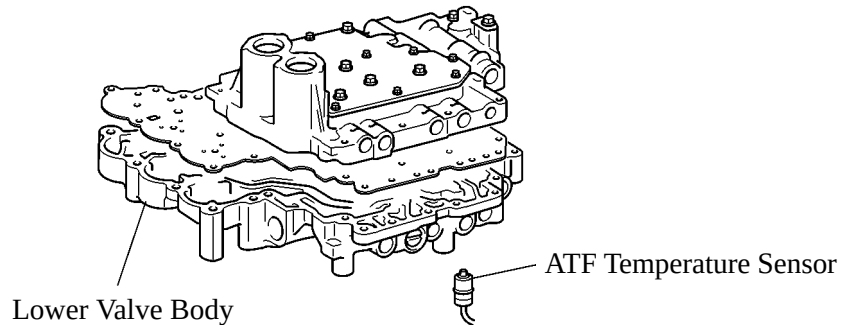
3. Layout of Main Components



4. Construction and Operation of Main Components

ATF Temperature Sensor

- The ATF temperature sensor is installed in the lower valve body for direct detection of the fluid temperature.
- The ATF temperature sensor is used for correction of clutch and brake pressure to keep smooth shift quality every time.

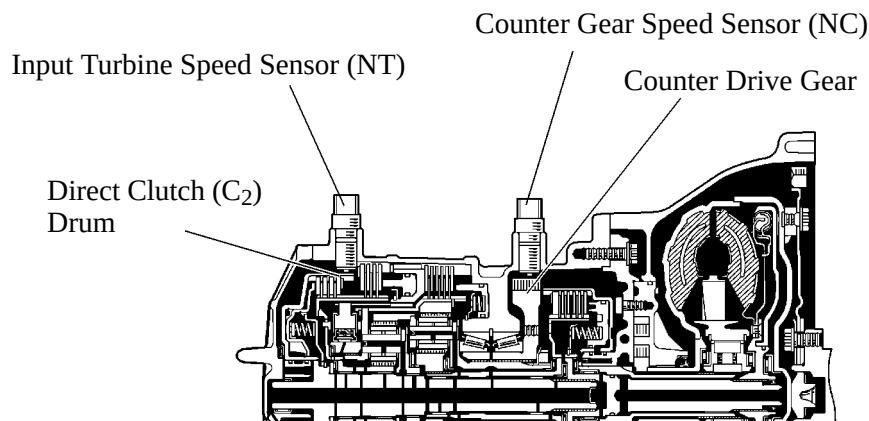


240CH92

Input Turbine Speed Sensor and Counter Gear Speed Sensor

The U140F and U241E automatic transaxles use an input turbine speed sensor (for the NT signal) and a counter gear speed sensor (for the NC signal). Thus, the ECM can detect the timing of the shifting of the gears and appropriately control the engine torque and hydraulic pressure in response to the various conditions.

- The input turbine speed sensor detects the input speed of the transaxle. The direct clutch (C_2) drum is used as the timing rotor for this sensor.
- The counter gear speed sensor detects the speed of the counter gear. The counter drive gear is used as the timing rotor for this sensor.



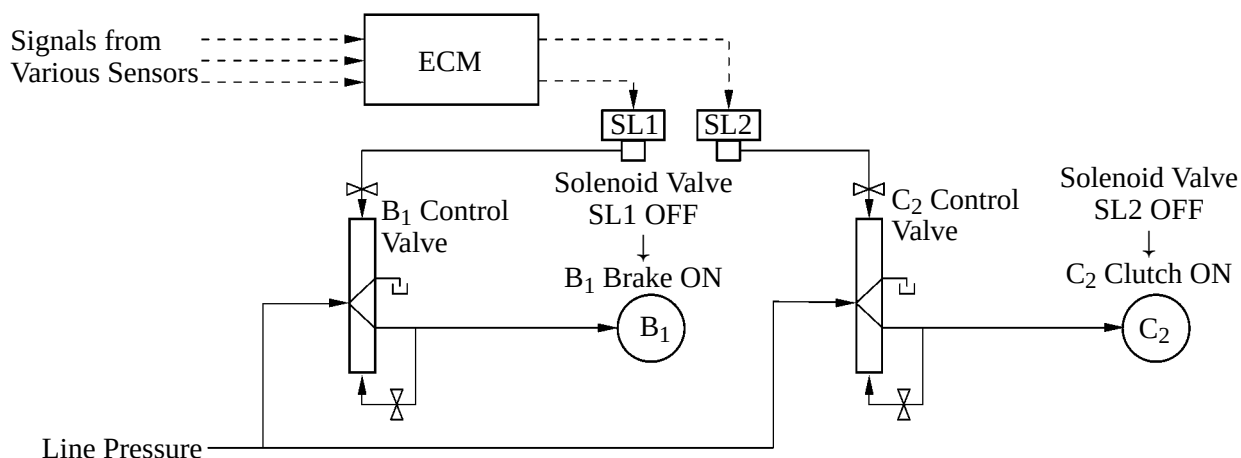
181CH14

5. Clutch Pressure Control

Clutch to Clutch Pressure Control

A clutch to clutch pressure control is used for shifting from the 1st to 2nd gear, and from the 2nd to 3rd gear. Solenoid valves SL1 and SL2 are actuated in accordance with the signals from the ECM, and this output pressure is guided directly to the control valves B₁ and C₂ in order to regulate the line pressure that acts on the B₁ brake and C₂ clutch.

As a result, high response and excellent shift characteristics have been achieved.

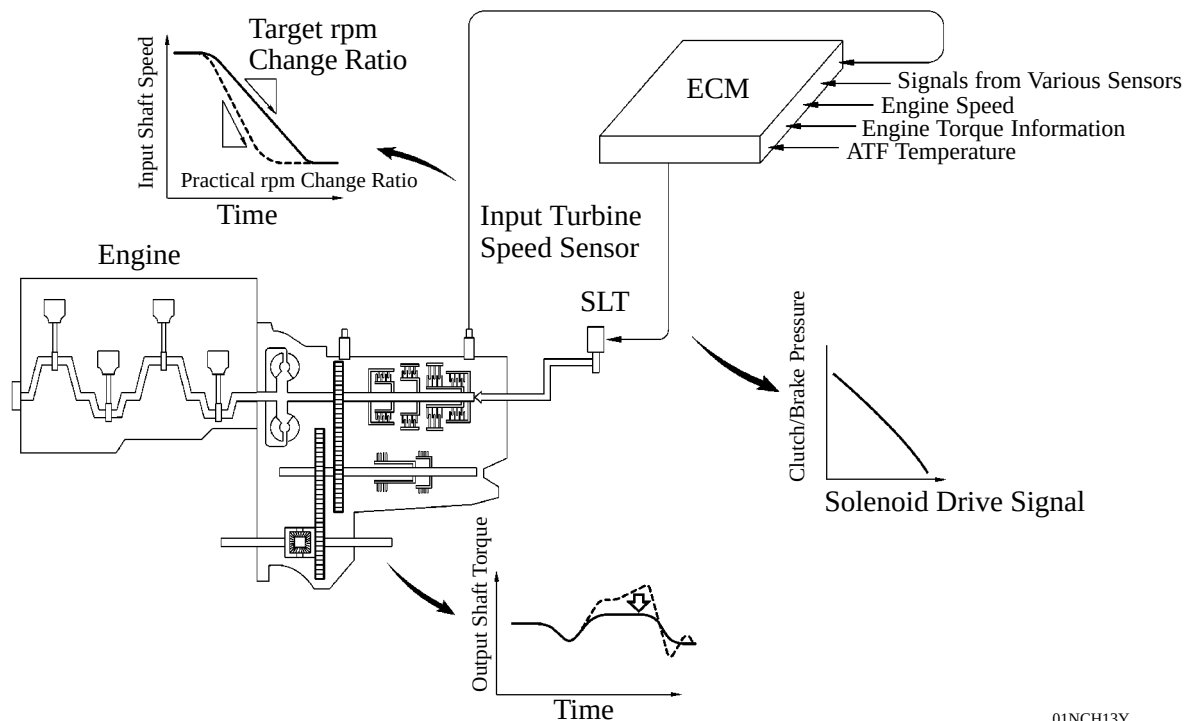


264CH05

Clutch Pressure Optimal Control

The solenoid valve SLT is used for optimal control of clutch pressure. The ECM monitors the signals from various sensors such as the input turbine speed sensor, allowing solenoid valve SLT to minutely control the clutch pressure in accordance with engine output and driving conditions.

As a result, smooth shift characteristics have been realized.

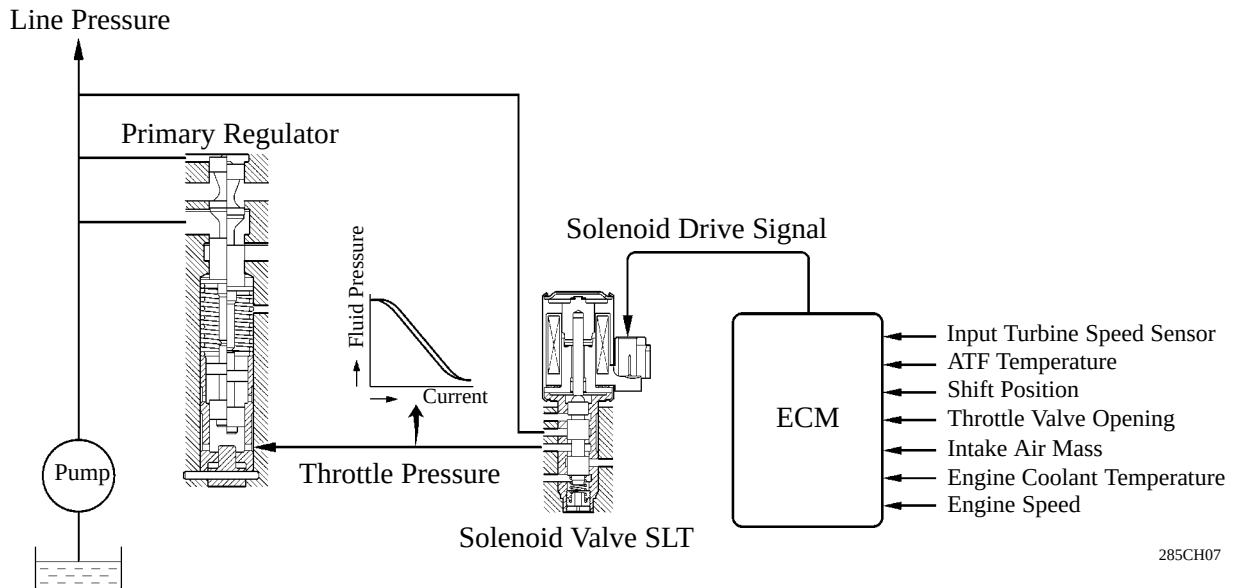


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6. Line Pressure Optimal Control

Through the use of the solenoid valve SLT, the line pressure is optimally controlled in accordance with the engine torque information, as well as with the internal operating conditions of the torque converter and the transaxle.

Accordingly, the line pressure can be controlled minutely in accordance with the engine output, traveling condition, and the ATF temperature, thus realizing smooth shift characteristics and optimizing the workload in the oil pump.



7. High Response Shift Control

Due to the use of the previously mentioned centrifugal fluid pressure canceling mechanism and the clutch pressure optimal control, not only smooth shifting has been achieved, but the shift time lag has been halved to realize excellent response.

8. Shift Control in Uphill/Downhill Traveling

General

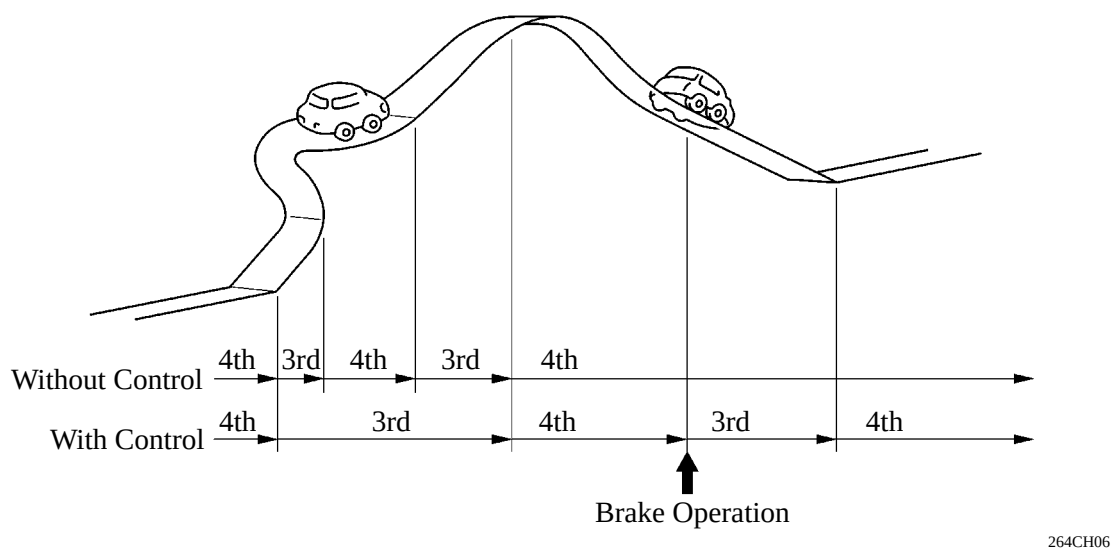
This control helps minimize the gear shifting when the driver operates the accelerator pedal while driving on a winding uphill or downhill road in order to ensure a smooth drive.

Shift Control in Uphill Traveling

When the ECM detects uphill travel, it prohibits upshifting to the 4th after downshifting to the 3rd.

Shift Control in Downhill Traveling

If a signal indicating that the driver has operated the brake pedal is input while the ECM detects downhill travel, it downshifts from the 4th to 3rd.

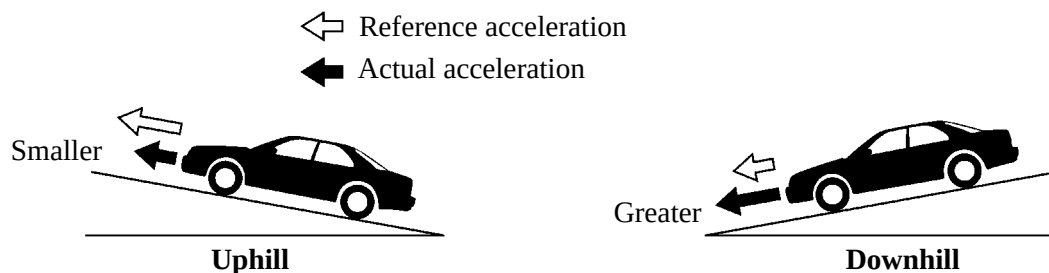


Uphill/Downhill Judgment

The actual acceleration calculated from the speed sensor signal is compared with the reference acceleration (based on level road travel) stored in the ECM to determine uphill or downhill travel.

Actual Acceleration < Reference Acceleration

Actual Acceleration > Reference Acceleration



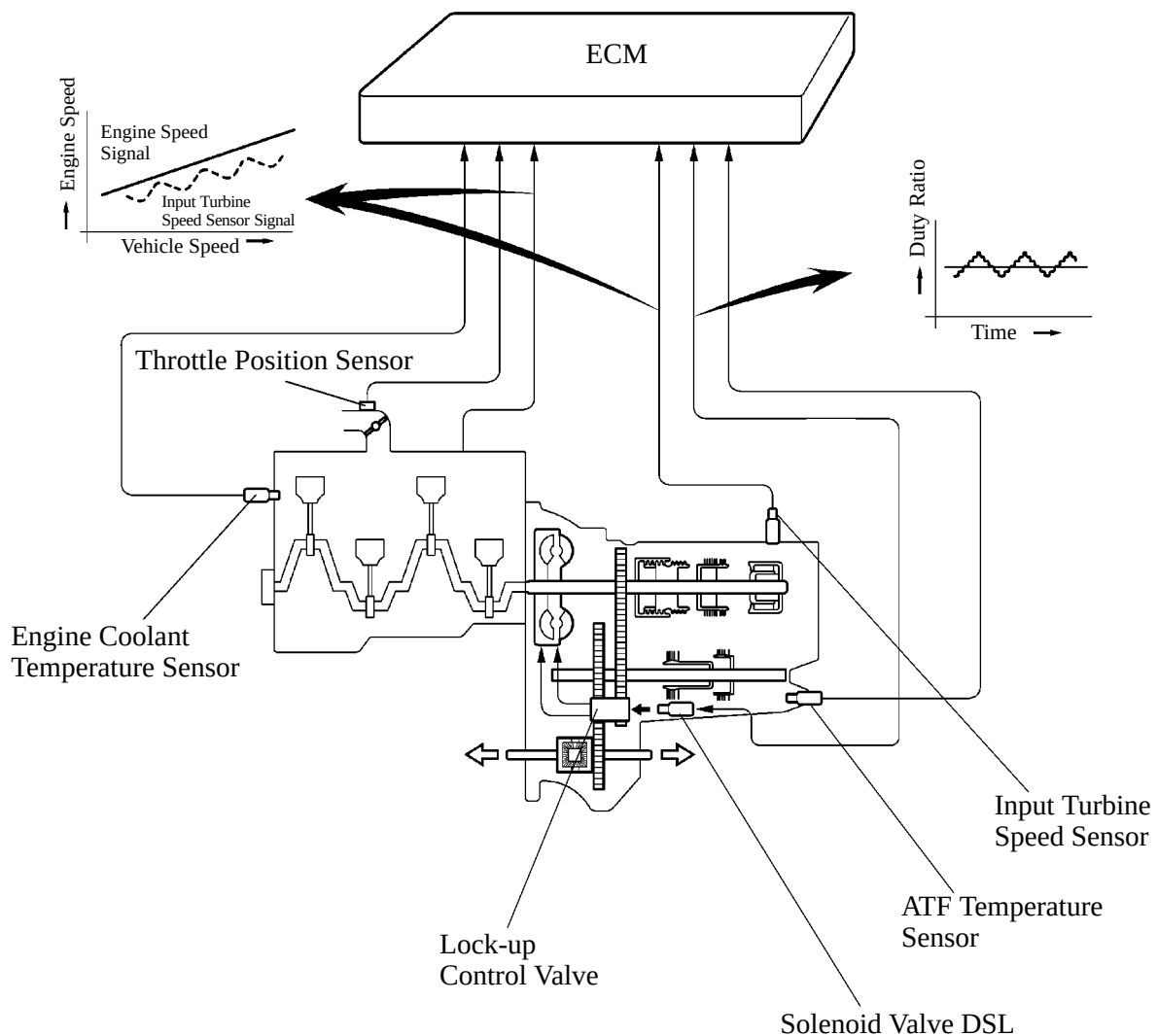
9. Flex Lock-up Clutch Control

The flex lock-up clutch control is used.

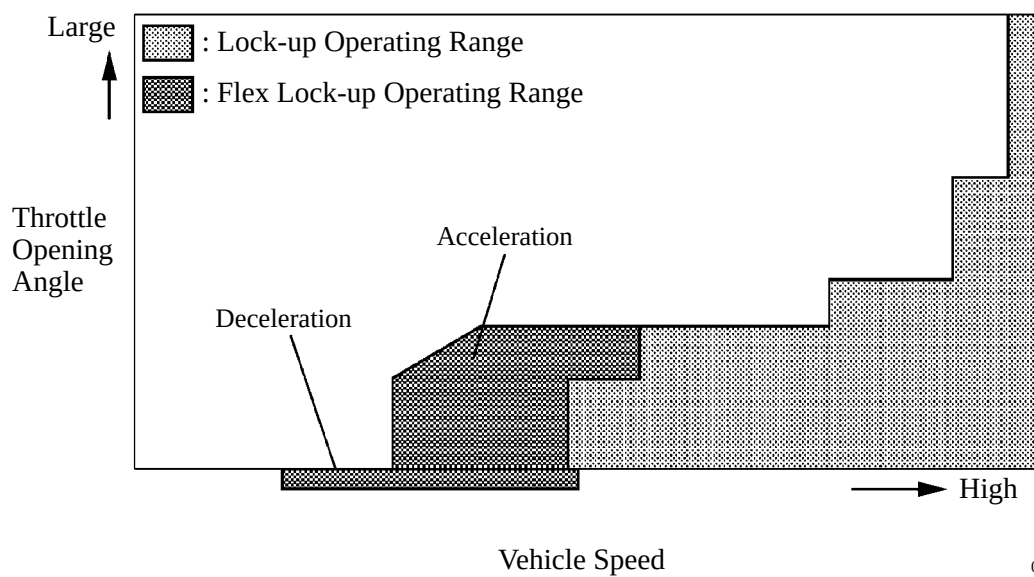
This flex lock-up clutch control regulates the solenoid valve DSL as an intermediate mode between the ON/OFF operation of the lock-up clutch.

The flex lock-up clutch control operates in the 3rd and 4th gears in the D range during acceleration, and in the 3rd and 4th gears in the D range, and in the 3rd gear in the 3 range during deceleration.

- During the acceleration, the partition control of the power transmission between the lock-up clutch and torque converter according to the driving conditions greatly boosts transmission efficiency, and fuel-economy has been improved.
- During the deceleration, lock-up clutch is made to operate. Therefore fuel-cut area has been expanded and fuel-economy has been improved.



► Flex Lock-up Operating Range ◀



005CH04Y

► Flex Lock-up Operation Gear in D and 3 Range ◀

Range	Gear	Acceleration Flex Lock-up	Deceleration Flex Lock-up
D	1st	x	x
	2nd	x	x
	3rd	○	○
	4th	○	○
3	1st	x	x
	2nd	x	x
	3rd	x	○

10. Diagnosis

- When the ECM detects a malfunction, the ECM makes a diagnosis and memorizes the failed section. Furthermore, the MIL (Malfunction Indicator Lamp) in the combination meter illuminates or blinks to inform the driver.
- At the same time, the DTCs (Diagnosis Trouble Codes) are stored in memory. The DTCs can be read by connecting the hand-held tester. For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

11. Fail-safe

This function minimizes the loss of drivability when any abnormality occurs in each sensor or solenoid.

Fail-safe Control List

Malfunction Part	Function
Speed Sensor	During a speed sensor malfunction, the vehicle speed is detected through the signals from the counter gear speed sensor to effect normal control.
ATF Temperature Sensor	During a ATF temperature sensor malfunction, the 4th upshift is prohibited.
Counter Gear Speed Sensor	During a counter gear speed sensor malfunction, the 4th upshift is prohibited.
Solenoid Valve DSL	When the solenoid valve DSL has a malfunction, the current to the solenoid valve is stopped. This stops lock-up control, then fuel economy decreases.
Solenoid Valves SL1, SL2, and S4	The current to the failed solenoid valve is cut off and control is effected by operating the other solenoid valves with normal operation. Shift control is effected as described in the table below, depending on the failed solenoid.

► Normal ◀

Solenoid Valve			Gear
SL1	SL2	S4	
ON	ON	OFF	1st
OFF	ON	OFF	2nd
OFF	OFF	OFF	3rd
OFF	OFF	ON	4th

► Solenoid valve SL1 malfunction ◀

Traveling in 1st or 2nd			Gear
Solenoid Valve			
SL1	SL2	S4	
x*	ON	OFF	2nd
x*	ON	OFF	2nd
x*	OFF→ON	OFF→ON	3rd
x*	OFF→ON	ON	3rd

Traveling 3rd or 4th			Gear
Solenoid Valve			
SL1	SL2	S4	
x	ON→OFF	OFF	3rd
x	ON→OFF	OFF	3rd
x	OFF	OFF	3rd
x	OFF	ON	4th

*: The 2nd brake (B₁) is constantly operating.

► Solenoid valve SL2 malfunction ◀

Solenoid Valve			Gear
SL1	SL2	S4	
ON→OFF	x	OFF	3rd
OFF	x	OFF	3rd
OFF	x	OFF	3rd
OFF	x	ON	4th

► Solenoid valve S4 malfunction ◀

Solenoid Valve			Gear
SL1	SL2	S4	
ON	ON	x	1st
OFF	ON	x	2nd
OFF	OFF	x	3rd
OFF	OFF	x	3rd

► Solenoid valves SL1 and SL2 malfunction ◀

Solenoid Valve			Gear
SL1	SL2	S4	
x	x	OFF	3rd
x	x	OFF	3rd
x	x	OFF	3rd
x	x	ON	4th

► Solenoid valves SL1 and S4 malfunction ◀

Traveling in 1st or 2nd			Gear
Solenoid Valve			
SL1	SL2	S4	
x	ON	x	2nd
x	ON	x	2nd
x	OFF→ON	x	2nd
x	OFF→ON	x	2nd

Traveling in 3rd or 4th			Gear
Solenoid Valve			
SL1	SL2	S4	
x	ON→OFF	x	3rd
x	ON→OFF	x	3rd
x	OFF	x	3rd
x	OFF	x	3rd

► Solenoid valves SL2 and S4 malfunction ◀

Solenoid Valve			Gear
SL1	SL2	S4	
ON→OFF	x	x	3rd
OFF	x	x	3rd
OFF	x	x	3rd
OFF	x	x	3rd

► Solenoid valves SL1, SL2 and S4 malfunction ◀

Solenoid Valve			Gear
SL1	SL2	S4	
x	x	x	3rd
x	x	x	3rd
x	x	x	3rd
x	x	x	3rd

■ SHIFT CONTROL MECHANISM

1. General

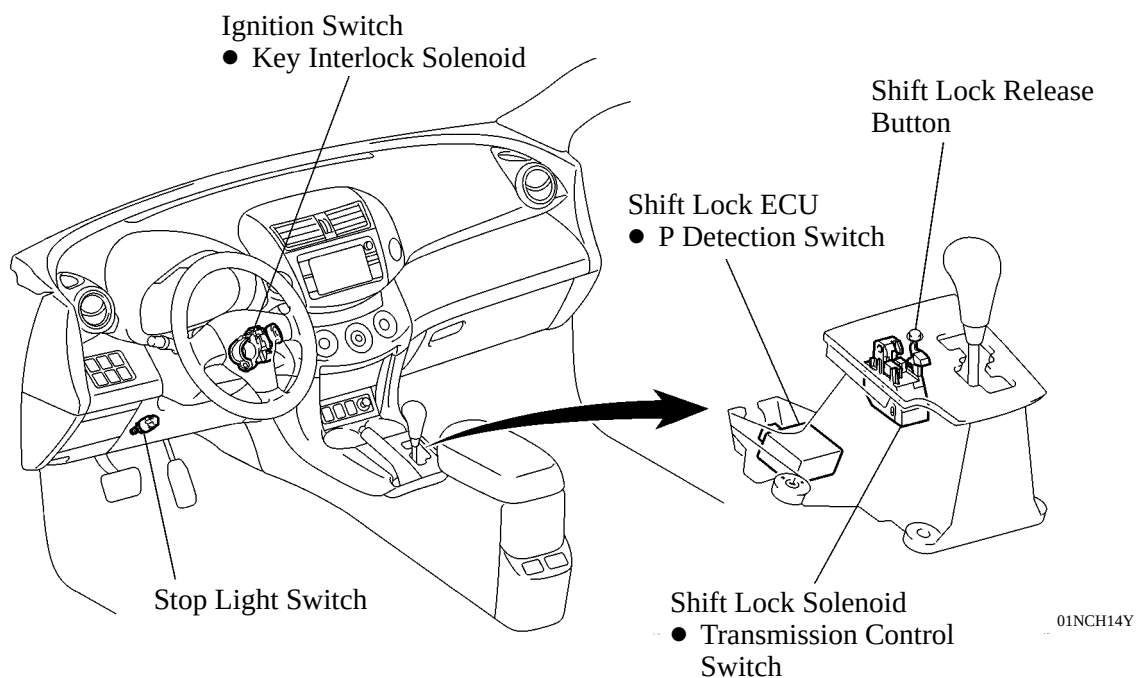
- A gate type shift lever that uses a shift control cable is used. For the gate type, the shift lever button and the overdrive switch of the straight type shift lever have been discontinued. Similar functions are achieved through a single-shift operation (fore-aft and side-to-side).
- A shift lock system that consisting of the key interlock device and shift lock mechanism is used.

2. Shift Lock System

General

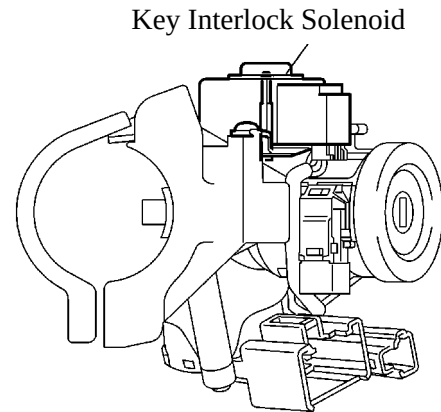
- The key interlock device prevents the key from being pulled out after the ignition switch is turned OFF, unless the shift lever is moved to the P position. Thus, the driver is urged to park the vehicle in the P position.
- The shift lock mechanism prevents the shift lever from being moved to a position other than the P position, unless the ignition switch is turned ON and the brake pedal is depressed. It prevents the vehicle from starting off suddenly.

Layout of Main Components



Key Interlock Solenoid

The activation of the key interlock solenoid that is mounted on the upper column bracket moves the lock pin to restrict the movement of the key cylinder. Therefore, if the shift lever is moved to any position other than “P”, the ignition key cannot be moved from the “ACC” to the “LOCK” position.

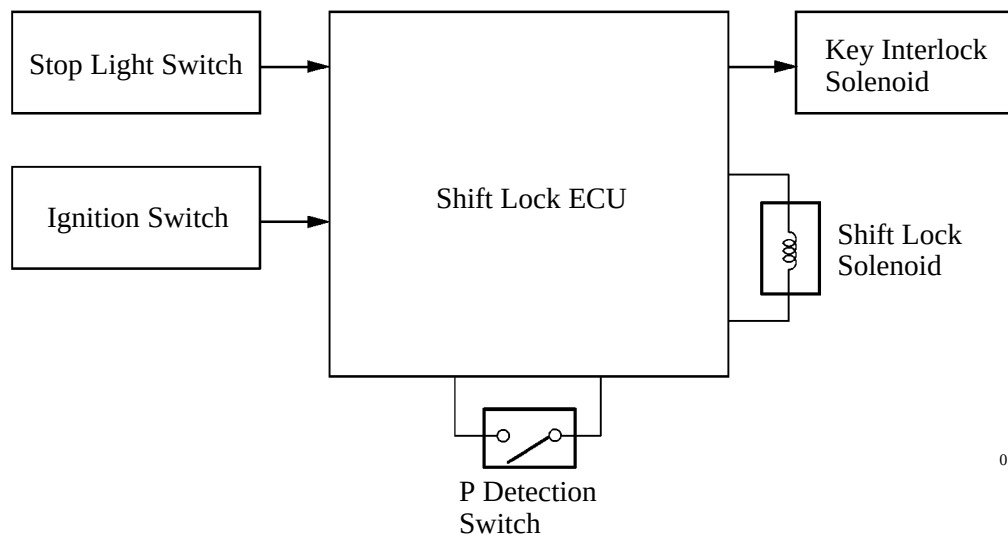


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System Operation

- The shift lock ECU uses the P detection switch to detect the shift lever position, and receives input signals from the stop light switch and ignition switch. Upon receiving these signals, the shift lock ECU turns ON the key interlock solenoid and the shift lock solenoid in order to release the key interlock and shift lock.
- A shift lock override button, which manually overrides the shift lock mechanism, is used.

► System Diagram ◀



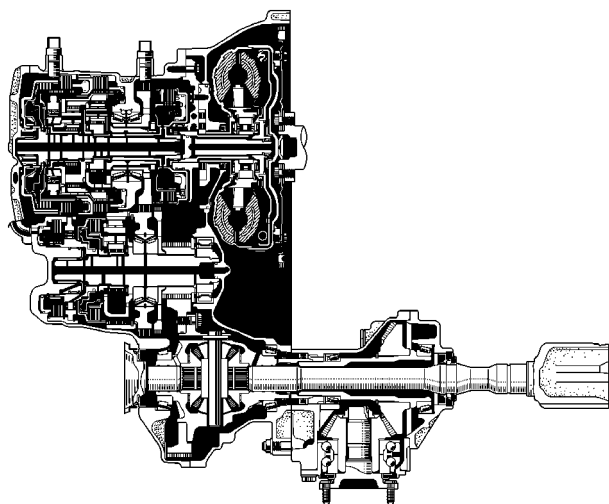
01NCH15Y

CHASSIS

U140F AND U241E AUTOMATIC TRANSAXLES

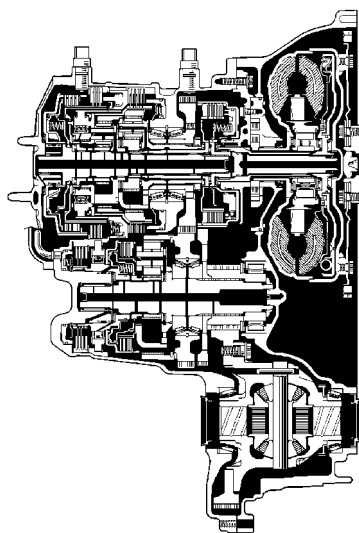
DESCRIPTION

- For the 2AZ-FE engine models, U140F (for 4WD model) and U241E (for 2WD model) automatic transaxles are used. These automatic transaxles are compact and high capacity 4-speed Super ECT (Electronic Controlled Transaxle).
- A low-viscosity type transmission fluid (Toyota Genuine ATF WS) is used for all the automatic transaxles.



01NCH10Y

U140F Automatic Transaxle



181CH09

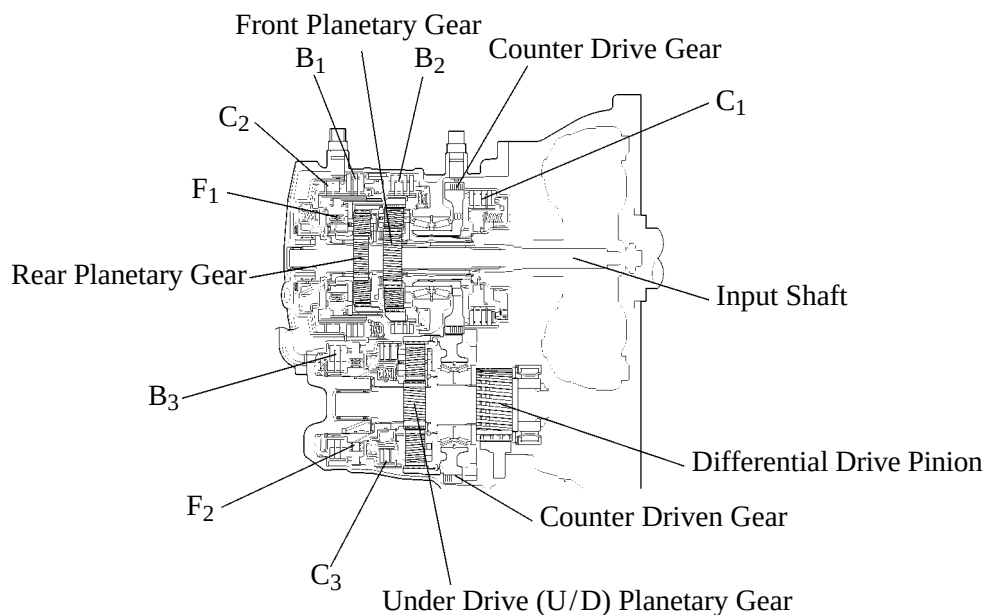
U241E Automatic Transaxle

► Specifications ◀

Transaxle Type		U140F	U241E
Engine Type		2AZ-FE	←
Drive Type		4WD	2WD
Gear Ratio*1	1st	3.938	3.943
	2nd	2.194	2.197
	3rd	1.411	1.413
	4th	1.019	1.020
	Reverse	3.141	3.145
Differential Gear Ratio		3.080	2.923
Fluid Capacity	Liters (US qts, Imp. qts)	8.7 (9.2, 7.7)	8.6 (9.1, 7.6)
Fluid Type		Toyota Genuine ATF WS	←
Weight (Reference)*2	kg (lb)	98 (216)	89 (196)

*1: Counter Gear Ratio Included

*2: Weight shows the figure with the fluid fully filled.



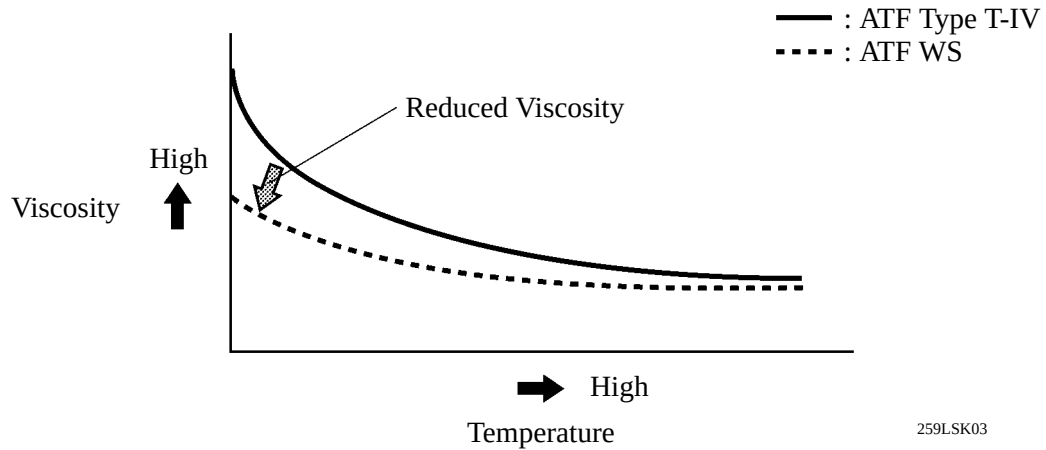
208CH01

► Specifications ◀

Transaxle Type			U140F	U241E
C ₁	Forward Clutch	The No. of Discs	5	←
C ₂	Direct Clutch		3	←
C ₃	U/D Direct Clutch		3	←
B ₁	2nd Brake		3	←
B ₂	1st & Reverse Brake		5	←
B ₃	U/D Brake		3	←
F ₁	No. 1 One-way Clutch	The No. of Sprags	22	←
F ₂	U/D One-way Clutch		24	15
Front Planetary Gear		The No. of Sun Gear Teeth	43	←
		The No. of Pinion Gear Teeth	17	←
		The No. of Ring Gear Teeth	77	←
Rear Planetary Gear		The No. of Sun Gear Teeth	31	←
		The No. of Pinion Gear Teeth	19	←
		The No. of Ring Gear Teeth	69	←
U/D Planetary Gear		The No. of Sun Gear Teeth	35	32
		The No. of Pinion Gear Teeth	28	26
		The No. of Ring Gear Teeth	91	83
Counter Gear		The No. of Drive Gear Teeth	52	50
		The No. of Driven Gear Teeth	53	51

■ ATF (AUTOMATIC TRANSMISSION FLUID) WS

- The ATF WS is used to reduce the resistance of the ATF and ensure fuel economy by reducing its viscosity in the practical operation range. At the high-temperature end, its viscosity is the same as that of the ATF Type T-IV, which ensures the durability of the automatic transaxle.
- There is no interchangeability between the ATF WS and other types of ATFs (ATF Type T-IV, D-II).



Service Tip

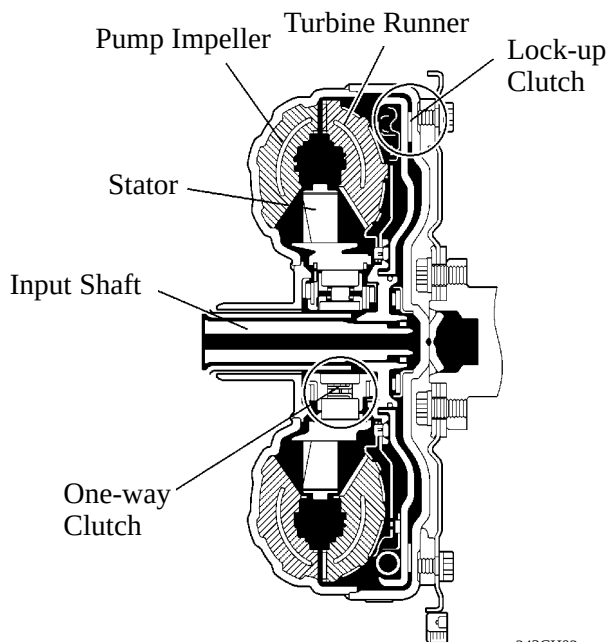
- The color of the ATF level gauge used in the ATF WS has been changed to black. (Orange was used in the ATF Type T-IV on the previous model.)
- If a vehicle with a transaxle filled with ATF WS is replenished with another type of ATF, the vehicle might not start off at extremely low temperatures.

■ TORQUE CONVERTER

- These torque converters have optimally designed fluid passages and impeller configuration, resulting in substantially enhanced transmission efficiency to ensure better starting, acceleration and fuel economy.
- Furthermore, a hydraulically operated lock-up mechanism which cuts power transmission losses due to slippage at medium and high speeds is used.

► Specifications ◀

Transaxle Type	U151E	U151F
Torque Converter Type	3-element, 1-step, 2-phase (with Lock-up Mechanism)	←
Stall Torque Ratio	1.75	←



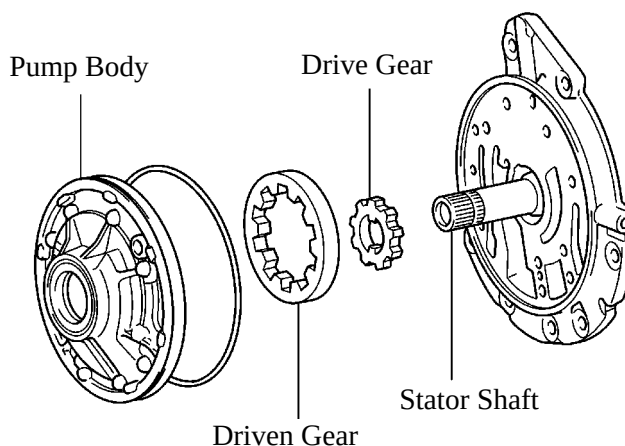
243CH02

■ OIL PUMP

The oil pump is combined with torque converter, lubricates the planetary gear units and supplies operating pressure to the hydraulic control.

► Specifications ◀

Transaxle Type	U151E	U151F
Drive Gear Teeth	9	←
Driven Gear Teeth	10	←

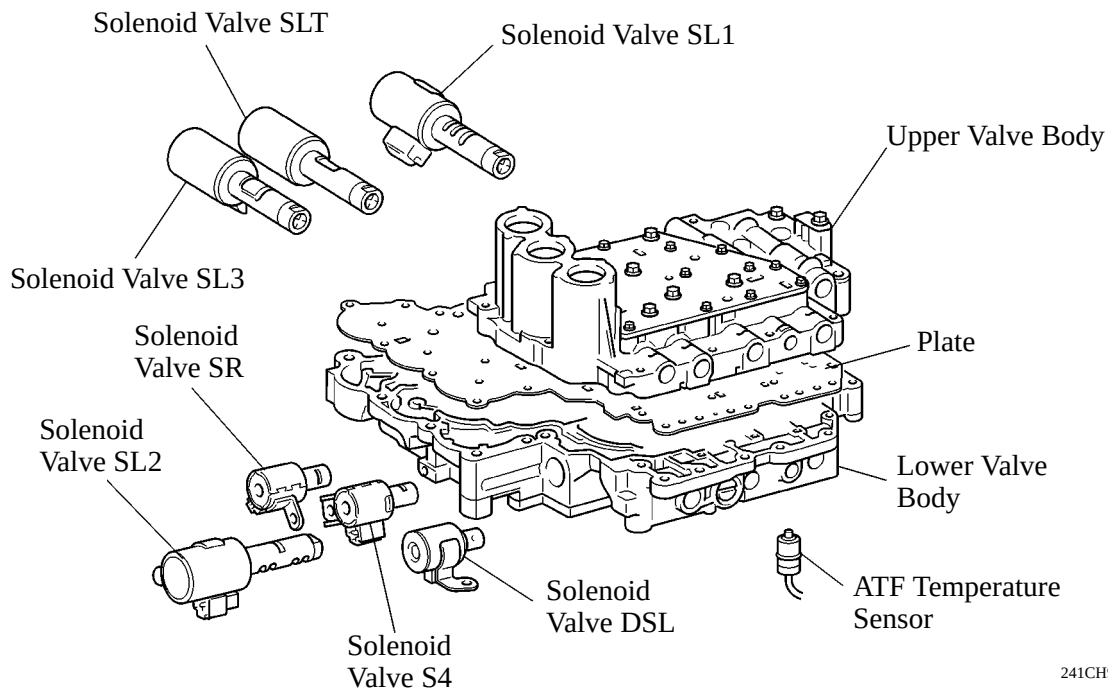


241CH85

■ VALVE BODY UNIT

1. General

The valve body consists of the upper and lower valve bodies and 7 solenoid valves. Apply orifice control, which controls the flow volume to the B₃ brake, is used in this unit.

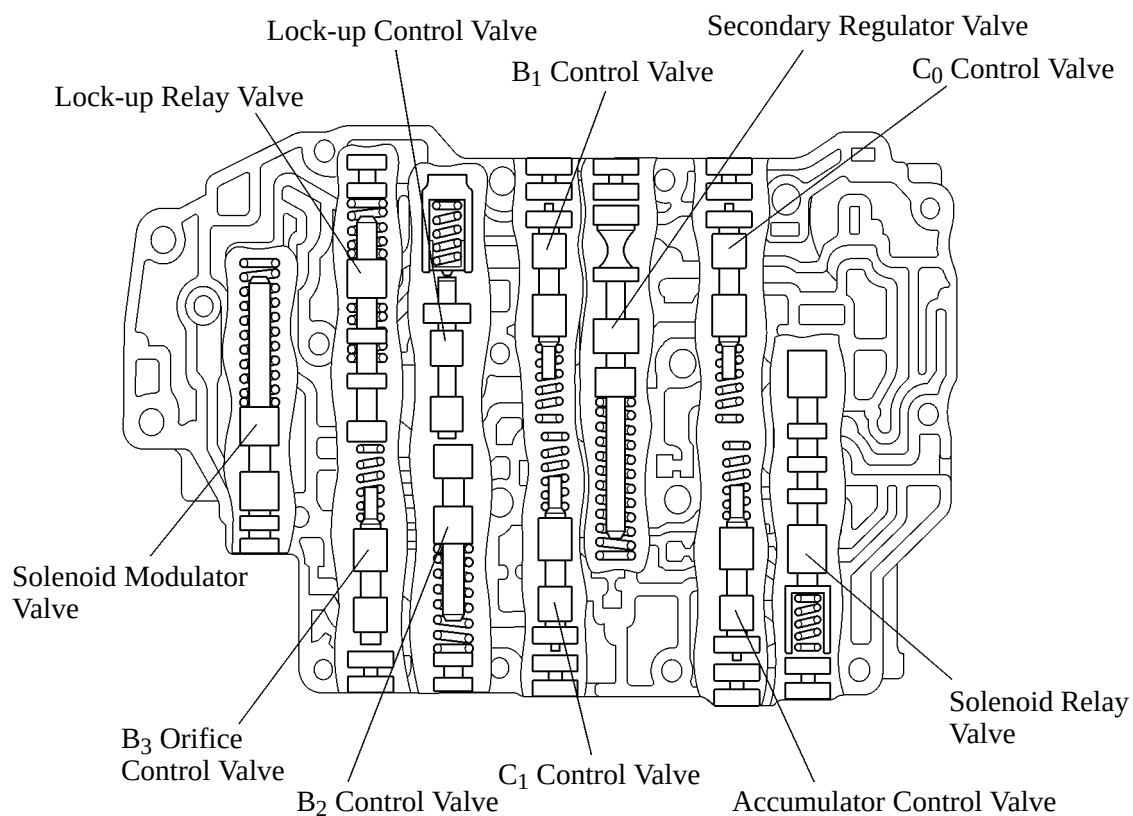


241CH97

► Function of Solenoid Valves ◀

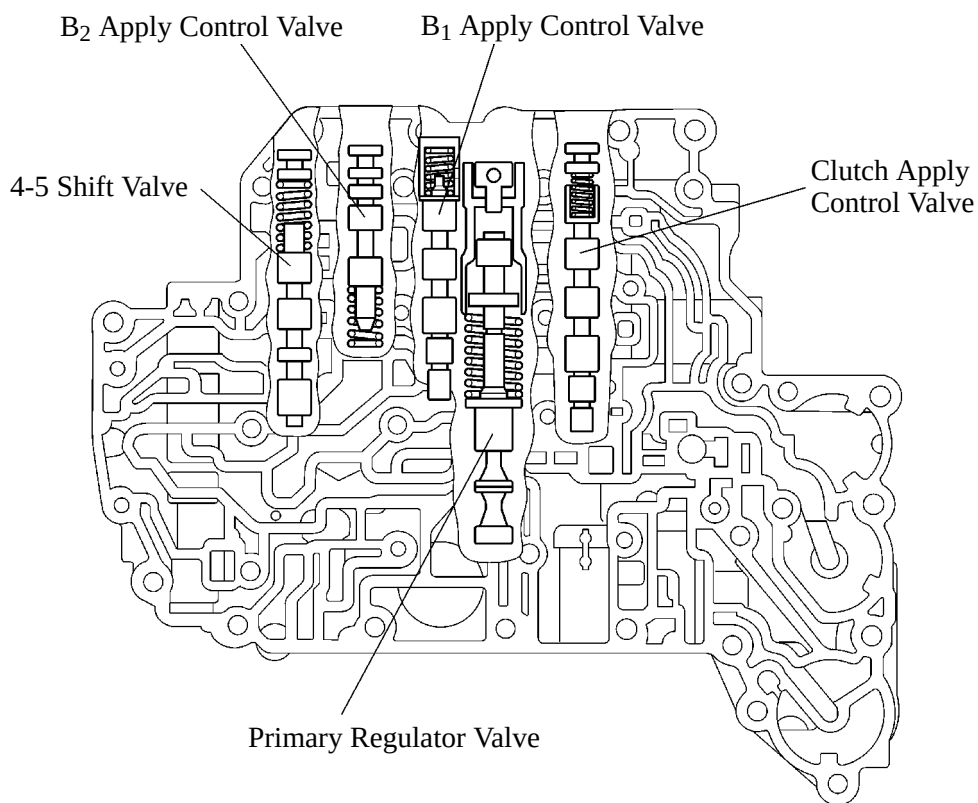
Solenoid Valve	Function
SL1	B ₁ brake pressure control
SL2	● C₀ clutch pressure control ● Lock-up clutch pressure control
SL3	C ₁ clutch pressure control
SLT	● Line pressure control ● Secondary pressure control
SR	Controls the solenoid relay valve
S4	Controls the 4-5 shift valve
DSL	Controls the B ₂ control valve and the Lock-up relay valve

► Upper Valve Body ◀



211CH13

► Lower Valve Body ◀



211CH14

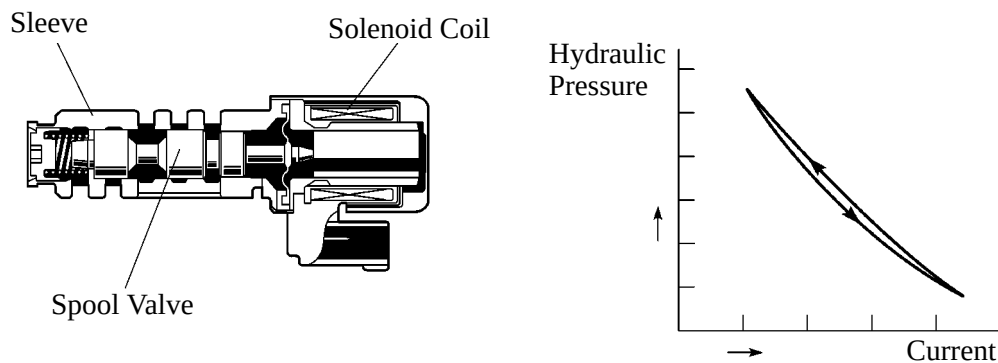
2. Solenoid Valve

Solenoid Valves SL1, SL2, SL3 and SLT

1) General

In order to provide a hydraulic pressure that is proportion to current that flows to the solenoid coil, the solenoid valves SL1, SL2, SL3, and SLT linearly control the line pressure, and clutch and brake engagement pressures based on the signals received from the ECM.

The solenoid valves SL, SL2, SL3, and SLT have the same basic structure.



241CH98

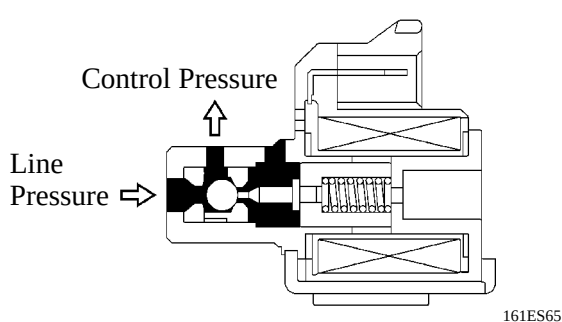
2) Function of Solenoid Valves SL1, SL2, SL3 and SLT

Solenoid Valve	Action	Function
SL1	Clutch and brake engagement pressure control	B ₁ brake pressure control
SL2		● C₀ clutch pressure control ● Lock-up clutch pressure control
SL3		C ₁ clutch pressure control
SLT	Line pressure control	● Line pressure control ● Secondary pressure control

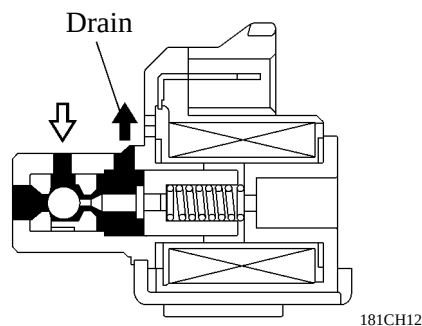
Solenoid Valves SR, S4 and DSL

1) General

The solenoid valves SR, S4, and DSL use a three-way solenoid valve.



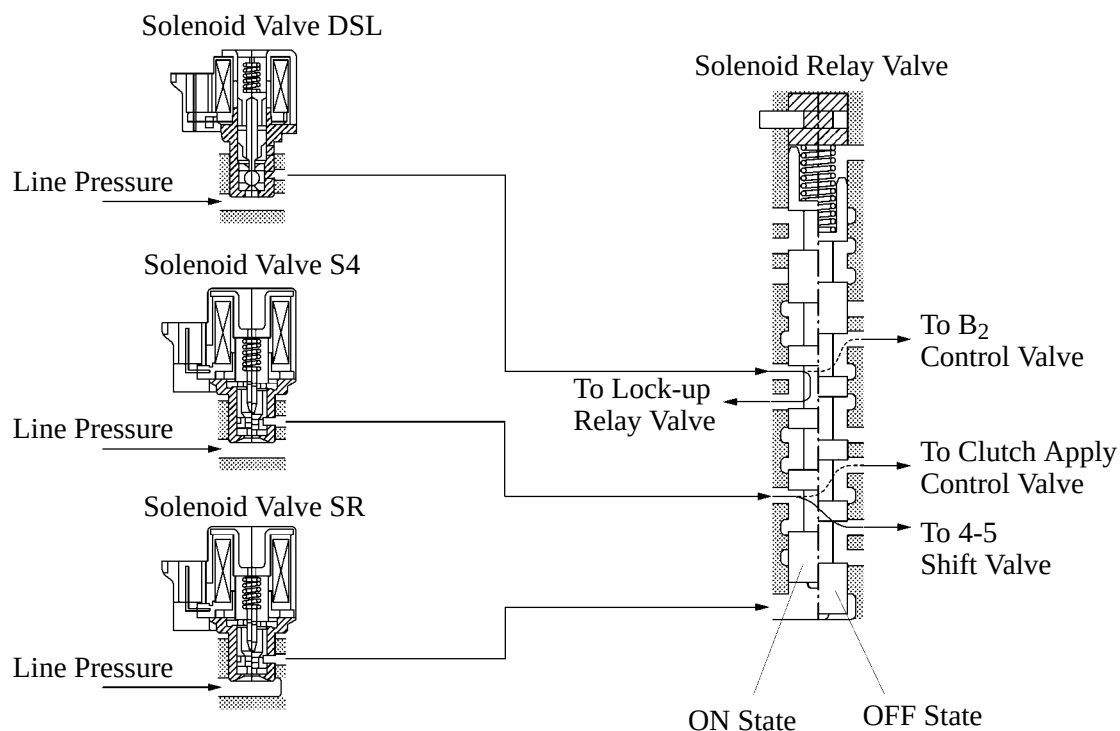
Solenoid Valve ON



Solenoid Valve OFF

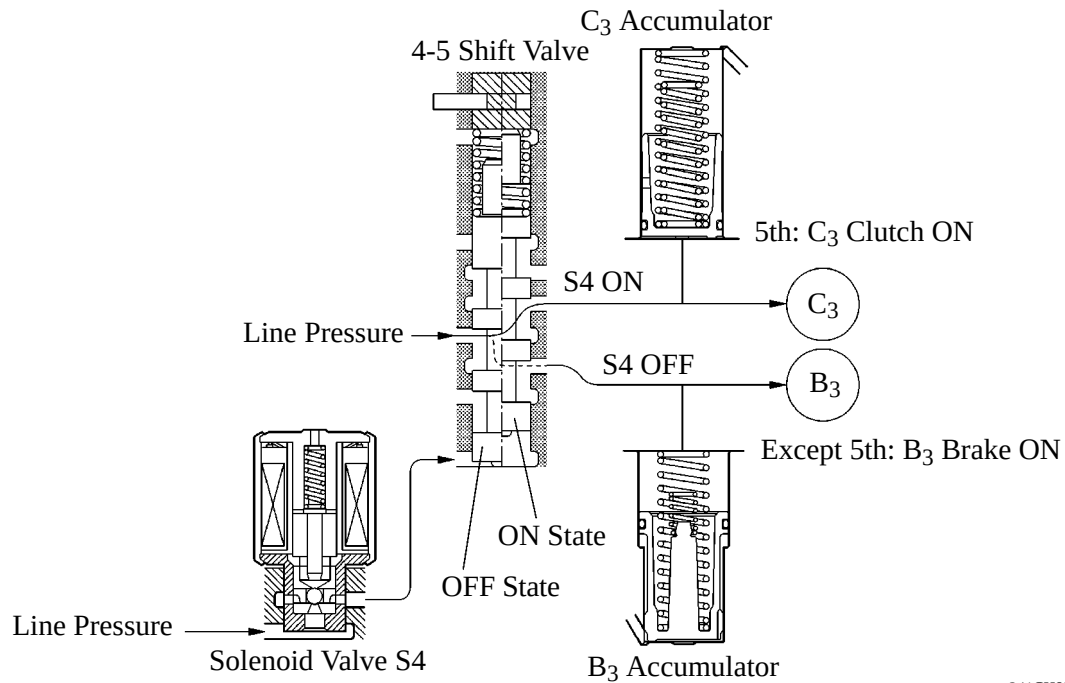
2) Function of Solenoid Valve SR

The solenoid valve SR controls the solenoid relay valve. Accordingly, the fluid passages from the solenoid valve DSL and S4 have been changed.



3) Function of Solenoid Valve S4

The solenoid valve S4 when set to ON controls the 4-5 shift valve to establish the 5th by changing over the fluid pressure applied to B₃ brake and C₃ clutch.

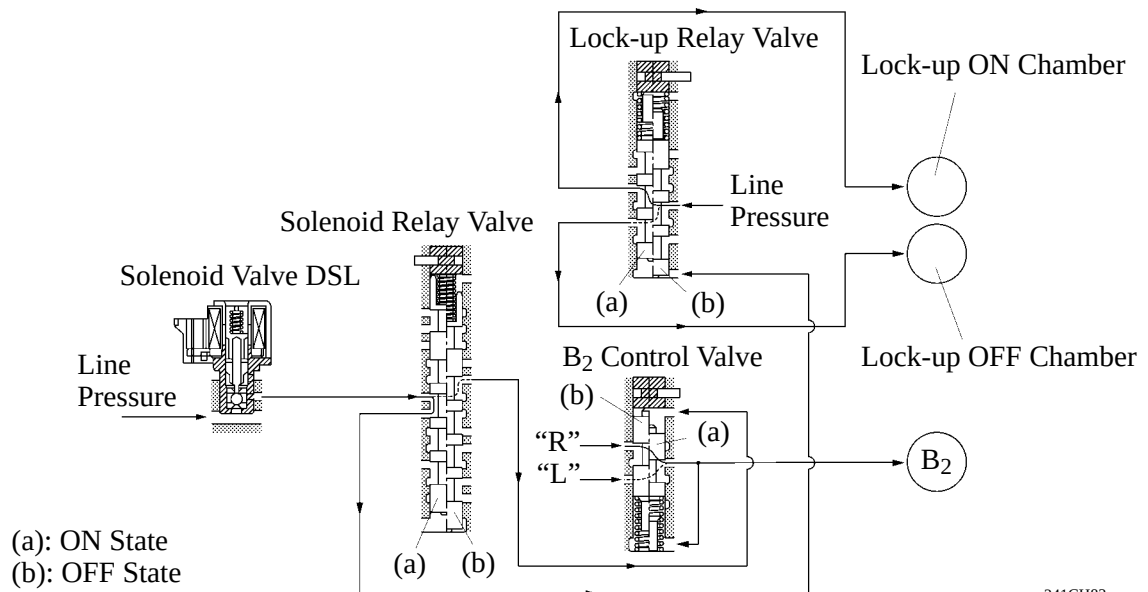


241CH82

4) Function of Solenoid Valve DSL

The solenoid valve DSL controls the B₂ control valve via the solenoid relay valve when the transaxle is shifted in the L position. However, when the transaxle is shifted in the R position, the line pressure from the manual valve controls the 1st & reverse brake (B₂).

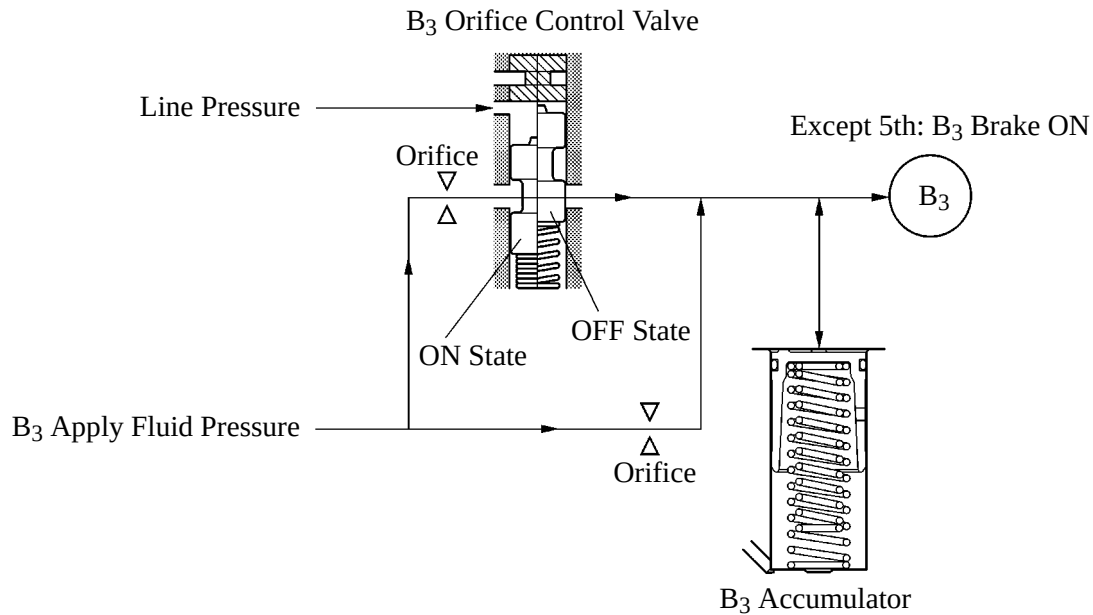
During lock-up, the lock-up relay valve is controlled via the solenoid relay valve.



241CH83

3. Apply Orifice Control

This control is effected by the B₃ orifice control valve. The B₃ orifice control valve has been provided for the B₃ brake, which is applied when shifting from 5th to 4th. The B₃ orifice control valve is controlled by the amount of the line pressure in accordance with shifting conditions, and the flow volume of the fluid that is supplied to the B₃ brake is controlled by varying the size of the orifice in the control valve.



■ ELECTRONIC CONTROL SYSTEM

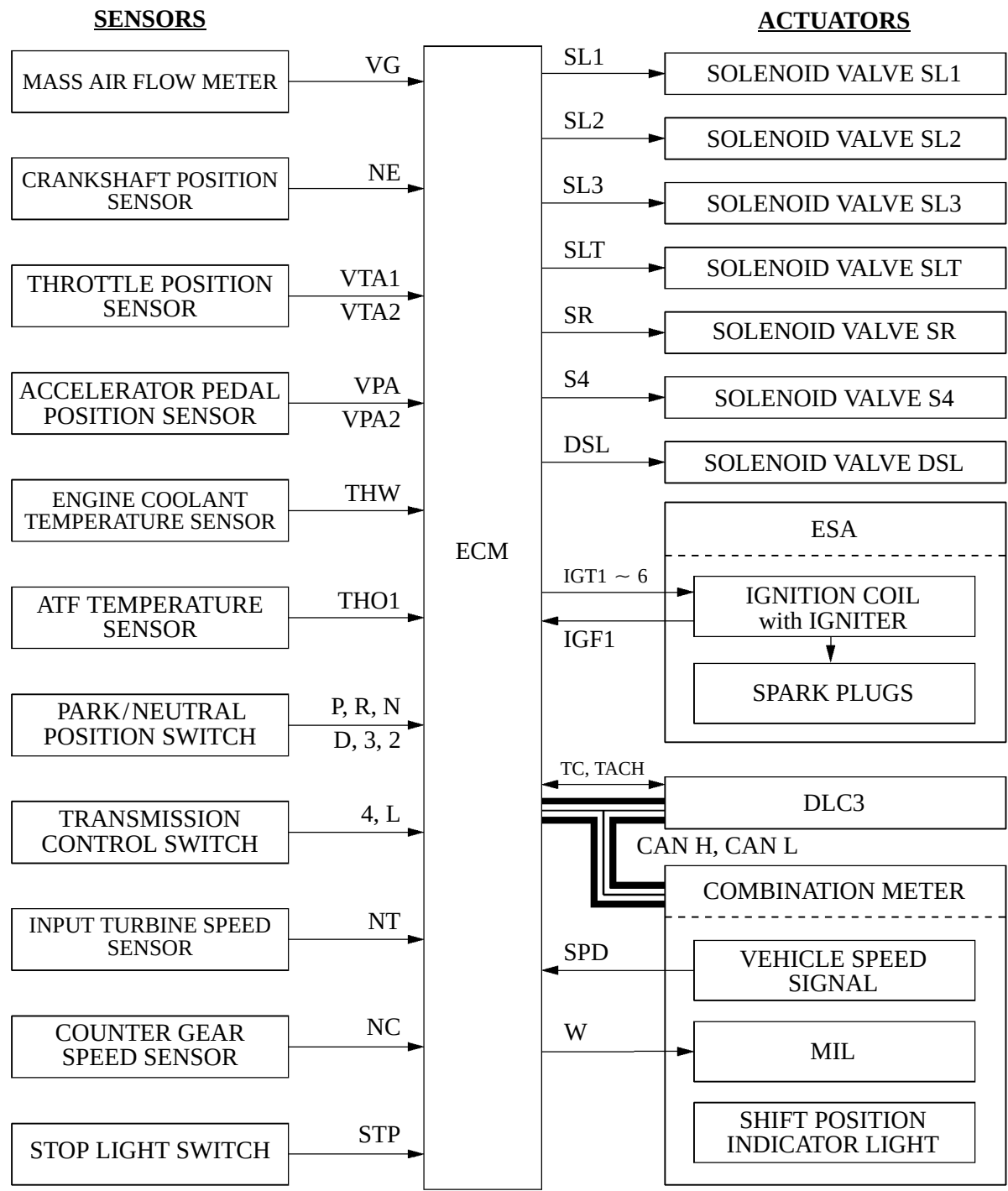
1. General

The electronic control system of the U151E and U151F automatic transaxles consists of the controls listed below.

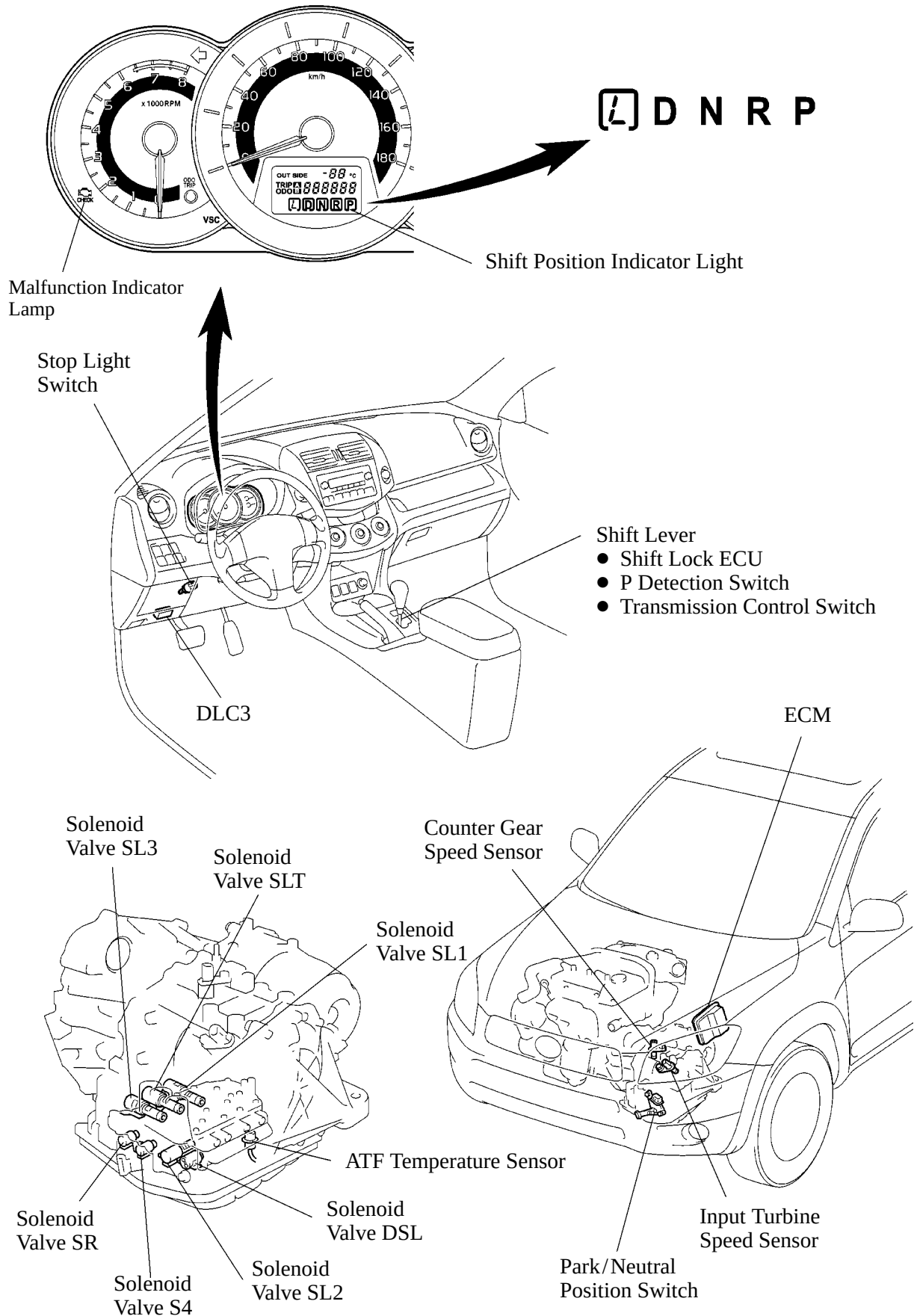
System	Function
Clutch Pressure Control (See page CH-47)	- Controls the pressure that is applied directly to B₁ brake, C₀ and C₁ clutches by actuating 3 solenoid valves (SL1, SL2 and SL3) in accordance with ECM signals. 3 solenoid valves (SL1, SL2 and SL3) minutely controls the clutch pressure in accordance with the engine output and driving conditions.
Line Pressure Optimal Control (See page CH-48)	Actuates the solenoid valve SLT to control the line pressure in accordance with information from the ECM and the operating conditions of the transaxle.
Engine Torque Control	Retards the engine ignition timing temporarily to improve shift feeling during up or down shifting.
Shift Control in Uphill/Downhill Traveling (See page CH-49)	Controls to restrict the 4th or 5th gear upshift or to provide appropriate engine braking by the ECM to determine whether the vehicle is traveling uphill or downhill.
Shift Timing Control	The ECM sends current to solenoid valves (SL1, SL2 and/or SL3) based on signals from each sensor and shifts the gear.
Flex Lock-up Clutch Control (See page CH-50)	Controls the solenoid valves SL2 and DSL, provides an intermediate mode between the ON/OFF operation of the lock-up clutch, and increases the operating range of the lock-up clutch to improve fuel economy.
Lock-up Timing Control	The ECM sends current to the solenoid valves DSL and SL2 based on signals from each sensor and engages or disengages the lock-up clutch.
“N” to “D” Squat Control	When the shift lever is shifted from “N” to “D” position, the gear is temporarily shifted to 3rd and then to 1st to reduce vehicle squat.
Diagnosis (See page CH-52)	When the ECM detects a malfunction, the ECM makes a diagnosis and memorizes the failed section.
Fail-safe (See page CH-52)	Even if a malfunction is detected in the sensors or solenoids, the ECM effects fail-safe control to prevent the vehicle’s drivability from being affected significantly.

2. Construction

The configuration of the electronic control system in the U151E and U151F automatic transaxles is as shown in the following chart.



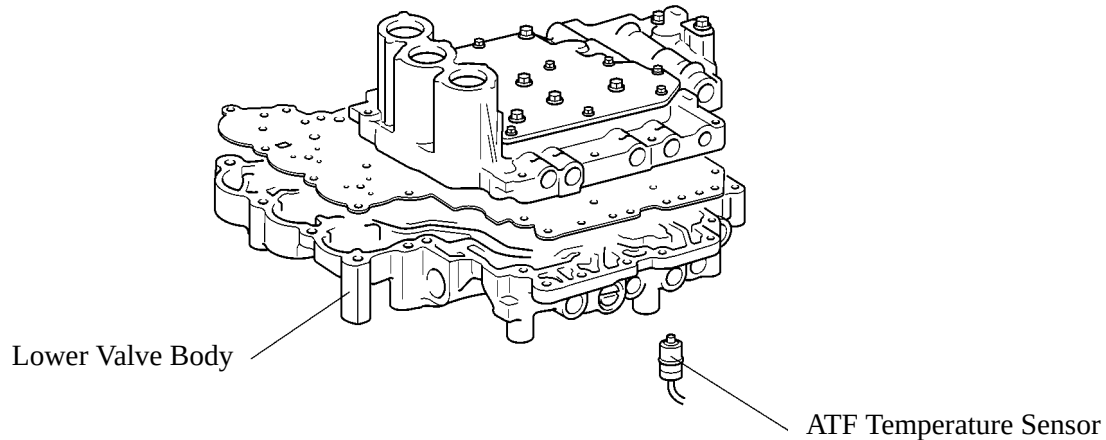
3. Layout of Main Components



4. Construction and Operation of Main Components

ATF Temperature Sensor

- The ATF temperature sensor is installed in the lower valve body for direct detection of the fluid temperature.
- The ATF temperature sensor is used for correction of clutch and brake pressure to keep smooth shift quality every time.

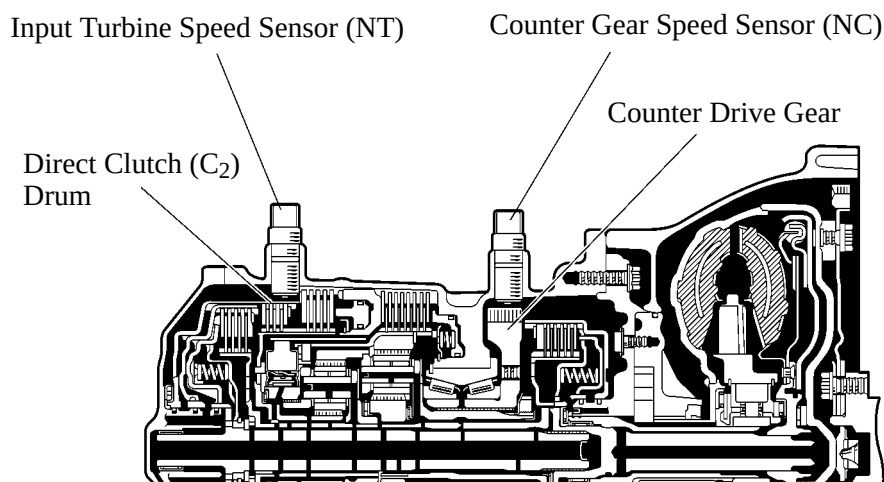


241CH87

Input Turbine Speed Sensor and Counter Gear Speed Sensor

The U151E and U151F automatic transaxles use an input turbine speed sensor (for the NT signal) and a counter gear speed sensor (for the NC signal). Thus, the ECM can detect the timing of the shifting of the gears and appropriately control the engine torque and hydraulic pressure in response to the various conditions.

- The input turbine speed sensor detects the input speed of the transaxle. The direct clutch (C₂) drum is used as the timing rotor for this sensor.
- The counter gear speed sensor detects the speed of the counter gear. The counter drive gear is used as the timing rotor for this sensor.



211CH16

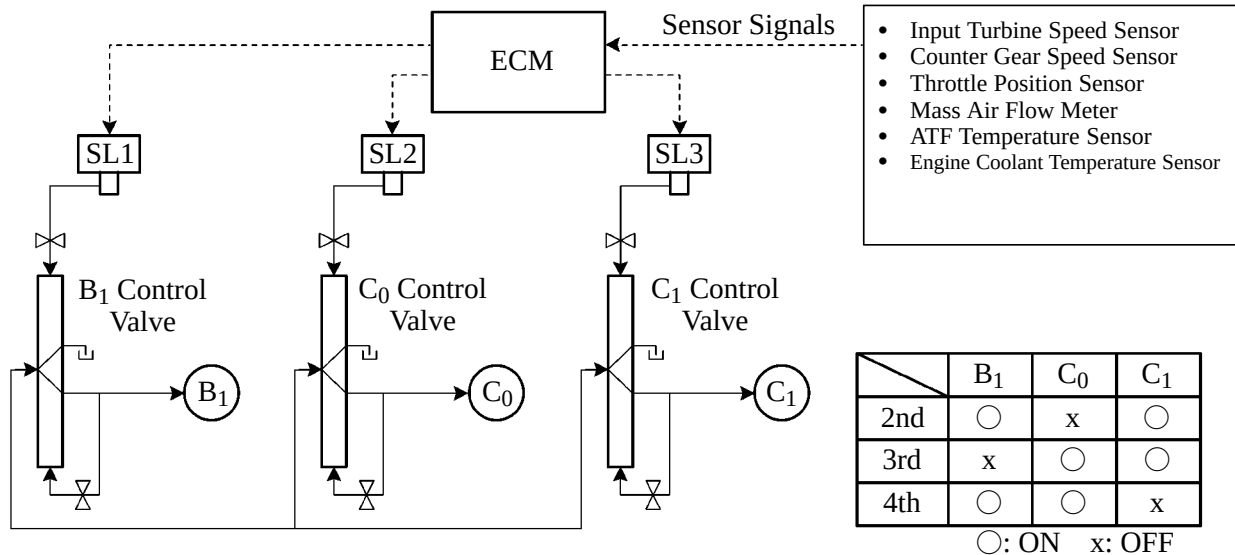
5. Clutch Pressure Control

Clutch to Clutch Pressure Control

This control is used for shifting from the 2nd to 3rd gear, and from the 3rd to 4th gear.

Solenoid valves SL1, SL2, and SL3 are actuated in accordance with the signals from the ECM, and this output pressure is guided directly to the control valves B₁, C₀, and C₁ in order to regulate the line pressure that acts on the B₁ brake, and C₀ and C₁ clutches.

As a result, high response and excellent shift characteristics have been realized.

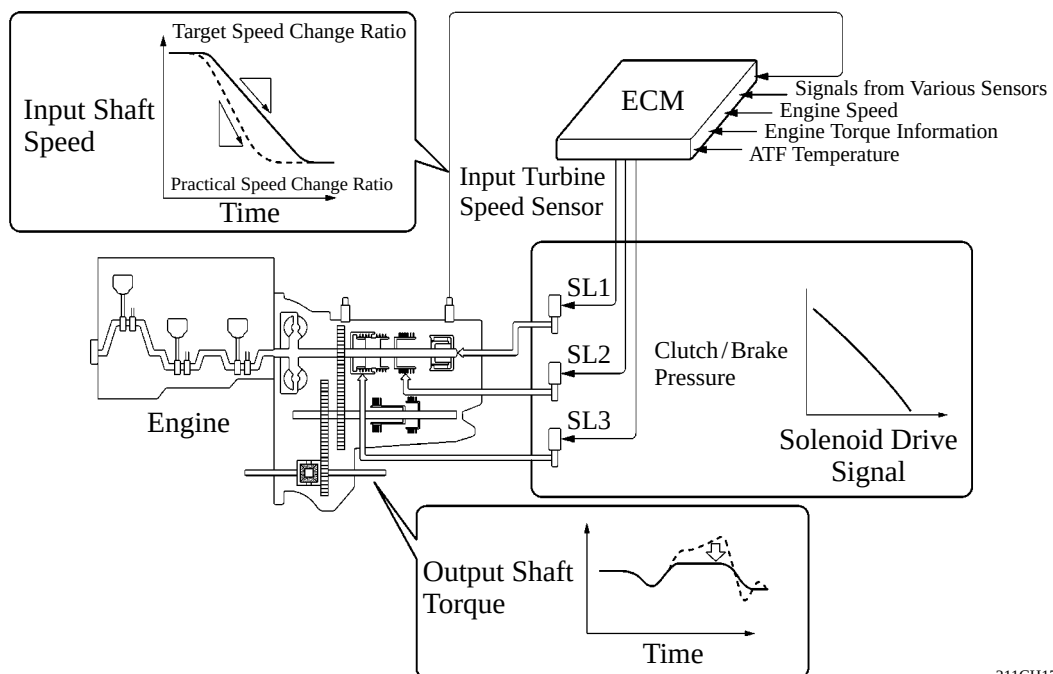


285CH05

Clutch Pressure Optimal Control

The ECM monitors the signals from various sensors such as the input turbine speed sensor, allowing shift solenoid valves SL1, SL2, and SL3 to minutely control the clutch pressure in accordance with engine output and driving conditions.

As a result, smooth shift characteristics have been realized.

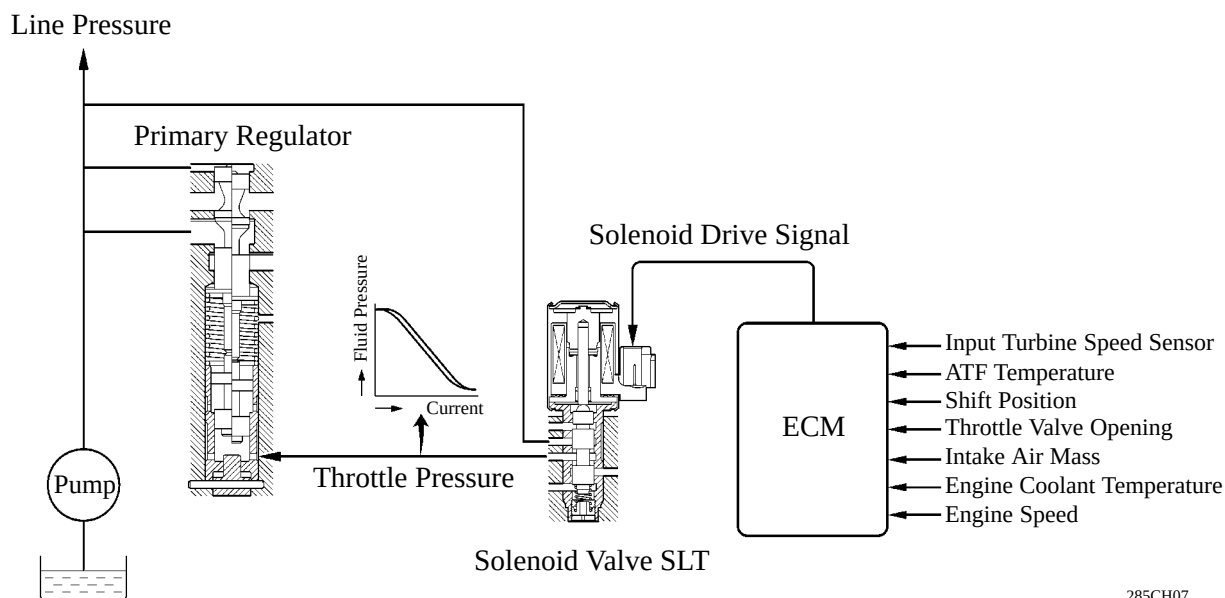


211CH17

6. Line Pressure Optimal Control

Through the use of the solenoid valve SLT, the line pressure is optimally controlled in accordance with the engine torque information, as well as with the internal operating conditions of the torque converter and the transaxle.

Accordingly, the line pressure can be controlled minutely in accordance with the engine output, traveling condition, and the ATF temperature, thus realizing smooth shift characteristics and optimizing the workload in the oil pump.



285CH07

7. Shift Control in Uphill/Downhill Traveling

General

This control helps minimize the gear shifting when the driver operates the accelerator pedal while driving on a winding road with ups and downs, in order to ensure a smooth drive.

Shift Control in Uphill Traveling

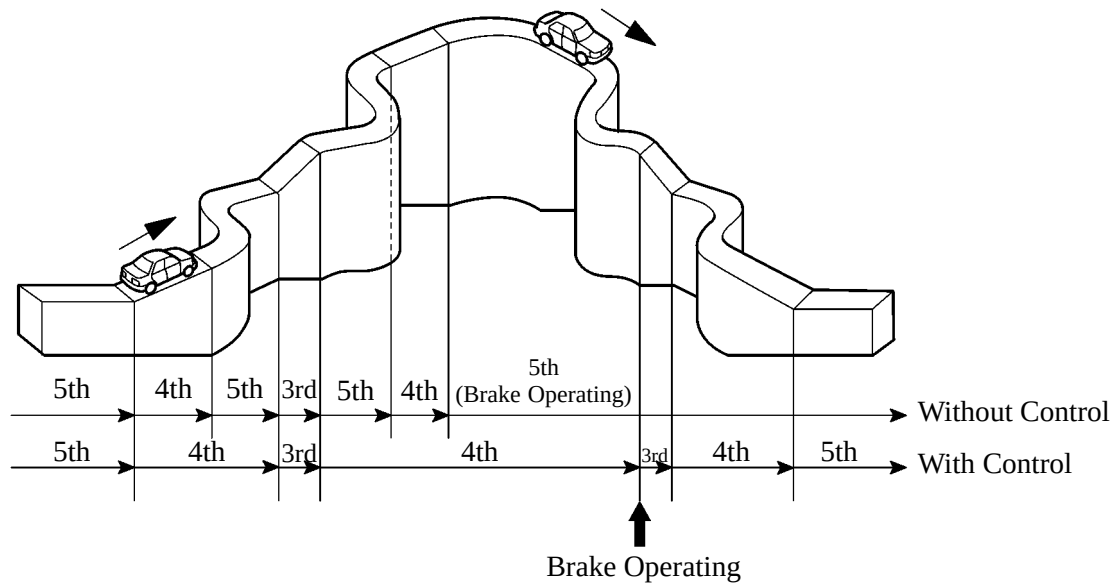
When the ECM determines uphill travel, it prohibits the transaxle from shifting up into 5th after the transaxle has shifted down below 4th.

When the ECM determines uphill travel with a steeper grade, it prohibits the transaxle from shifting up into 4th after the transaxle has shifted down below 3rd.

Shift Control in Downhill Traveling

When the ECM determines downhill travel, it shifts down the transaxle from 5th to 4th in accordance with the brake operation signal that is input when the driver operates the brake pedal.

When the ECM determines downhill travel with a steeper grade, and a brake operation signal is input again, the ECM shifts the transaxle down from 4th to 3rd.



229LC183

Uphill/Downhill Judgment

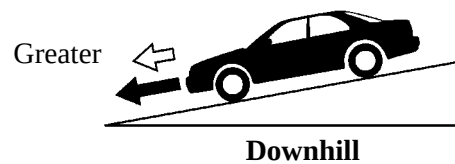
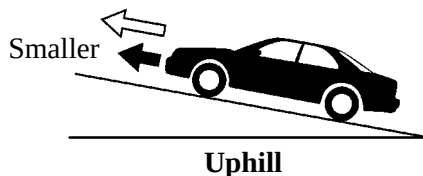
The actual acceleration calculated from the speed sensor signal is compared with the reference acceleration (based on level road travel) stored in the ECM to determine uphill or downhill travel.

Actual Acceleration < Reference Acceleration

Actual Acceleration > Reference Acceleration

⇐ Reference acceleration

⇐ Actual acceleration



162CH10

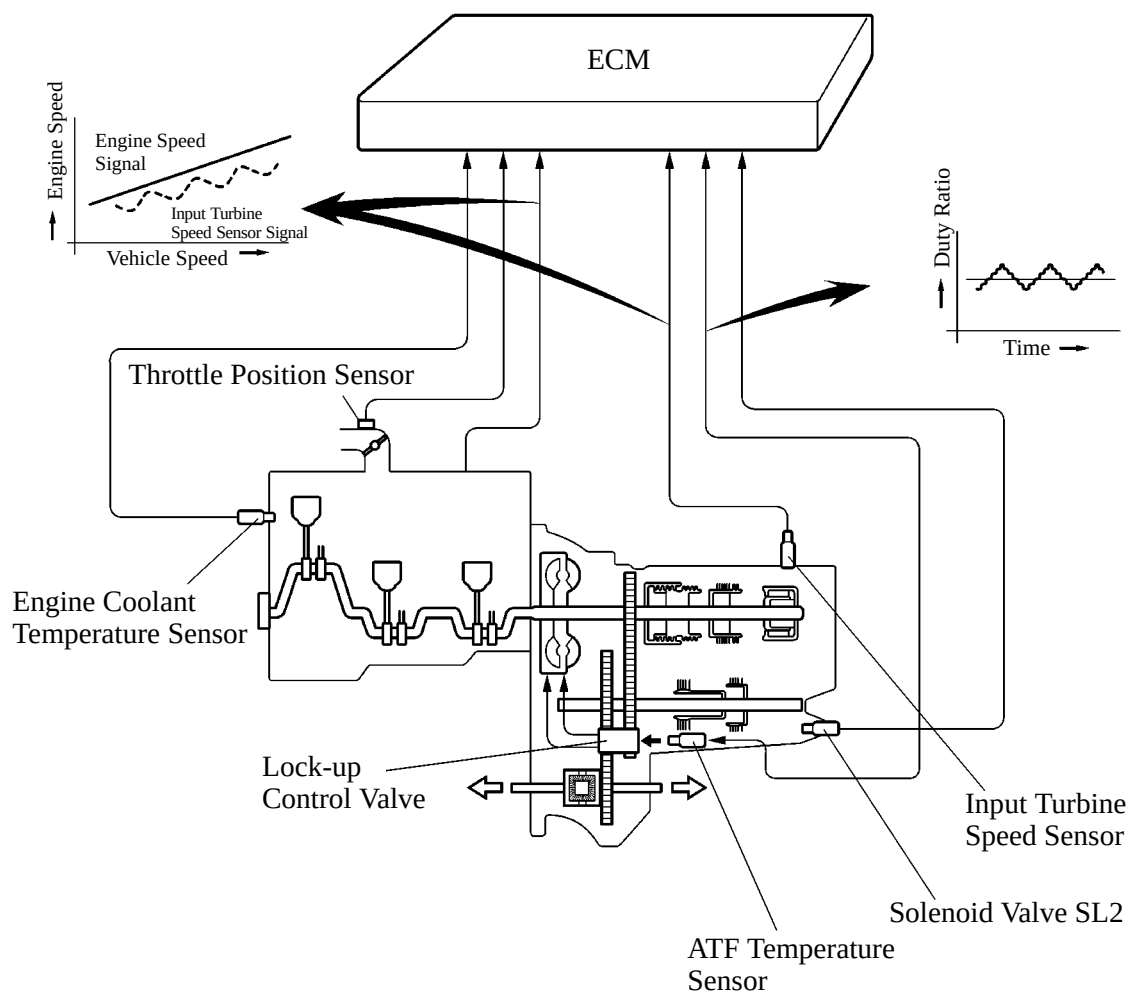
8. Flex Lock-up Clutch Control

The flex lock-up clutch control is used.

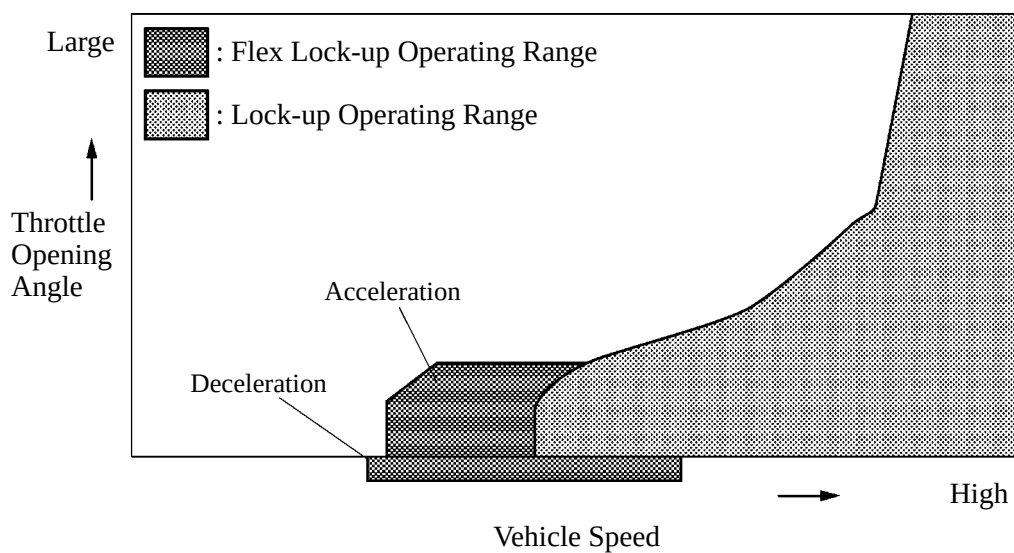
This flex lock-up clutch control regulates the solenoid valve SL2 as an intermediate mode between the ON/OFF operation of the lock-up clutch.

The flex lock-up clutch control operates in the 4th and 5th gears in the D range during acceleration, and in the 4th and 5th gears in the D range, and in the 4th gear in the 4 range during deceleration.

- During the acceleration, the partition control of the power transmission between the lock-up clutch and torque converter according to the driving conditions greatly boosts transmission efficiency, and fuel-economy has been improved.
- During the deceleration, lock-up clutch is made to operate. Therefore fuel-cut area has been expanded and fuel-economy has been improved.



► Flex Lock-up Operating Range ◀



01MCH04Y

► Flex Lock-up Operation Gears in D, 5 and 4 Range ◀

Range	Gear	Acceleration Flex Lock-up	Deceleration Flex Lock-up
D, 5	1st	x	x
	2nd	x	x
	3rd	x	x
	4th	○	○
	5th	○	○
4	1st	x	x
	2nd	x	x
	3rd	x	x
	4th	x	○

9. Diagnosis

- When the ECM detects a malfunction, the ECM makes a diagnosis and memorizes the failed section. Furthermore, the MIL (Malfunction Indicator Lamp) in the combination meter illuminates or blinks to inform the driver.
- At the same time, the DTCs (Diagnosis Trouble Codes) are stored in memory. The DTCs can be read by connecting a hand-held tester. For details, see the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

10. Fail-safe

This function minimizes the loss of drivability when any abnormality occurs in each sensor or solenoid.

Fail-safe Control List

Malfunction Part	Function
Speed Sensor	During a speed sensor malfunction, the vehicle speed is detected through the signals from the counter gear speed sensor to effect normal control.
ATF Temperature Sensor	During an ATF temperature sensor malfunction, 5th gear upshift is prohibited.
Counter Gear Speed Sensor	During a counter gear speed sensor malfunction, 5th gear upshift is prohibited.
Solenoid Valves SL1, SL2, SL3, and S4	The current to the failed solenoid valve is cut off and control is effected by operating other solenoid valves with normal operation. Shift control is effected as described in the table below, depending on the failed solenoid. Even if the engine starts under this condition, the gear position remains where it was before.
Solenoid Valve DSL	When the solenoid valve DSL has a malfunction, the current to the solenoid valve is stopped. This stops lock-up control, then fuel economy decreases.

► Normal ◀

Δ: According to Flex Lock-up

Solenoid Valve	SL1	ON	OFF	ON	OFF	OFF
	SL2	ON	ON	OFF	Δ	Δ
	SL3	OFF	OFF	OFF	ON	ON
	S4	OFF	OFF	OFF	OFF	ON
Gear Position		1st	2nd	3rd	4th	5th

► Solenoid valve SL1 malfunction (During driving at 1st or 2nd) ◀

Solenoid Valve	SL1	x				
	SL2	ON	ON	ON	ON	ON
	SL3	OFF	OFF	OFF	ON → OFF	ON → OFF
	S4	OFF	OFF	OFF	OFF	ON → OFF
Gear Position		1st → 2nd	2nd	3rd → 2nd	4th → 2nd	5th → 2nd

► Solenoid valve SL1 malfunction (During driving at 3rd) ◀

Δ: According to Flex Lock-up

Solenoid Valve	SL1	x				
	SL2	ON → Δ	ON → Δ	Δ	Δ	Δ
	SL3	OFF	OFF	OFF	ON → OFF	ON → OFF
	S4	OFF → ON	OFF → ON	OFF → ON	OFF → ON	ON
Gear Position		1st → 4th	2nd → 4th	3rd → 4th	4th	5th → 4th

► Solenoid valve SL1 malfunction (During driving at 4th or 5th) ◀

Δ: According to Flex Lock-up

Solenoid Valve	SL1	x				
	SL2	ON → Δ	ON → Δ	Δ	Δ	Δ
	SL3	OFF → ON	OFF → ON	OFF → ON	ON	ON
	S4	OFF	OFF	OFF	OFF	ON
Gear Position		1st → 4th	2nd → 4th	3rd → 4th	4th	5th

► Solenoid valve SL2 malfunction ◀

Solenoid Valve	SL1	ON	OFF → ON	ON	OFF → ON	OFF → ON
	SL2	x				
	SL3	OFF	OFF	OFF	ON → OFF	ON → OFF
	S4	OFF → ON	OFF → ON	OFF → ON	OFF → ON	ON
Gear Position		1st → 4th	2nd → 4th	3rd → 4th	4th	5th → 4th

► Solenoid valve SL3 malfunction ◀

Δ: According to Flex Lock-up

Solenoid Valve	SL1	ON	OFF	ON	OFF → ON	OFF → ON
	SL2	ON	ON	OFF	Δ	Δ
	SL3	x				
	S4	OFF	OFF	OFF	OFF → ON	ON
Gear Position		1st	2nd	3rd	4th	5th → 4th

► Solenoid valve S4 malfunction ◀

Δ: According to Flex Lock-up

Solenoid Valve	SL1	ON	OFF	ON	OFF	OFF
	SL2	ON	ON	OFF	Δ	Δ
	SL3	OFF	OFF	OFF	ON	ON
	S4	x				
Gear Position		1st	2nd	3rd	4th	5th → 4th

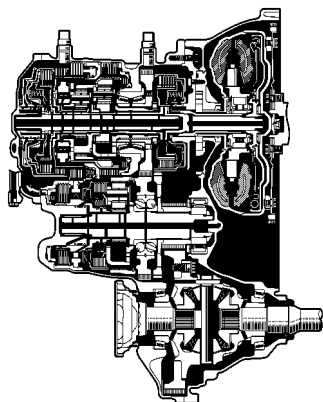
► Solenoid valves SL1, SL2, SL3 and S4 malfunction ◀

Solenoid Valve	SL1	x				
	SL2					
	SL3					
	S4					
Gear Position		1st → 4th	2nd → 4th	3rd → 4th	4th	5th → 4th

U151E AND U151F AUTOMATIC TRANSAXLES

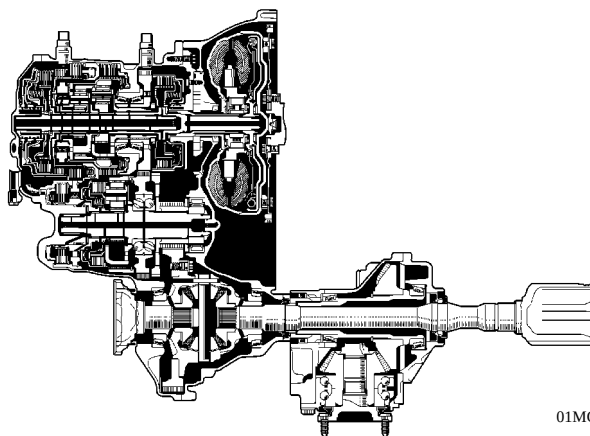
DESCRIPTION

- For the 2GR-FE engine models, U151E (for 2WD model) and U151F (for 4WD model) automatic transaxle are used. These automatic transaxles are compact, lightweight and high-capacity 5-speed Super ECT (Electronically Controlled Transaxle).
- A low-viscosity type transmission fluid (Toyota Genuine ATF WS) is used for all the automatic transaxles. For details on ATF WS, see page CH-5.



241CH01

U151E Automatic Transaxle



01MCH02Y

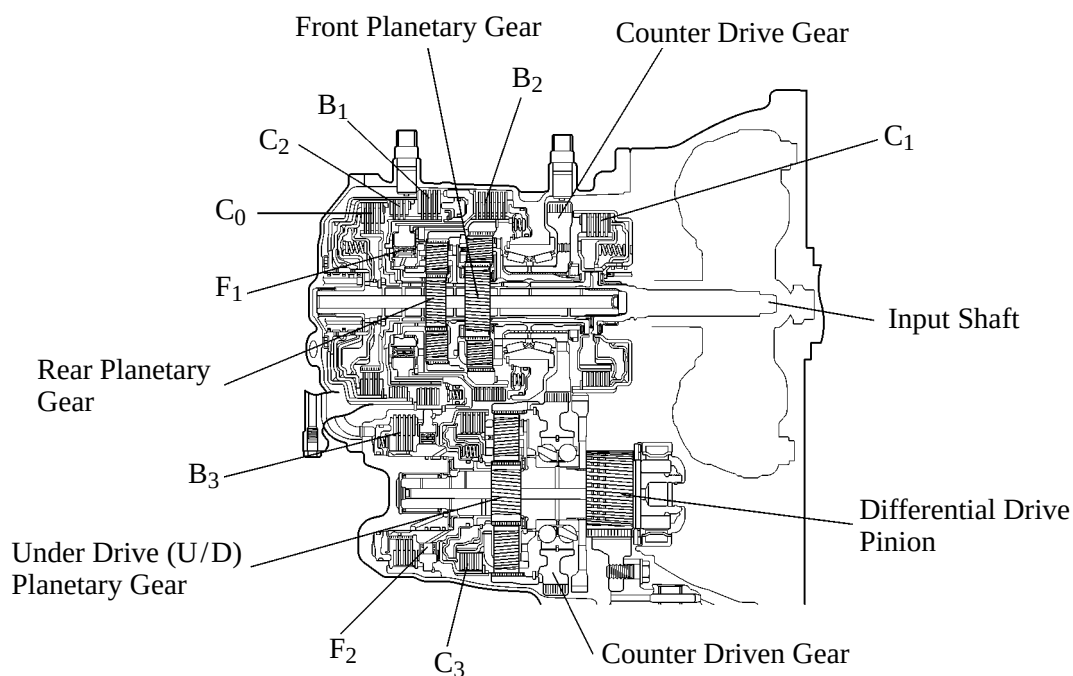
U151F Automatic Transaxle

► Specifications ◀

Transaxle Type		U151E	U151F
Engine Type		2GR-FE	←
Drive Type		2WD	4WD
Gear Ratio*1	1st	4.235	←
	2nd	2.360	←
	3rd	1.517	←
	4th	1.047	←
	5th	0.756	←
	Reverse	3.378	←
Differential Gear Ratio		3.080	←
Fluid Capacity	Liters (US qts, Imp. qts)	8.8 (9.3, 7.7)	9.0 (9.5, 7.9)
Fluid Type		Toyota Genuine ATF WS	←
Weight (Reference)*2	kg (lb)	101 (223)	102 (225)

*1: Counter Gear Ratio Included.

*2: Weight shows the figure with the fluid fully filled.



241CH03

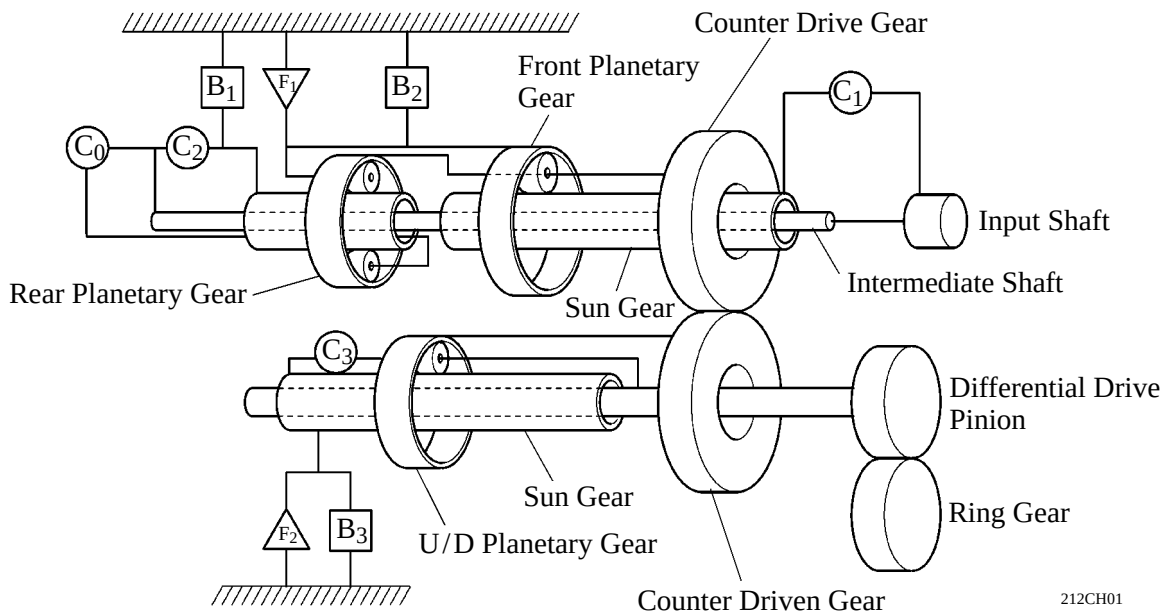
► Specifications ◀

Transaxle Type			U151E	U151F
C ₁	Forward Clutch	The No. of Discs	5	←
C ₂	Reverse Clutch		3	←
C ₃	U/D Direct Clutch		4	←
C ₀	Direct & O/D Clutch		4	←
B ₁	2nd & O/D Brake		4	←
B ₂	1st & Reverse Brake		6	←
B ₃	U/D Brake		4	←
F ₁	No. 1 One-way Clutch	The No. of Sprags	28	←
F ₂	U/D One-way Clutch		24	←
Front Planetary Gear	The No. of Sun Gear Teeth		43	←
	The No. of Pinion Gear Teeth		17	←
	The No. of Ring Gear Teeth		77	←
Rear Planetary Gear	The No. of Sun Gear Teeth		31	←
	The No. of Pinion Gear Teeth		19	←
	The No. of Ring Gear Teeth		69	←
U/D Planetary Gear	The No. of Sun Gear Teeth		35	←
	The No. of Pinion Gear Teeth		28	←
	The No. of Ring Gear Teeth		91	←
Counter Gear	The No. of Drive Gear Teeth		52	←
	The No. of Driven Gear Teeth		57	←

■ PLANETARY GEAR UNIT

1. Construction

- The counter drive and driven gears are placed in front of the front planetary gear and the under drive (U/D) planetary gear unit is placed above the counter shaft. Furthermore, the number of the brake and one-way clutch is minimized to realize the compact and high-capacity structure.
- The centrifugal fluid pressure canceling mechanism is used in the C_0 , C_2 , C_3 , and C_1 clutches that are applied when shifting from 2nd to 3rd, from 3rd to 4th and from 4th to 5th. For details on the centrifugal fluid pressure mechanism, see page CH-11.



2. Function of Components

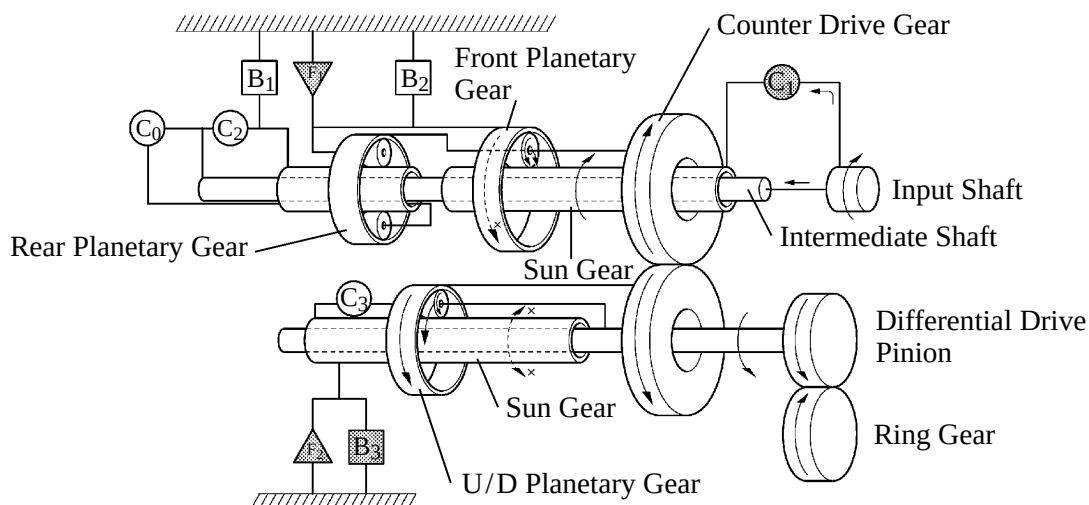
Component		Function
C_1	Forward Clutch	Connects input shaft and front planetary sun gear.
C_2	Reverse Clutch	Connects intermediate shaft and rear planetary sun gear.
C_3	U/D Direct Clutch	Connects U/D sun gear and U/D planetary carrier.
C_0	Direct & O/D Clutch	Connects intermediate shaft and rear planetary carrier.
B_1	2nd & O/D Brake	Prevents rear planetary sun gear from turning either clockwise or counterclockwise.
B_2	1st & Reverse Brake	Prevents rear planetary carrier and front planetary ring gear from turning either clockwise or counterclockwise.
B_3	U/D Brake	Prevents U/D planetary sun gear from turning either clockwise or counterclockwise.
F_1	No. 1 One-way Clutch	Prevents rear planetary carrier and front planetary ring gear from turning counterclockwise.
F_2	U/D One-way Clutch	Prevents U/D planetary sun gear from turning clockwise.
Planetary Gear		These gears change the route through which driving force is transmitted, in accordance with the operation of each clutch and brake, in order to increase or reduce the output speed.

3. Transaxle Power Flow

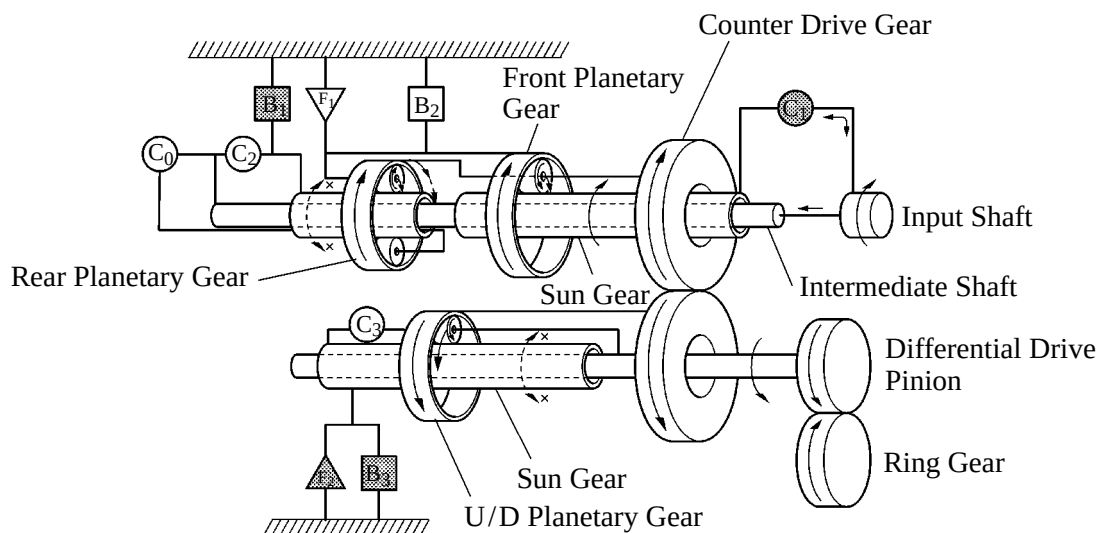
Shift Lever Position	Gear	Solenoid Valve						C ₀	C ₁	C ₂	C ₃	B ₁	B ₂	B ₃	F ₁	F ₂
		S4	SR	DSL	SL1	SL2	SL3									
P	Park	OFF	OFF	OFF	ON	ON	OFF							○		
R	Reverse	OFF	OFF	OFF	ON	ON	OFF			○			○	○		
N	Neutral	OFF	OFF	OFF	ON	ON	OFF							○		
D	1st	OFF	OFF	OFF	ON	ON	OFF		○					○	○	○
	2nd	OFF	OFF	OFF	OFF	ON	OFF		○			○		○		○
	3rd	OFF	ON	OFF	ON	OFF	OFF	○	○					○		○
	4th	OFF	ON	OFF/ ON*	OFF	OFF/ ON*	ON	○				○		○		○
	5th	ON	ON	OFF/ ON*	OFF	OFF/ ON*	ON	○			○	○				
4	1st	OFF	OFF	OFF	ON	ON	OFF		○					○	○	○
	2nd	OFF	OFF	OFF	OFF	ON	OFF		○			○		○		○
	3rd	OFF	ON	OFF	ON	OFF	OFF	○	○					○		○
	4th	OFF	ON	OFF/ ON*	OFF	OFF/ ON*	ON	○				○		○		○
3	1st	OFF	OFF	OFF	ON	ON	OFF		○					○	○	○
	2nd	OFF	OFF	OFF	OFF	ON	OFF		○			○		○		○
	3rd	OFF	ON	OFF	ON	OFF	OFF	○	○					○		○
2	1st	OFF	OFF	OFF	ON	ON	OFF		○					○	○	○
	2nd	OFF	OFF	OFF	OFF	ON	OFF		○			○		○		○
L	1st	OFF	OFF	ON	ON	ON	OFF		○				○	○	○	○

○: ON *: Flex Lock-up ON

1st Gear (D, 4, 3 or 2 Position)

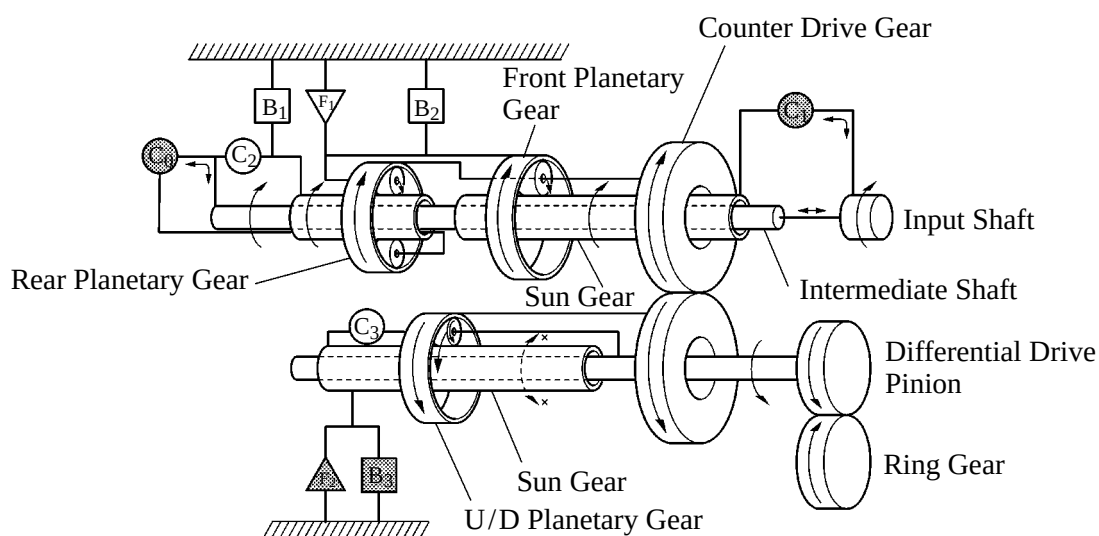


2nd Gear (D, 4, 3 or 2 Position)



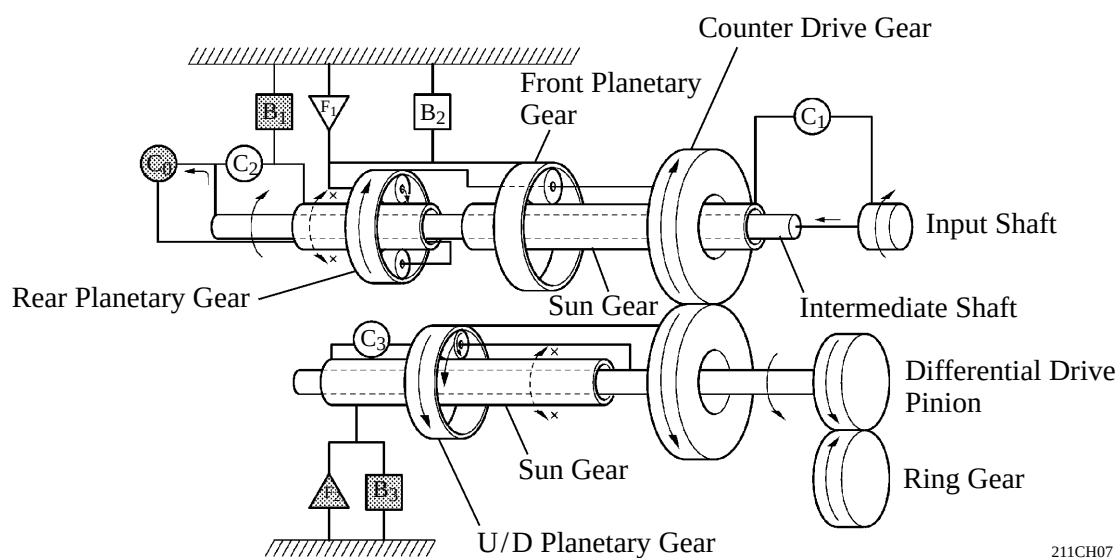
005CH10Y

3rd Gear (D, 4 or 3 Position)

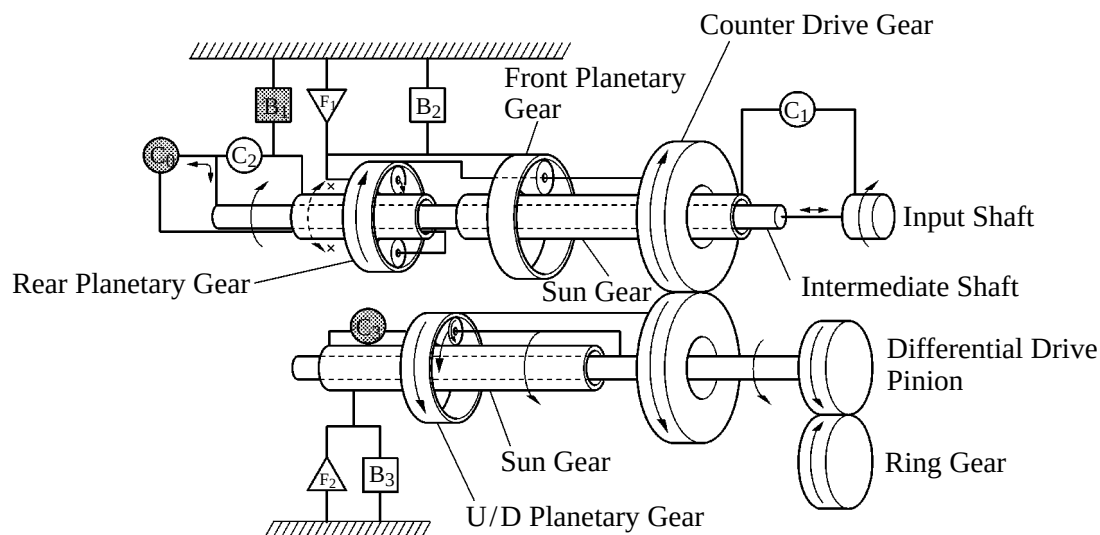


005CH11Y

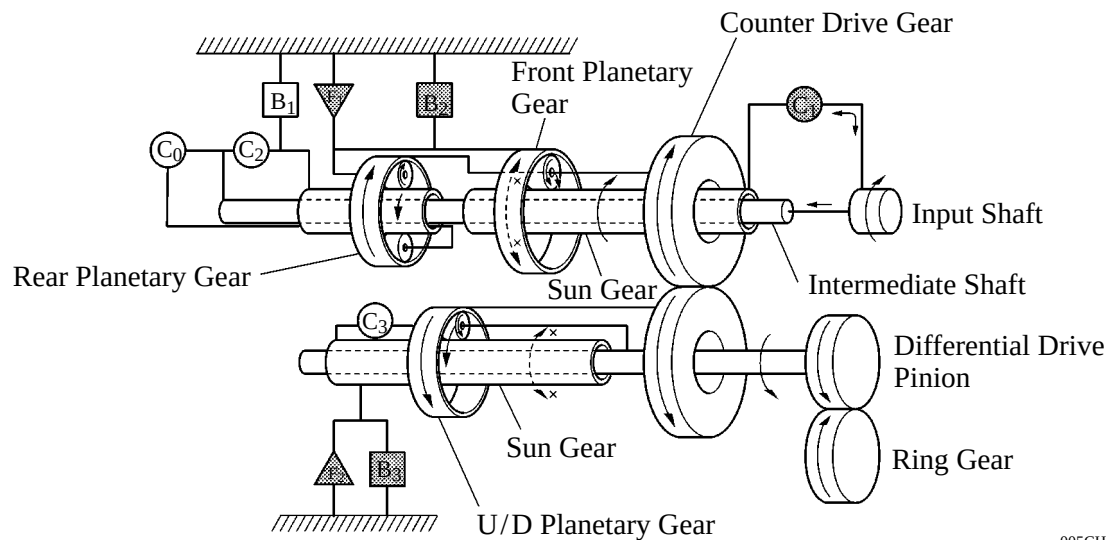
4th Gear (D or 4 Position)



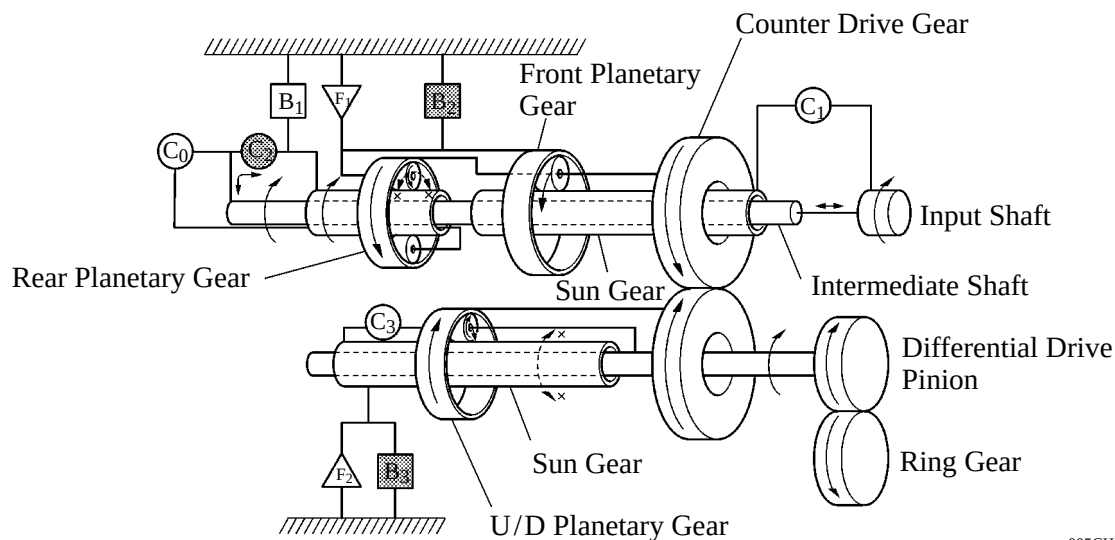
211CH07

5th Gear (D Position)

005CH13Y

1st Gear (L Position)

005CH14Y

Reverse Gear (R Position)

005CH15Y

■ FEATURES OF 2AZ-FE ENGINE

The 2AZ-FE engine has achieved the following performance through the use of the items listed below.

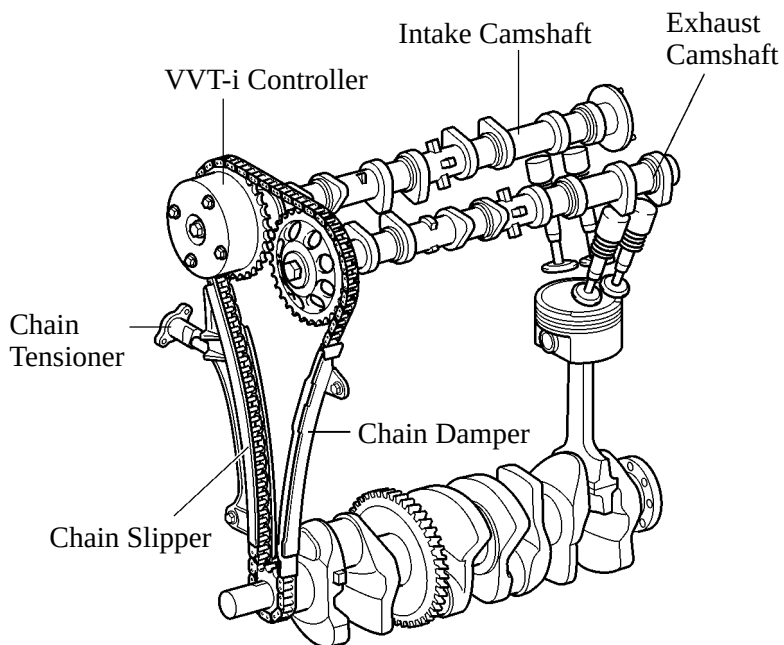
- (1) High performance and reliability
- (2) Low noise and vibration
- (3) Lightweight and compact design
- (4) Good serviceability
- (5) Clean emission and fuel economy

Section	Item	(1)	(2)	(3)	(4)	(5)
Engine Proper	A cylinder block made of aluminum alloy along with a magnesium alloy die-cast cylinder head cover is used.			○		
	A taper squish shape is used for the combustion chamber.	○				○
	A resin gear balance shaft is used.		○	○		
Valve Mechanism	A timing chain and chain tensioner are used.		○	○	○	
	The shim-less type valve lifters are used.	○		○		
	The VVT-i system is used.	○				○
Intake and Exhaust System	A charcoal filter is used in the air cleaner cap.					○
	Intake manifold made of plastic is used.			○		
	The linkless-type throttle body is used.			○	○	
	A thin-wall ceramic TWC (Three-Way Catalytic converter) is used.					○
Fuel System	The fuel returnless system is used.			○	○	○
	Quick connectors are used to connect the fuel hose with the fuel pipe.			○	○	○
	12-hole type fuel injectors with high atomizing performance are used.	○				○
Ignition System	Iridium-tipped spark plugs are used.	○			○	
Charging System	The segment conductor type generator is used.	○	○	○		
Starting System	PS (Planetary reduction-Segment conductor motor) type starter is used.	○		○		
Engine Control System	The ETCS-i is used.	○				○
	The DIS (Direct Ignition System) makes ignition timing adjustment unnecessary.	○			○	○
	The non-contact type sensor is used in the throttle position sensor.	○				
	The planar type air-fuel ratio sensor is used.					○

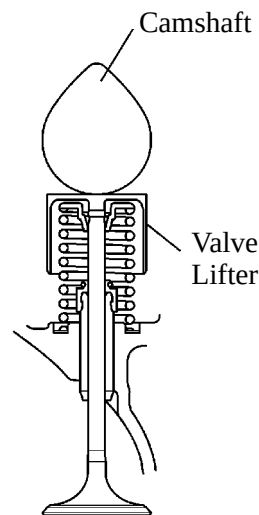
■ VALVE MECHANISM

1. General

- The VVT-i system is used to improve fuel economy, engine performance and reduce exhaust emissions. For details of VVT-i system, see page EG-48.
- The intake and exhaust camshafts are driven by a timing chain.
- Along with the increase in the amount of valve lift, the shim-less type valve lifter is used. This valve lifter increases the cam contact surface.



181EG10



240EG46

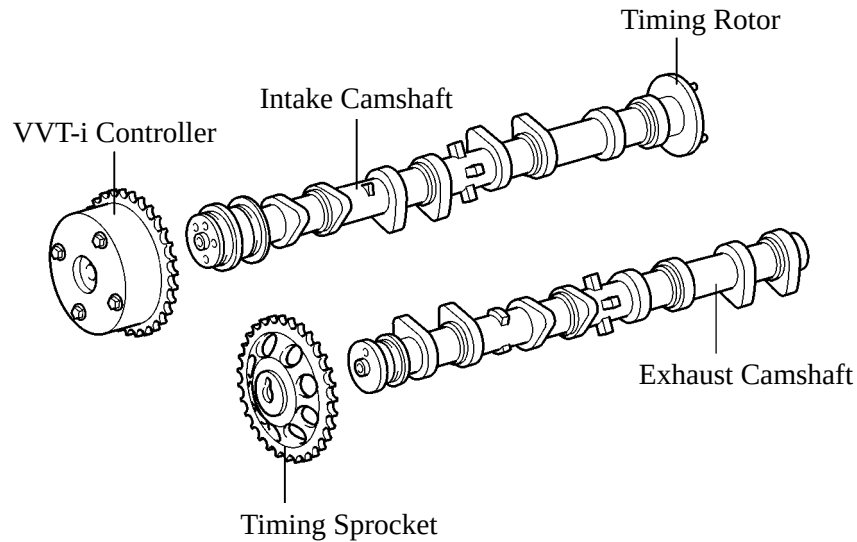
Service Tip

The adjustment of the valve clearance is accomplished by selecting and replacing the appropriate valve lifters.

A total of 35 valve lifters are available in 0.02 mm (0.008 in.) increments, from 5.06 mm (0.199 in.) to 5.74 mm (0.226 in.). For details, refer to 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

2. Camshaft

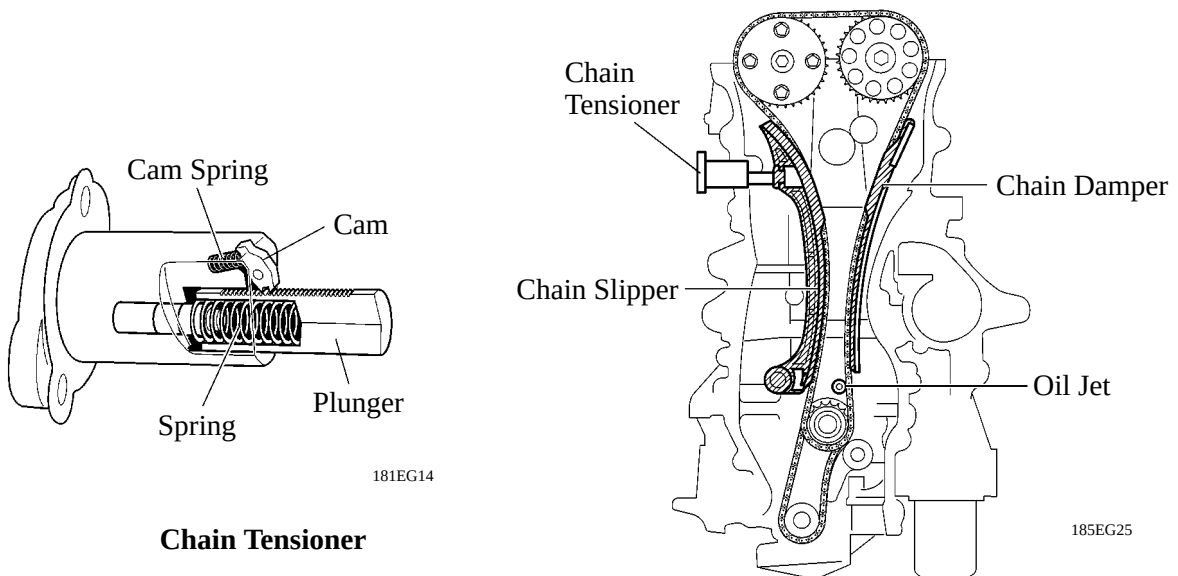
- The intake camshaft is provided with timing rotor to trigger the camshaft position sensor.
- In conjunction with the adoption of the VVT-i system, an oil passage is provided in the intake camshaft in order to supply engine oil pressure to the VVT-i system.
- A VVT-i controller has been installed on the front of the intake camshaft to vary the timing of the intake valves.



181EG11

3. Timing Chain

- A roller chain with an 8 mm (0.315 in.) pitch is used to make the engine more compact.
- The timing chain is lubricated by an oil jet.
- The chain tensioner uses a spring and oil pressure to maintain proper chain tension at all times.
- The chain tensioner suppresses noise generated by the timing chain.
- A ratchet type non-return mechanism is used.
- To achieve excellent serviceability, the chain tensioner is constructed so that it can be removed and installed from the outside of the timing chain cover.



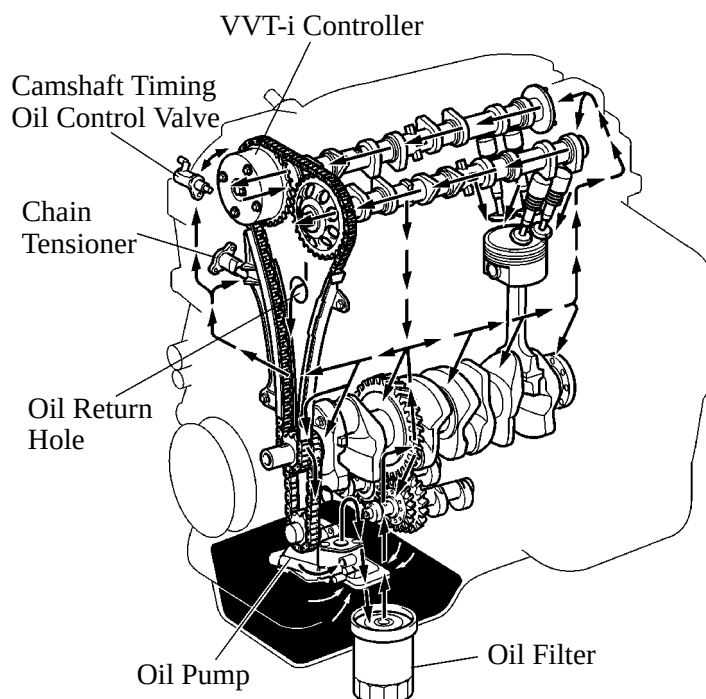
181EG14

185EG25

■ LUBRICATION SYSTEM

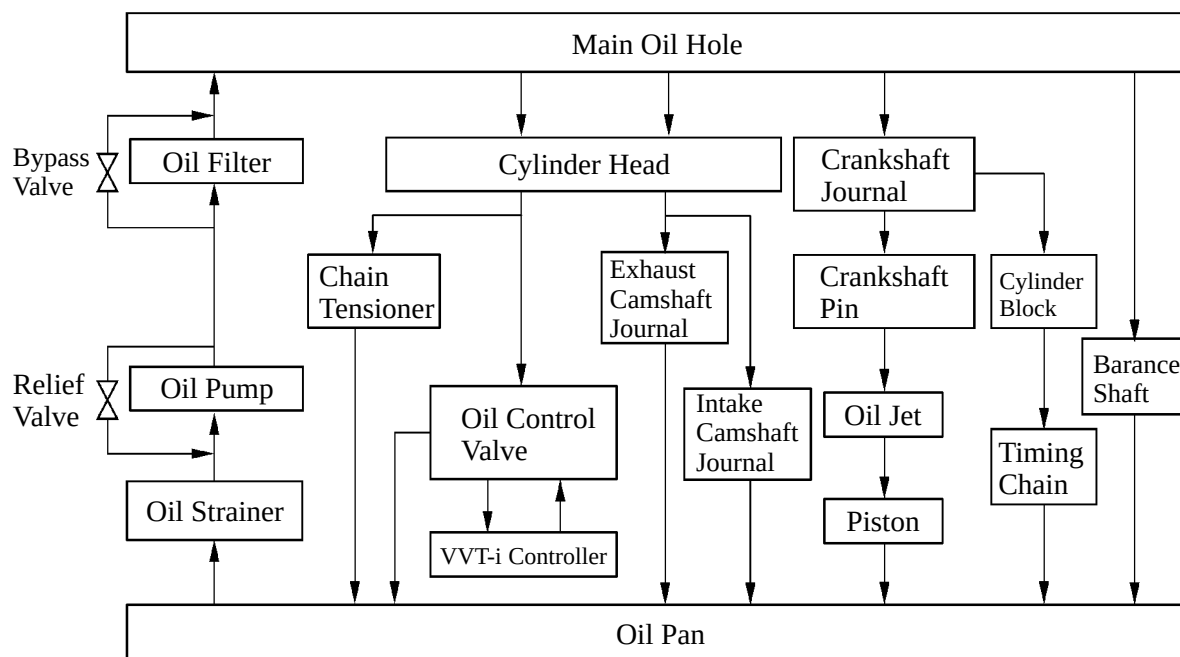
1. General

- The lubrication circuit is fully pressurized and oil passes through an oil filter.
- The trochoid gear type oil pump is chain-driven by the crankshaft.
- The oil filter is attached downward from the crankcase to improve serviceability.
- Along with the adoption of the VVT-i system, the cylinder head is provided with a VVT-i controller and a camshaft timing oil control valve. This system is operated by the engine oil.



208EG07

► Oil Circuit ◀



01NEG33Y

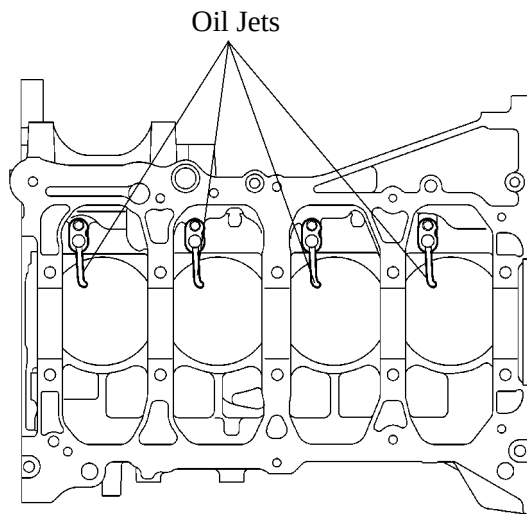
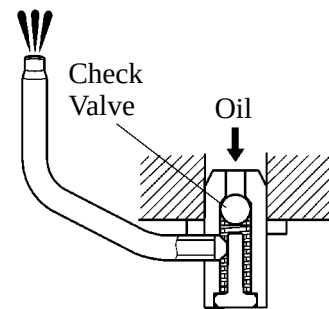
► Oil Capacity ◀

Liters (US qts, Imp. qts)

Dry	5.0 (5.3, 4.4)
with Oil Filter	4.3 (4.5, 3.8)
without Oil Filter	4.1 (3.8, 3.1)

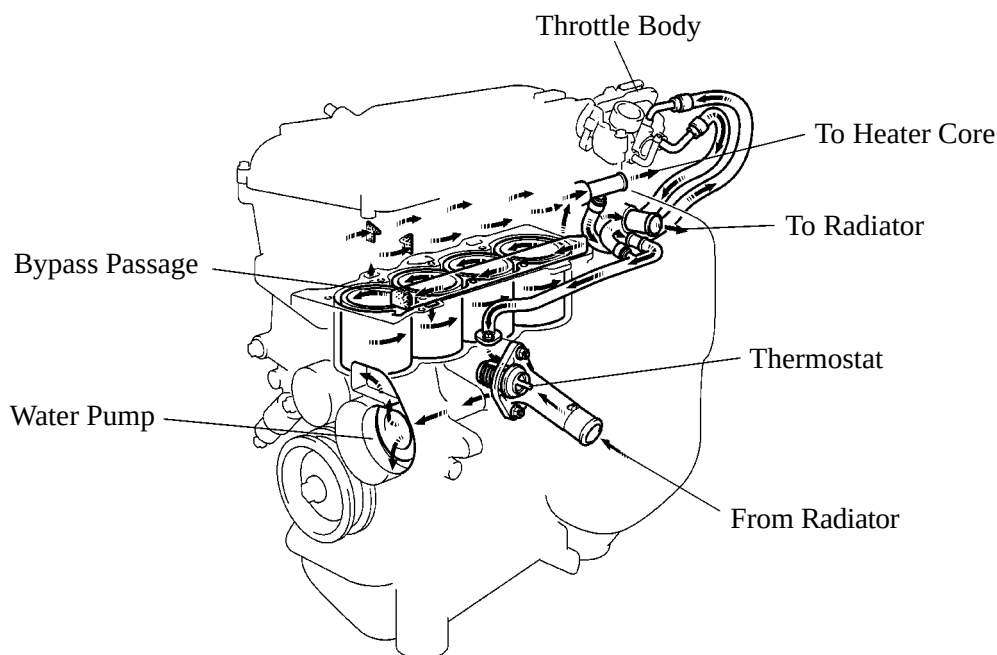
2. Oil Jet

- Piston oil jets for cooling and lubricating the pistons are used in the cylinder block.
- These oil jets contain a check valve to prevent oil from being fed when the oil pressure is low. This prevents the overall oil pressure in the engine from dropping.

**Bottom Side View****Oil Jet Cross Section**

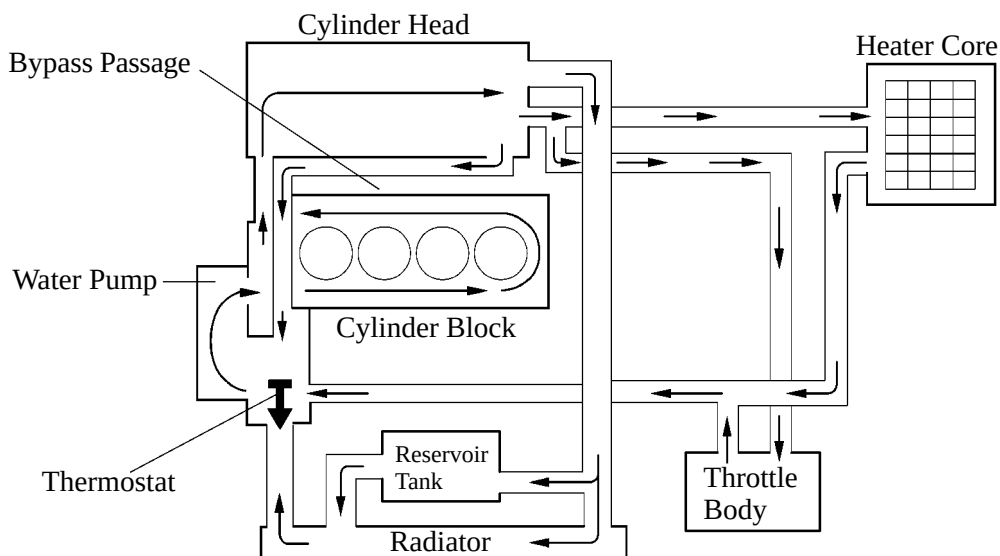
■ COOLING SYSTEM

- The cooling system uses a pressurized forced-circulation system with pressurized reservoir tank.
- A thermostat with a bypass valve is located on the water inlet housing to maintain suitable temperature distribution in the cooling system.
- An aluminum radiator core is used for weight reduction.
- The flow of the engine coolant makes a U-turn in the cylinder block to ensure a smooth flow of the engine coolant. In addition, a bypass passage is enclosed in the cylinder head and the cylinder block.
- Warm water from the engine is sent to the throttle body to prevent freeze-up.
- The TOYOTA genuine Super Long Life Coolant (SLLC) is used.



01NEG35Y

► System Diagram ◀



01NEG59Y

► Engine Coolant Specifications ◀

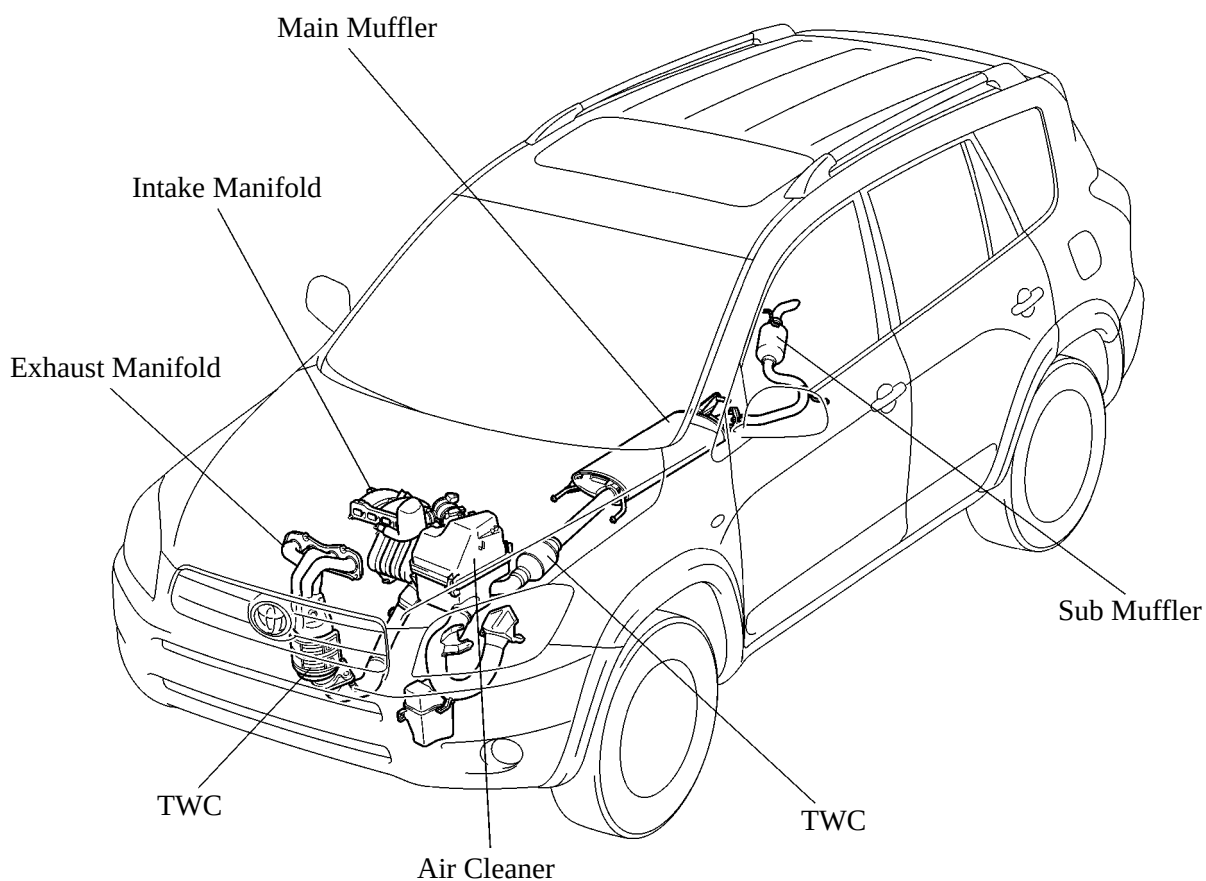
Engine Coolant	Type		TOYOTA genuine Super Long Life Coolant (SLLC) or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite and non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology is a combination of low phosphates and organic acids.) Do not use plain water alone.
	Color		Pink
	Capacity Liters (US qts, Imp. qts)	M/T	6.6 (7.0, 5.8)
		A/T	6.7 (7.1, 5.9)
	Maintenance Intervals	First Time	100,000 mile (160,000 km)
		Subsequent	Every 50,000 mile (80,000 km)
Thermostat	Opening Temperature °C (°F)		80 - 84 (176 - 183)

- SLLC is pre-mixed (the U.S.A. models: 50 % coolant and 50 % deionized water, the Canada. models: 55 % coolant and 45 % deionized water). Therefore, no dilution is needed when SLLC in the vehicle is added or replaced.
- If LLC is mixed with SLLC, the interval for LLC (every 25,000 miles / 40,000 km or 24 months whichever comes first) should be used.
- You can also apply the new maintenance interval (every 50,000 miles / 80,000 km) to vehicles initially filled with LLC (red-colored), if you use SLLC (pink-colored) for the engine coolant change.

■ INTAKE AND EXHAUST SYSTEM

1. General

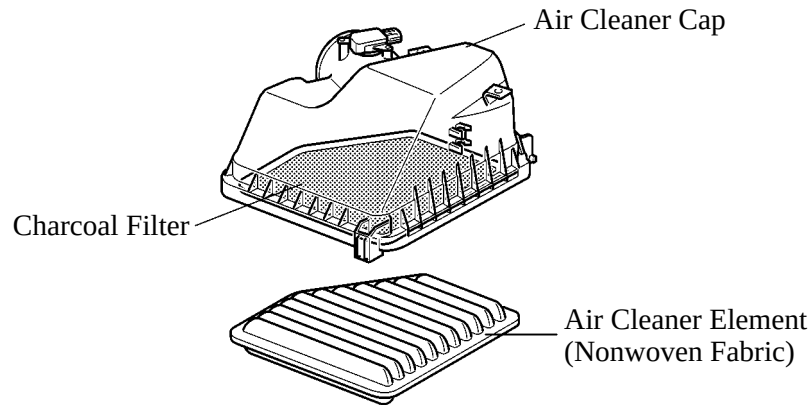
- The linkless-type throttle body is used to realize excellent throttle control.
- ETCS-i (Electronic Throttle Control System-intelligent) is used to provide excellent throttle control. For details, see page EG-43.
- A plastic intake manifold is used for weight reduction.
- A stainless steel exhaust manifold is used for weight reduction.



01MEG32Y

2. Air Cleaner

- A nonwoven, full-fabric type air cleaner element is used.
- A charcoal filter, which adsorbs the HC that accumulates in the intake system when the engine is stopped, is used in the air cleaner cap in order to reduce evaporative emissions.



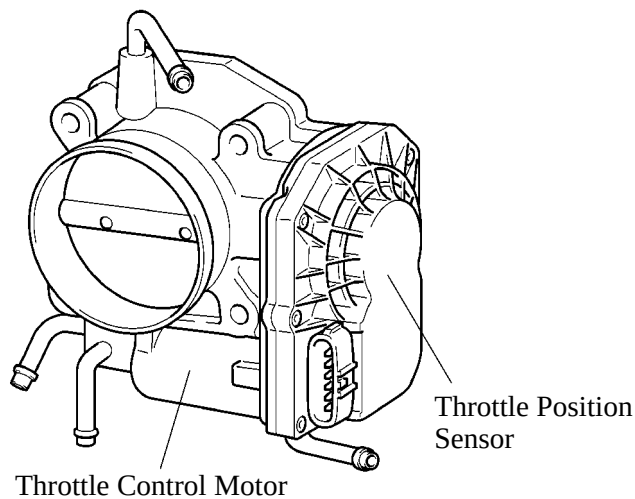
01MEG10Y

Service Tip

The charcoal filter, which is maintenance-free, cannot be removed from the air cleaner cap.

3. Throttle Body

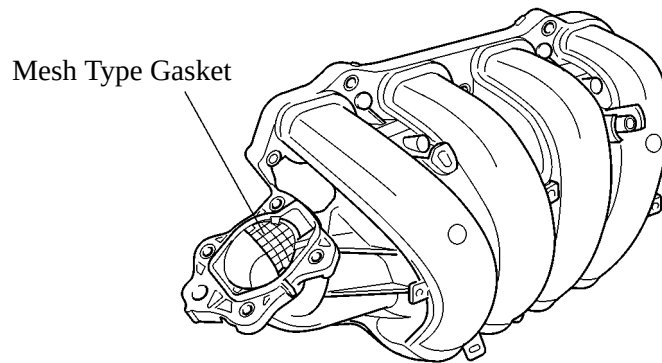
- The linkless-type throttle body is used and it realizes excellent throttle control.
- A DC motor with excellent response and minimal power consumption is used for the throttle control motor. The ECM performs the duty ratio control of the direction and the amperage of the current that flows to the throttle control motor in order to regulate the opening angle of the throttle valve.



01NEG42Y

4. Intake Manifold

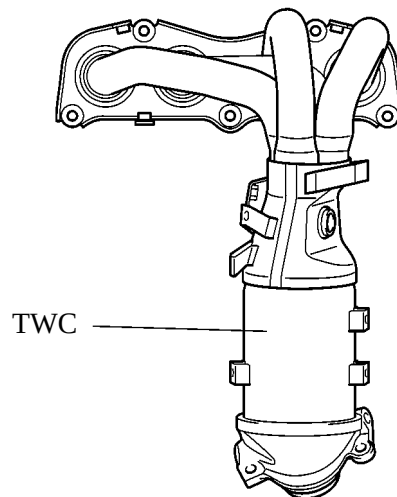
- The intake manifold has been made of plastic to reduce the weight and the amount of heat transferred from the cylinder head. As a result, it has become possible to reduce the intake air temperature and improve the intake volumetric efficiency.
- A mesh type gasket is used, in order to reduce the intake noise.



01NEG37Y

5. Exhaust Manifold

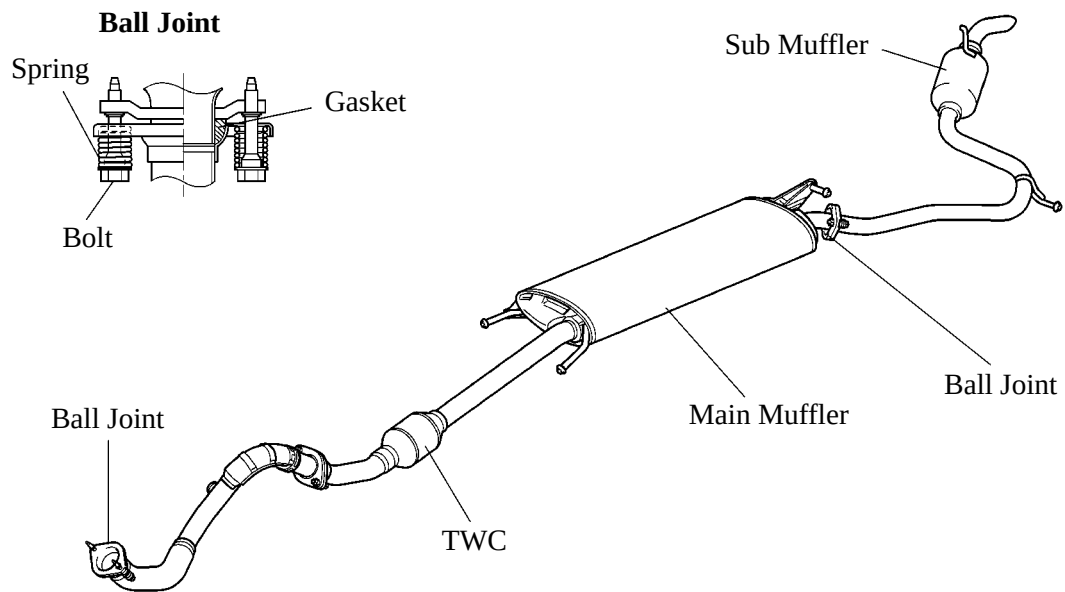
A stainless steel exhaust manifold is used for improving the warm-up of TWC (Three-Way Catalytic converter) and for weight reduction.



01NEG38Y

6. Exhaust Pipe

- The exhaust pipe uses two ball joints in order to achieve a simple construction and ensured reliability.
- The TWC can improve exhaust emission by optimizing the cell density and the wall thickness.

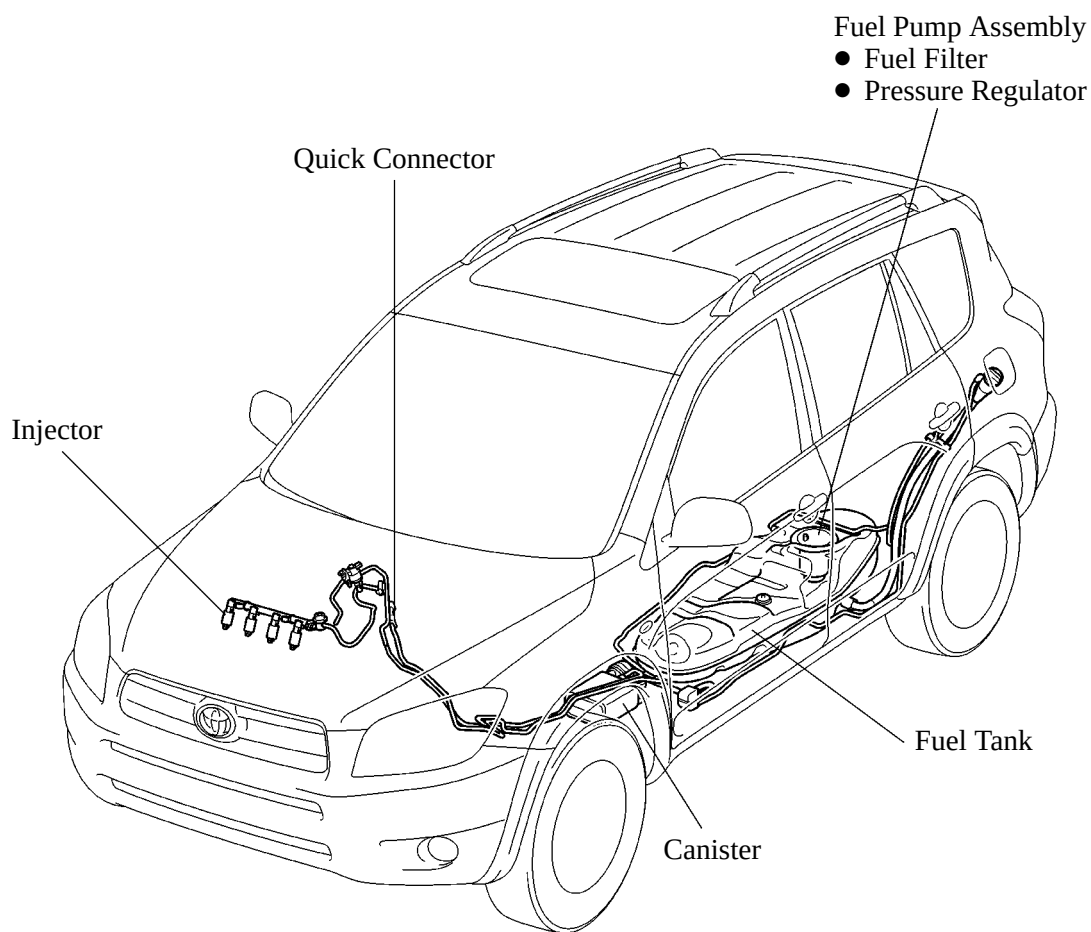


01MEG33Y

■ FUEL SYSTEM

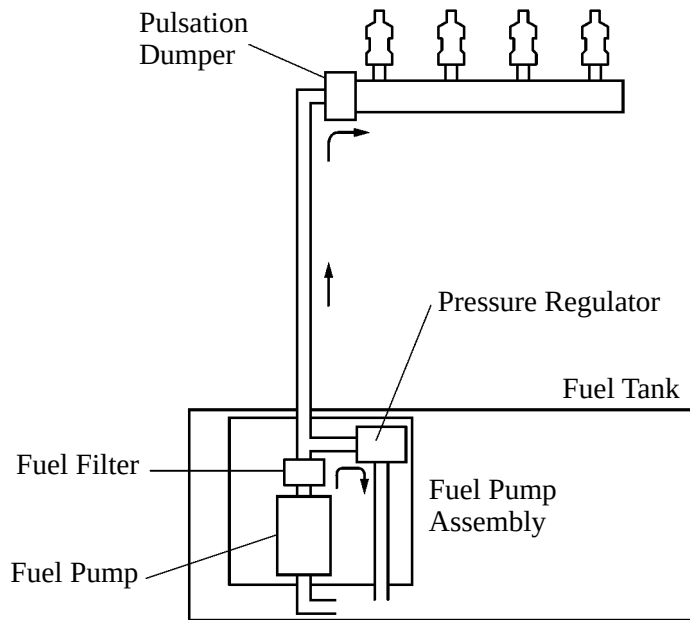
1. General

- The fuel returnless system is used to reduce evaporative emissions.
- A fuel cut control is used to stop the fuel pump when the SRS airbag is deployed in a front or side collision. For details, see page EG-53.
- A quick connector is used in the fuel main pipe to improve serviceability.
- The 12-hole type fuel injector is used.
- The ORVR (On-board Refueling Vapor Recovery) system is used. For details, see page EG-54.



2. Fuel Returnless System

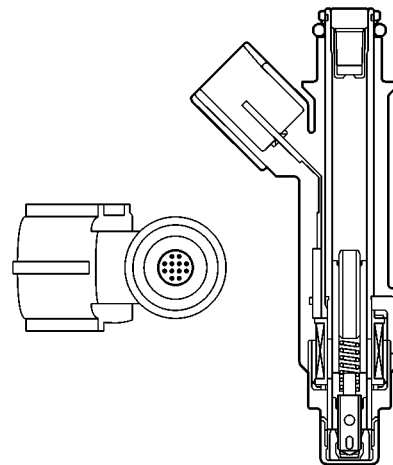
Fuel returnless system is used to reduce the evaporative emission. As shown below, by integrating the fuel filter and pressure regulator with fuel pump assembly, the fuel return system in which the fuel returns from the engine area is discontinued and temperature rise inside the fuel tank is prevented.



185EG16

3. Fuel Injector

The 12-hole type injector is used. By modifying its injector nozzle to a taper shape, this injector has achieved high atomizing performance of fuel. In addition, the injector provides good performance with the lightweight moving parts and the optimized magnetic circuit.

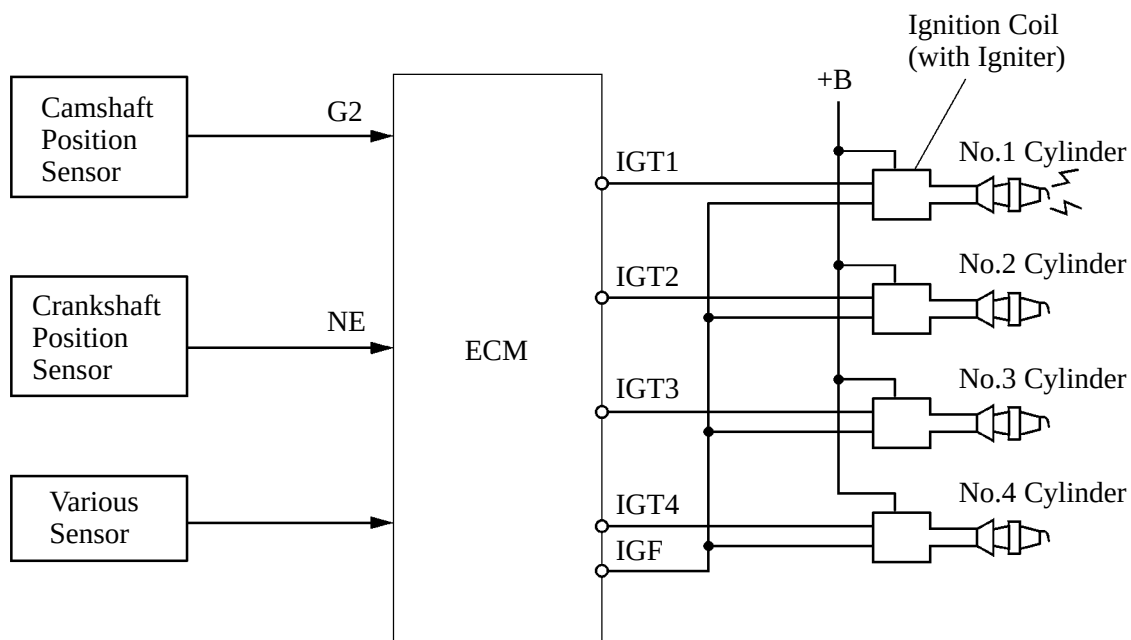


DR011EG18

■ IGNITION SYSTEM

1. General

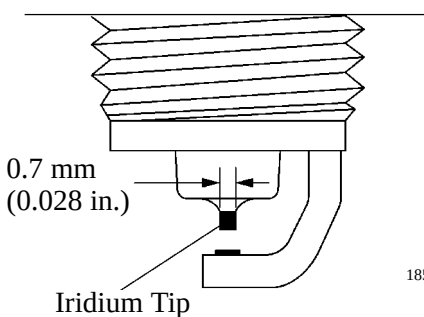
- A DIS (Direct Ignition System) is used. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor.
- The DIS in this engine is an independent ignition system which has one ignition coil (with igniter) for each cylinder.
- Iridium-tipped spark plugs are used.



165EG25

2. Spark Plug

Iridium-tipped spark plugs are used to improve ignition performance while maintaining the same durability of the platinum-tipped spark plugs.



185EG38

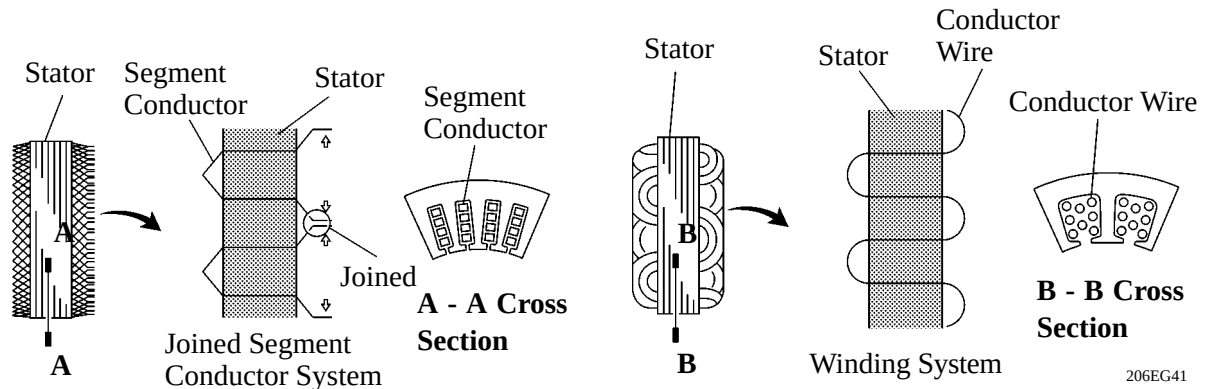
► Specifications ◀

DENSO	SK20R11
NGK	IFR6A11
Plug Gap	1.0 - 1.1 mm (0.039 - 0.043 in.)

■ CHARGING SYSTEM

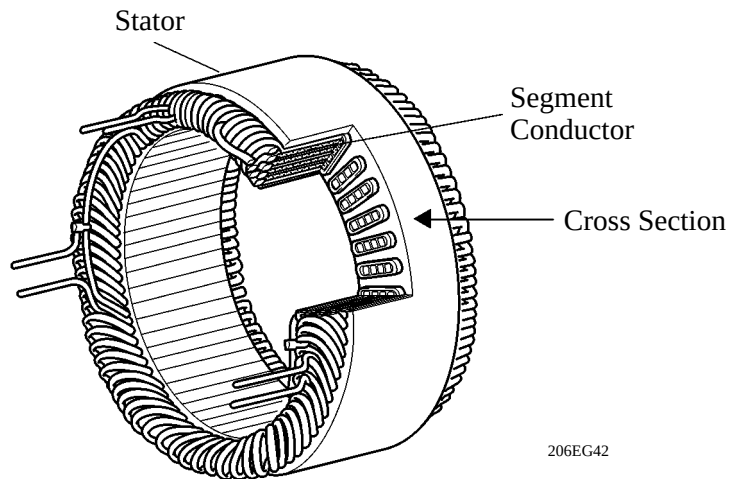
1. Segment Conductor Type Generator

- A compact and lightweight segment conductor type generator that generates high amperage output in a highly efficient manner is used.
- This generator has a joined segment conductor system in which multiple segment conductors are welded together to form the stator. Compared to the conventional winding system, the electrical resistance is reduced due to the shape of the segment conductors, and their arrangement helps to make the generator compact.



Segment Conductor Type Generator

Conventional Type Generator

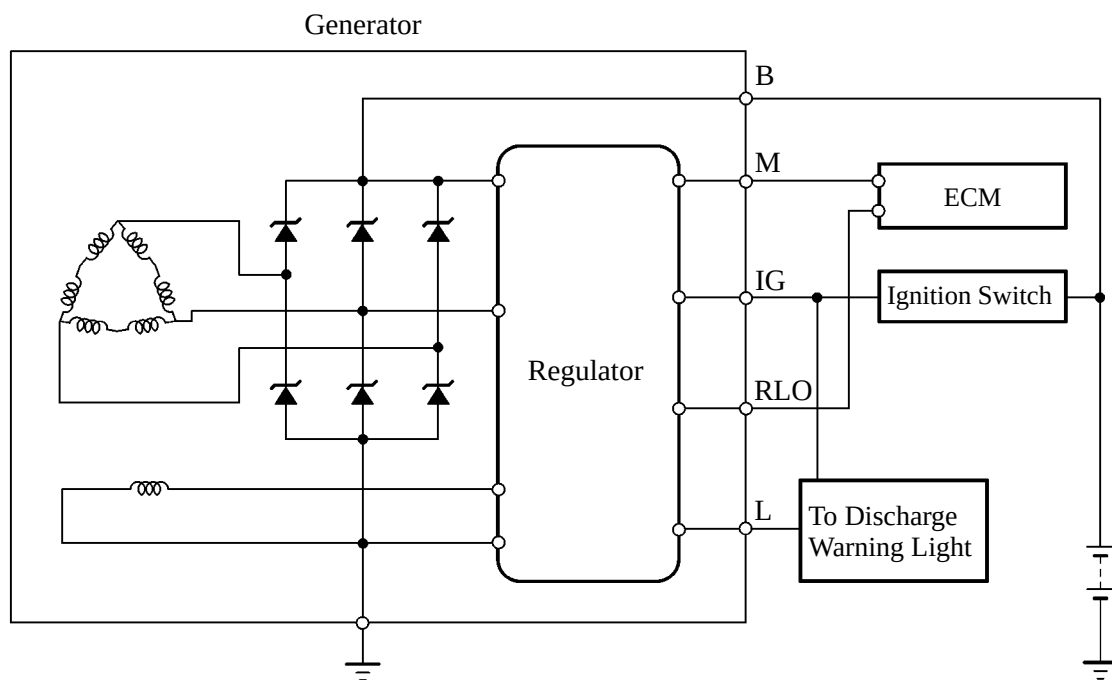


Stator of Segment Conductor Type Generator

► Specifications ◀

Type	SE0
Rated Voltage	12 V
Rated Output	100 A
Initial Output Starting Speed	Max. 1,500 rpm

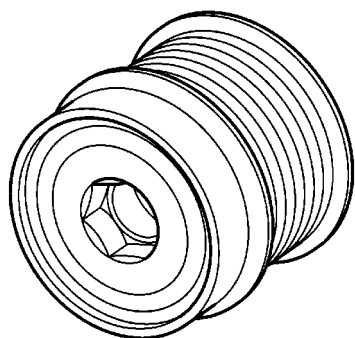
► Wiring Diagram ◀



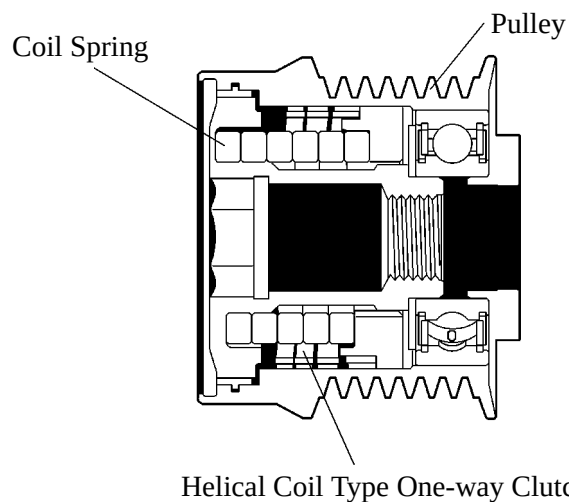
01NEG45Y

2. Generator Pulley

- A helical coil type one-way clutch is used on the generator pulley in order to reduce the load that acts on the auxiliary equipment belt.
- The pulley mounting nut and the generator pulley have been integrated to achieve a compact construction.



281EG12



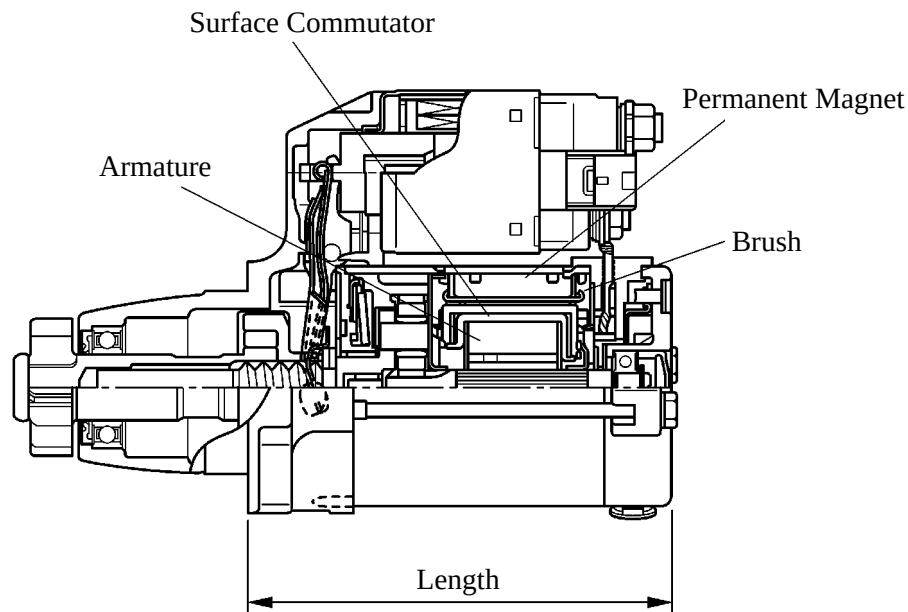
281EG13

Helical Coil Type One-way Clutch

■ STARTING SYSTEM

1. General

- A compact and lightweight PS (Planetary reduction-Segment conductor motor) type starter is used.
- Because the PS type starter contains an armature that uses square-shaped conductors, and its surface functions as a commutator, it has resulted in both improving its output torque and reducing its overall length.
- In place of the field coil used in the conventional type starter, the PS type starter uses two types of permanent magnets: main magnets and interpolar magnets. The main magnets and interpolar magnets have been efficiently arranged to increase the magnetic flux and to shorten the length of the yoke.



01NEG46Y

► Specifications ◀

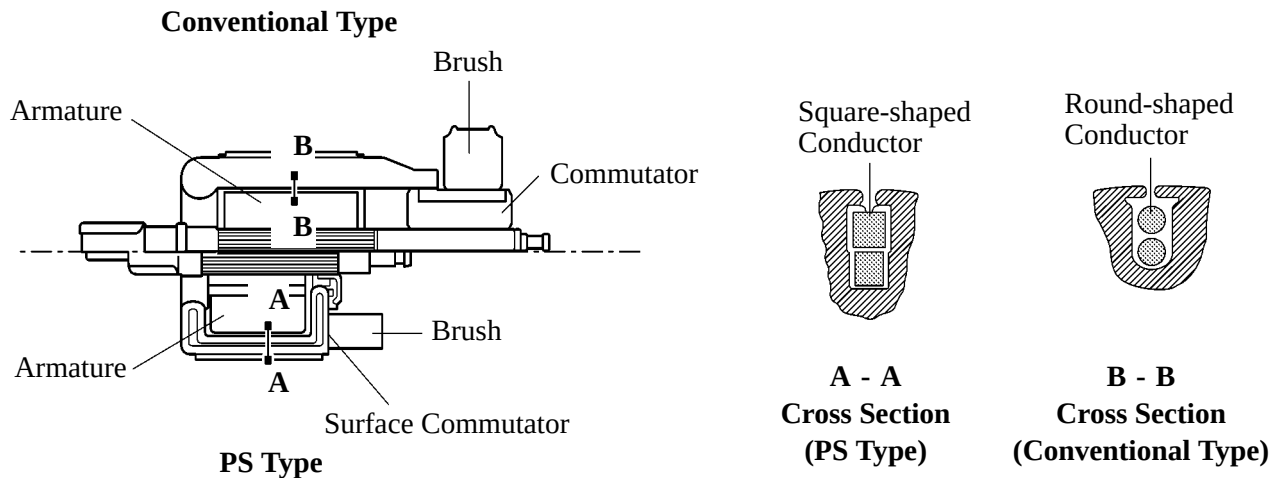
Starter Type	PS Type
Rating Output	1.7 kW
Rating Voltage	12 V
Length* ¹ mm (in.)	128 (5.04)
Weight g (lb)	2950 (6.50)
Rotational Direction* ²	Counterclockwise

*¹: Length from the mounted area to the rear end of the starter

*²: Viewed from pinion side

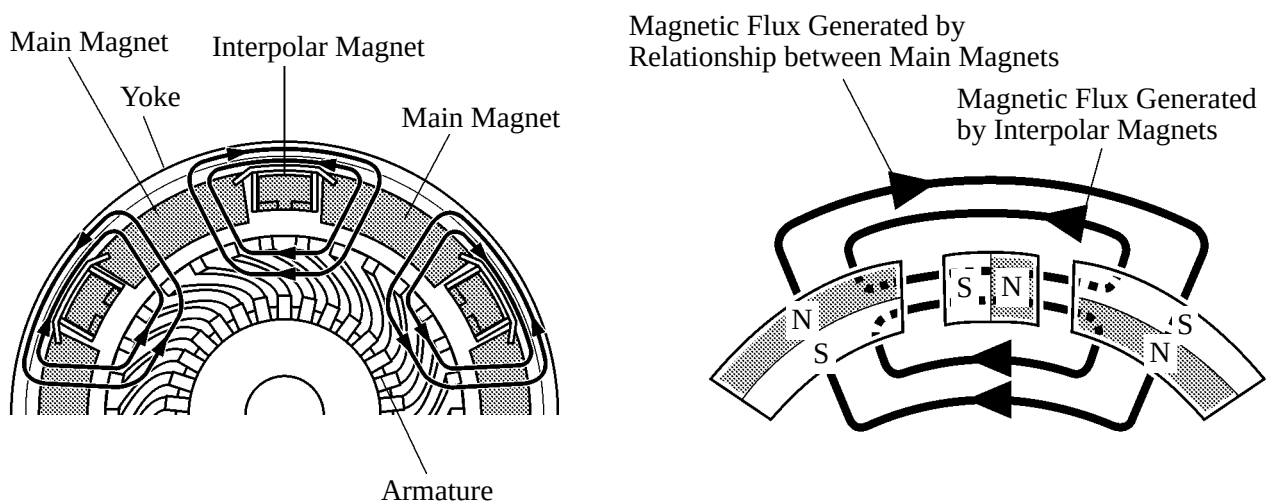
2. Construction

- Instead of constructing the armature coil with conventional type round-shaped conductor wires, the PS type starter uses square conductors. With this type of construction, the same conditions that are realized by winding numerous round-shaped conductor wires can be achieved without increasing the mass. As a result, the output torque has been increased, and the armature coil has been made more compact.
- Because the surface of the square-shaped conductors that are used in the armature coil functions as a commutator, the overall length of the PS type starter has been shortened.



206EG20

- Instead of the field coils used in the conventional type starter, the PS type starter uses two types of permanent magnets: the main magnets and the interpolar magnets. The main and interpolar magnets are arranged alternately inside the yoke, allowing the magnetic flux that is generated between the main and interpolar magnets to be added to the magnetic flux that is generated by the main magnets. In addition to increasing the amount of magnetic flux, this construction shortens the overall length of the yoke.



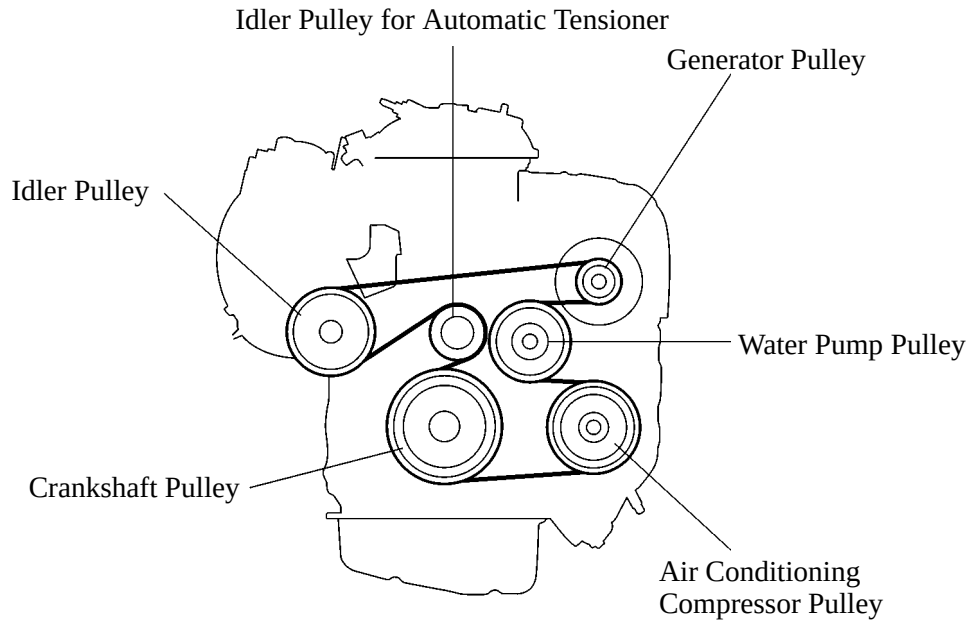
Cross Section of Yoke

222EG15

■ SERPENTINE BELT DRIVE SYSTEM

1. General

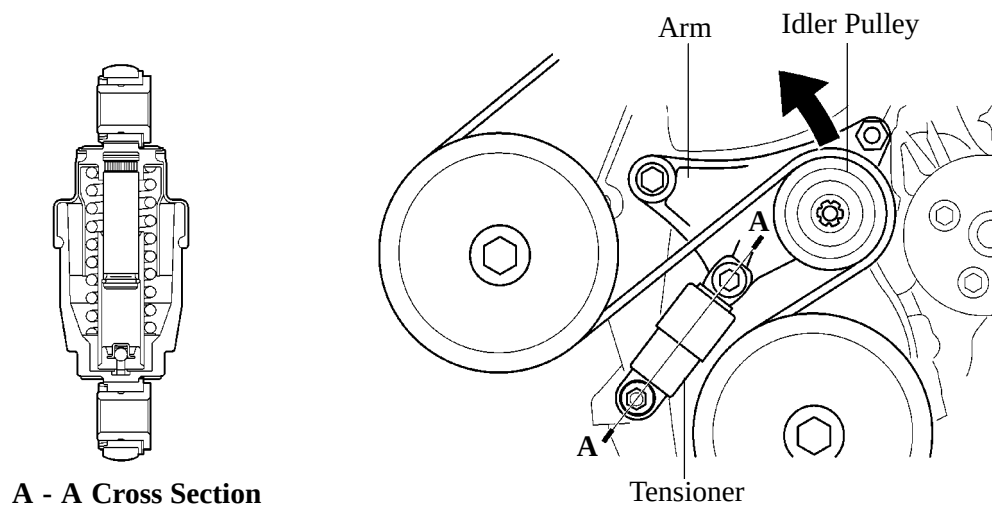
- Accessory components are driven by a serpentine belt consisting of a single V-ribbed belt. It reduces the overall engine length, weight and the number of engine parts.
- An automatic tensioner eliminates the need for tension adjustment.



240EG98

2. Automatic Tensioner

The automatic tensioner consists of an idler pulley and a tensioner. The idler pulley maintains belt tension by the force of the spring that is located in the tensioner.



258RV77

■ ENGINE CONTROL SYSTEM

1. General

The engine control system for the 2AZ-FE engine has the following systems.

System	Outline
SFI Sequential Multiport Fuel Injection	● An L-type SFI system directly detects the intake air volume with a hot-wire type mass air flow meter. ● The fuel injection system is a sequential multiport fuel injection system.
ESA Electronic Spark Advance	Ignition timing is determined by the ECM based on signals from various sensors. The ECM corrects ignition timing in response to engine knocking.
ETCS-i Electronic Throttle Control System-intelligent (See page-43)	Optimally controls the throttle valve opening in accordance with the amount of accelerator pedal effort and the condition of the engine and the vehicle. ● A linkless-type is used, without an accelerator cable. ● An accelerator pedal position sensor is provided on the accelerator pedal. ● A non-contact type throttle position sensor and accelerator pedal position sensor are used.
VVT-i Variable Valve Timing-intelligent (See page EG-48)	Controls the intake camshaft to an optimal valve timing in accordance with the engine condition.
Air-fuel Ratio Sensor, Oxygen Sensor Heater Control	Maintains the temperature of the air-fuel ratio sensor or oxygen sensor at an appropriate level to realize accuracy of detection of the oxygen concentration in the exhaust gas.
Air Conditioning Cut-off Control	By turning the air conditioning compressor ON or OFF in accordance with the engine condition, drivability is maintained.
Cooling Fan Control (See page EG-52)	Radiator cooling fan operation is controlled by signals from ECM based on the engine coolant temperature sensor signal and the condition of the air conditioning operation.
Fuel Pump Control (See page EG-53)	● Fuel pump operation is controlled by signal from the ECM. ● The fuel pump is stopped when the SRS driver's and front passenger's airbags are deployed.
Evapotative Emission Control (See page EG-54)	The ECM controls the purge flow of evaporative emissions (HC) in the canister in accordance with engine conditions. Approximately five hours after the ignition switch has been turned OFF, the ECM operates the canister pump module to detect any evaporative emission leakage occurring in the EVAP (evaporative emission) control system through changes in the 0.02 in. leak pressure.
Charging Control (See page EG-65)	The ECM regulates the charging voltage of the generator in accordance with the driving conditions and the charging state of the battery.

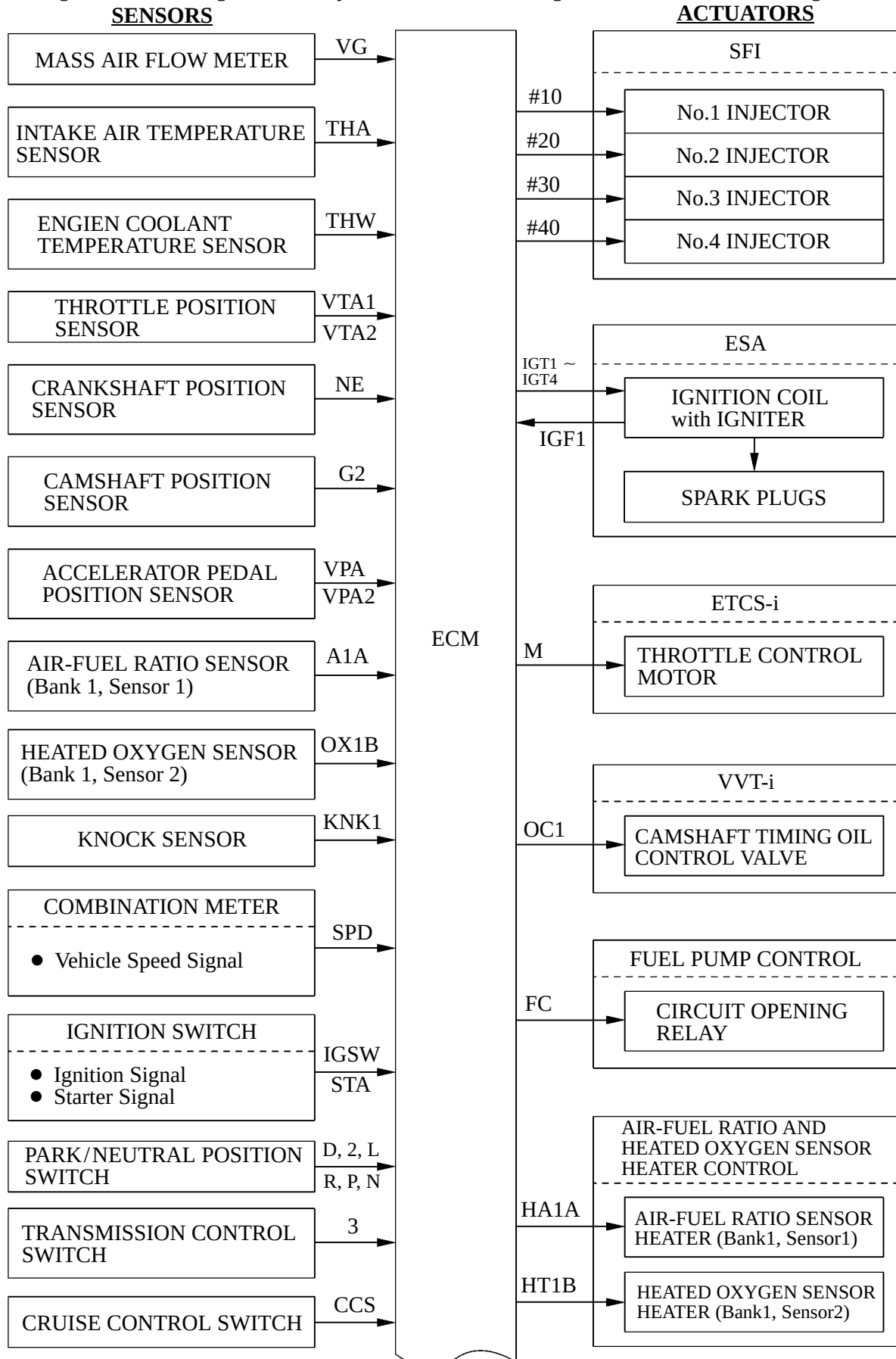
(Continued)

System	Outline
Engine Immobilizer* ²	Prohibits fuel delivery and ignition if an attempt is made to start the engine with an invalid ignition key.
Diagnosis (See page EG-67)	When the ECM detects a malfunction, the ECM diagnoses and memorizes the failed section.
Fail-safe (See page EG-67)	When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in memory.

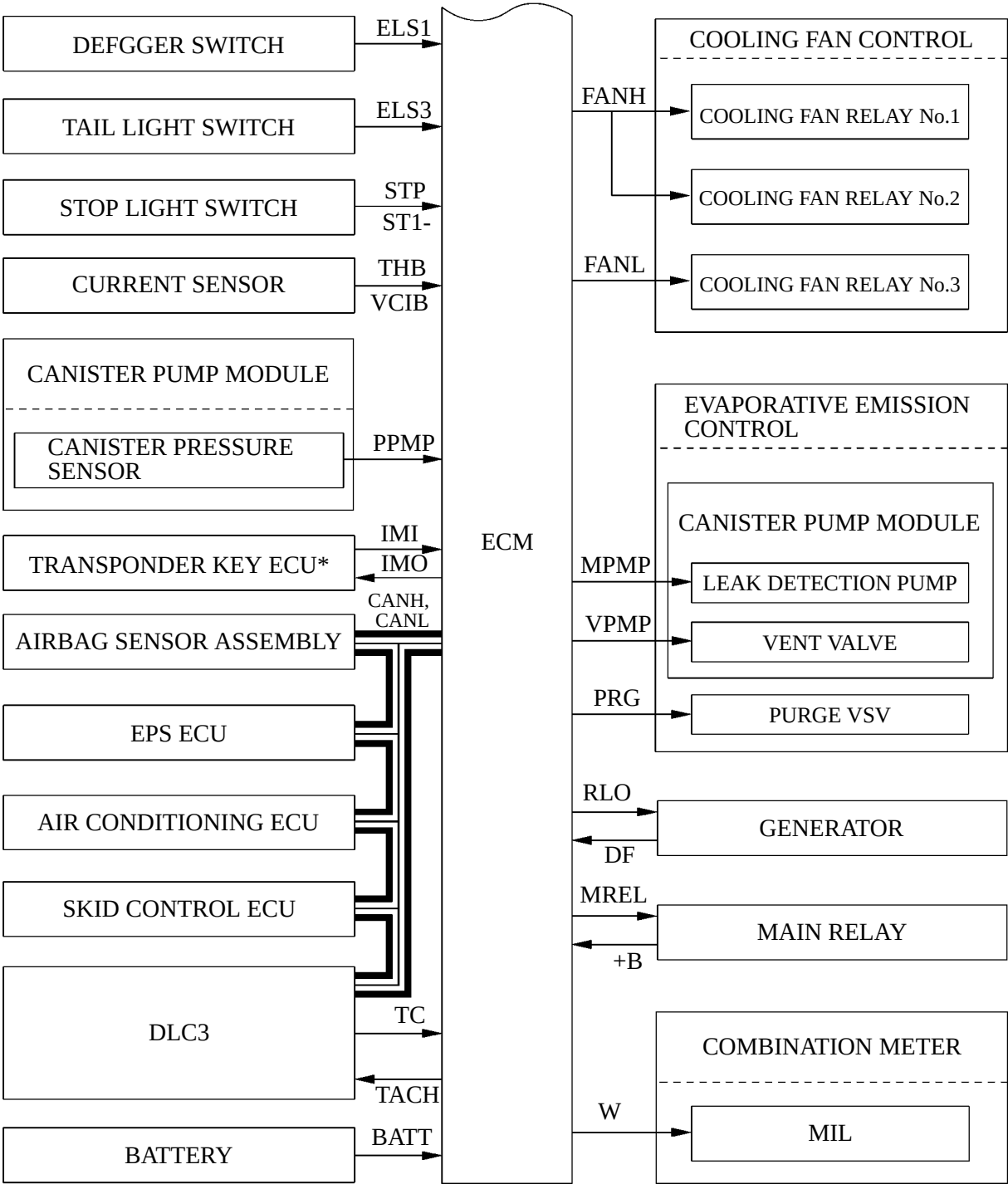
*²: Models with Engine Immobilizer System

2. Construction

The configuration of the engine control system in the 2AZ-FE engine is shown in the following chart.



(Continued)
01MEG04Y

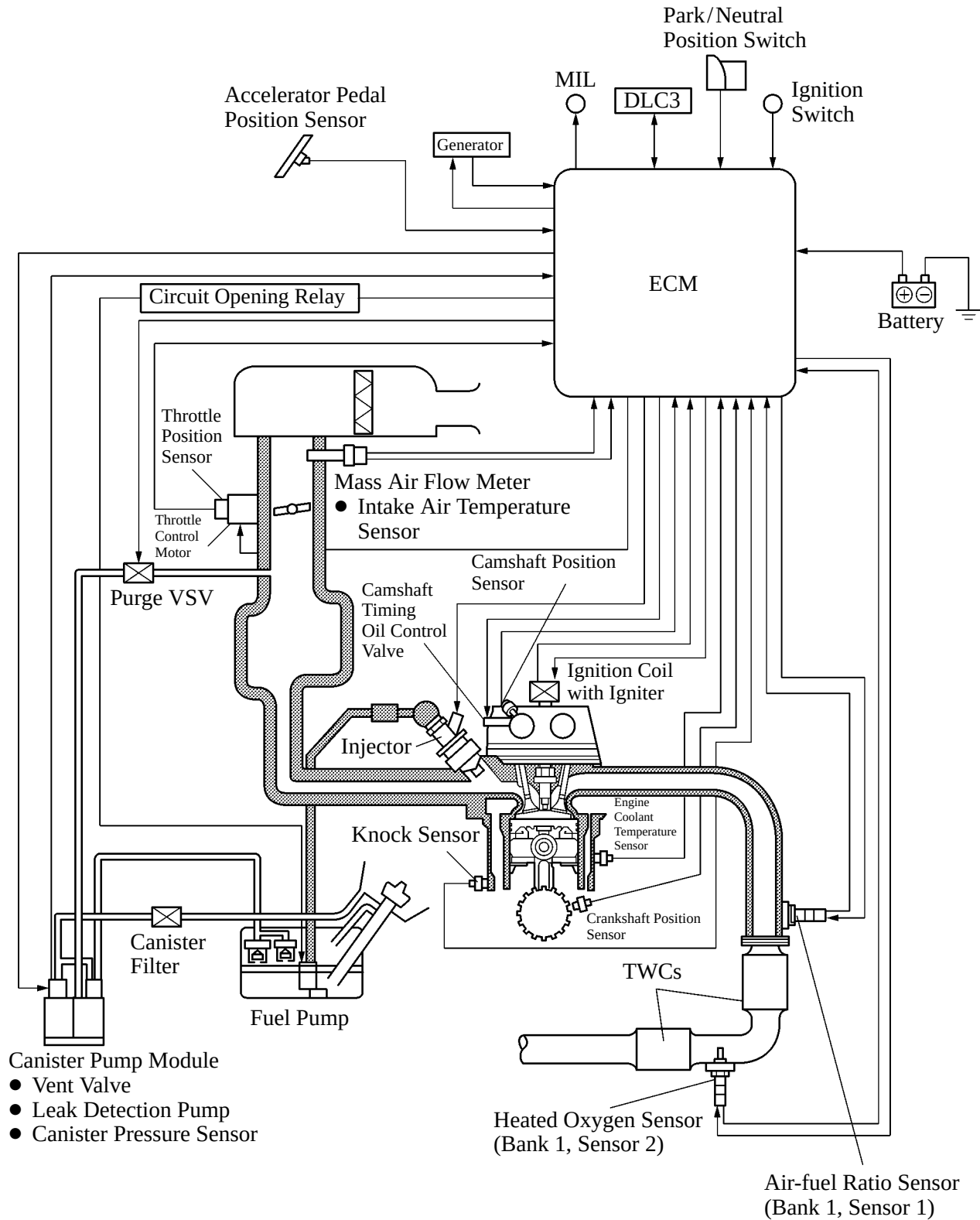


≡ : CAN

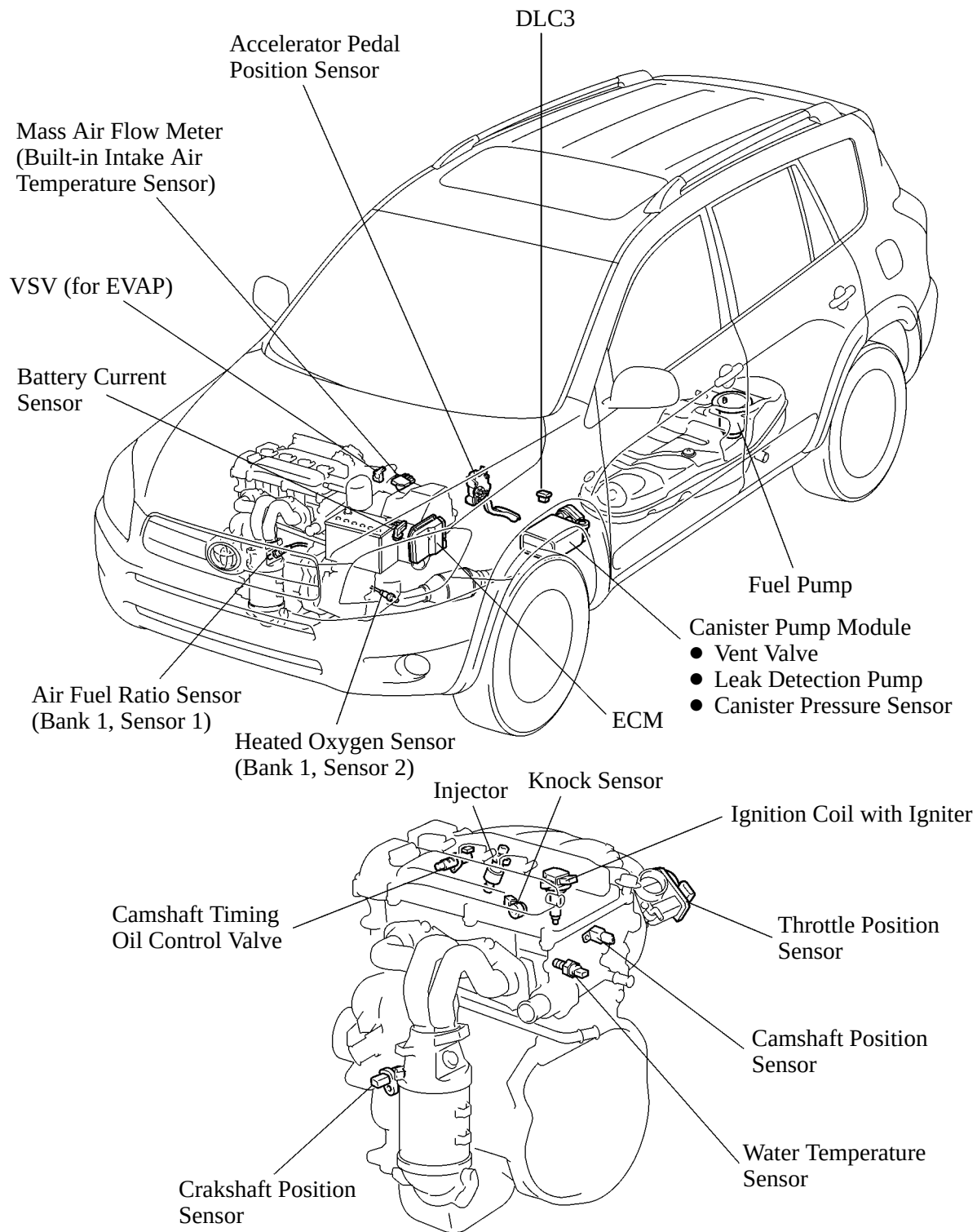
01MEG05Y

*: Models with Engine Immobilizer System

3. Engine Control System Diagram



4. Layout of Main Components



5. Main Components of Engine Control System

General

The main components of the 2AZ-FE engine control system are as follows:

Component	Outline	Quantity
ECM	32-bit CPU	1
Mass Air Flow Meter	Hot-wire Type	1
Crankshaft Position Sensor (Rotor Teeth)	Pick-up Coil Type (36-2)	1
Camshaft Position Sensor (Rotor Teeth)	Pick-up Coil Type (3)	1
Throttle Position Sensor	Non-contact Type	1
Accelerator Pedal Position Sensor	Non-contact Type	1
Knock Sensor	Built-in Piezoelectric Element Type (Flat Type)	1
Air-fuel Ratio Sensor (Bank 1, Sensor 1)	Type with Heater (Planar Type)	1
Heated Oxygen Sensor (Bank 1, Sensor 2)	Type with Heater (Cup Type)	1
Injector	12-hole Type	4

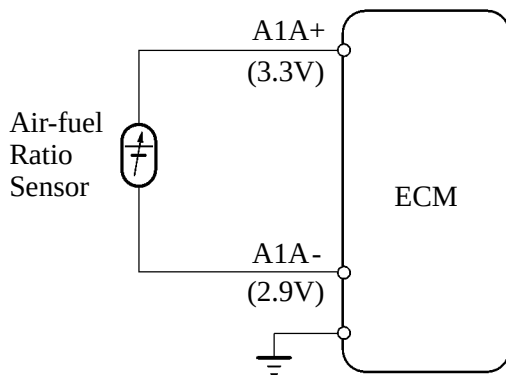
ECM

The 32-bit CPU of the ECM is used to increase the speed for processing the signals.

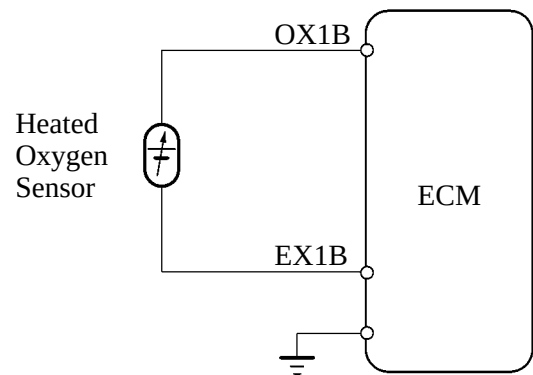
Air-fuel Ratio Sensor and Heated Oxygen Sensor

1) General

- The air-fuel ratio sensor and heated oxygen sensor differ in output characteristics.
- Approximately 0.4V is constantly applied to the air-fuel ratio sensor, which outputs an amperage that varies in accordance with the oxygen concentration in the exhaust emission. The ECM converts the changes in the output amperage into voltage in order to linearly detect the present air-fuel ratio. The air-fuel ratio sensor data is read out by the hand-held tester.
- The output voltage of the heated oxygen sensor changes in accordance with the oxygen concentration in the exhaust emission. The ECM uses this output voltage to determine whether the present air-fuel ratio is richer or leaner than the stoichiometric air-fuel ratio.

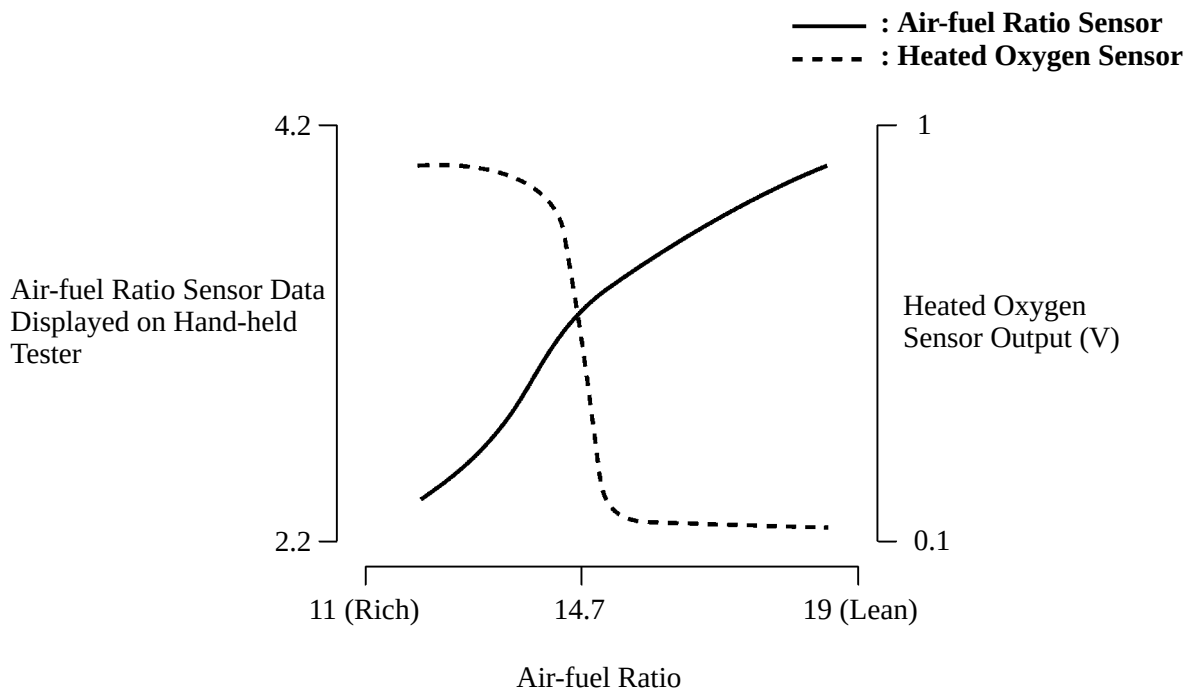


Air-fuel Ratio Sensor Circuit



00REG21Y

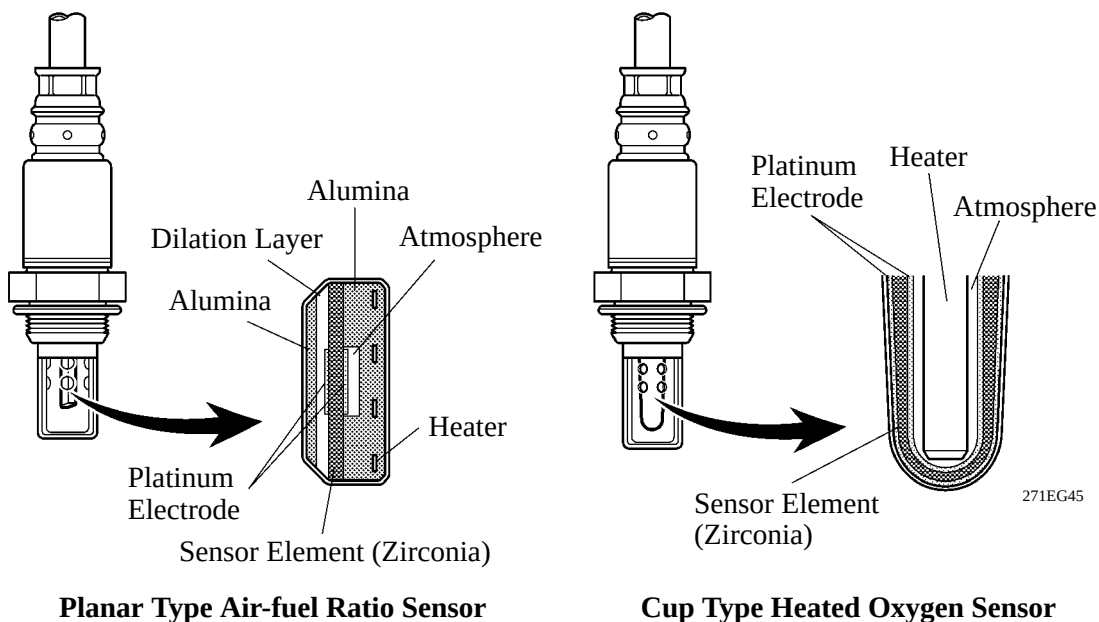
Heated Oxygen Sensor



D13N11

2) Construction

- The basic construction of the air-fuel ratio sensor and heated oxygen sensor is the same. However, they are divided into the cup type and the planar type, according to the different types of heater construction that are used.
- The cup type sensor contains a sensor element that surrounds a heater.
- The planar type sensor uses alumina, which excels in heat conductivity and insulation, to integrate a sensor element with a heater, thus realizing the excellent warm-up performance of the sensor.

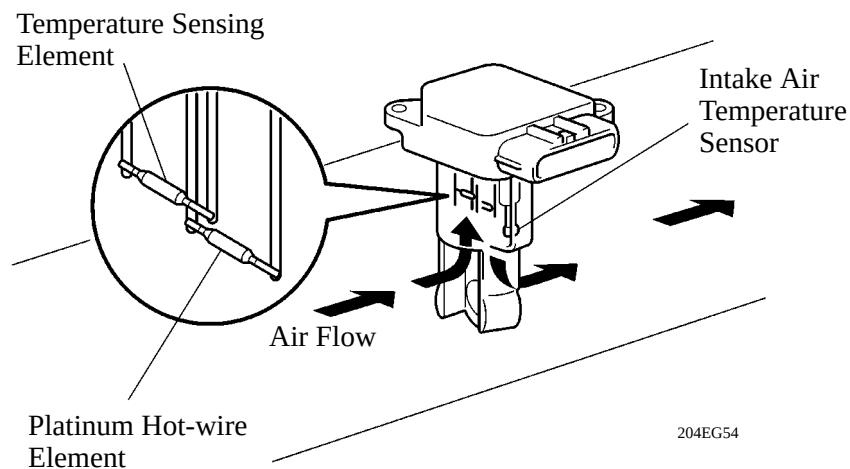


► Warm-up Specification ◀

Sensor Type	Planar Type	Cup Type
Warm-up Time	Approx. 10 sec.	Approx. 30 sec.

Mass Air Flow Meter

- The compact and lightweight mass air flow meter, which is a plug-in type, allows a portion of the intake air to flow through the detection area. By directly measuring the mass and the flow rate of the intake air, the detection precision is ensured and the intake air resistance is reduced.
- This mass air flow meter has a built-in intake air temperature sensor.



Knock Sensor (Flat Type)

1) General

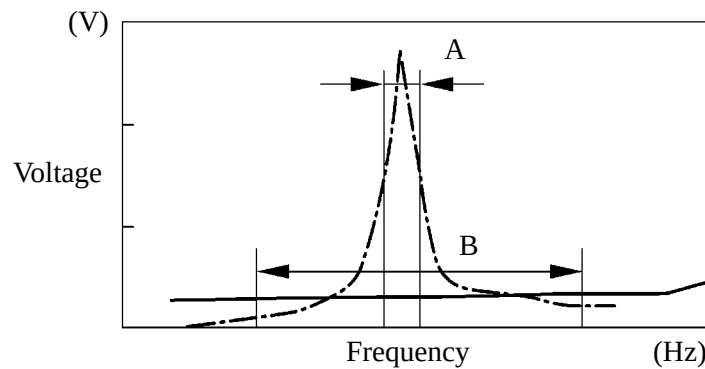
In the conventional type knock sensor (resonant type), a vibration plate which has the same resonance point as the knocking frequency of the engine is built in and can detect the vibration in this frequency band.

On the other hand, a flat type knock sensor (non-resonant type) has the ability to detect vibration in a wider frequency band from about 6 kHz to 15 kHz, and has the following features.

- The engine knocking frequency will change a bit depending on the engine speed. The flat type knock sensor can detect the vibration even when the engine knocking frequency is changed. Thus the vibration detection ability is increased compared to the conventional type knock sensor, and a more precise ignition timing control is possible.

— · — · : Conventional Type

———— : Flat Type



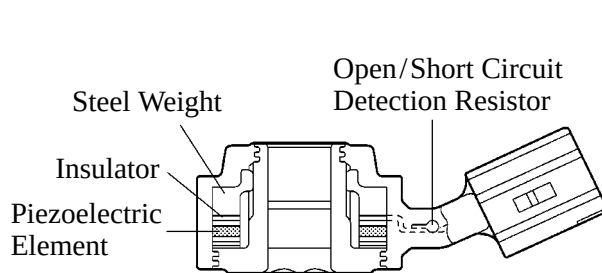
A: Detection Band of Conventional Type
B: Detection Band of Flat Type

Characteristic of Knock Sensor

214CE04

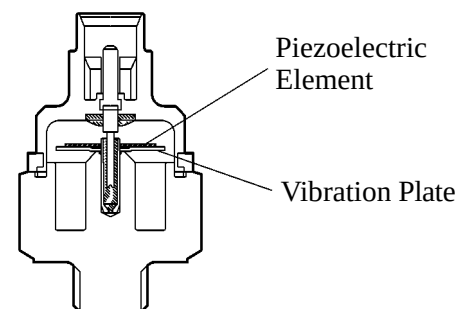
2) Construction

- The flat type knock sensor is installed on the engine through the stud bolt installed on the cylinder block. For this reason, a hole for the stud bolt is running through the center of the sensor.
- Inside of the sensor, a steel weight is located on the upper portion and a piezoelectric element is located under the weight through the insulator.
- The open/short circuit detection resistor is integrated.



Flat Type Knock Sensor
(Non-resonant Type)

214CE01

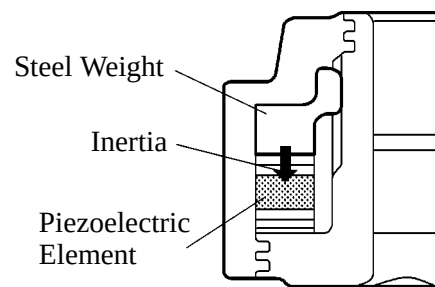


Conventional Type Knock Sensor
(Resonant Type)

214CE02

3) Operation

The knocking vibration is transmitted to the steel weight and its inertia applies pressure to the piezoelectric element. The action generates electromotive force.

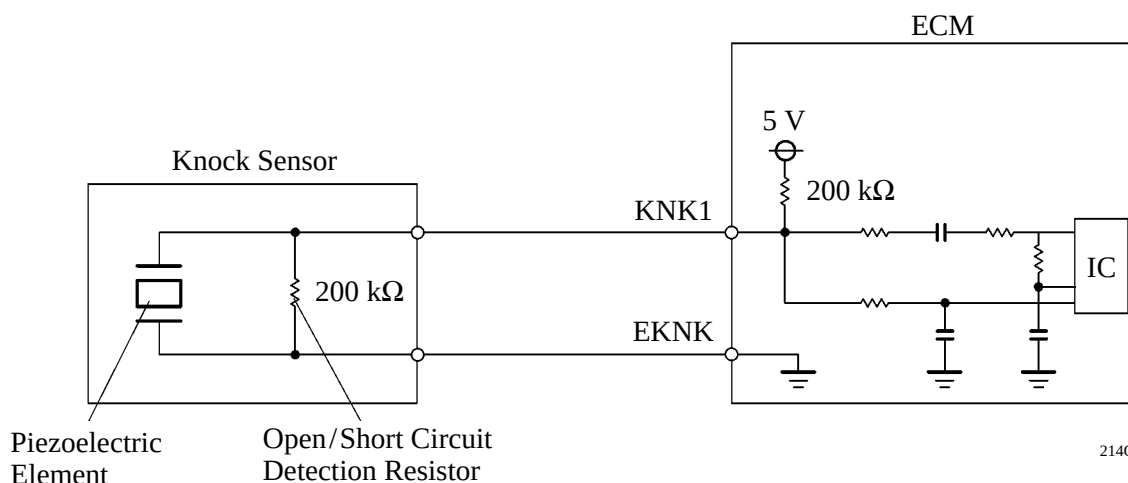


214CE08

4) Open/Short Circuit Detection Resistor

While the ignition is ON, the open/short circuit detection resistor in the knock sensor and the resistor in the ECM keep constant the voltage at the terminal KNK1 of engine.

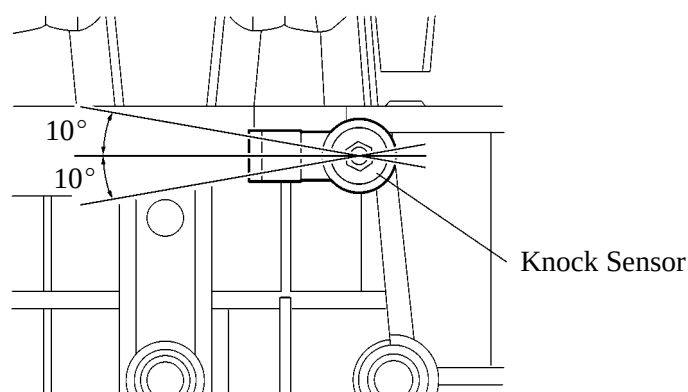
An IC (Integrated Circuit) in the ECM is always monitoring the voltage of the terminal KNK1. If the open/short circuit occurs between the knock sensor and the ECM, the voltage of the terminal KNK1 will change and the ECM detects the open/short circuit and stores DTC (Diagnostic Trouble Code).



214CE06

Service Tip

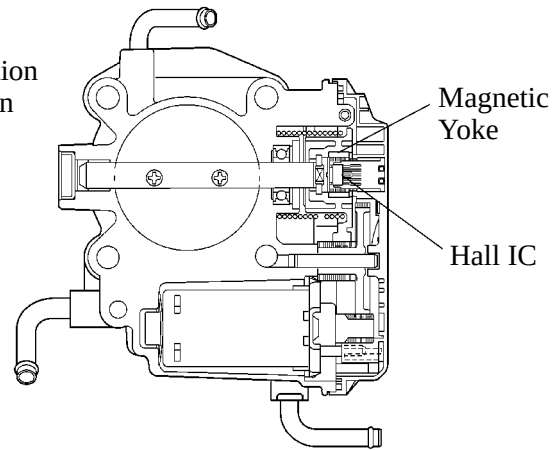
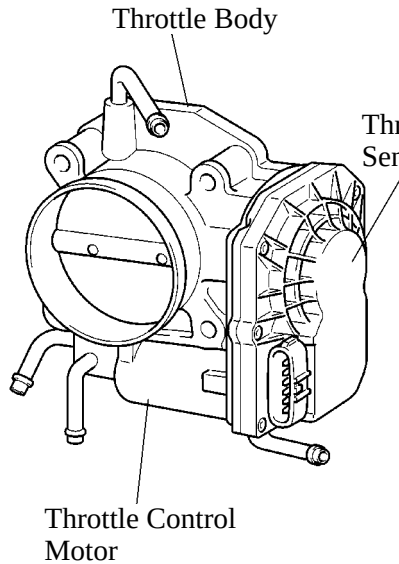
- In accordance with the adoption of an open/short circuit detection resistor, the inspection method for the sensor has been changed. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).
- To prevent the water accumulation in the connector, make sure to install the flat type knock sensor in the position as shown in the following illustration.



251EG12

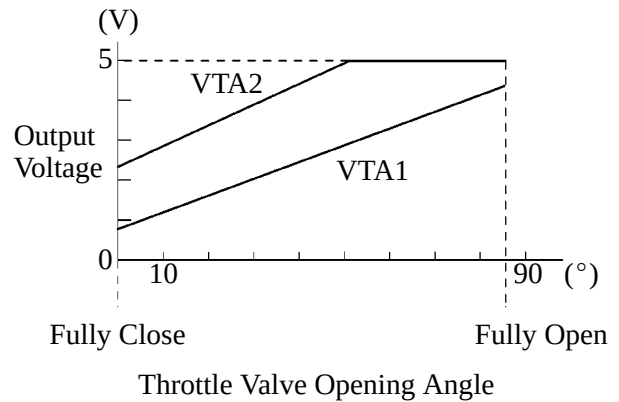
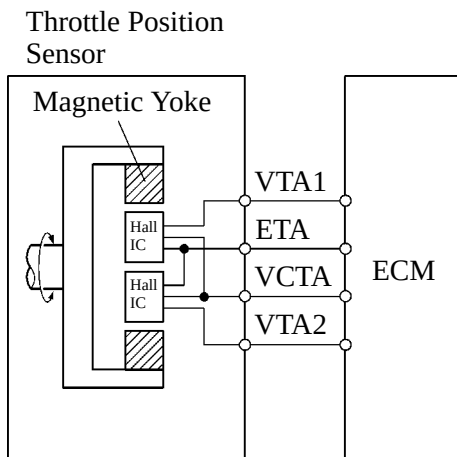
Throttle Position Sensor

The throttle position sensor is mounted on the throttle body to detect the opening angle of the throttle valve. The throttle position sensor converts the magnetic flux density that changes when the magnetic yoke (located on the same axis as the throttle shaft) rotates around the Hall IC into electric signals to operate the throttle control motor.



Cross Section

01NEG43Y



230LX12

238EG79

Service Tip

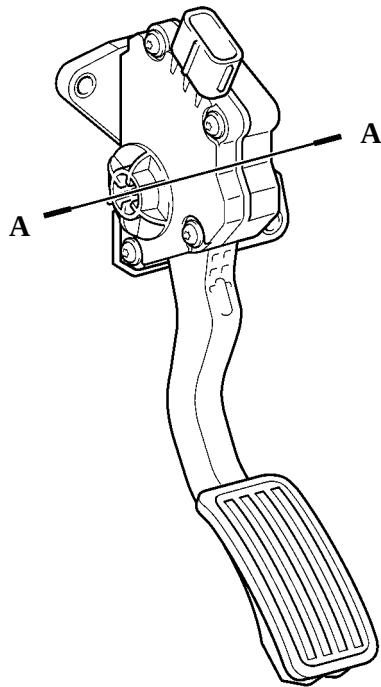
The inspection method differs from the conventional contact type throttle position sensor because this non-contact type sensor uses a Hall IC.

For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

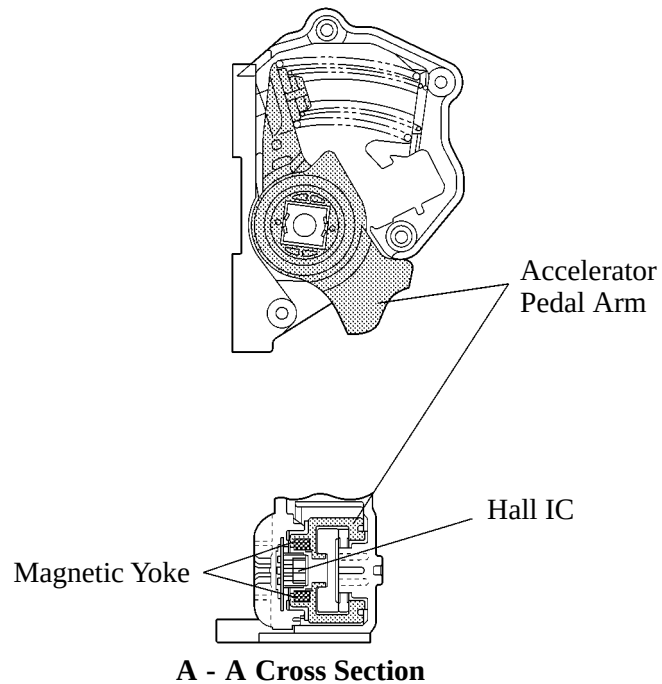
Accelerator Pedal Position Sensor

The non-contact type accelerator pedal position sensor uses a Hall IC.

- The magnetic yoke that is mounted at the accelerator pedal arm rotates around the Hall IC in accordance with the amount of effort that is applied to the accelerator pedal. The Hall IC converts the changes in the magnetic flux at that time into electrical signals, and outputs them as accelerator pedal effort to the ECM.
- The Hall IC contains circuits for the main and sub signals. It converts the accelerator pedal depressed angles into electric signals with two differing characteristics and outputs them to the ECM.

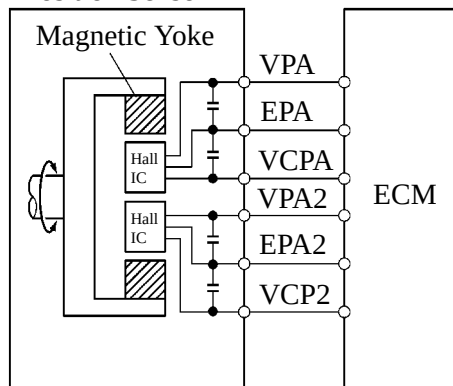


Internal Construction

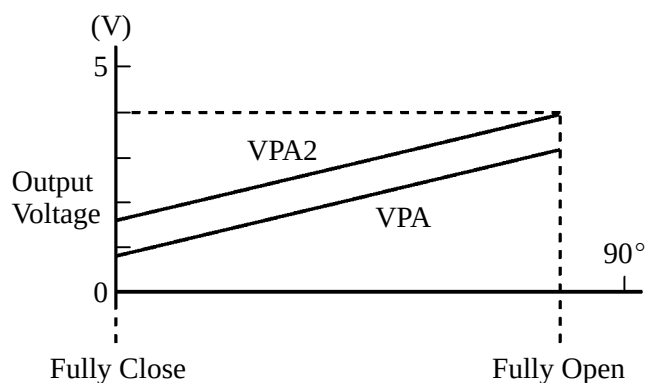


00SEG39Y

Accelerator Pedal Position Sensor



228TU24



Accelerator Pedal Depressed Angle

228TU25

Service Tip

The inspection method differs from the conventional contact type accelerator pedal position sensor because this non-contact type sensor uses a Hall IC.

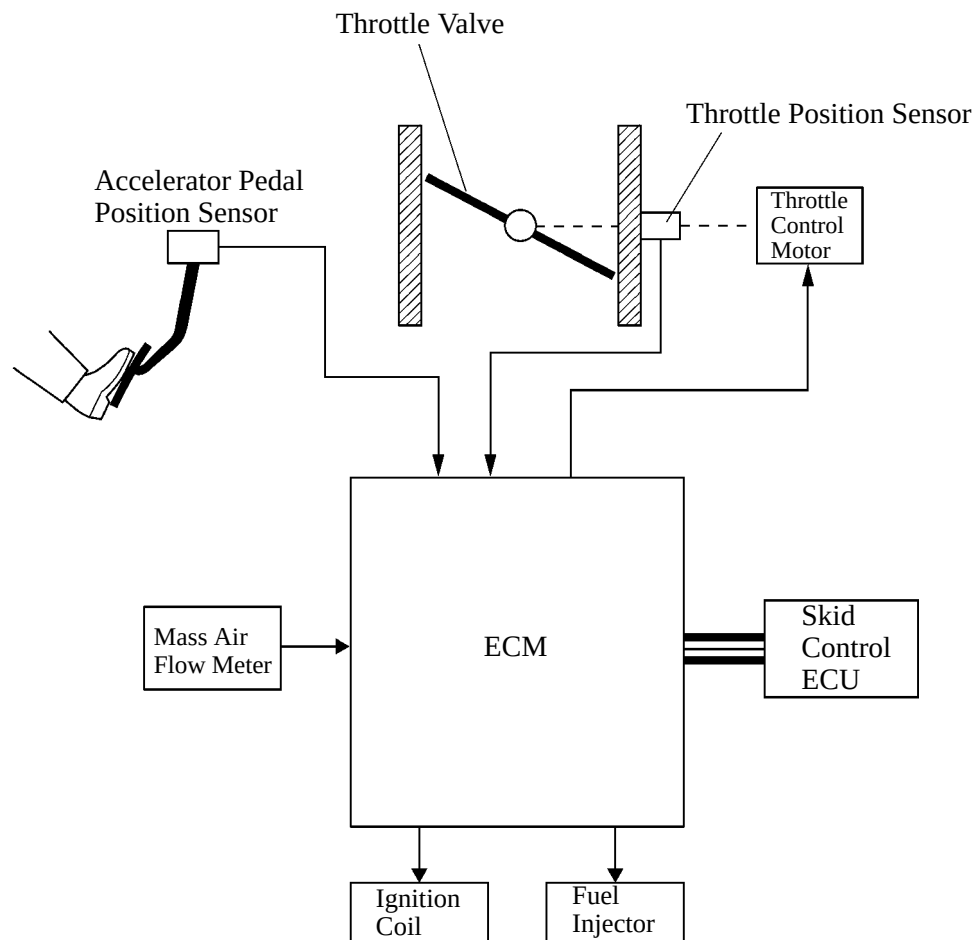
For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M0U).

6. ETCS-i (Electronic Throttle Control System-intelligent)

General

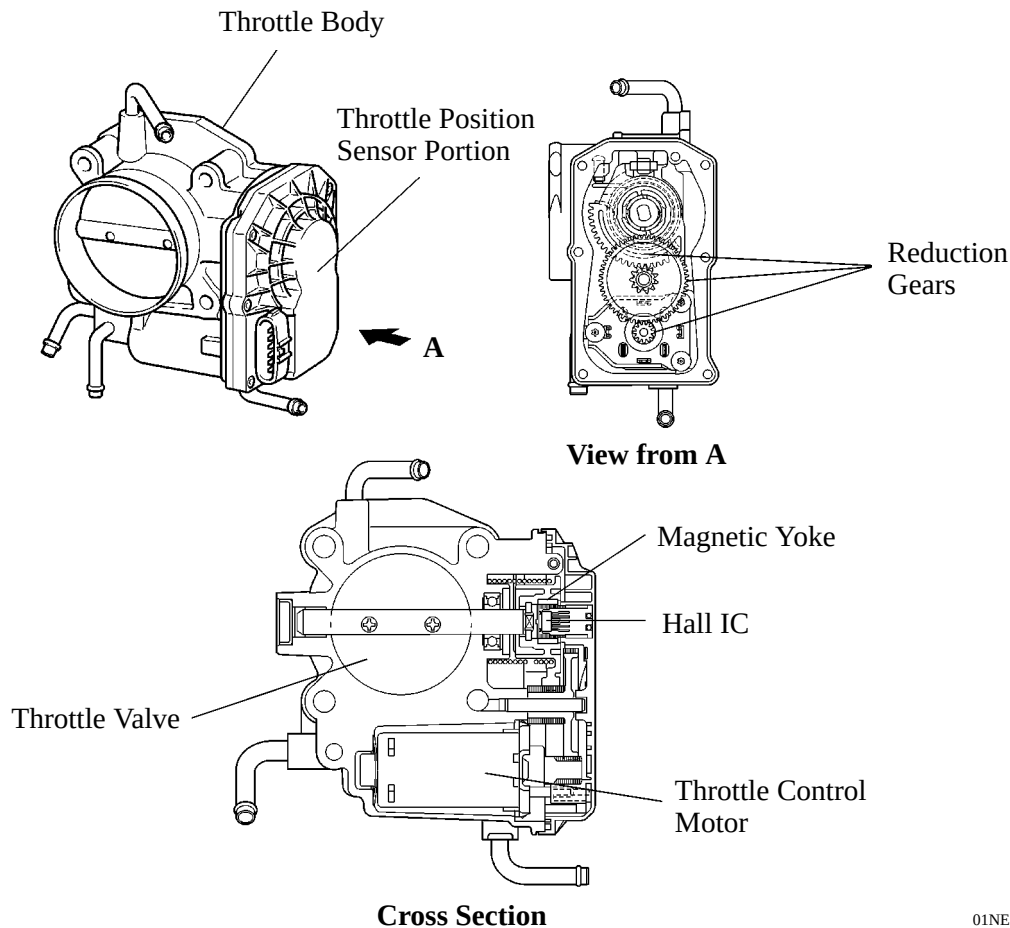
- The ETCS-i is used, providing excellent throttle control in all the operating ranges. In the 2AZ-FE engine, the accelerator cable has been discontinued, and an accelerator pedal position sensor has been provided on the accelerator pedal.
- In the conventional throttle body, the throttle valve opening is determined by the amount of the accelerator pedal effort. In contrast, the ETCS-i uses the ECM to calculate the optimal throttle valve opening that is appropriate for the respective driving condition and uses a throttle control motor to control the opening.
- The ETCS-i controls the IAC (Idle Air Control) system, the TRAC (Traction Control), VSC (Vehicle Stability Control) system and cruise control system.
- In case of an abnormal condition, this system switches to the limp mode.

► System Diagram ◀



≡ : CAN

Construction



01NEG44Y

1) Throttle Position Sensor

The throttle position sensor is mounted on the throttle body, to detect the opening angle of the throttle valve.

2) Throttle Control Motor

A DC motor with excellent response and minimal power consumption is used for the throttle control motor. The ECM performs the duty ratio control of the direction and the amperage of the current that flows to the throttle control motor in order to regulate the opening of the throttle valve.

Operation

1) General

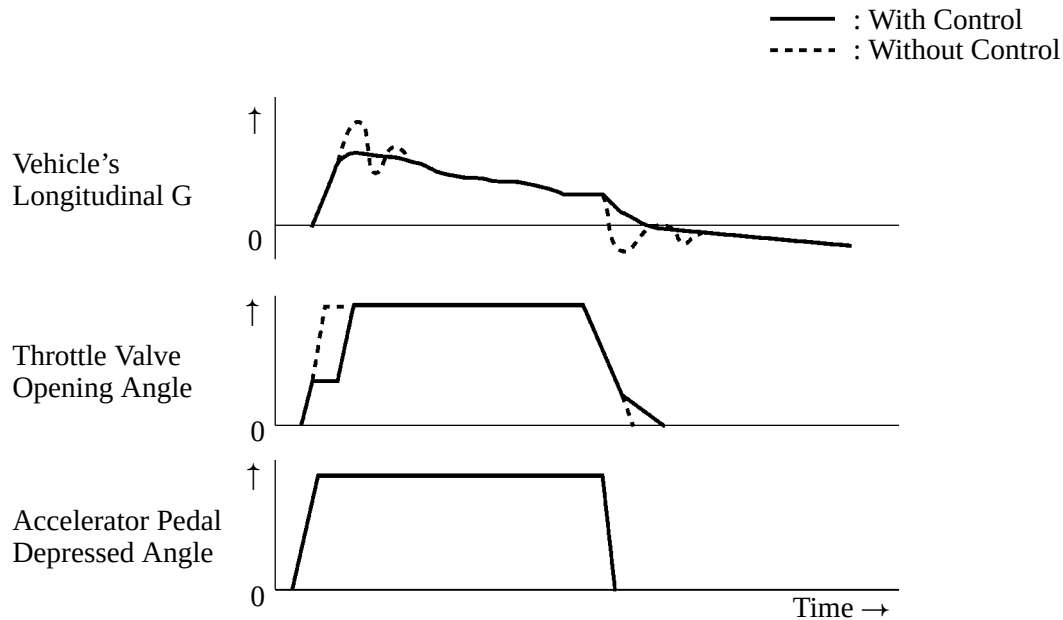
The ECM drives the throttle control motor by determining the target throttle valve opening in accordance with the respective operating condition.

- Non-linear Control
- Idle Air Control
- TRAC Throttle Control
- VSC Coordination Control
- Cruise Control

2) Normal Throttle Control (Non-linear Control)

It controls the throttle to an optimal throttle valve opening that is appropriate for the driving condition such as the amount of the accelerator pedal effort and the engine speed in order to realize excellent throttle control and comfort in all operating ranges.

► Control Examples During Acceleration and Deceleration ◀



005EG13Y

3) Idle Air Control

The ECM controls the throttle valve in order to constantly maintain an ideal idle speed.

4) TRAC Throttle Control

As part of the TRAC system, the throttle valve is closed by a demand signal from the skid control ECU if an excessive amount of slippage is created at a driving wheel, thus facilitating the vehicle in providing excellent stability and driving force.

5) VSC Coordination Control

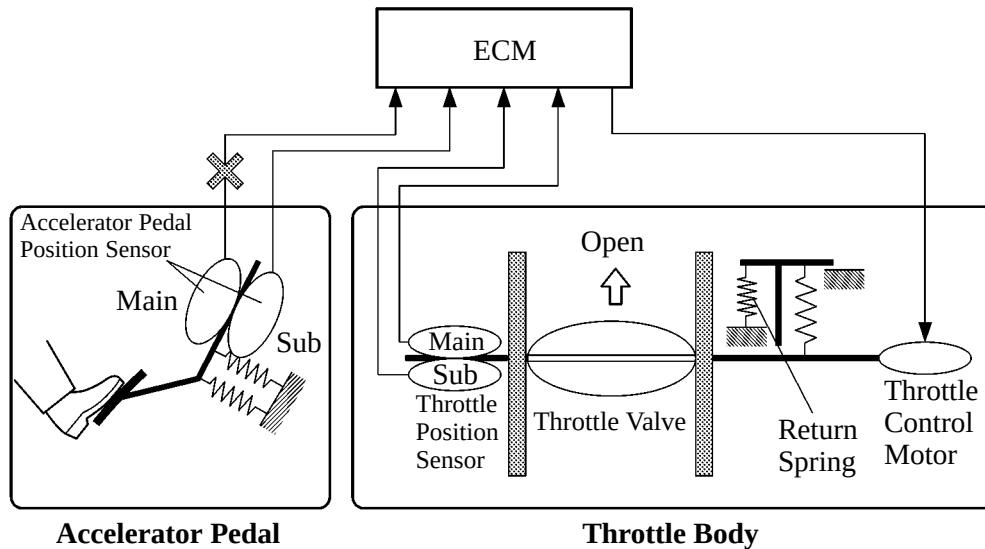
In order to bring the effectiveness of the VSC system control into full play, the throttle valve opening angle is controlled by effecting a coordination control with the skid control ECU.

6) Cruise Control

An ECM with an integrated cruise control ECU directly actuates the throttle valve for operation of the cruise control.

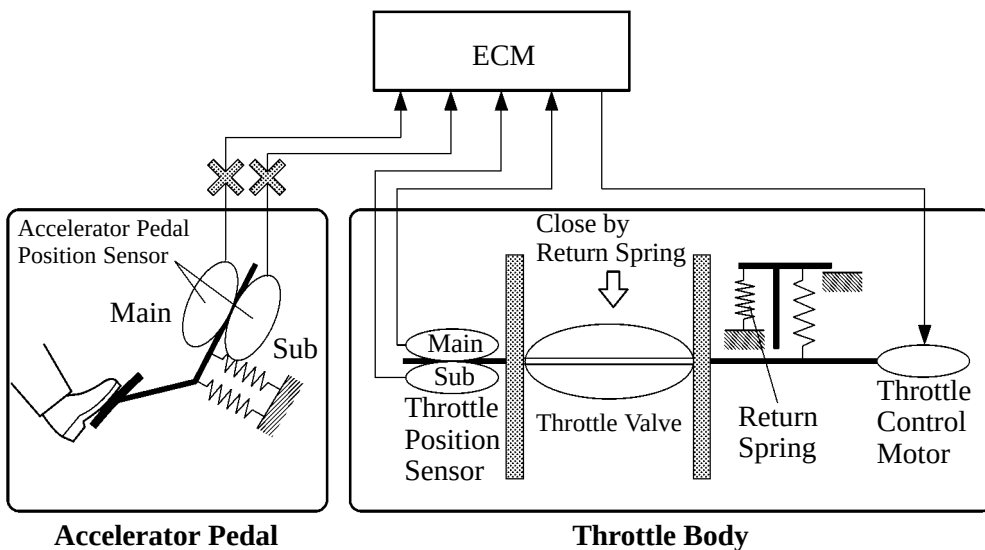
Fail-safe of Accelerator Pedal Position Sensor

- The accelerator pedal position sensor is comprised of two (main, sub) sensor circuits. If a malfunction occurs in either one of the sensor circuits, the ECM detects the abnormal signal voltage difference between these two sensor circuits and switches to the limp mode. In the limp mode, the remaining circuit is used to calculate the accelerator pedal depressed angle, in order to operate the vehicle under the limp mode control.



199EG45

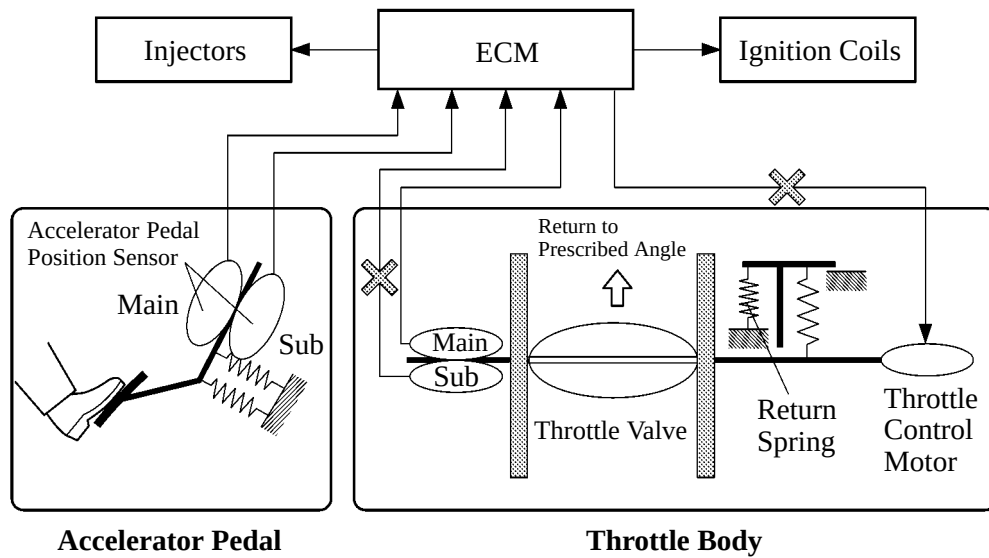
- If both circuits have malfunctions, the ECM detects the abnormal signal voltage from these two sensor circuits and stops the throttle control. At this time, the vehicle can be driven within its idling range.



199EG46

Fail-safe of Throttle Position Sensor

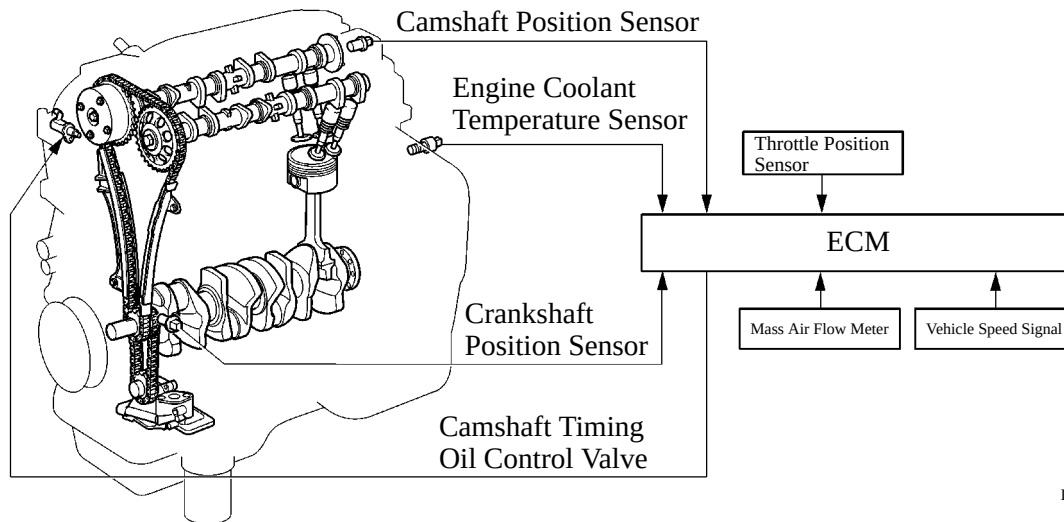
- The throttle position sensor is comprised of two (main, sub) sensor circuits. If a malfunction occurs in either one or both of the sensor circuits, the ECM detects the abnormal signal voltage difference between these two sensor circuits, cuts off the current to the throttle control motor, and switches to the limp mode. Then, the force of the return spring causes the throttle valve to return and stay at the prescribed opening angle. At this time, the vehicle can be driven in the limp mode while the engine output is regulated through the control of the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator opening.
- The same control as above is effected if the ECM detects a malfunction in the throttle control motor system.



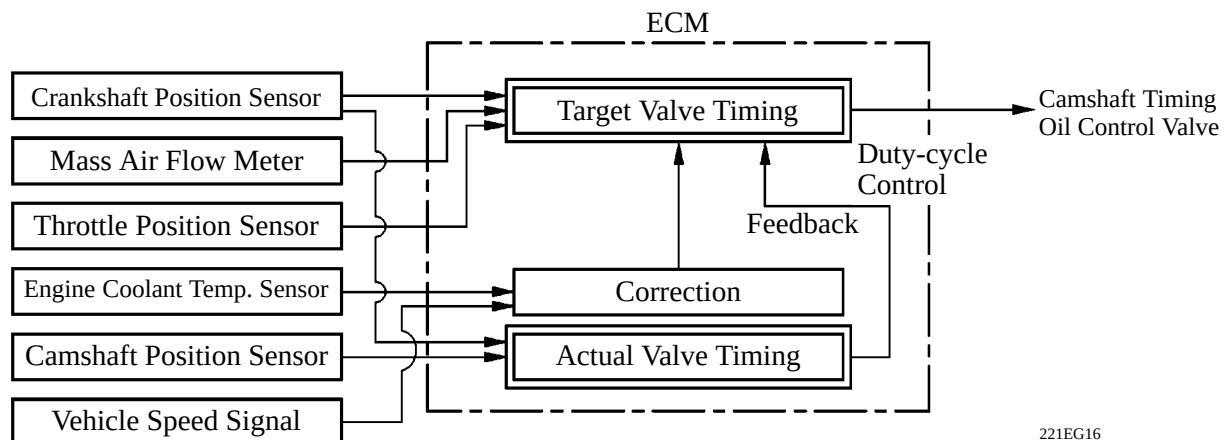
7. VVT-i (Variable Valve Timing-intelligent) System

General

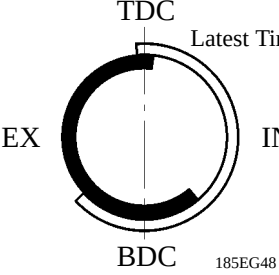
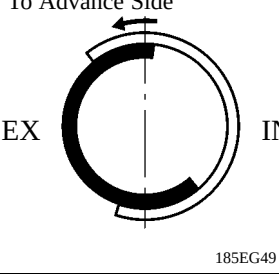
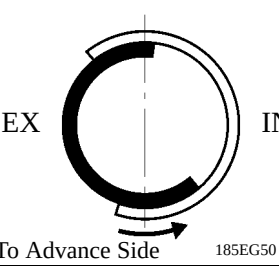
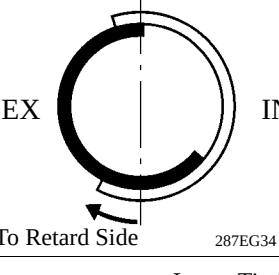
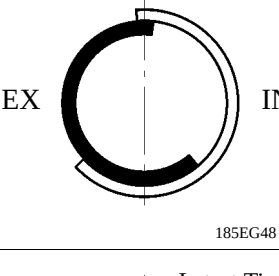
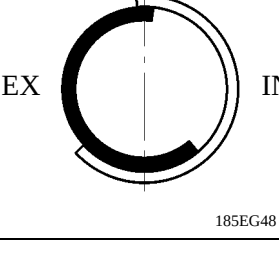
- The VVT-i system is designed to control the intake camshaft within a range of 40° (of Crankshaft Angle) to provide valve timing that is optimally suited to the engine condition. This realizes proper torque in all the speed ranges as well as realizing excellent fuel economy, and reducing exhaust emissions.



- Using the engine speed signal, vehicle speed signal, and the signals from mass air flow meter, throttle position sensor and engine coolant temperature sensor, the ECM can calculate optimal valve timing for each driving condition and controls the camshaft timing oil control valve. In addition, the ECM uses signals from the camshaft position sensor and crankshaft position sensor to detect the actual valve timing, thus providing feedback control to achieve the target valve timing.



Effectiveness of the VVT-i System

Operation State	Objective	Effect
- During Idling - At Light Load	 Minimizing overlap to reduce blowback to the intake side	- Stabilized idling rpm - Better fuel economy
At Medium Load	 Increasing overlap increases internal EGR, reducing pumping loss	- Better fuel economy - Improved emission control
In Low to Medium Speed Range with Heavy Load	 Advancing the intake valve close timing for volumetric efficiency improvement	Improved torque in low to medium speed range
In High Speed Range with Heavy Load	 Retarding the intake valve close timing for volumetric efficiency improvement	Improved output
At Low Temperature	 Minimizing overlap to prevent blowback to the intake side leads to the lean burning condition, and stabilizes the idling speed at fast idle	- Stabilized fast idle rpm - Better fuel economy
- Upon Starting - Stopping the Engine	 Minimizing overlap to minimize blowback to the intake side	Improved startability

Construction

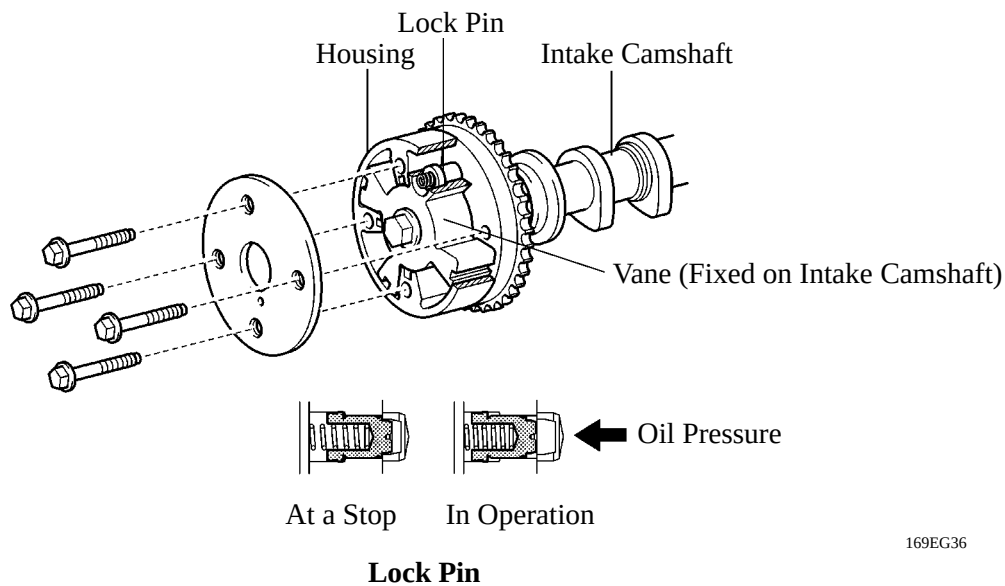
1) VVT-i Controller

This controller consists of the housing driven by the timing chain and the vane fixed on the intake camshaft.

The oil pressure sent from the advance or retard side path at the intake camshaft causes rotation in the VVT-i controller vane circumferential direction to vary the intake valve timing continuously.

When the engine is stopped, the intake camshaft will be in the most retarded state to ensure startability.

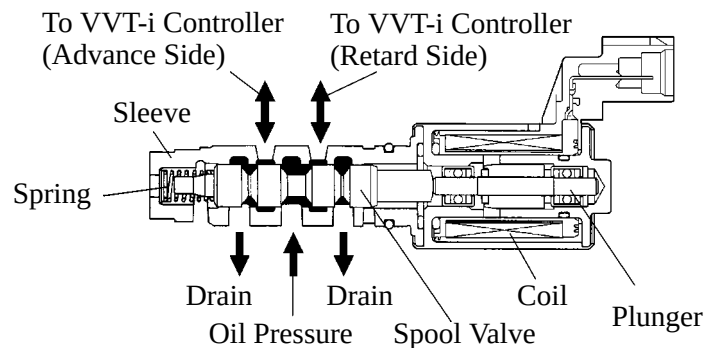
When hydraulic pressure is not applied to the VVT-i controller immediately after the engine has been started, the lock pin locks the movement of the VVT-i controller to prevent a knocking noise.



169EG36

2) Camshaft Timing Oil Control Valve

This camshaft timing oil control valve controls the spool valve position in accordance with the duty-cycle control from the ECM. This allows hydraulic pressure to be applied to the VVT-i controller advance or retard sides. When the engine is stopped, the camshaft timing oil control valve is in the most retarded state.

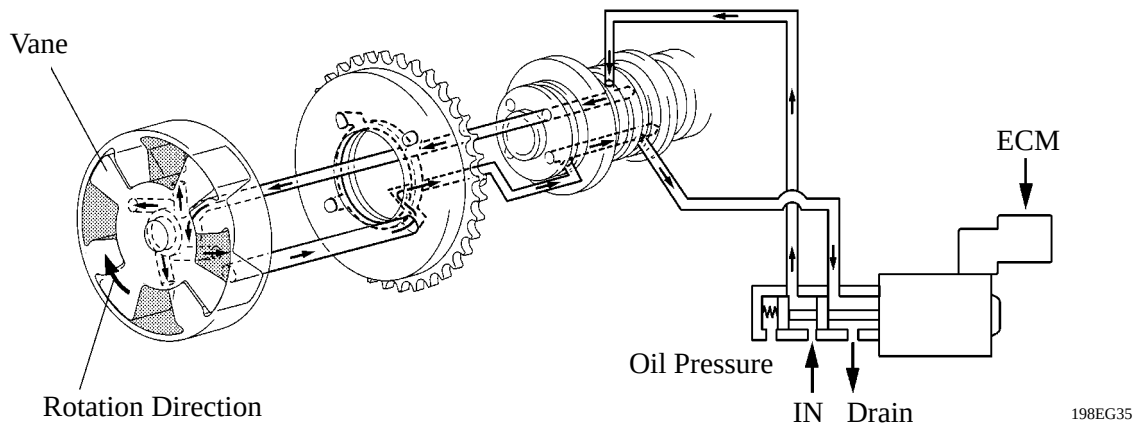


221EG17

Operation

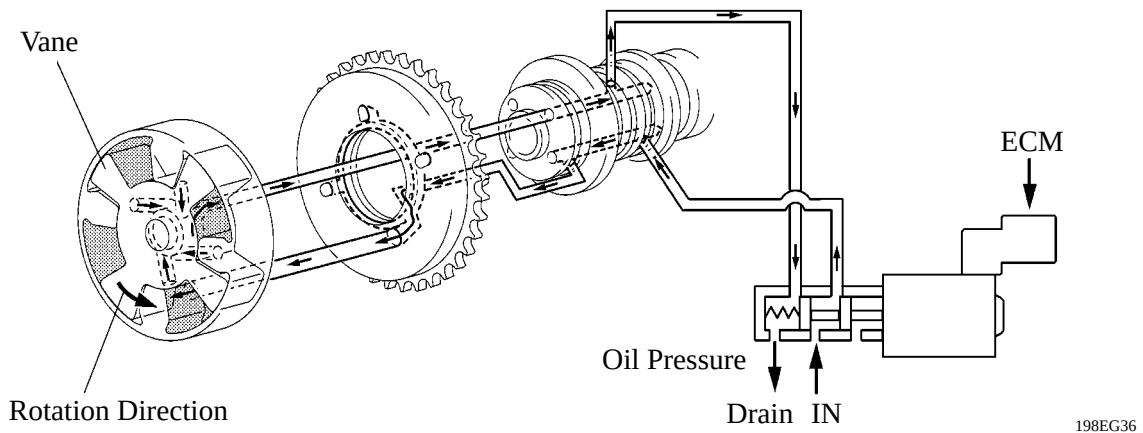
1) Advance

When the camshaft timing oil control valve is operated as illustrated below by the advance signals from the ECM, the resultant oil pressure is applied to the advance side vane chamber to rotate the camshaft in the advance direction.



2) Retard

When the camshaft timing oil control valve is operated as illustrated below by the retard signals from the ECM, the resultant oil pressure is applied to the retard side vane chamber to rotate the camshaft in the retard direction.



3) Hold

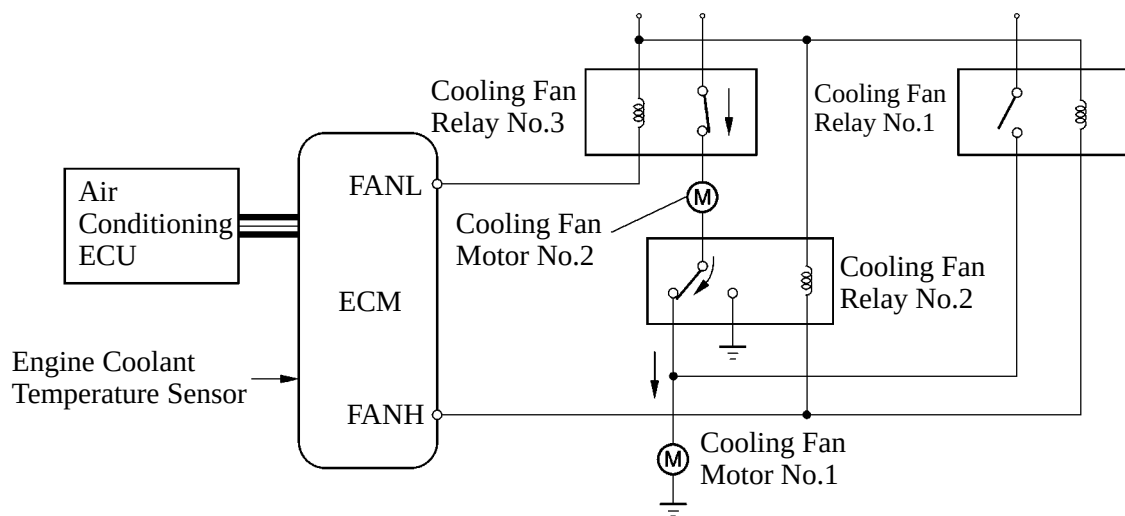
After reaching the target timing, the valve timing is held by keeping the camshaft timing oil control valve in the neutral position unless the traveling state changes.

This adjusts the valve timing at the desired target position and prevents the engine oil from running out when it is unnecessary.

8. Cooling Fan Control

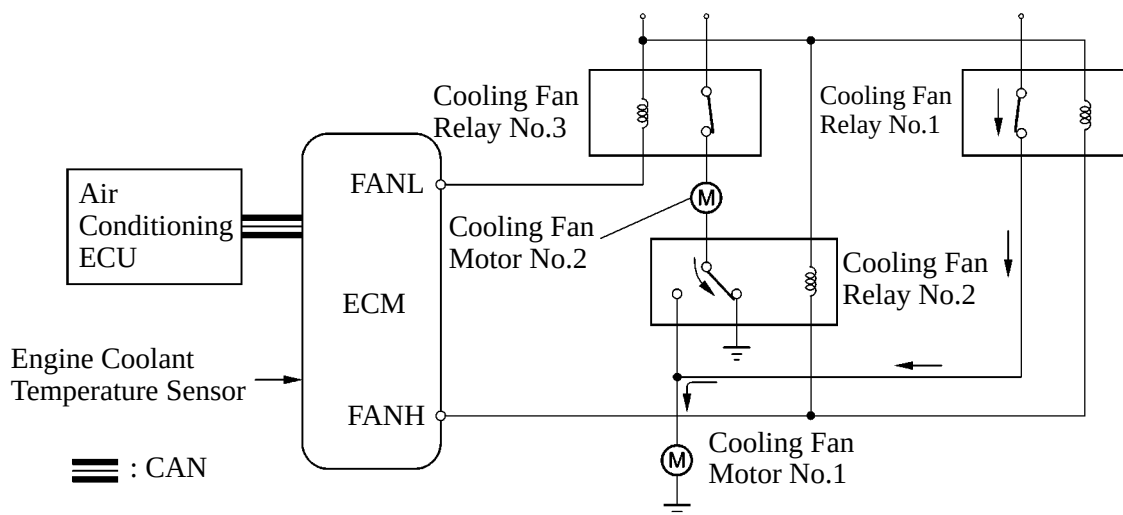
On the models with air conditioning, the ECM controls the operation of the cooling fan in two speeds (Low and High) based on the engine coolant temperature sensor signal and the air conditioning ECU signal. This control is accomplished by operating the 2 fan motors in 2 stages through low speed (series connection) and high speed (parallel connection).

► Wiring Diagram ◀



01NEG09Y

Low Speed (Series Connection)



≡ : CAN

High Speed (Parallel Connection)

01NEG10Y

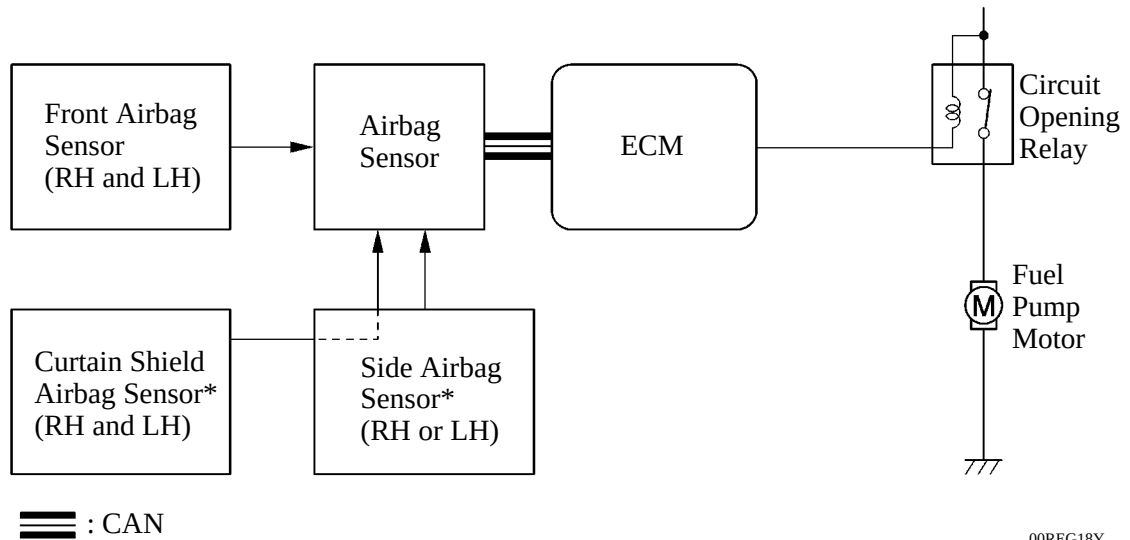
► Cooling Fan Operation ◀

Air Conditioning Condition		Engine Coolant Temperature °C (°F)	
A/C Compressor	Refrigerant Pressure	94 (201.2) or lower	95.5 (203.9) or higher
OFF	1.2 MPa (12.5 kgf/cm ² , 178 psi) or lower	OFF	High
ON	1.2 MPa (12.5 kgf/cm ² , 178 psi) or lower	Low	High
	1.2 MPa (12.5 kgf/cm ² , 178 psi) or higher	High	High

9. Fuel Pump Control

A fuel cut control is used to stop the fuel pump when the SRS airbag is deployed at the front collision. In this system, the airbag deployment signal from the airbag sensor is detected by the ECM, which turns OFF the circuit opening relay.

After the fuel cut control has been activated, turning the ignition switch from OFF to ON cancels the fuel cut control, and the engine can be restarted.



00REG18Y

*: Models with SRS Driver, Front Passenger, Side and Curtain Shield Airbags

10. EVAP (evaporative Emission) Control System

General

The EVAP (evaporative emission) control system prevents the vapor gas that is created in the fuel tank from being released directly into the atmosphere.

- The canister stores the vapor gas that has been created in the fuel tank.
- The ECM controls the purge VSV in accordance with the driving conditions in order to direct the vapor gas into the engine, where it is burned.
- In this system, the ECM checks the evaporative emission leak and outputs DTC (Diagnostic Trouble Code) in the event of a malfunction. An EVAP (evaporative emission) leak check consists of an application of a vacuum pressure to the system and monitoring the changes in the system pressure in order to detect a leakage.
- This system consists of the purge VSV, canister, refueling valve, canister pump module, and ECM.
- The ORVR (Onboard Refueling Vapor Recovery) function is provided in the refueling valve.
- The canister pressure sensor has been included to the canister pump module.
- The canister filter has been provided on the fresh air line. This canister filter is maintenance-free.
- The followings are the typical conditions for enabling an EVAP leak check:

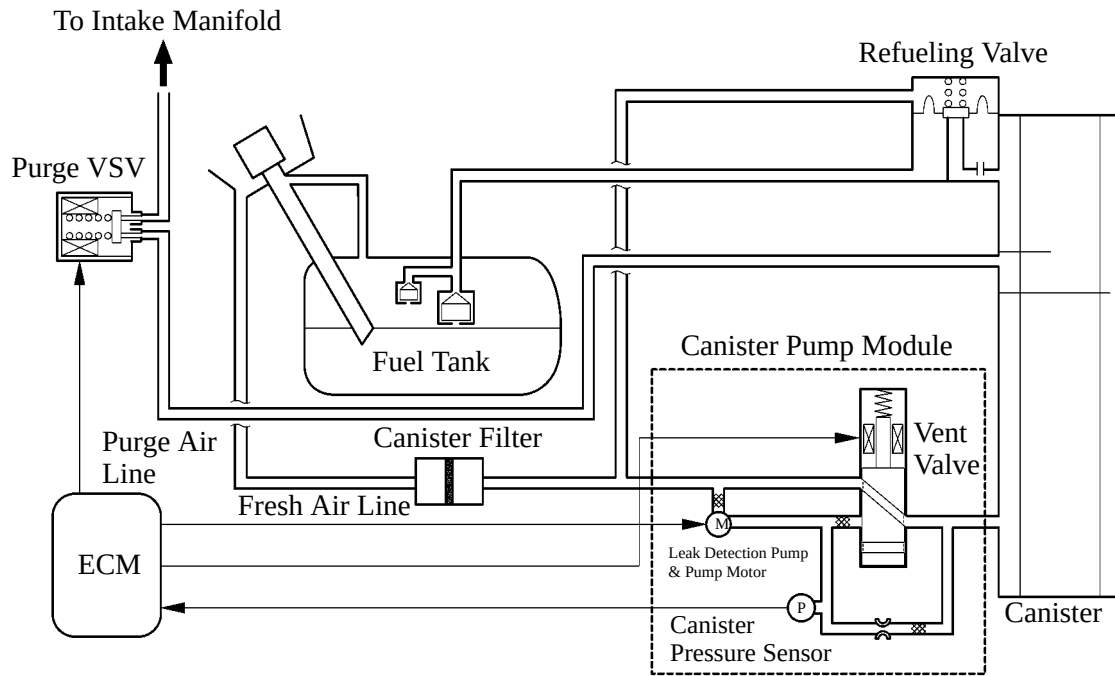
Typical Enabling Condition	● Five hours have elapsed after the engine has been turned OFF*. ● Altitude: Below 2400 m (8000 feet) ● Battery voltage: 10.5 V or more ● Ignition switch: OFF ● Engine coolant temperature: 4.4 to 35°C (40 to 95°F) ● Intake air temperature: 4.4 to 35°C (40 to 95°F)
----------------------------	--

*: If engine coolant temperature does not drop below 35°C (95°F), this time should be extended to 7hours. Even after that, if the temperature is not less than 35°C (95°F), the time should be extended to 9.5 hours.

Service Tip

- The canister pump module performs the EVAP leak check. This check is done approximately five hours after the engine is turned off. So you may hear sound coming from underneath the luggage compartment for several minutes. It does not indicate a malfunction.
- The pinpoint pressure test procedure is carried out by pressurizing the fresh air line that runs from the pump module to the air filler neck. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

System Diagram



00REG22Y

Function of Main Components

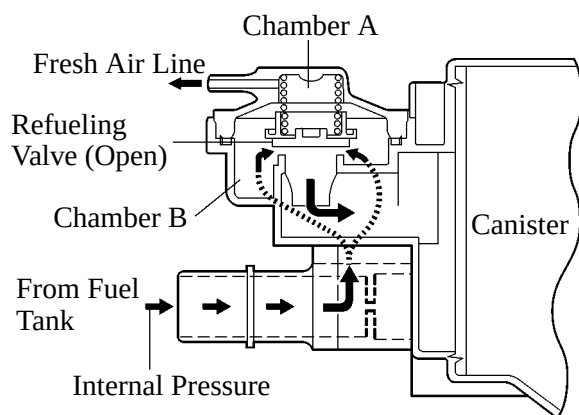
Component		Function
Canister		Contains activated charcoal to absorb the vapor gas that is created in the fuel tank.
Refueling Valve		Controls the flow rate of the vapor gas from the fuel tank to the canister when the system is purging or during refueling.
	Restrictor Passage	Prevents a large amount of vacuum during purge operation or system monitoring operation from affecting the pressure in the fuel tank.
Fresh Air Line		Fresh air goes into the canister and the cleaned drain air goes out into the atmosphere.
Canister Pump Module	Vent Valve	Opens and closes the fresh air line in accordance with the signals from the ECM.
	Leak Detection Pump	Applies vacuum pressure to the EVAP control system in accordance with the signals from the ECM.
	Canister Pressure Sensor	Detects the pressure in the EVAP control system and sends the signals to the ECM.
Purge VSV		Opens in accordance with the signals from the ECM when the system is purging, in order to send the vapor gas that was absorbed by the canister into the intake manifold. In system monitoring mode, this valve controls the introduction of the vacuum into the fuel tank.
Canister Filter		Prevents dust and debris in the fresh air from entering the system.
ECM		Controls the canister pump module and purge VSV in accordance with the signals from various sensors, in order to achieve a purge volume that suits the driving conditions. In addition, the ECM monitors the system for any leakage and outputs a DTC if a malfunction is found.

Construction and Operation

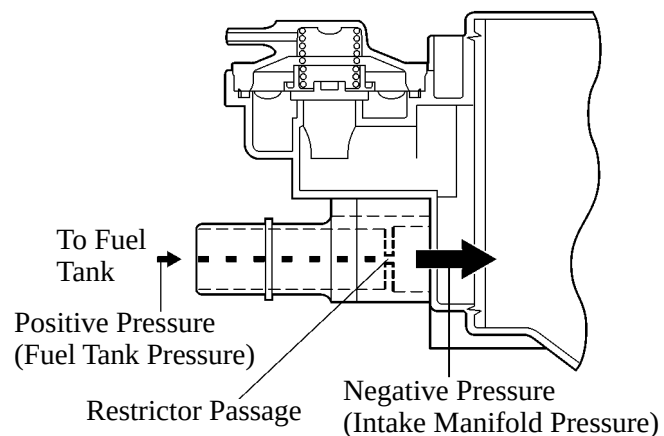
1) Refueling Valve

The refueling valve consists of the chamber A, chamber B, and restrictor passage. A constant atmospheric pressure is applied to the chamber A.

- During refueling, the internal pressure of the fuel tank increases. This pressure causes the refueling valve to lift up, allowing the vapor gas to enter the canister.
- The restrictor passage prevents the large amount of vacuum that is created during purge operation or system monitoring operation from entering the fuel tank, and limits the flow of the vapor gas from the fuel tank to the canister. If a large volume of vapor gas recirculates into the intake manifold, it will affect the air-fuel ratio control of the engine. Therefore, the role of the restrictor passage is to help prevent this from occurring.



During Refueling



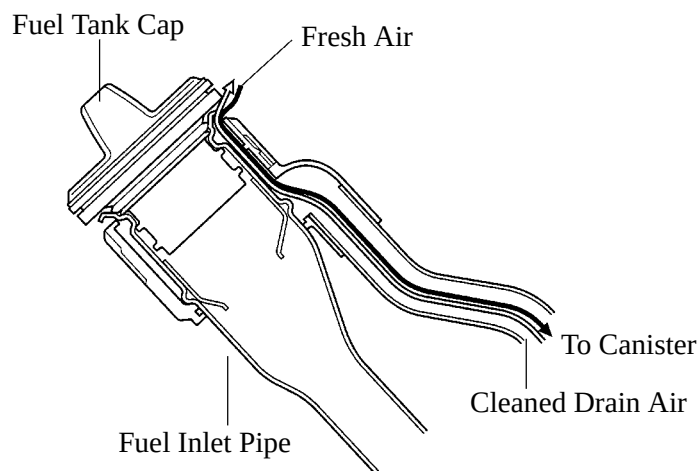
During Purge Operation or System Monitoring Operation

285EG76

D13N07

2) Fuel Inlet (Fresh Air Line)

In accordance with the change of structure of the EVAP control system, the location of a fresh air line inlet has been changed from the air cleaner section to the near fuel inlet. The fresh air from the atmosphere and drain air cleaned by the canister will go in and out of the system through the passage shown below.

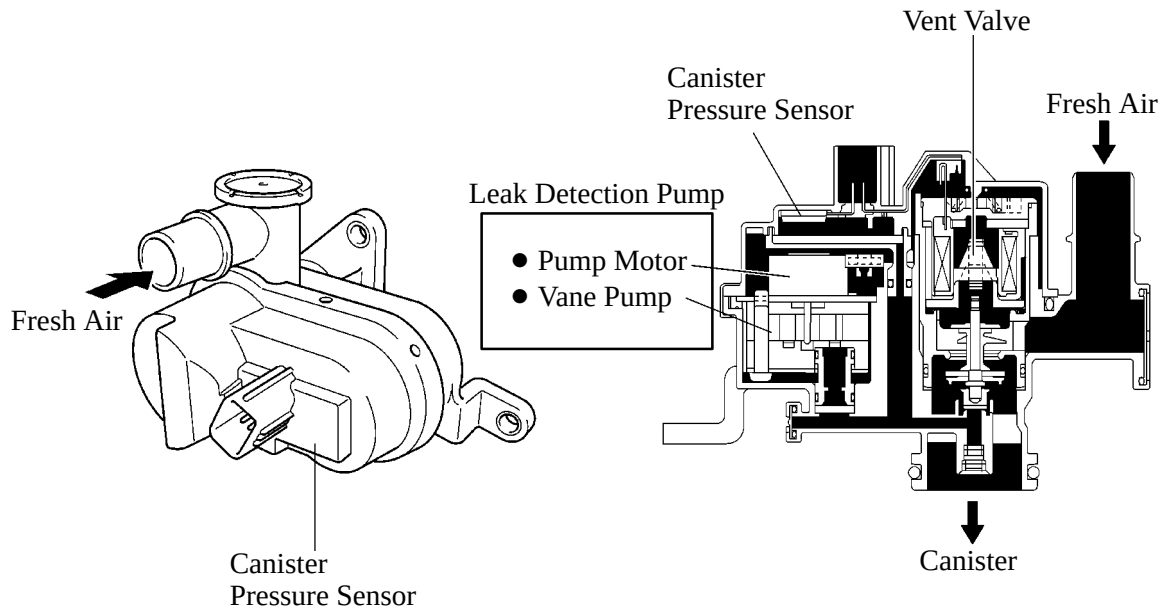


228TU119

3) Canister Pump Module

Canister pump module consists of the vent valve, leak detection pump, and canister pressure sensor.

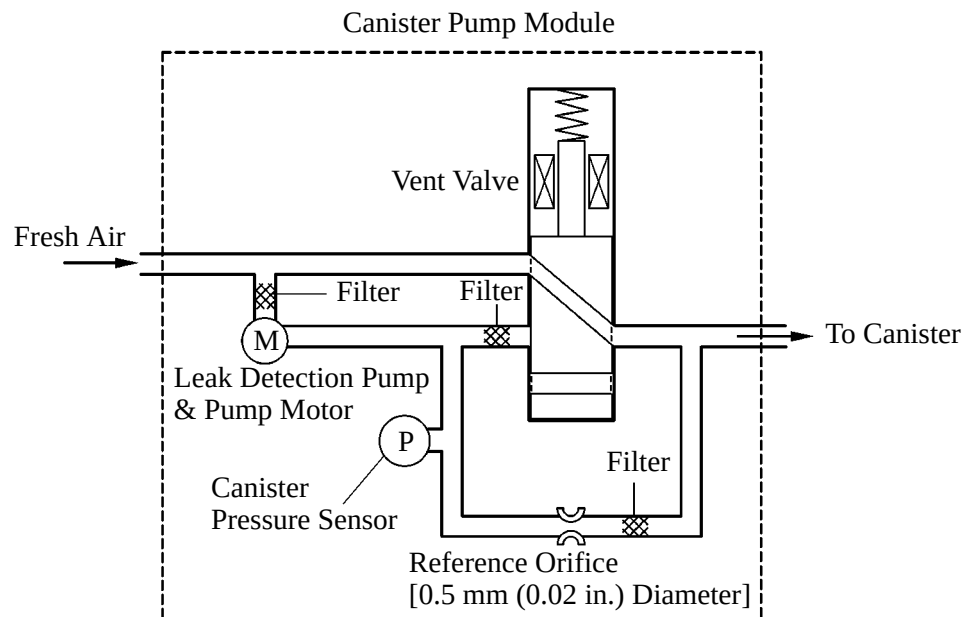
- The vent valve switches the passages in accordance with the signals received from the ECM.
- A DC type brushless motor is used for the pump motor.
- A vane type vacuum pump is used.



279EG25

279EG26

► Simple Diagram ◀



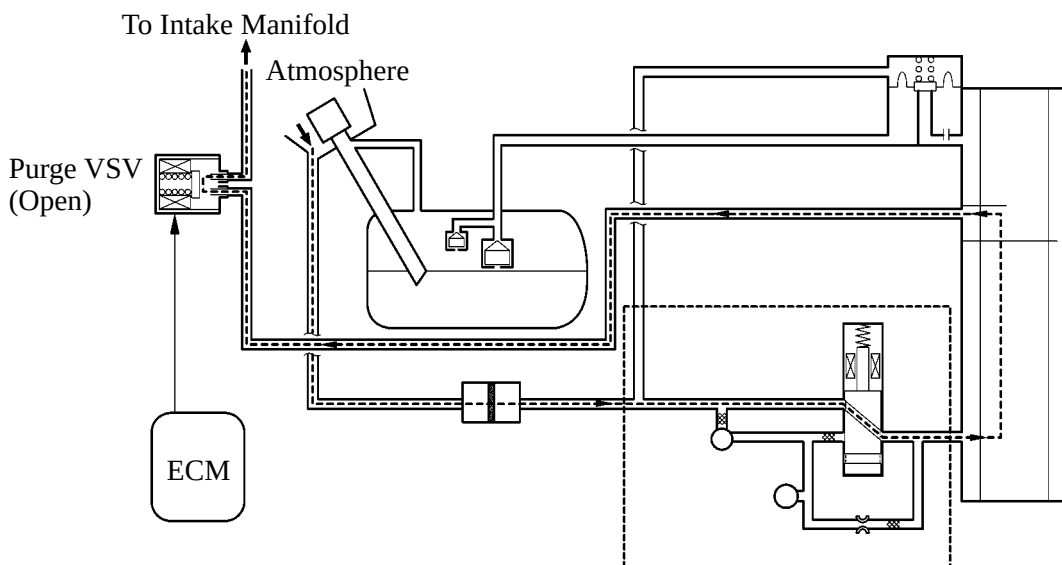
D13N17

System Operation

1) Purge Flow Control

When the engine has satisfied the predetermined conditions (closed loop, engine coolant temperature above 74°C (165°F), etc.), the stored vapor gas are purged from the canister whenever the purge VSV is opened by the ECM.

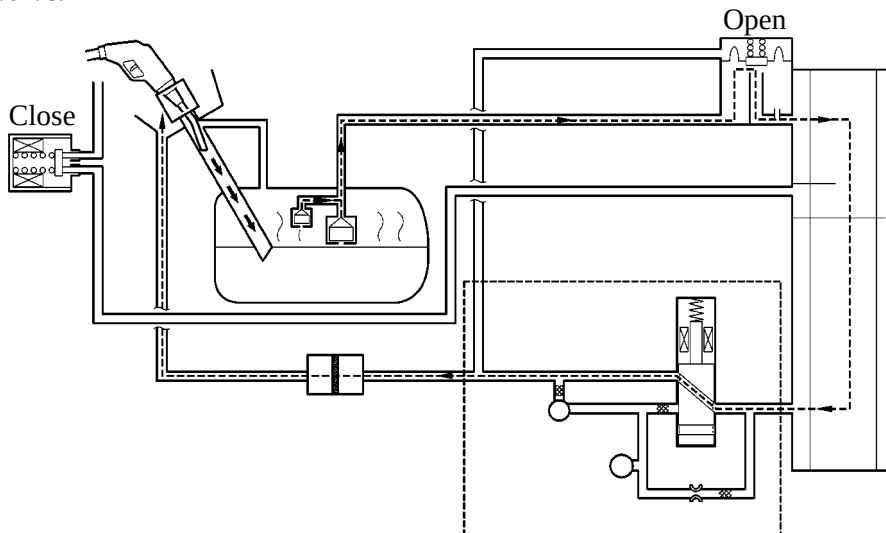
The ECM will change the duty ratio cycle of the purge VSV, thus controlling purge flow volume. Purge flow volume is determined by intake manifold pressure and the duty ratio cycle of the purge VSV. Atmospheric pressure is allowed into the canister to ensure that purge flow is constantly maintained whenever purge vacuum is applied to the canister.



00REG23Y

2) ORVR (On-board Refueling Vapor Recovery)

When the internal pressure of the fuel tank increases during refueling, this pressure causes the diaphragm in the refueling valve to lift up, allowing the vapor gas to enter the canister. Because the vent valve is always open (even when the engine is stopped) when the system is in a mode other than the monitoring mode, the air that has been cleaned through the canister is discharged outside the vehicle via the fresh air line. If the vehicle is refueled in the monitoring mode, the ECM will recognize the refueling by way of the canister pressure sensor, which detects the sudden pressure increase in the fuel tank, and will open the vent valve.



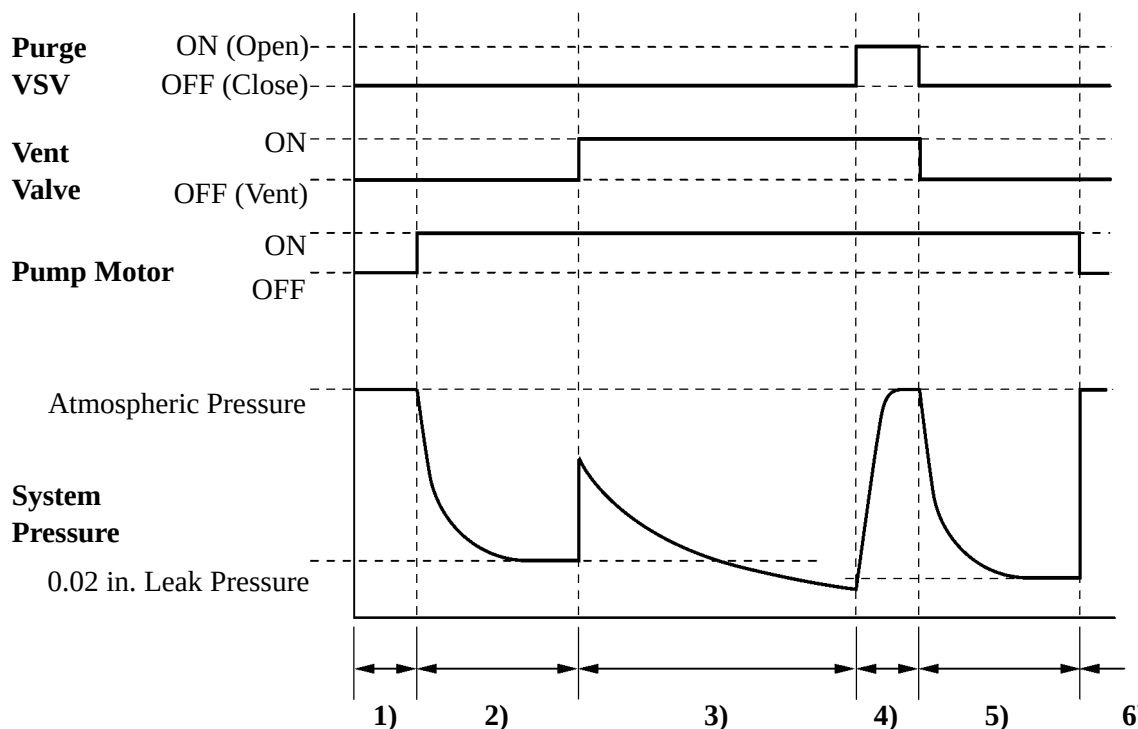
00REG24Y

3) EVAP Leak Check

a. General

The EVAP leak check operates in accordance with the following timing chart:

► Timing Chart ◀

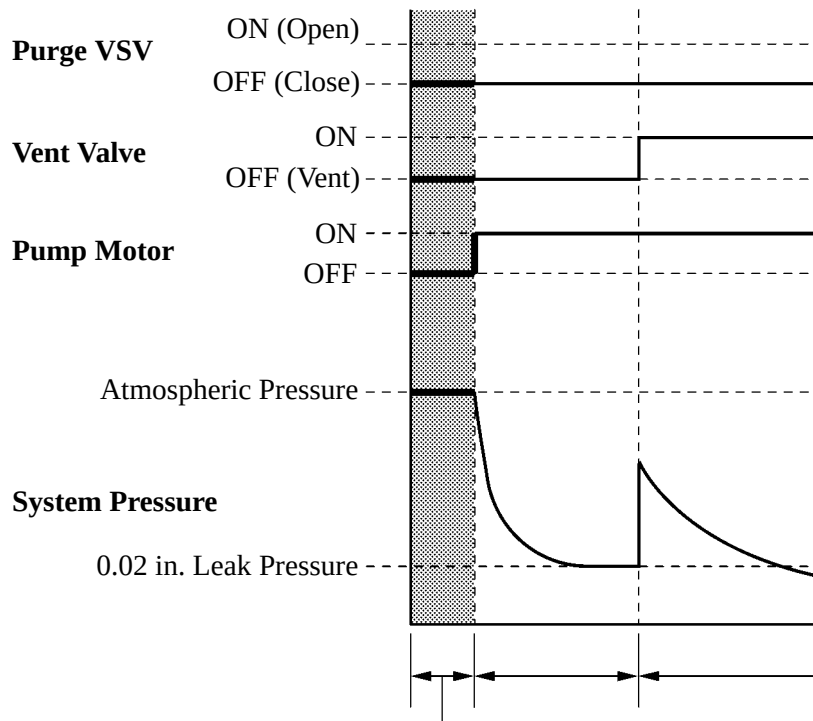
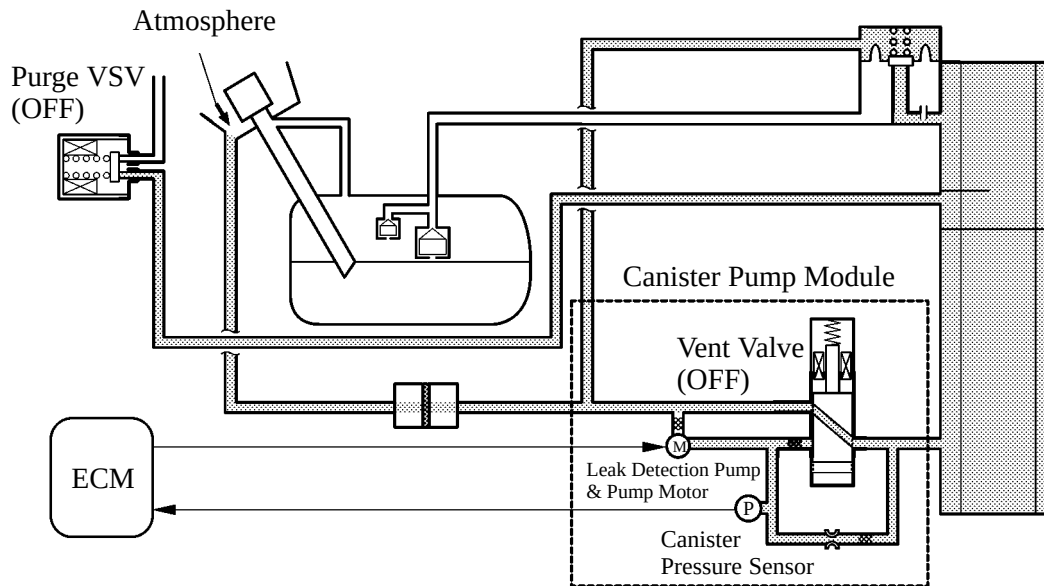


275TU47

Order	Operation	Description	Time
1)	Atmospheric Pressure Measurement	ECM turns vent valve OFF (vent) and measures EVAP control system pressure to memorize atmospheric pressure.	10 sec.
2)	0.02 in. Leak Pressure Measurement	Leak detection pump creates negative pressure (vacuum) through 0.02 in. orifice and the pressure is measured. ECM determines this as 0.02 in. leak pressure.	60 sec.
3)	EVAP Leak Check	Leak detection pump creates negative pressure (vacuum) in EVAP control system and EVAP control system pressure is measured. If stabilized pressure is larger than 0.02 in. leak pressure, ECM determines EVAP control system has a leakage. If EVAP control system pressure does not stabilize within 12 minutes, ECM cancels EVAP monitor.	Within 12 min.
4)	Purge VSV Monitor	ECM opens purge VSV and measures EVAP control system pressure increase. If increase is large, ECM interprets this as normal.	10 sec.
5)	Repeat 0.02 in. Leak Pressure Measurement	Leak detection pump creates negative pressure (vacuum) through 0.02 in. orifice and pressure is measured. ECM determines this as 0.02 in. leak pressure.	60 sec.
6)	Final Check	ECM measures atmospheric pressure and records monitor result.	—

b. Atmospheric Pressure Measurement

- 1) When the ignition switch is turned OFF, the purge VSV and vent valve are turned OFF. Therefore, the atmospheric pressure is introduced into the canister.
- 2) The ECM measures the atmospheric pressure through the signals provided by the canister pressure sensor.
- 3) If the measurement value is out of standards, the ECM actuates the leak detection pump in order to monitor the changes in the pressure.

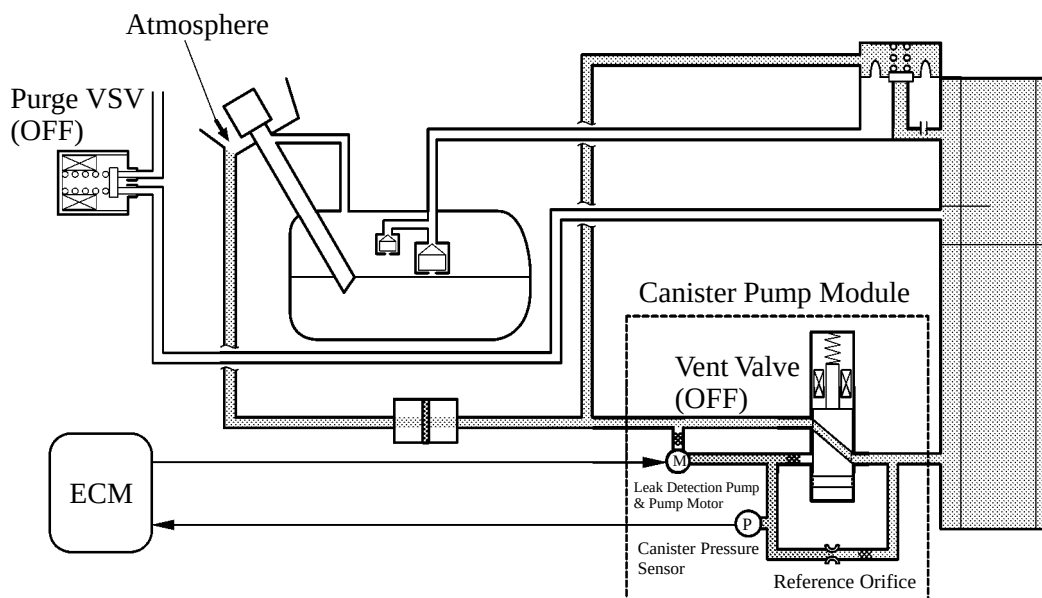


00REG25Y

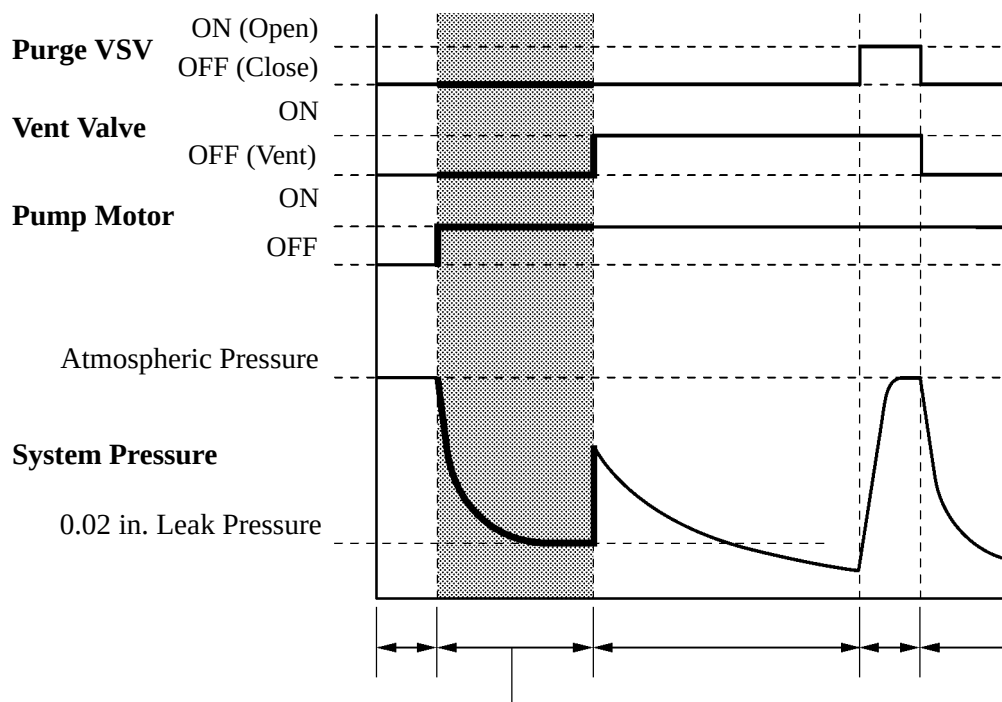
D13N22

c. 0.02 in. Leak Pressure Measurement

- 1) The vent valve remains OFF, and the ECM introduces atmospheric pressure into the canister and actuates the leak detection pump in order to create a negative pressure.
- 2) At this time, the pressure will not decrease beyond a 0.02 in. leak pressure due to the atmospheric pressure that enters through a 0.02 in. diameter reference orifice.
- 3) The ECM compares the logic value with this pressure, and stores it as a 0.02 in. leak pressure in its memory.
- 4) If the measurement value is below the standard, the ECM will determine that the reference orifice is clogged and store DTC (Diagnostic Trouble Code) P043E in its memory.
- 5) If the measurement value is above the standard, the ECM will determine that a high flow rate pressure is passing through the reference orifice and store DTCs (Diagnostic Trouble Codes) P043F, P2401 and P2402 in its memory.



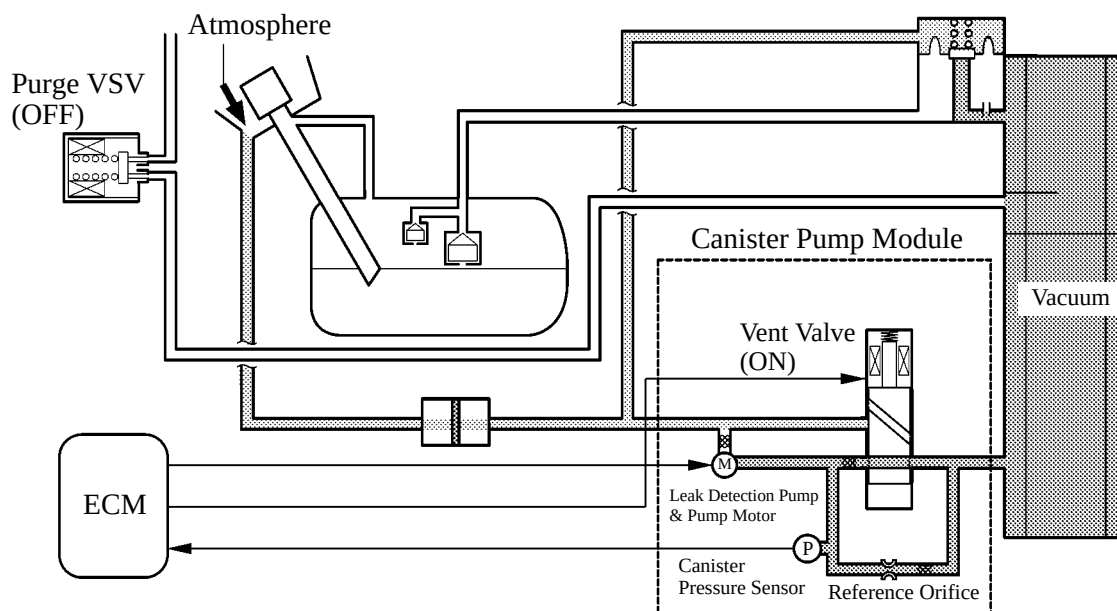
00REG26Y

**0.02 in. Leak Pressure Measurement**

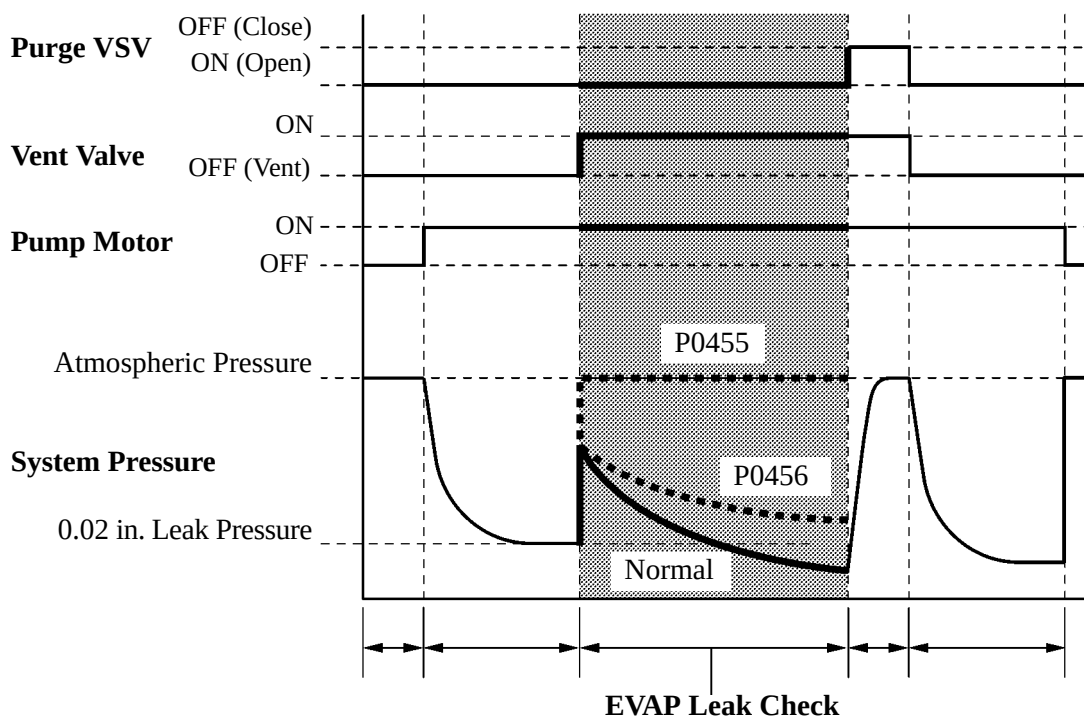
275TU48

d. EVAP Leak Check

- 1) While actuating the leak detection pump, the ECM turns ON the vent valve in order to introduce a vacuum into the canister.
- 2) When the pressure in the system stabilizes, the ECM compares this pressure with the 0.02 in. leak pressure in order to check for a leakage.
- 3) If the measurement value is below the 0.02 in. leak pressure, the ECM determines that there is no leakage.
- 4) If the measurement value is above the 0.02 in. leak pressure and near atmospheric pressure, the ECM determines that there is a gross leakage (large hole) and stores DTC P0455 in its memory.
- 5) If the measurement value is above the 0.02 in. leak pressure, the ECM determines that there is a small leakage and stores DTC P0456 in its memory.



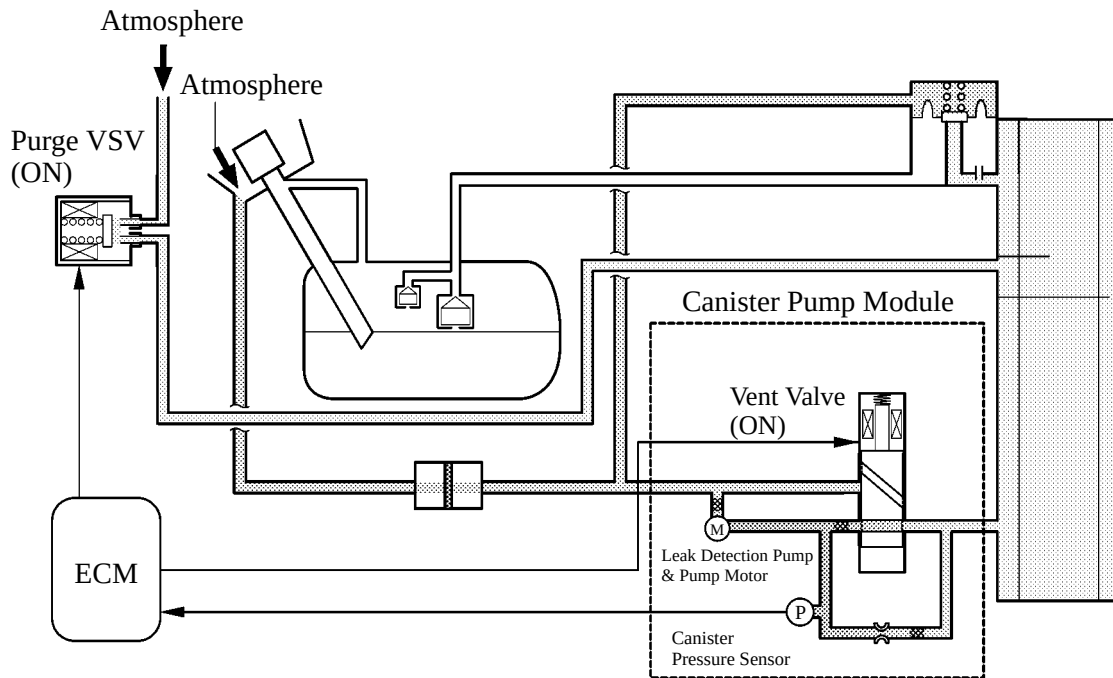
00REG27Y

**EVAP Leak Check**

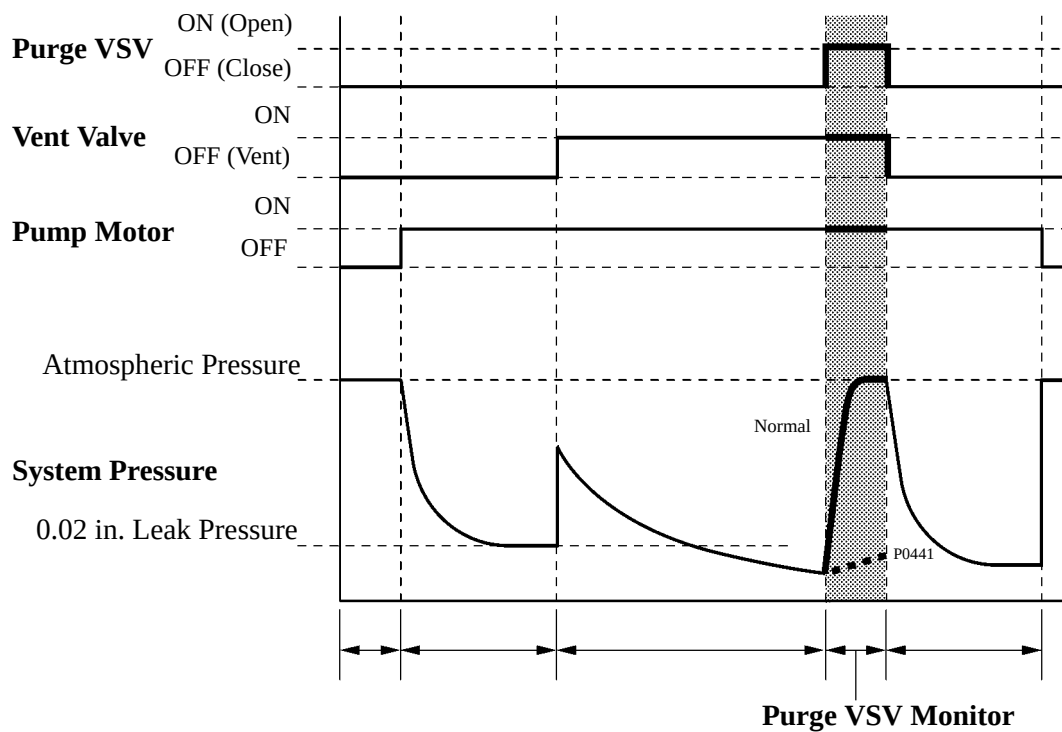
275TU49

e. Purge VSV Monitor

- 1) After completing an EVAP leak check, the ECM turns ON (open) the purge VSV with the leak detection pump actuated, and introduces the atmospheric pressure from the intake manifold to the canister.
- 2) If the pressure change at this time is within the normal range, the ECM determines the condition to be normal.
- 3) If the pressure is out of the normal range, the ECM will stop the purge VSV monitor and store DTC P0441 in its memory.



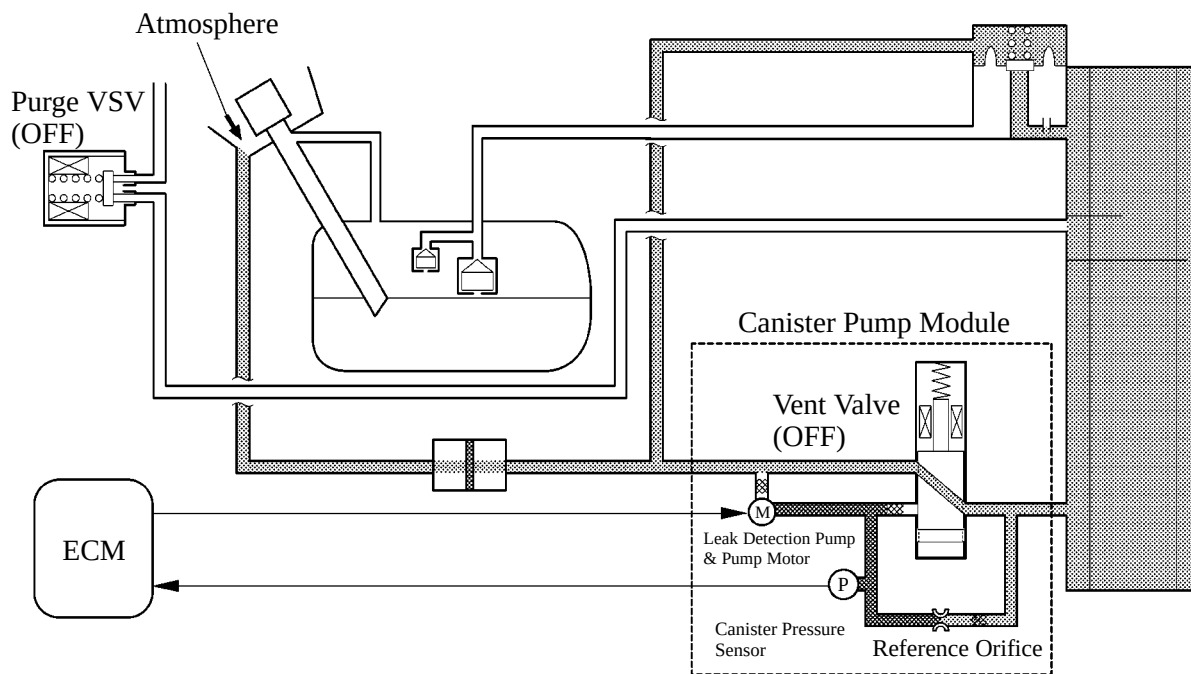
00REG28Y



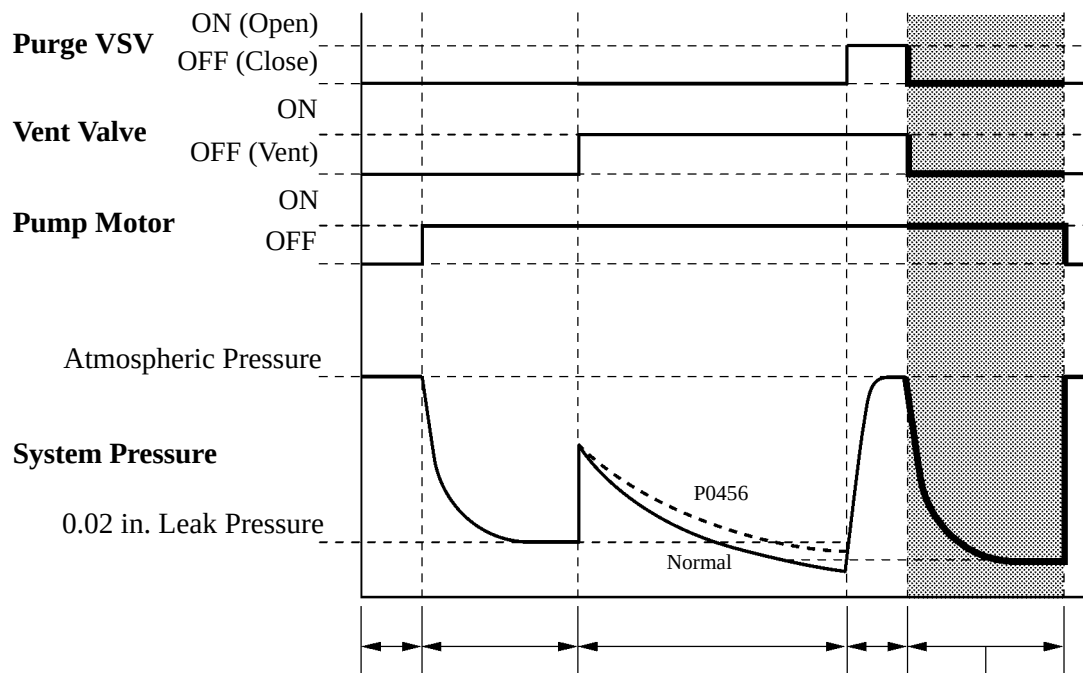
275TU50

f. Repeat 0.02 in. Leak Pressure Measurement

- 1) While the ECM operates the vacuum pump, the purge VSV and vent valve turn off and a repeat 0.02 in. leak pressure measurement is performed.
- 2) The ECM compares the measured pressure with the pressure during EVAP leak check.
- 3) If the pressure during the EVAP leak check is below the measured value, the ECM determines that there is no leakage.
- 4) If the pressure during the EVAP leak check is above the measured value, the ECM determines that there is a small leakage and stores DTC P0456 in its memory.



01MEG03Y

**Repeat 0.02 in. Leak Pressure Measurement**

275TU51

11. Charging Control

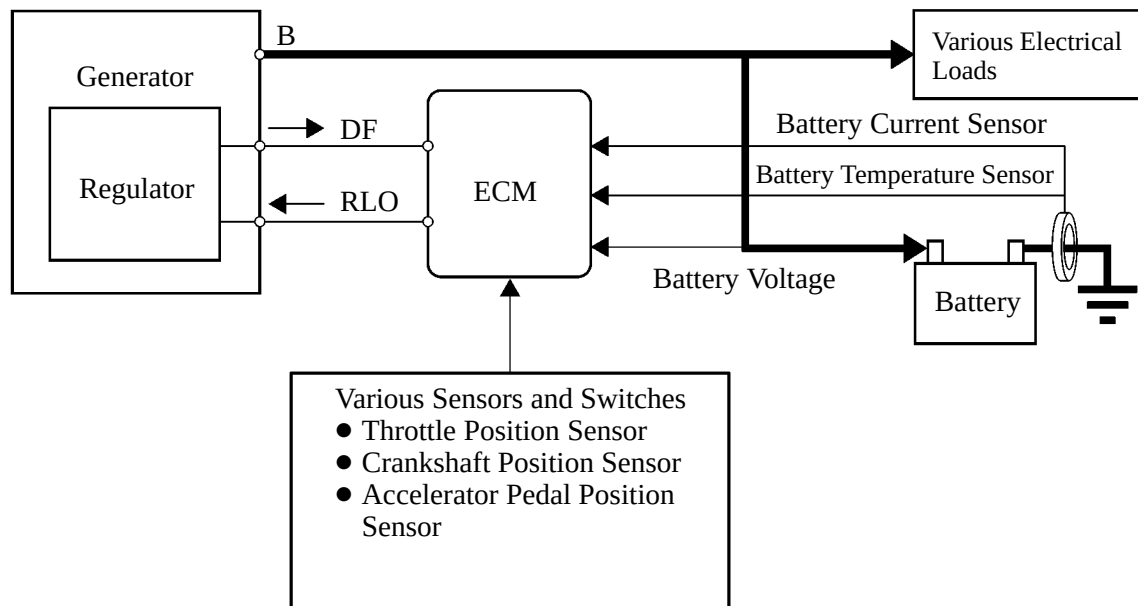
General

This system lowers the generated voltage when the vehicle is idling or is being driven at a constant speed, and raises the generated voltage when the vehicle is decelerating. This reduces the load on the engine as a result of the electric generation of the generator, thus contributing to the fuel economy of the engine. During acceleration, this system regulates the generated voltage in order to place the amperage estimation value close to the target value.

- This control consists of the ECM, battery current sensor with a built-in battery temperature sensor, generator, and various sensors and switches.
- The ECM detects driving condition based on signals from various sensors and switches, and detects charging condition based on signals from the generator, battery current sensor and battery temperature sensor. Then the ECM outputs signals to the IC regulator to control the generated voltage of the generator. The ECM stops the charging control and the generator switches to normal power generation mode under the following conditions:

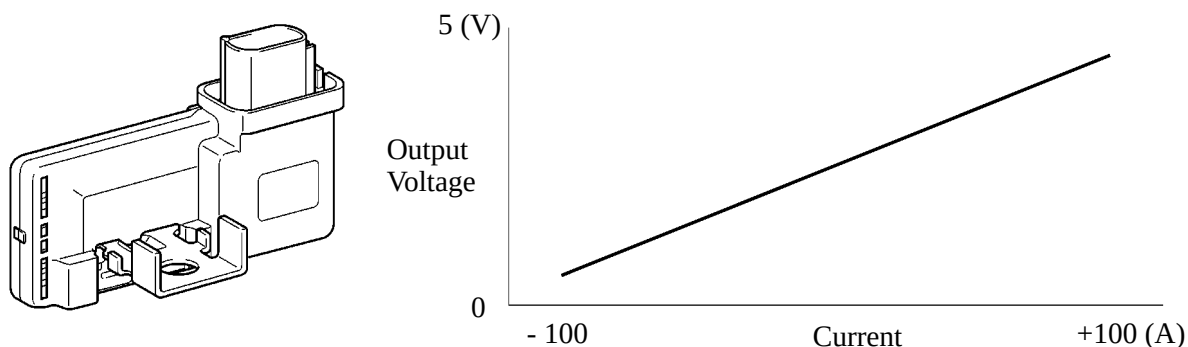
- Low battery capacity
- Low or high battery temperature
- Wipers operating or blower motor operating with tail lamp relay ON

► System Diagram ◀



Battery Current Sensor

Installed on the negative terminal of the battery, this sensor detects the amount of charging and discharging amperage of the battery and sends signal to the ECM. Based on this signal, the ECM calculates the battery capacity. A Hall IC is used for detecting the amount of charging and discharging amperage. The changes that occur in the magnetic flux density in the core as a result of the charging and amperage of the battery are converted and output as voltage.

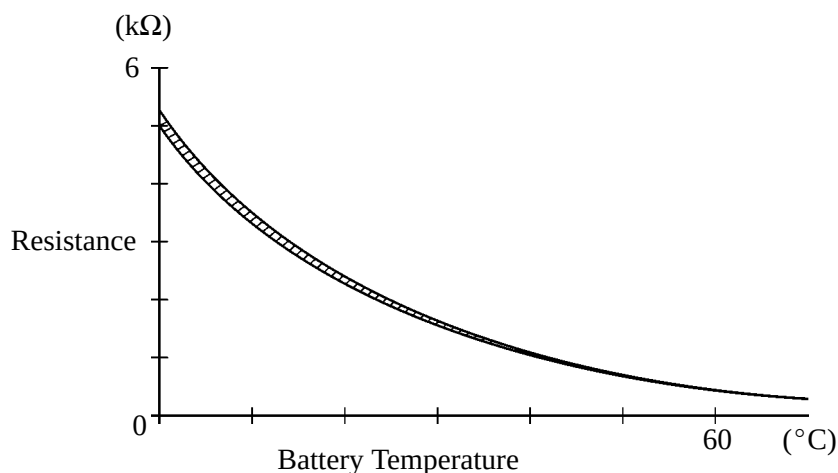


281EG86

258AS61

Batter Temperature Sensor

- The battery temperature sensor is built into the battery current sensor.
- The battery characteristic (battery internal resistance) of taking in current for charging varies according to battery electrolyte temperature. If the electrolyte temperature is too low or too high, the battery internal resistance will increase, resulting in early deterioration. To prevent this, the battery temperature sensor changes its resistance as shown below to detect the temperature.



288EG61C

Fail-safe

Due to a failure in the battery current sensor or battery temperature sensor, the ECM may determine the necessity of performing a fail-safe operation. Then, the ECM stops the charging control and the generator switches to the normal power generation mode.

When the ECM detects a malfunction in a sensor, the ECM memorizes the DTC (Diagnostic Trouble Code). The MIL (Malfunction Indicator Lamp) does not illuminate.

► DTC Chart ◀

DTC No.	Detection Item	DTC No.	Detection Item
P0516	Battery Temperature Sensor Circuit Low	P1551	Battery Current Sensor Circuit Low
P0517	Battery Temperature Sensor Circuit High	P1552	Battery Current Sensor Circuit High
P0560	System Voltage	P1602	Detection of Battery
P1550	Battery Current Sensor Circuit		

12. Diagnosis

- When the ECM detects a malfunction, the ECM makes a diagnosis and memorizes the failed section. Furthermore, the MIL in the combination meter illuminates or blinks to inform the driver.
- The ECM will also store the DTCs of the malfunctions. The DTCs can be accessed by the use of the hand-held tester.
- For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

Service Tip

To clear the DTC that is stored in the ECM, use a hand-held tester or disconnect the battery terminal or remove the EFI fuse for 1 minute or longer.

13. Fail-safe

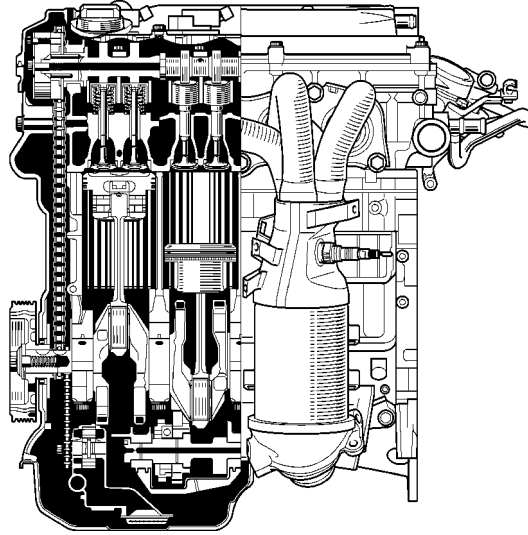
When a malfunction is detected at any of the sensors, there is a possibility of an engine or other malfunction occurring if the ECM were to continue to control the engine control system in the normal way. To prevent such a problem, the fail-safe function of the ECM either relies on the data stored in memory to allow the engine control system to continue operating, or stops the engine if a hazard is anticipated. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

ENGINE

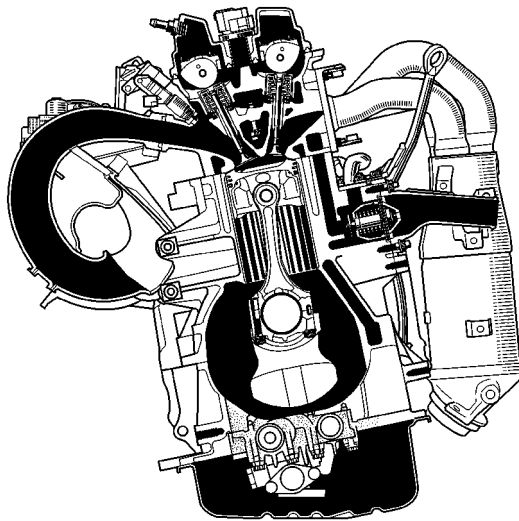
2AZ-FE ENGINE

■ DESCRIPTION

The 2AZ-FE engine is an in-line, 4-cylinder, 2.4-liter, 16-valve DOHC engine. This engine uses the VVT-i (Variable Valve Timing-intelligent) system, DIS (Direct Ignition System), ETCS-i (Electronic Throttle Control System-intelligent). It has been developed to realize high performance, quietness, fuel economy and clean emission.



01NEG49Y



01NEG50Y

► Engine Specifications ◀

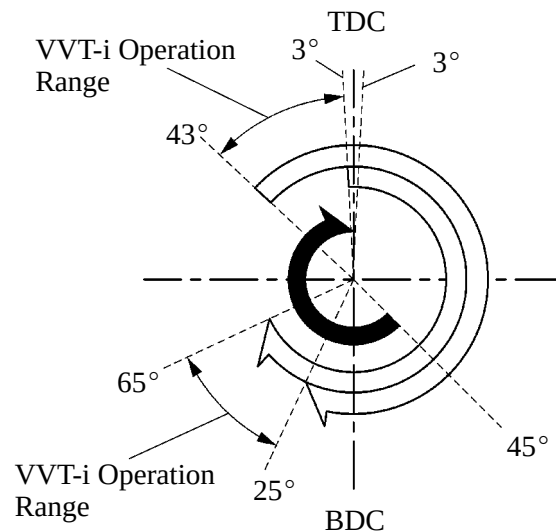
No. of Cyls. & Arrangement			4-cylinder, In-line
Valve Mechanism			16-valve DOHC, Chain Drive (with VVT-i)
Combustion Chamber			Pentroof Type
Manifolds			Cross-flow
Fuel System			SFI
Ignition System			DIS
Displacement		cm ³ (cu. in.)	2362 (144.1)
Bore x Stroke		mm (in.)	88.5 x 96.0 (3.48 x 3.78)
Compression Ratio			9.8 : 1
Max. Output* ¹		(SAE-NET)	124 kW @ 6000 rpm (166 HP @ 6000 rpm)
Max. Torque* ¹		(SAE-NET)	224 N·m @ 4000 rpm (165 ft-lbf @ 4000 rpm)
Valve Timing	Intake	Open	3° - 43° BTDC
		Close	65° - 25° ABDC
	Exhaust	Open	45° BBDC
		Close	3° ATDC
Firing Order			1 - 3 - 4 - 2
Research Octane Number			91 or higher
Octane Rating			87 or higher
Oil Grade			ILSAC
Tailpipe Emission Regulation			ULEV-II, SFTP
Evaporative Emission Regulation			LEV-II, ORVR
Engine Service Mass* ² (Reference)		kg (lb)	138 (304.2)

*1: Maximum output and torque rating is determined by revised SAE J1349 standard.

*2: Weight shows the figure with oil and water fully filled.

► Valve Timing ◀

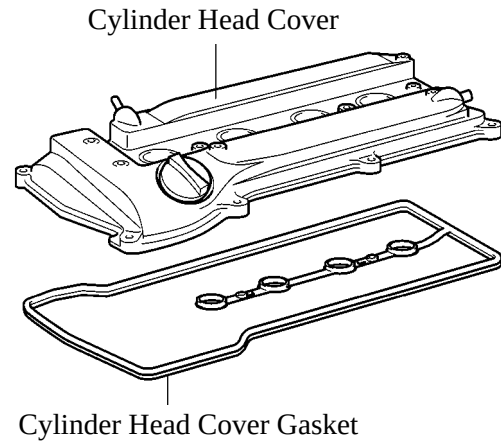
↗ : Intake Valve Opening Angle
 ↘ : Exhaust Valve Opening Angle



ENGINE PROPER

1. Cylinder Head Cover

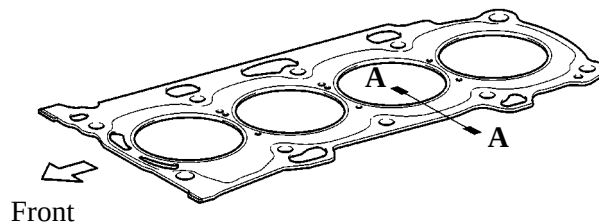
- A lightweight magnesium alloy die-cast cylinder head cover is used.
- Acrylic rubber, which excels in heat resistance and reliability, is used for the cylinder head cover gasket.



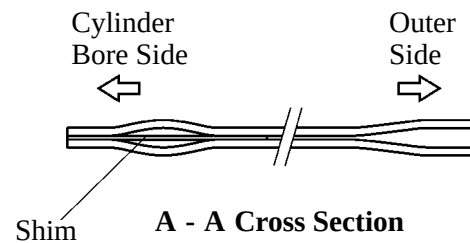
DR011EG20

2. Cylinder Head Gasket

A steel-laminate type cylinder head gasket is used. A shim has been added around the cylinder bore to increase the sealing surface, thus improving the sealing performance and durability.



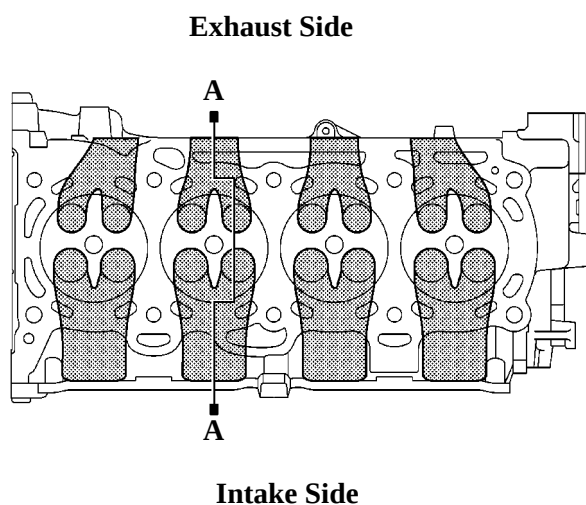
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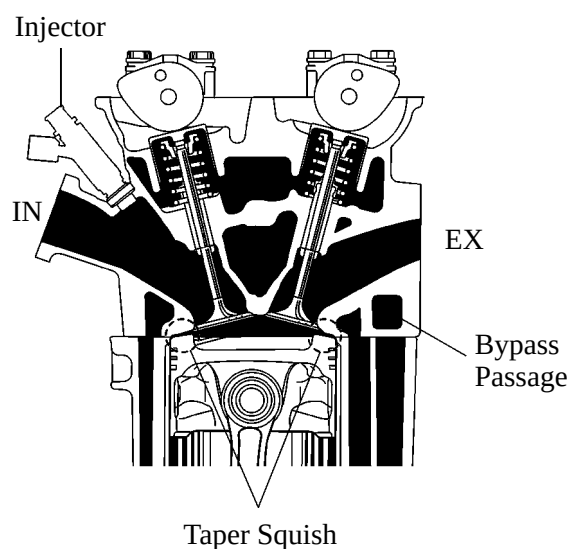
02AEG02Y

3. Cylinder Head

- Through the adoption of the taper squish combustion chamber, the engine knocking resistance and fuel efficiency have been improved.
- An upright intake port is used to improve the intake efficiency.
- Installing the injectors in the cylinder head enables the injectors inject fuel as close as possible to the combustion chamber. This prevents the fuel from adhering to the intake port walls, which reduces HC exhaust emissions.
- The routing of the water jacket in the cylinder head has been optimized to realize the high cooling performance. In addition, a water bypass passage has been provided below the exhaust ports to reduce the number of parts and the weight.



DR011EG21



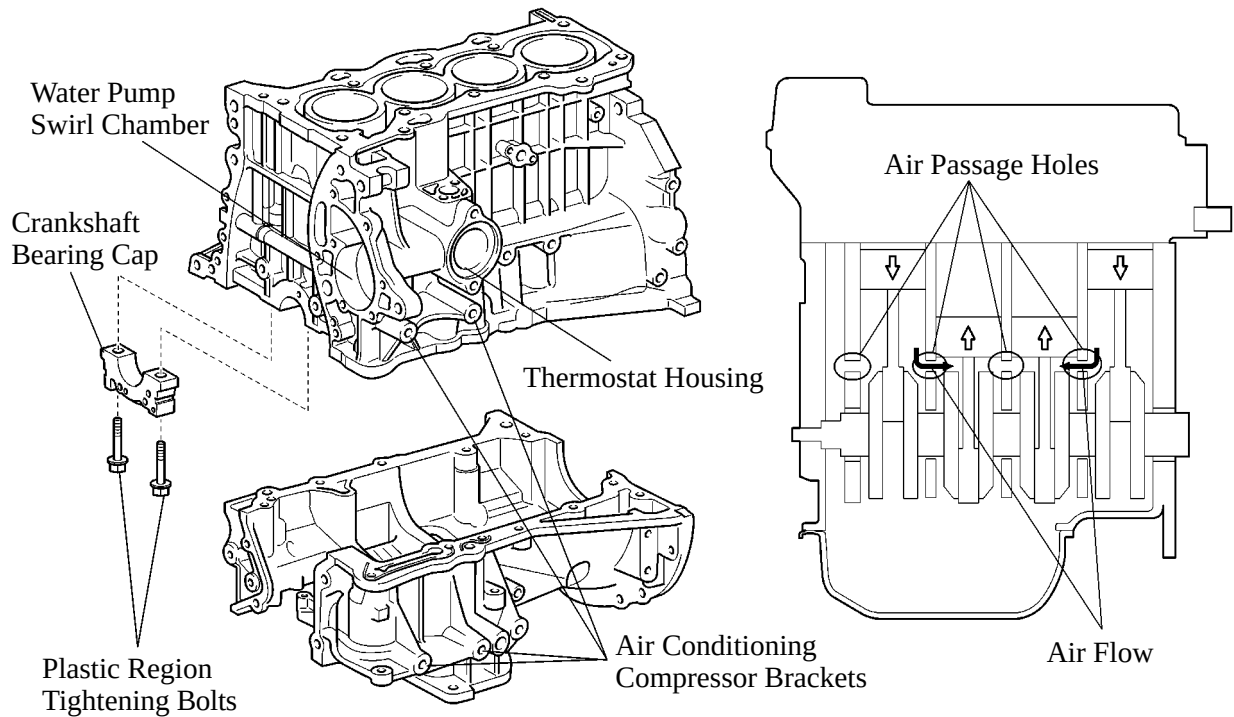
208EG67

A - A Cross Section

4. Cylinder Block

- Lightweight aluminum alloy is used for the cylinder block.
- By producing the thin cast-iron liners and cylinder block as a unit, compaction is realized.
- Air passage holes are provided in the crankshaft bearing area of the cylinder block. As a result, the air at the bottom of the cylinder flows smoother, and pumping loss (back pressure at the bottom of the piston generated by the piston's reciprocal movement) is reduced to improve the engine's output.
- The oil filter and the air conditioning compressor brackets are integrated into the crankcase. Also, the water pump swirl chamber and thermostat housing are integrated into the cylinder block.

► Air Flow During Engine Revolution ◀



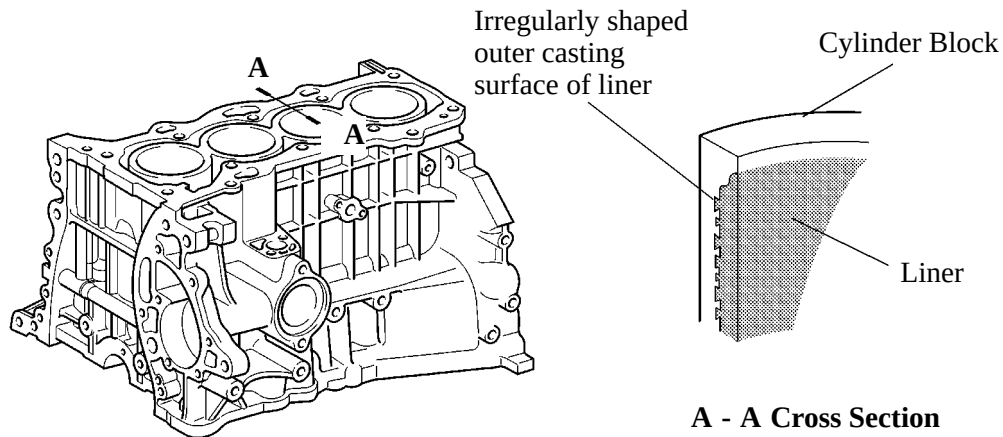
01NEG26Y

DR011EG22

NOTICE

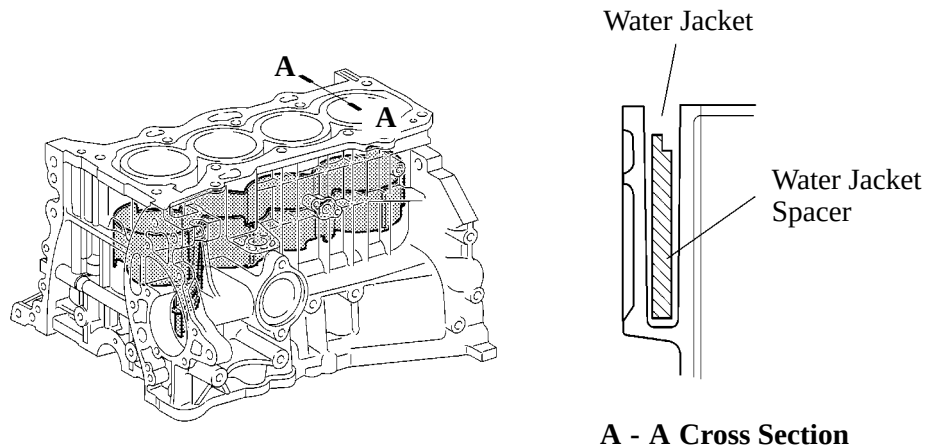
Never attempt to machine the cylinder because it has a thin liner thickness.

- The liners are the spiny-type, which have been manufactured so that their casting exteriors form large irregular surfaces in order to enhance the adhesion between the liners and the aluminum cylinder block. The enhanced adhesion helps heat dissipation, resulting in a lower overall temperature and heat deformation of the cylinder bores.



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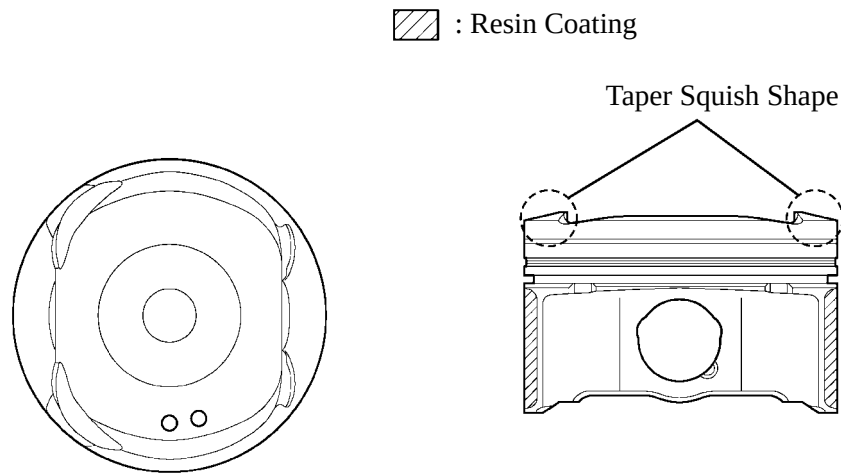
- Water jacket spacers are provided in the water jacket of the cylinder block.
- They suppress the water flow in the center of the water jackets, guide the coolant above and below the cylinder bores, and ensure uniform temperature distribution. As a result, the viscosity of the engine oil that acts as a lubricant between the bore walls and the pistons can be lowered, thus reducing friction.



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5. Piston

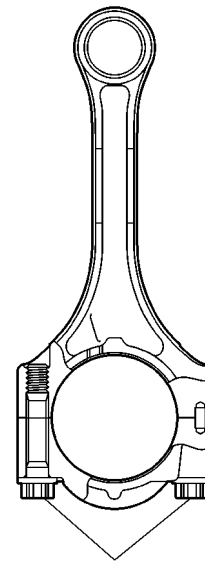
- The piston is made of aluminum alloy and skirt area is made compact and lightweight.
- The piston head portion uses a taper squish shape to improve the fuel combustion efficiency.
- The piston skirt has been coated with resin to reduce the friction loss.



01MEG01Y

6. Connecting Rod

- The connecting rods and caps are made of high-strength steel for weight reduction.
- Nut-less type plastic region tightening bolts are used on the connecting rod for a lighter design.
- The connecting rod bearings are reduced in width to reduce friction.

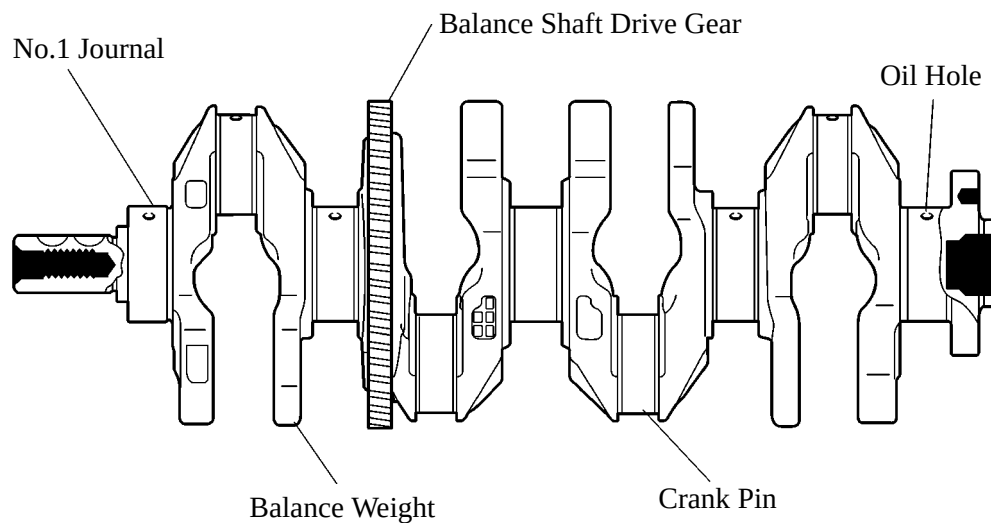


240EG45

Plastic Region Tightening Bolts

7. Crankshaft

- The forged crankshaft has 5 journals and 8 balance weights.
- The crankshaft is made of forged steel.
- Pin and journal fillets are roll-finished to maintain adequate strength.
- The balance shaft drive gear is provided for the crankshaft.

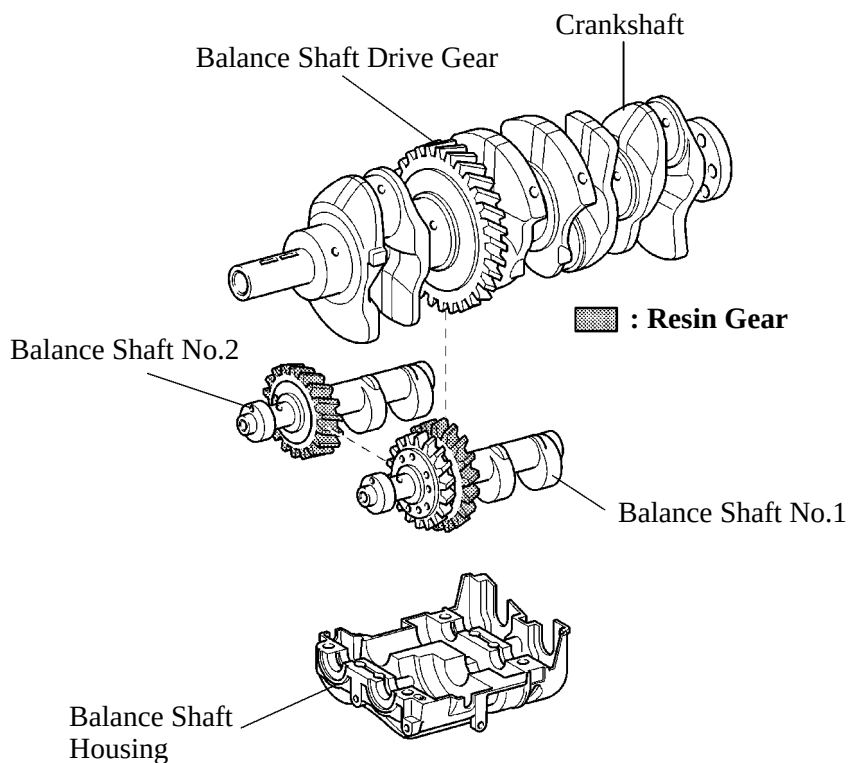


01NEG31Y

8. Balance Shaft

General

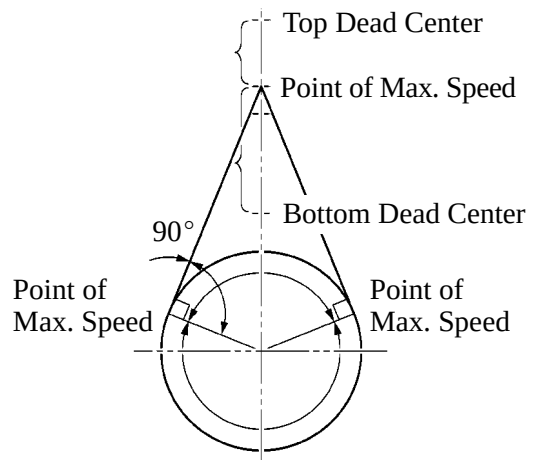
- A balance shaft is used to reduce vibrations.
- The crankshaft directly drives the No. 1 balance shaft.
- In addition, a resin gear is used on the driven side to suppress noise and offer lightweight design.



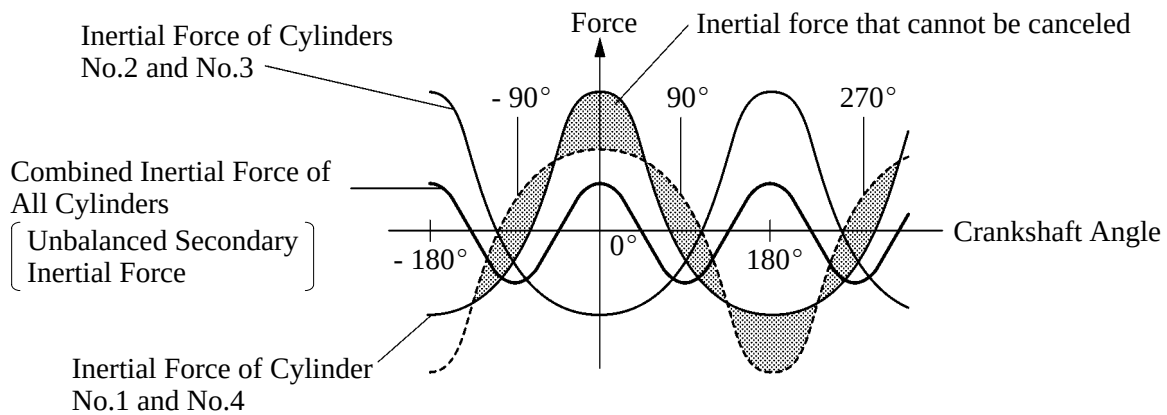
01NEG32Y

Operation

In the in-line 4-cylinder engine, the crankshaft angle for cylinders No.1 and No.4 are exactly at the opposite (180°) position of cylinders No.2 and No.3. Therefore, the inertial force of the pistons and the connecting rods of the former 2 cylinders and of the latter 2 cylinders almost cancel each other. However, because the position at which the piston reaches its maximum speed is located toward the top dead center from the center of the stroke, the upward inertial force is greater than the downward inertial force. This unbalanced secondary inertial force is generated twice for each rotation of the crankshaft.



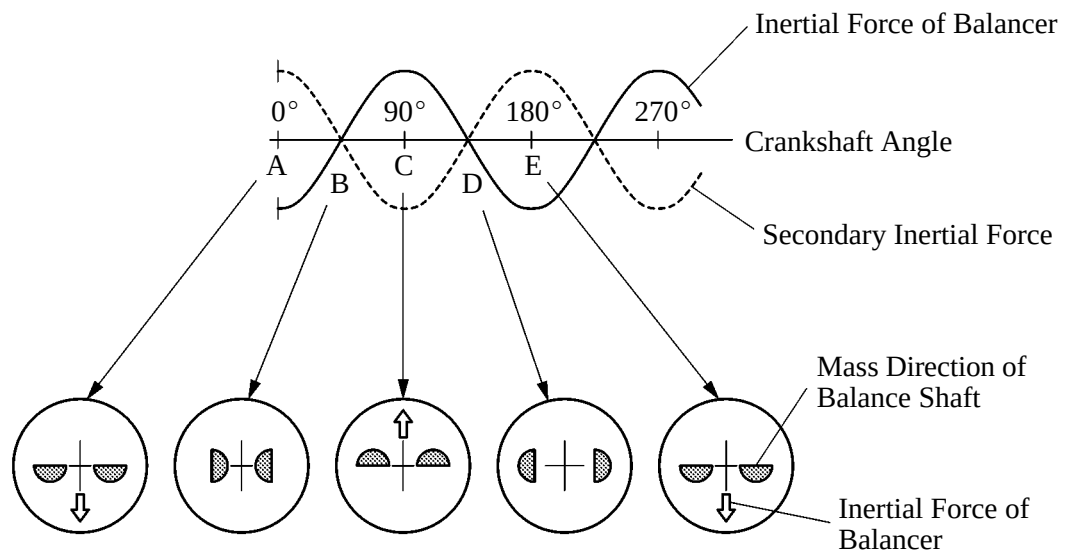
286EG71



Inertial Force Generated by the In-line 4 Cylinders

286EG72

To cancel the unbalanced secondary inertial force, 2 balance shafts are rotated twice for each rotation of the crankshaft and generate inertial force in the opposite direction. Also, in order to cancel the inertial force generated by the balance shaft itself, the balance shaft actually consists of 2 shafts rotating in opposite directions.



Mass Direction of Balance Shaft at Crankshaft Angle

286EG73

■ FEATURES OF 2GR-FE ENGINE

The 2GR-FE engine has achieved the following performance through the use of the items listed below.

- (1) High performance and reliability
- (2) Low noise and vibration
- (3) Lightweight and compact design
- (4) Good serviceability
- (5) Clean emission and fuel economy

Item		(1)	(2)	(3)	(4)	(5)
Engine Proper	A steel laminate type cylinder head gasket is used.	○				
	An upright intake port is used.	○		○		
	A taper squish shape is used for combustion chamber.	○				○
	A cylinder block made of aluminum alloy is used.			○		
	The skirt portion of the piston is applied with resin to reduce friction.	○	○			○
	An oil pan No. 1 made of aluminum alloy is used.		○	○		
Valve Mechanism	The Dual VVT-i (Variable Valve Timing-intelligent) system is used.	○				○
	Hydraulic lash adjusters are used.	○	○		○	
	Timing chains and chain tensioners are used.		○	○	○	
	Roller rocker arms are used.	○				○
Lubrication System	An oil filter with a replaceable element is used.				○	
Cooling System	The TOYOTA Genuine SLLC (Super Long Life Coolant) is used for the engine coolant.				○	
Intake and Exhaust System	The linkless-type throttle body is used.			○	○	
	The intake air chamber made of plastic is used.			○		
	A stainless steel exhaust manifold is used.			○		○
	An ultra thin-wall, high-cell density ceramic type TWC (Three-Way Catalytic converter) is used.					○
Fuel System	The fuel delivery pipe made of plastic is used.			○		
	A compact 12-hole type injector is used.	○				○
	Quick connectors are used to connect the fuel hose with the fuel pipe.				○	
Ignition System	The DIS (Direct Ignition System) makes ignition timing adjustment unnecessary.	○			○	○
	The long-reach type spark plugs are used.	○				

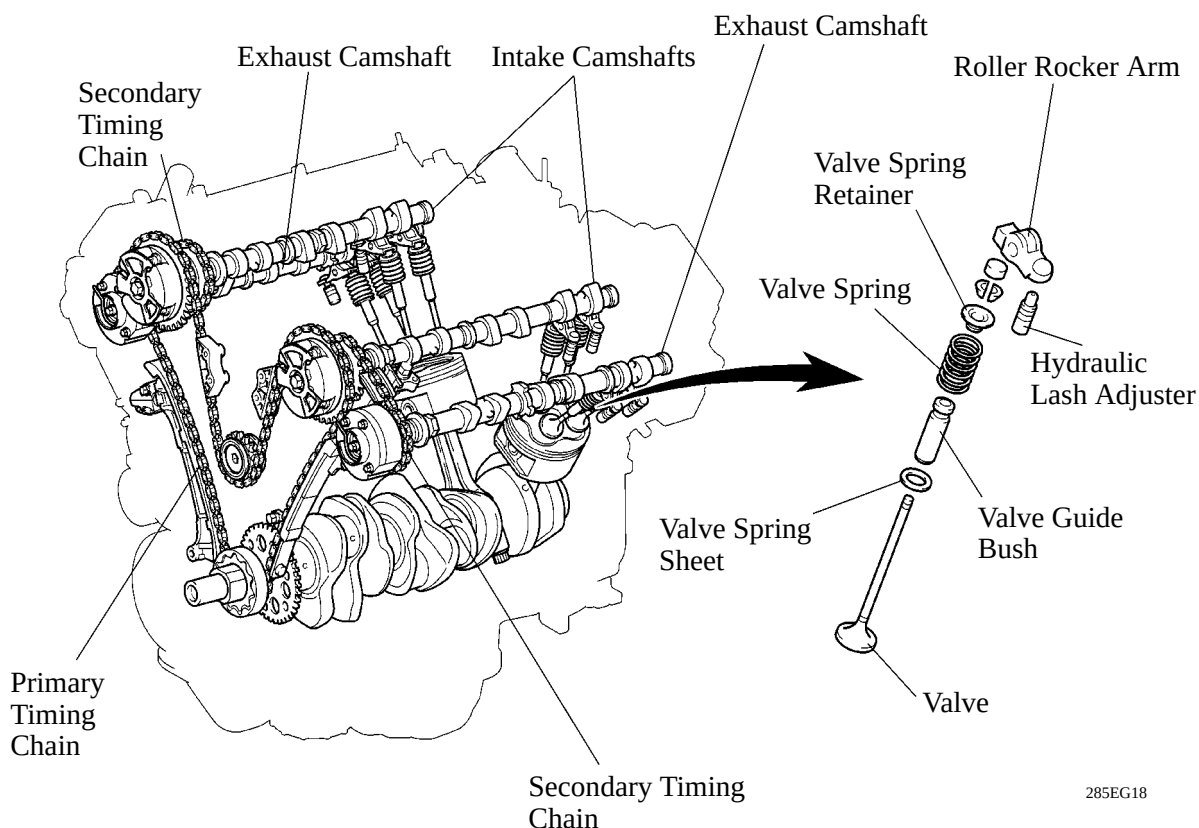
(Continued)

Item		(1)	(2)	(3)	(4)	(5)
Charging System	A segment conductor type generator is used.	○		○		
	A generator pulley with a clutch is used.					○
Starting System	The PS (Planetary reduction-Segment conductor motor) type starter is used.			○		
Serpentine Belt Drive System	A serpentine belt drive system is used.			○	○	
Engine Control System	The MRE (Magnetic Resistance Element) type VVT sensors are used.	○				
	The ETCS-i (Electronic Throttle Control System-intelligent) is used.	○				○
	The ACIS (Acoustic Control Induction System) is used.	○				○
	The air intake control system is used.	○	○			
	The charging control is used.	○				
	Evaporative emission control system is used.					○

■ VALVE MECHANISM

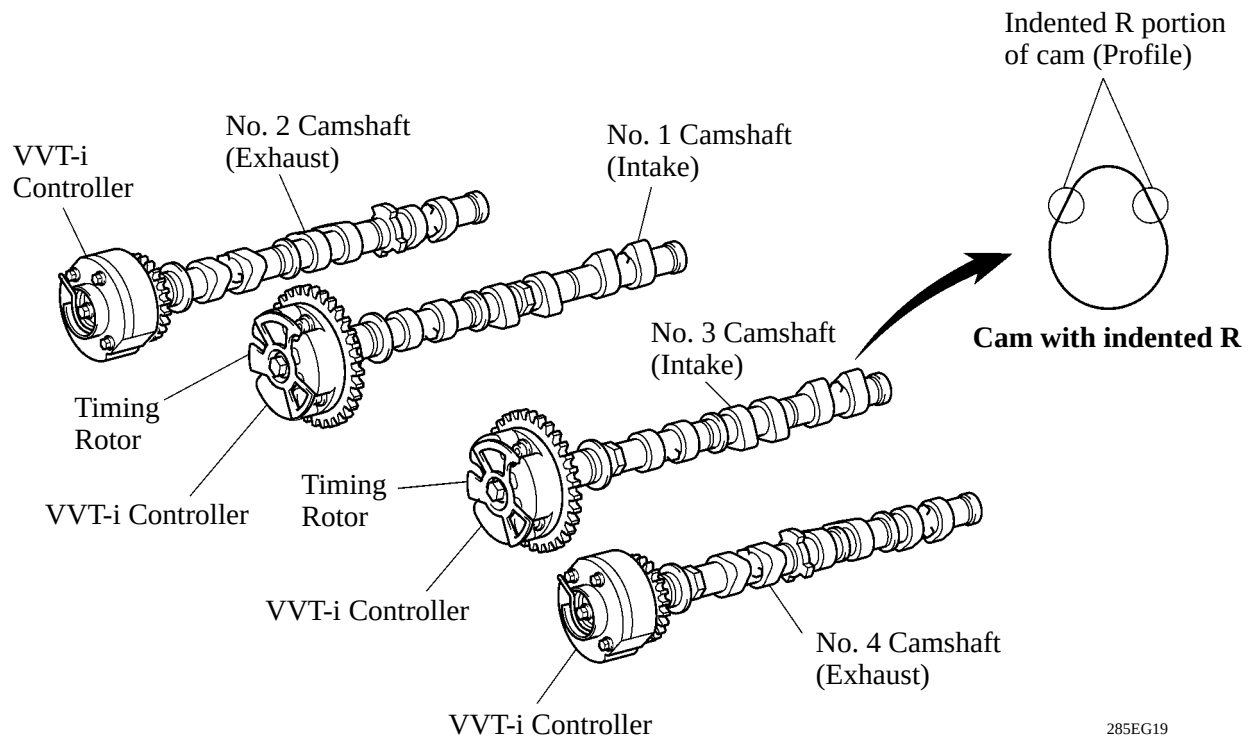
1. General

- Each cylinder of this engine has 2 intake valves and 2 exhaust valves. Intake and exhaust efficiency is increased due to the larger total port areas.
- This engine uses roller rocker arms with built-in needle bearings. This reduces the friction that occurs between the cams and the areas (roller rocker arms) that push the valves down, thus improving fuel economy.
- A hydraulic lash adjuster, which maintains a constant zero valve clearance through the use of oil pressure and spring force, is used.
- The intake camshafts are driven by the crankshaft via the primary timing chain. The exhaust camshafts are driven by the intake camshaft of the respective bank via the secondary timing chain.
- This engine uses a Dual VVT-i (Variable Valve Timing-intelligent) system which controls the intake and exhaust camshafts to provide optimal valve timing according to driving conditions. With this adoption, lower fuel consumption, higher engine performance, and fewer exhaust emissions have been achieved. For details of Dual VVT-i control, see page EG-120.



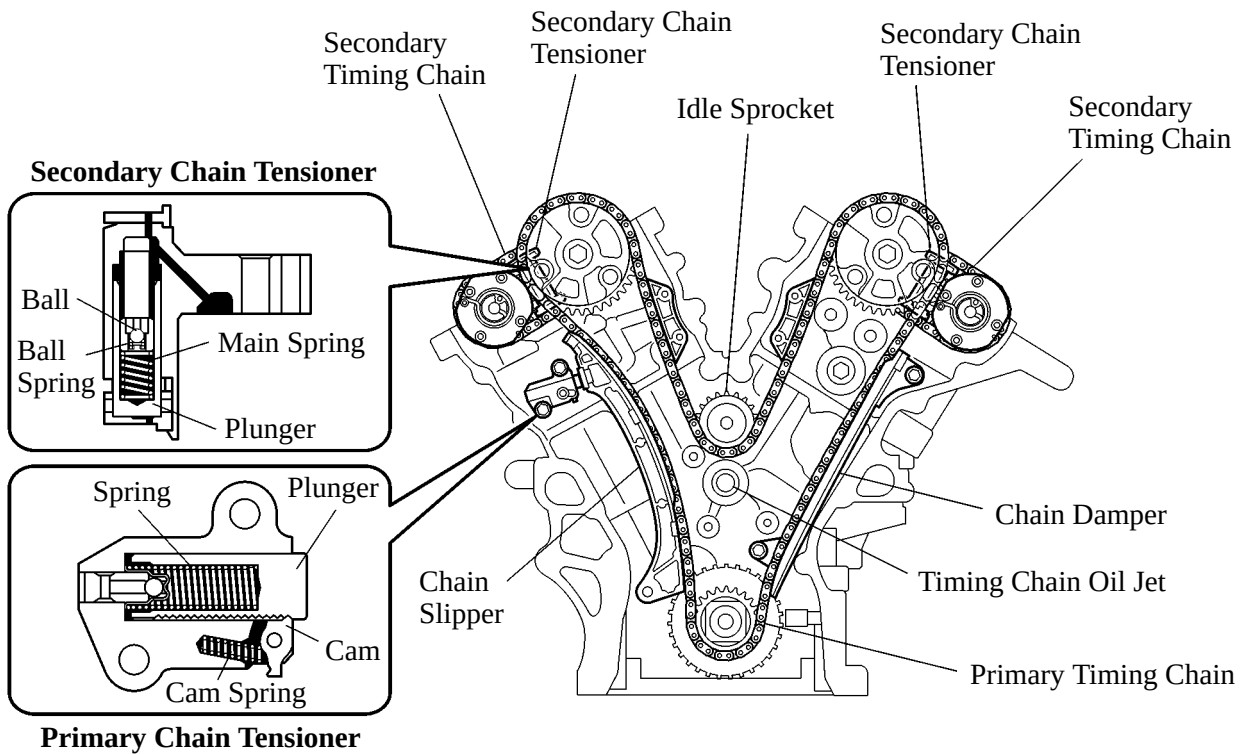
2. Camshaft

- The camshafts are made of cast iron alloy.
- An oil passage is provided on the intake and exhaust camshafts in order to supply engine oil to the VVT-i system.
- A VVT-i controller has been installed on the front of the intake and exhaust camshafts to vary the timing of the intake and exhaust valves.
- Together with the use of the roller rocker arm, the cam profile has been designed with an indented R (radius). This results in increased valve lift when the valve begins to open and finishes closing, helping to achieve enhanced output performance.



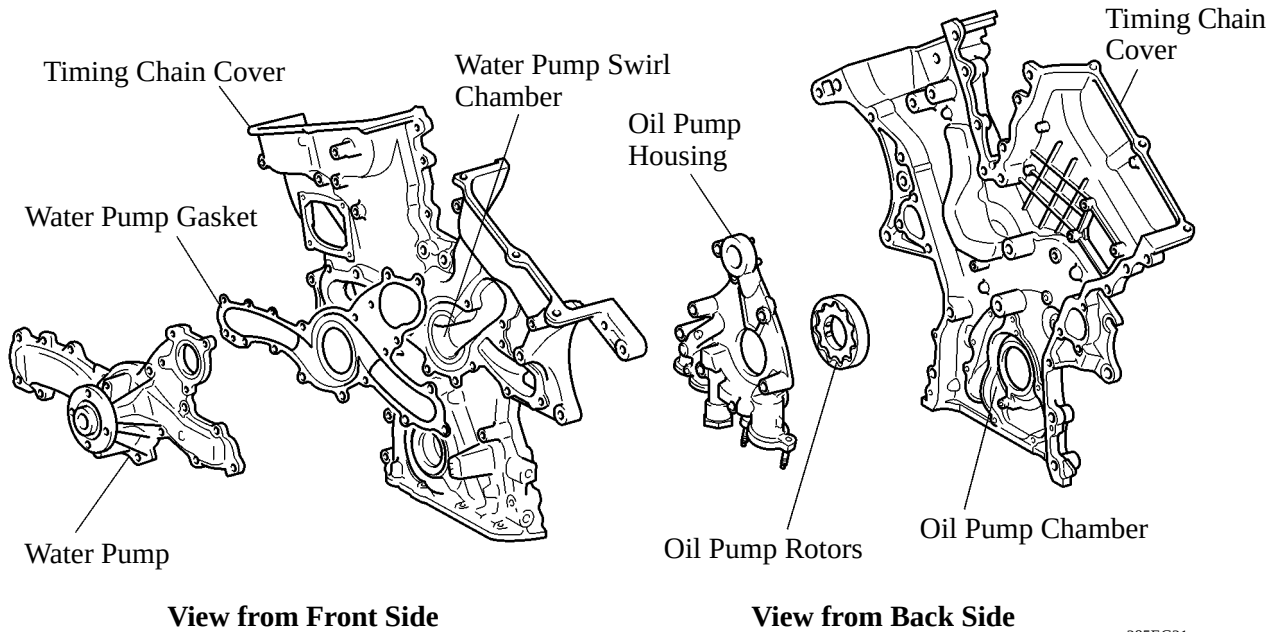
3. Timing Chain and Chain Tensioner

- Both the primary and secondary timing chains use roller chains with a pitch of 9.525 mm (0.375 in.).
- The timing chain is lubricated by an oil jet.
- The primary timing chain uses one chain tensioner, and each of the secondary timing chains for the right and left banks uses one chain tensioner.
- Both the primary and secondary chain tensioners use a spring and oil pressure to maintain proper chain tension at all times. They suppress noise generated by the timing chains.
- The primary chain tensioner is the ratchet type with a non-return mechanism.



4. Timing Chain Cover

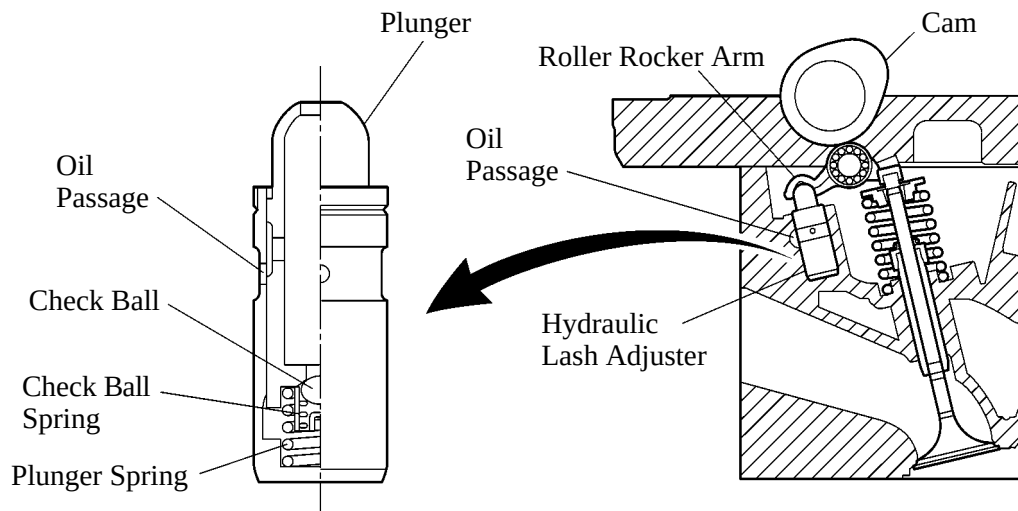
The timing chain cover has an integrated construction consisting of the cooling system (water pump and water passage) and the lubrication system (oil pump and oil passage). Thus, the number of parts has been reduced to reduce weight.



285EG21

5. Hydraulic Lash Adjuster

- The hydraulic lash adjuster, which is located at the fulcrum of the roller rocker arm, consists primarily of a plunger, plunger spring, check ball, and check ball spring.
- The engine oil that is supplied by the cylinder head and the built-in spring actuates the hydraulic lash adjuster. The oil pressure and the spring force that act on the plunger push the roller rocker arm against the cam, in order to adjust the valve clearance that is created during the opening and closing of the valve. As a result, engine noise is reduced.



285EG22

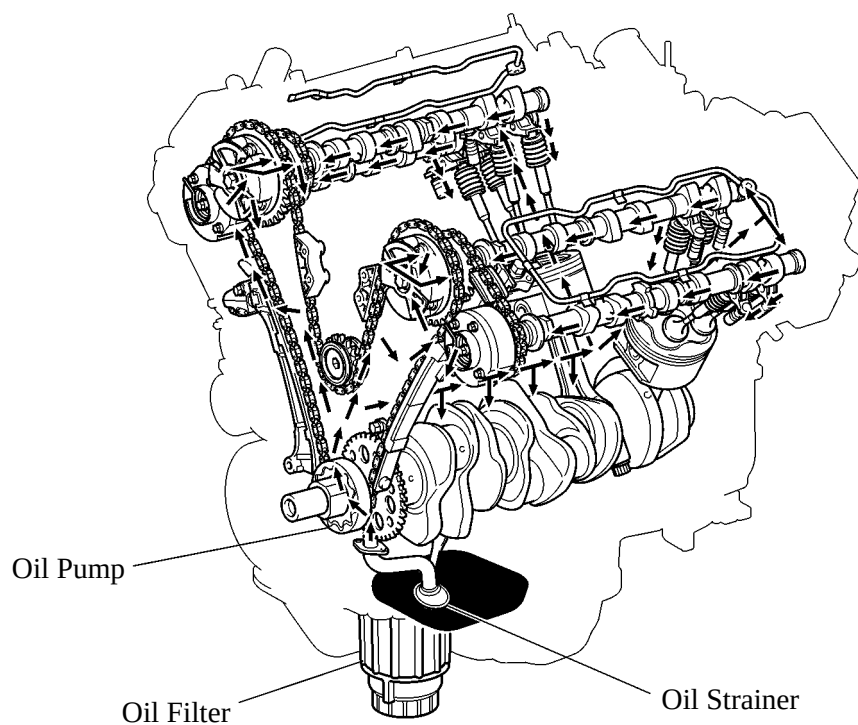
Service Tip

Valve clearance adjustment is not necessary because a hydraulic lash adjuster is used in this model.

■ LUBRICATION SYSTEM

1. General

- The lubrication circuit is fully pressurized and all oil passes through an oil filter.
- A cycloid rotor type oil pump is used.

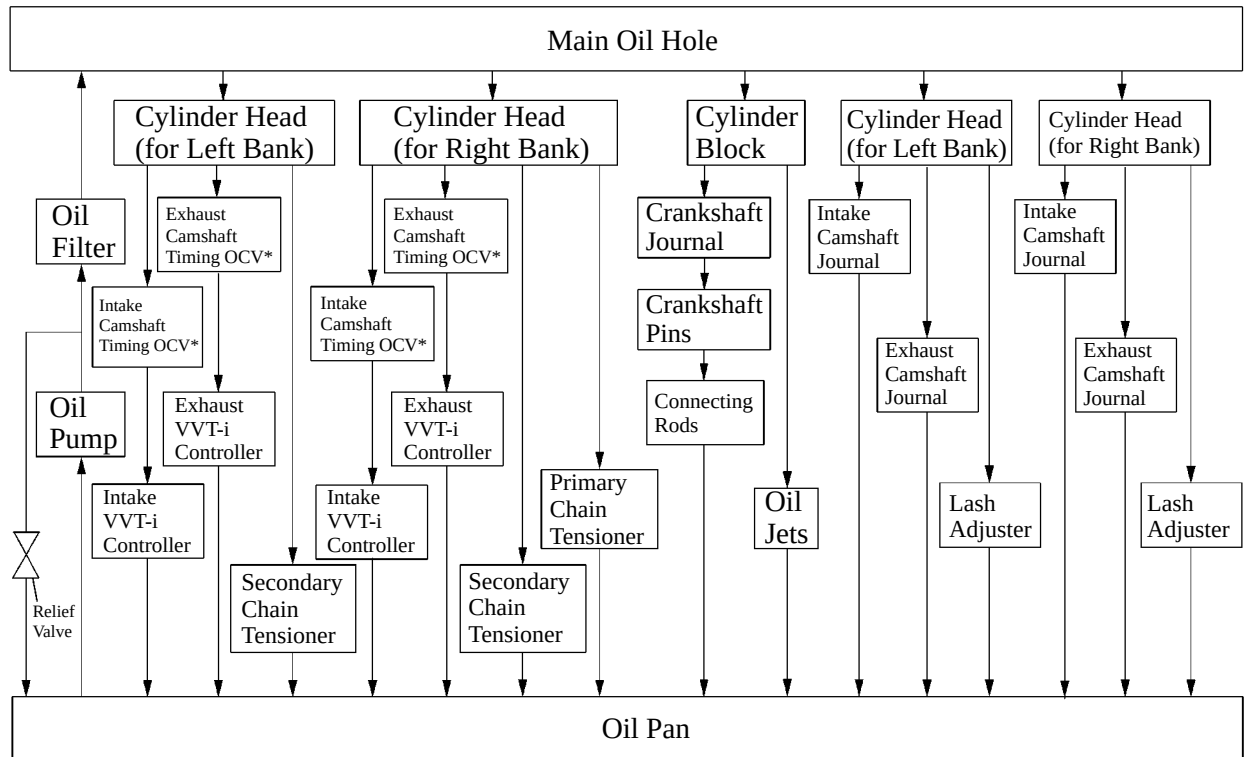


285EG23

► Oil Capacity ◀

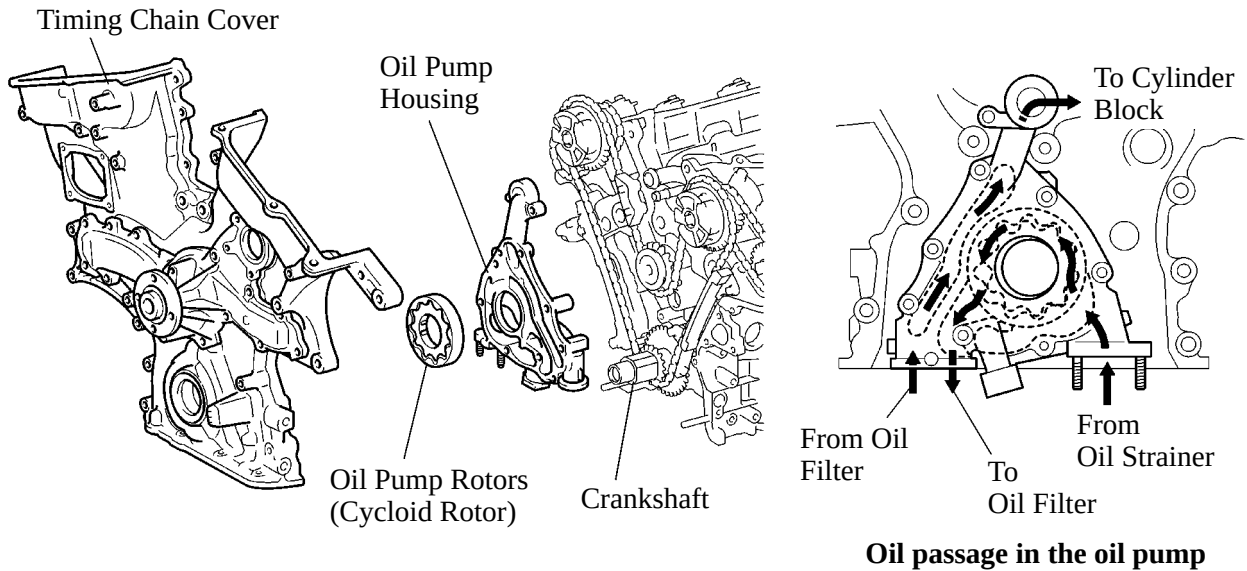
Dry	6.5 Liters (6.9 US pts, 5.7 Imp. qts)
With Oil Filter	6.1 Liters (6.4 US pts, 5.4 Imp. qts)
Without Oil Filter	5.7 Liters (6.0 US pts, 5.0 Imp. qts)

► Oil Circuit ◀



2. Oil Pump

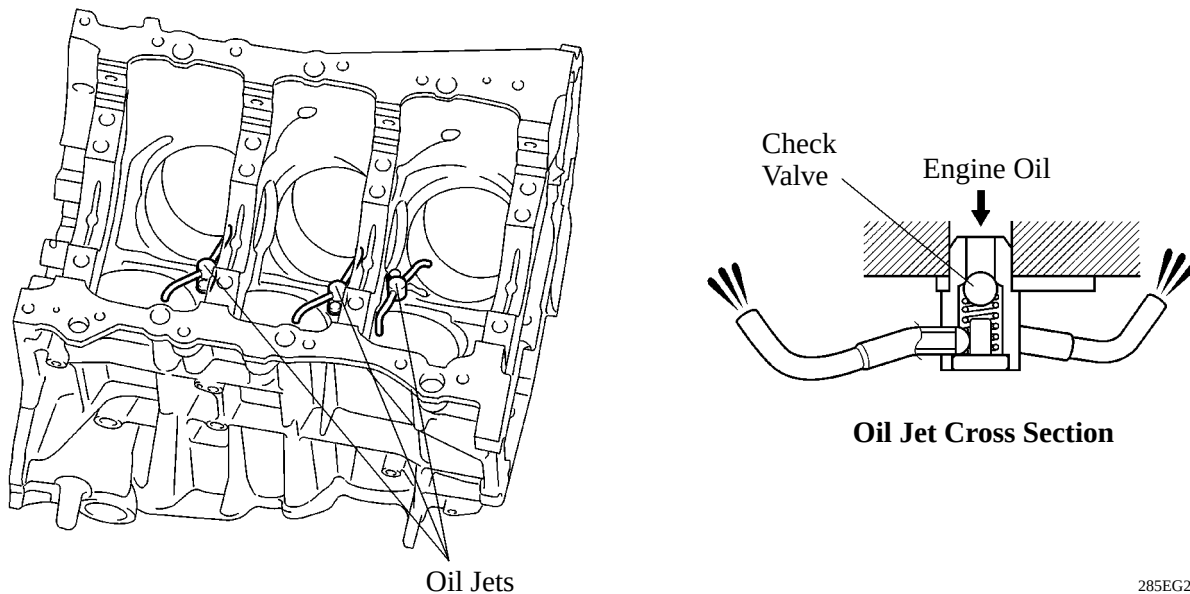
- A compact cycloid rotor type oil pump directly driven by the crankshaft is used.
- This oil pump has used an internal relief method which circulates relief oil to the suction passage in the oil pump. This aims to minimize oil level change in the oil pan, reduce friction, and reduce air mixing rate in the oil.



285EG24

3. Oil Jet

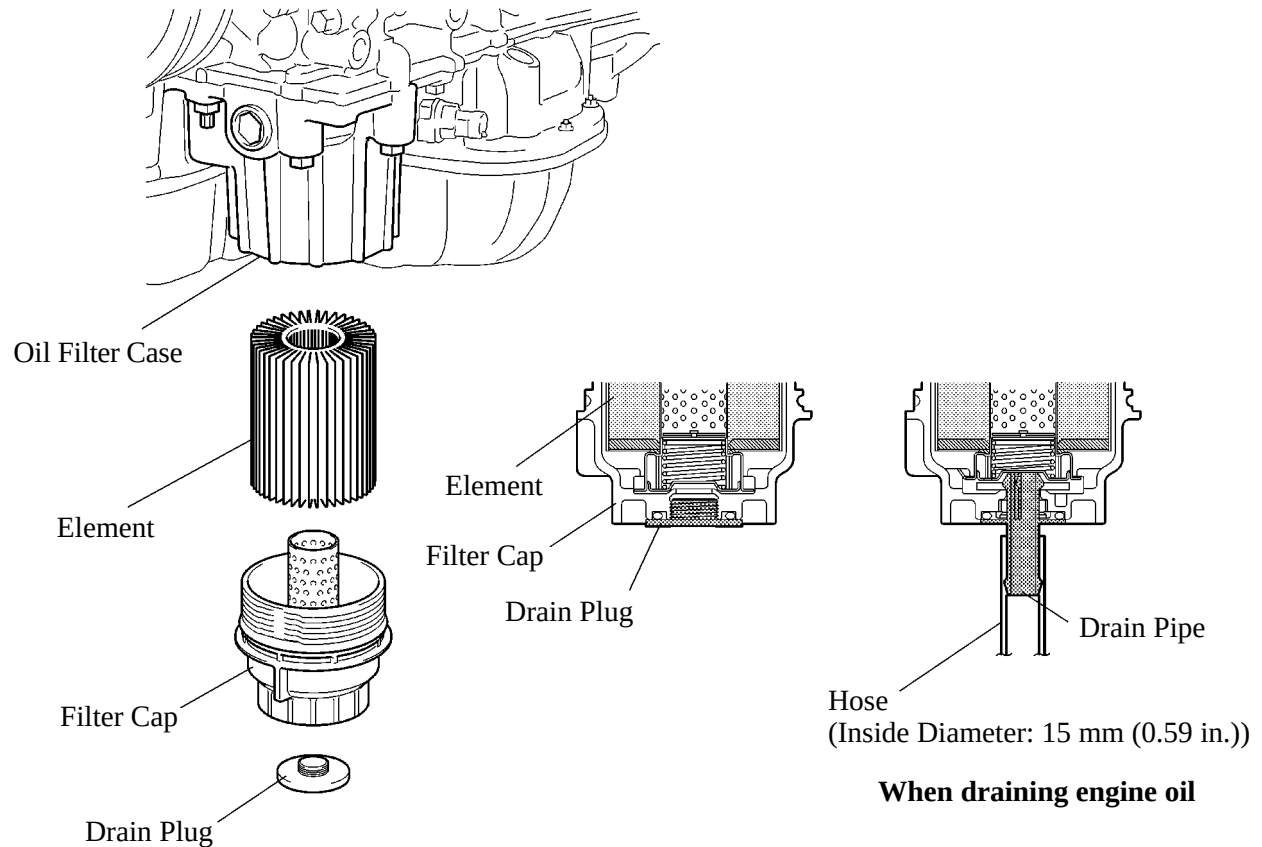
- Oil jets for cooling and lubricating the pistons have been provided in the cylinder block, in the center of the right and left banks.
- These oil jets contain a check valve to prevent oil from being fed when the oil pressure is low. This prevents the overall oil pressure in the engine from dropping.



285EG25

4. Oil Filter

- An oil filter with a replaceable element is used. The element uses a high-performance filter paper to improve filtration performance. It is also combustible for environmental protection.
- An aluminum alloy filter cap is used to extend its life.
- This oil filter has a structure which can drain the engine oil remaining in the oil filter. This prevents engine oil from spattering when replacing the element and allows the technician to work without touching hot engine oil.



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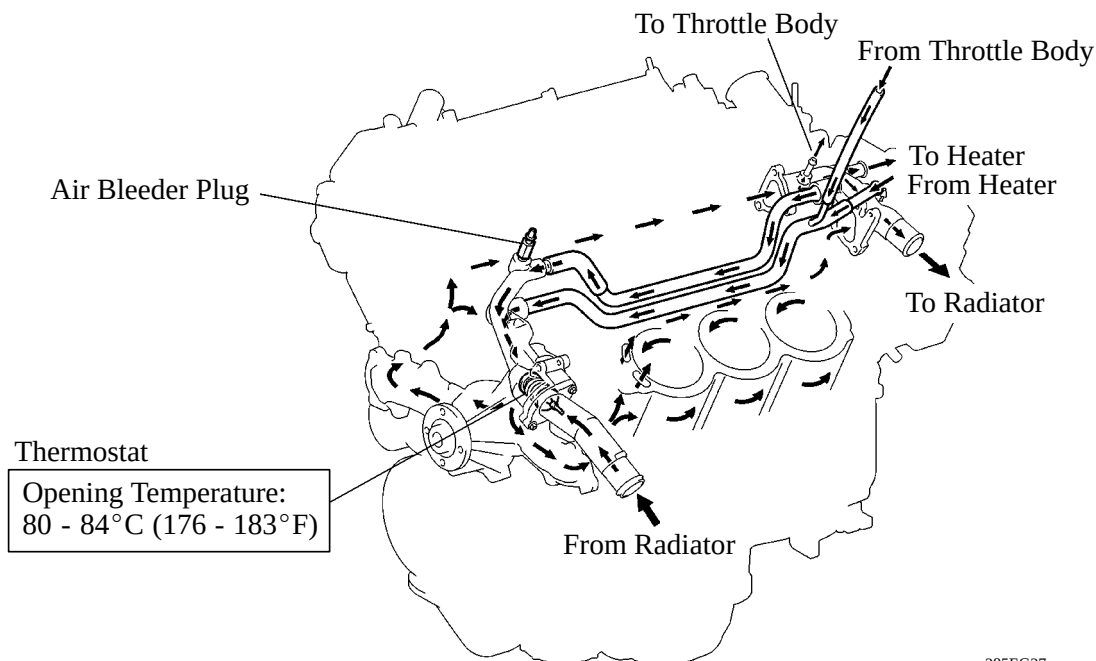
Service Tip

- The engine oil in the oil filter can be drained by removing the drain plug and inserting the drain pipe supplied with the element into the oil filter. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).
- The engine oil maintenance interval for a model that has an oil filter with a replaceable element is the same as that for the conventional model.

■ COOLING SYSTEM

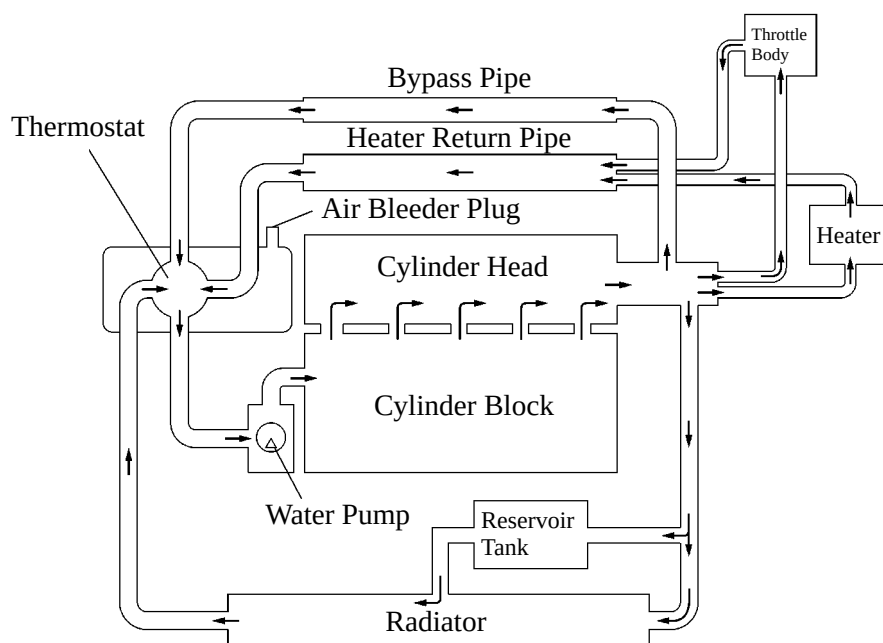
1. General

- The cooling system is a pressurized, forced-circulation type.
- A thermostat with a bypass valve is located on the water inlet housing to maintain suitable temperature distribution in the cooling system.
- A cooling fan control system in which the ECM optimally controls cooling fan speed is used. For details, see page EG-129.
- An air bleeder plug is provided on the water inlet assembly to improve the efficiency of changing the engine coolant. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).
- The TOYOTA genuine SLLC (Super Long Life Coolant) is used for the engine coolant.



285EG27

► System Diagram ◀



01MEG35Y

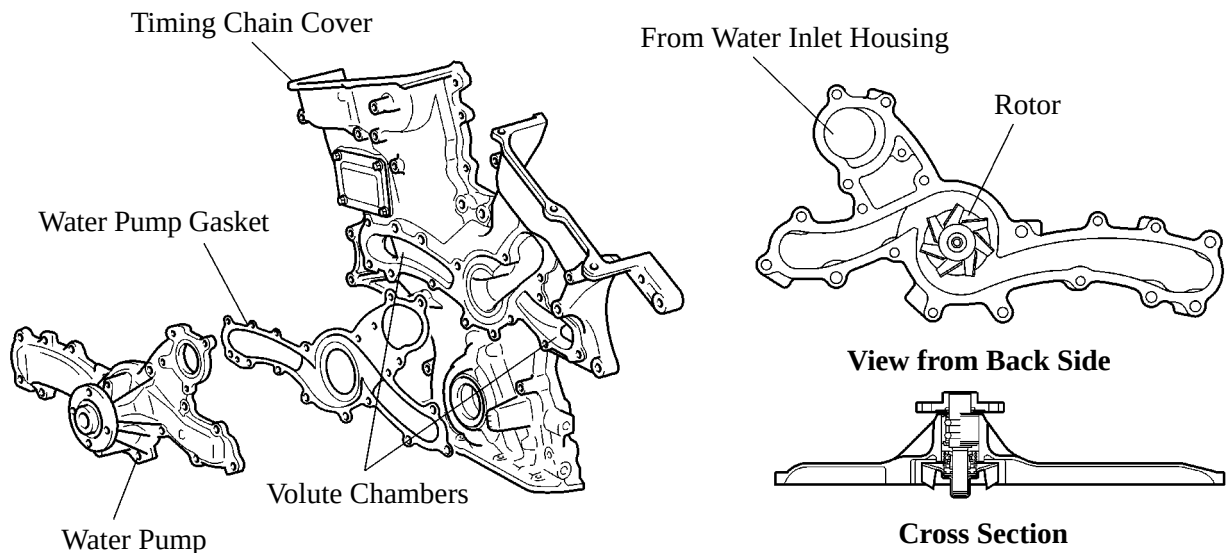
► Engine Coolant Specifications ◀

Engine Coolant	Type		TOYOTA genuine Super Long Life Coolant (SLLC) or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite and non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology is a combination of low phosphates and organic acids.) Do not use plain water alone.
	Color		Pink
	Capacity	Except Towing Package Models	8.9 Liters (9.4 US qts, 7.8 Imp. qts)
		Towing Package Models	9.2 Liters (9.7 US qts, 8.1 Imp. qts)
	Maintenance Intervals	First Time	100,000 miles (160,000 km)
		Subsequent	Every 50,000 miles (80,000 km)

- SLLC is pre-mixed (the U.S.A. models: 50 % coolant and 50 % deionized water, the Canada. models: 55 % coolant and 45 % deionized water), so no dilution is needed when SLLC in the vehicle is added or replaced.
- If LLC is mixed with SLLC, the interval for LLC (every 25,000 miles (USA), 32,000 km (CANADA) or 24 months whichever comes first) should be used.

2. Water Pump

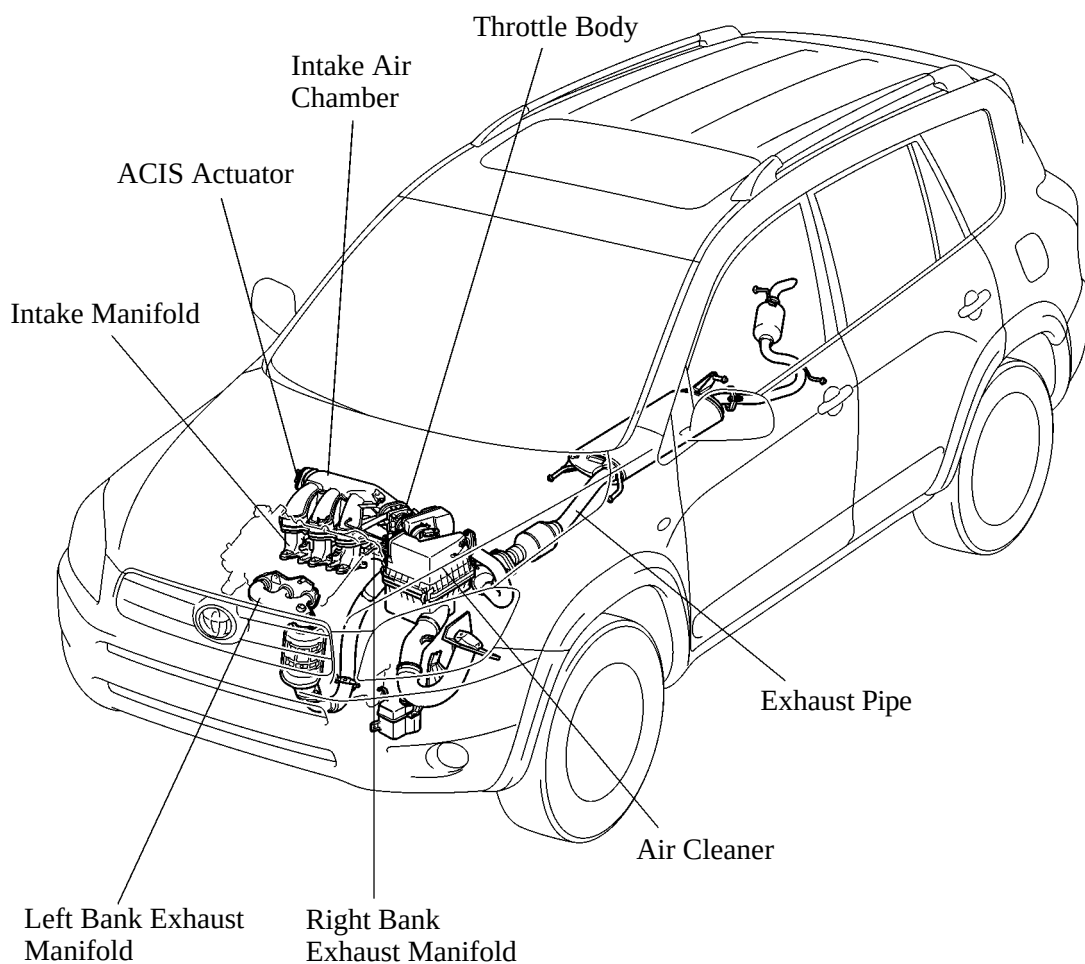
The water pump has two volute chambers, and circulates coolant uniformly to the left and right banks of the cylinder block.



■ INTAKE AND EXHAUST SYSTEM

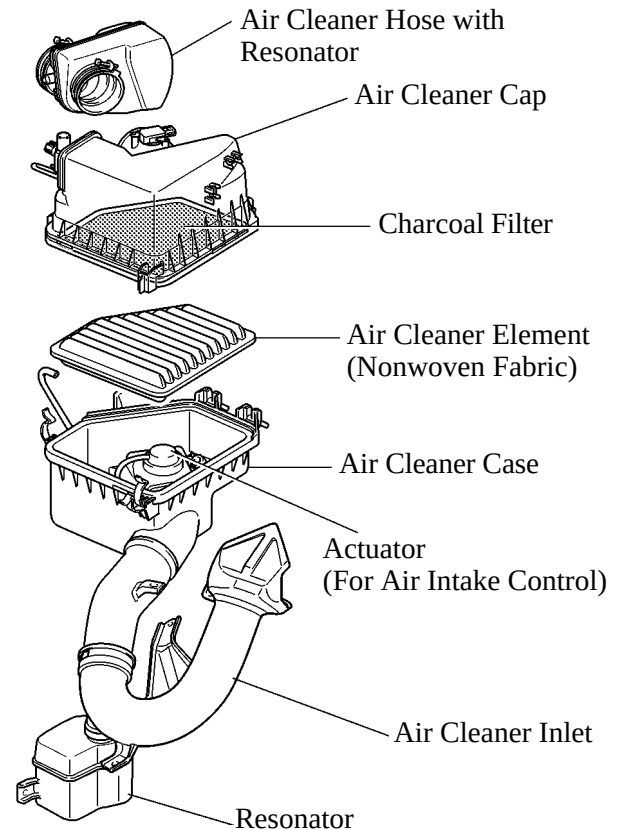
1. General

- The linkless-type throttle body is used and it realizes excellent throttle control.
- The intake air chamber made of plastic is used.
- A stainless steel exhaust manifold is used for weight reduction.
- ETCS-i (Electronic Throttle Control System-intelligent) provides excellent throttle control. For details, see page EG-118.
- ACIS (Acoustic Control Induction System) has improved the engine performance. For details, see page EG-126.
- The air intake control system is used to reduce engine noise. For details, see page EG-128.



2. Air Cleaner

- A nonwoven, full-fabric type air cleaner element is used.
- A charcoal filter, which adsorbs the HC that accumulates in the intake system when the engine is stopped, is used in the air cleaner case in order to reduce evaporative emissions. This filter is maintenance-free.
- Along with the use of the air intake control system, an air intake control valve is provided on the air cleaner case. For details, see page EG-128.
- Resonators have been provided to reduce the amount of intake air sound.

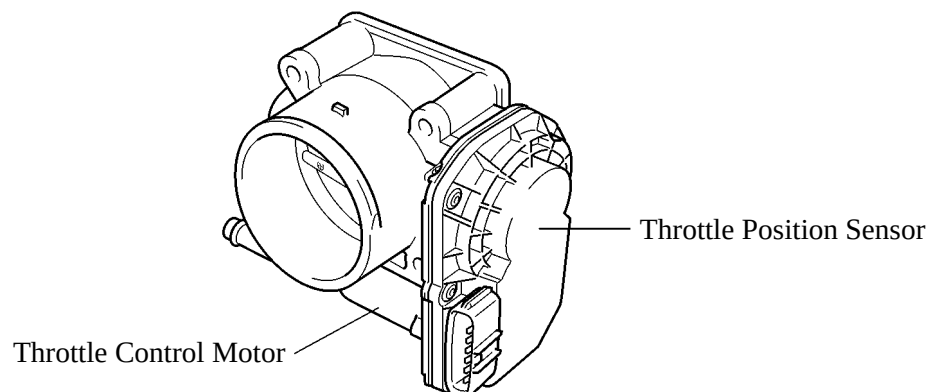


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3. Throttle Body

A linkless-type throttle body in which the throttle position sensor and the throttle control motor are integrated is used. It realizes excellent throttle valve control. For details, see page EG-118.

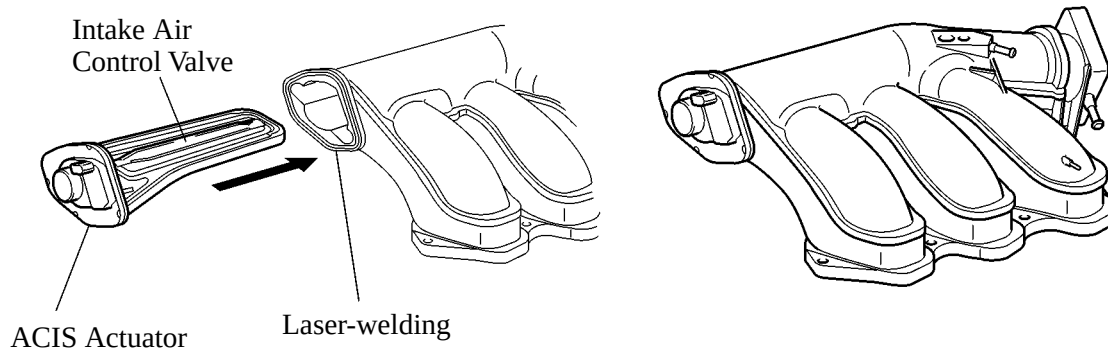
- In the throttle control motor, a DC motor with excellent response and minimal power consumption is used. The ECM performs the duty ratio control of the direction and the amperage of the current that flows to the throttle control motor in order to regulate the throttle valve angle.



285EG32

4. Intake Air Chamber

- The intake air chamber is made of plastic to realize lightweight.
- The intake air chamber contains an intake air control valve. This valve is activated by ACIS (Acoustic Control Induction System) and is used to alter the intake pipe length to improve the engine performance in all speed range. For details, see page EG-126.
- The ACIS actuator uses an electric actuator and is laser-welded onto the intake air chamber. Many of the components are made of plastic for weight reduction.



285EG33

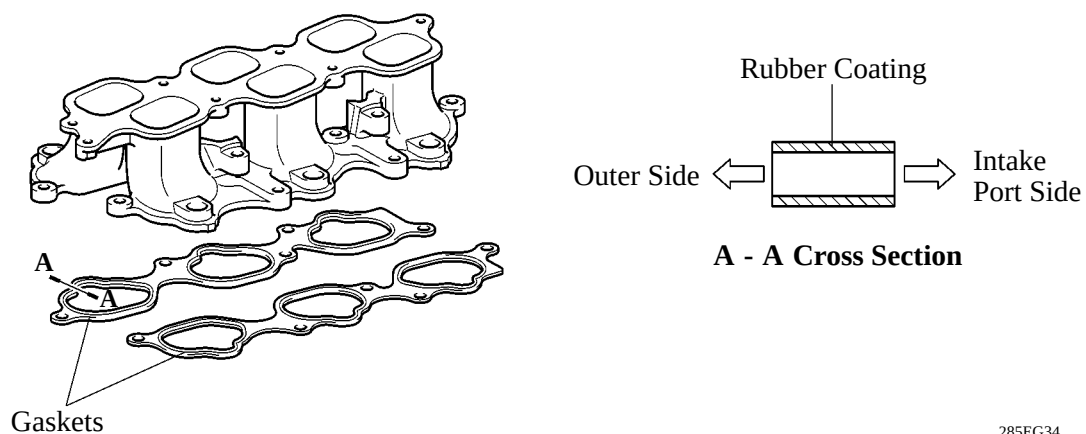
— REFERENCE —

Laser-welding:

In laser-welding, a laser-absorbing material (for the intake air chamber) is joined to a laser-transmitting material (for the ACIS actuator). Laser beams are then irradiated from the laser-transmitting side. The beams penetrate the laser-transmitting material to heat and melt the surface of the laser-absorbing material. Then, the heat of the laser-absorbing material melts the laser-transmitting material and causes both materials to become welded.

5. Intake Manifold

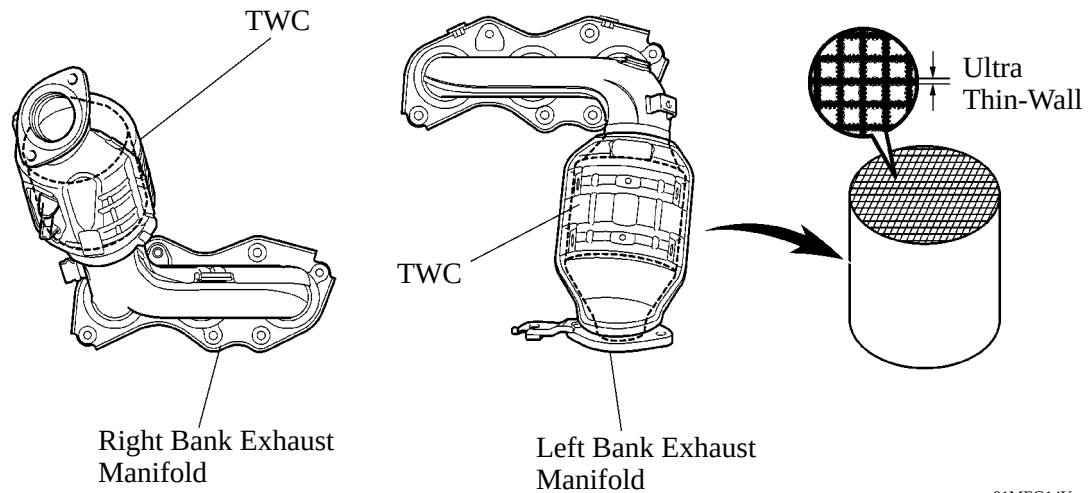
- Lightweight aluminum alloy is used for the intake manifold.
- The intake manifold gaskets have rubber coating applied onto surface, and provide superior durability.



285EG34

6. Exhaust Manifold

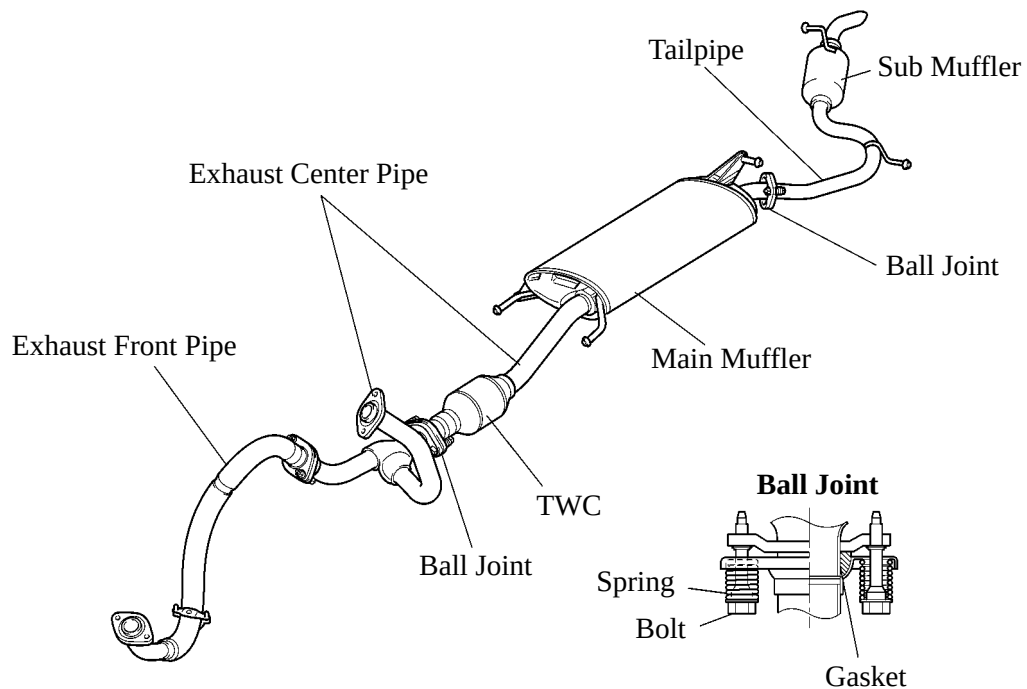
- A stainless steel exhaust manifold with an integrated TWC (Three-Way Catalytic converter) is used for warm-up of the TWC and for weight reduction.
- An ultra thin-wall, high-cell density, ceramic type TWC is used. This TWC is incorporated on each of the right and left banks.
- This TWC improves exhaust emissions by optimizing the cells density and the wall thickness.



01MEG14Y

7. Exhaust Pipe

- The exhaust pipe is made of stainless steel for improved rust resistance.
- A thin-wall, ceramic type TWC is used.
- Ball joints are used at two places: one at the exhaust center pipe joint, and the other between the exhaust center pipe and the tailpipe. As a result, a simple construction and reliability are realized.

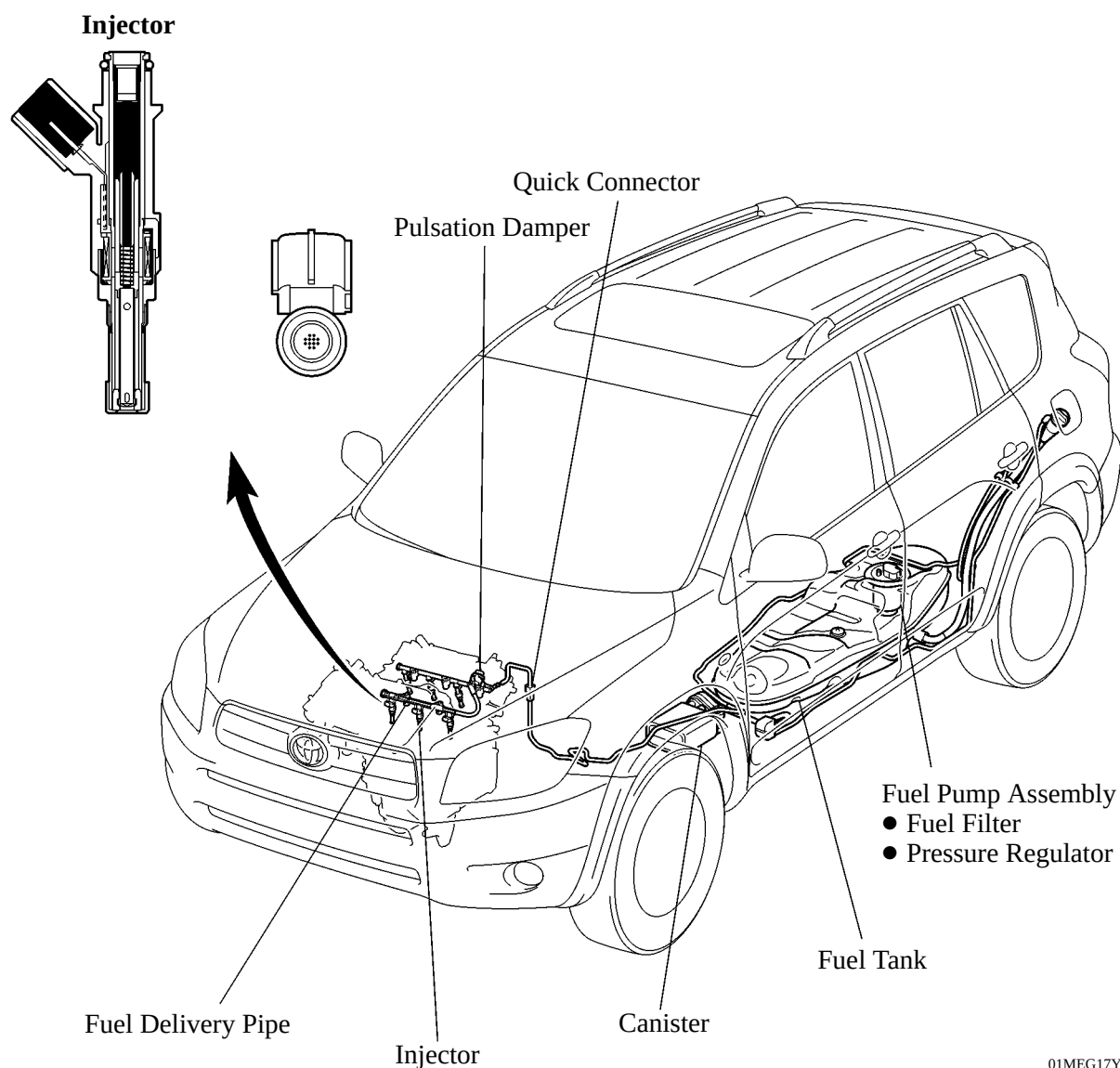


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■ FUEL SYSTEM

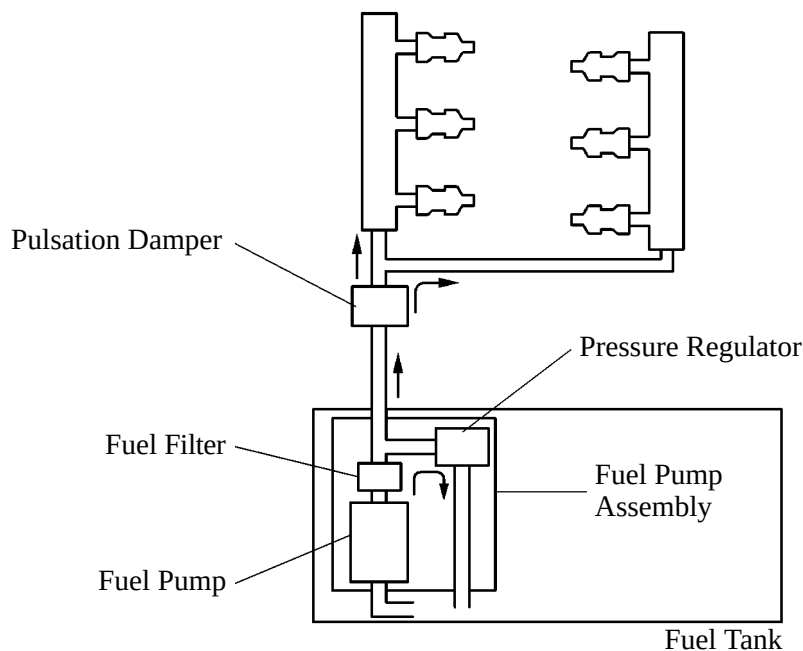
1. General

- The fuel returnless system is used to reduce evaporative emissions.
- A fuel cut control is used to stop the fuel pump when the SRS airbag is deployed in a frontal or side collision. For details, see page EG-53.
- The fuel delivery pipe made of plastic is used.
- A quick connector is used to connect the fuel pipe with the fuel hose for excellent serviceability.
- Compact 12-hole type injectors are used to increase atomization of the fuel.
- A compact fuel pump in which a fuel filter is integrated in the fuel pump assembly is used.
- The ORVR (On-board Refueling Vapor Recovery) system is used. For details, see page EG-131.



2. Fuel Returnless System

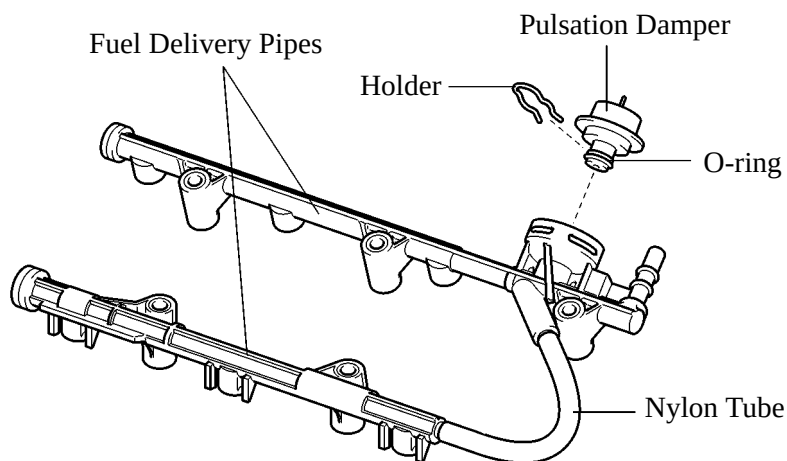
This type of fuel system is used to reduce the evaporative emission. As shown below, by integrating the fuel filter and pressure regulator with fuel pump assembly, the fuel return system in which the fuel returns from the engine area is discontinued and temperature rise inside the fuel tank is prevented.



01MEG34Y

3. Fuel Delivery Pipe

- The fuel delivery pipe made of plastic is used to realize lightweight.
- The right and left fuel delivery pipes are connected by a nylon tube.
- The pulsation damper is sealed with an O-ring and secured with a holder.



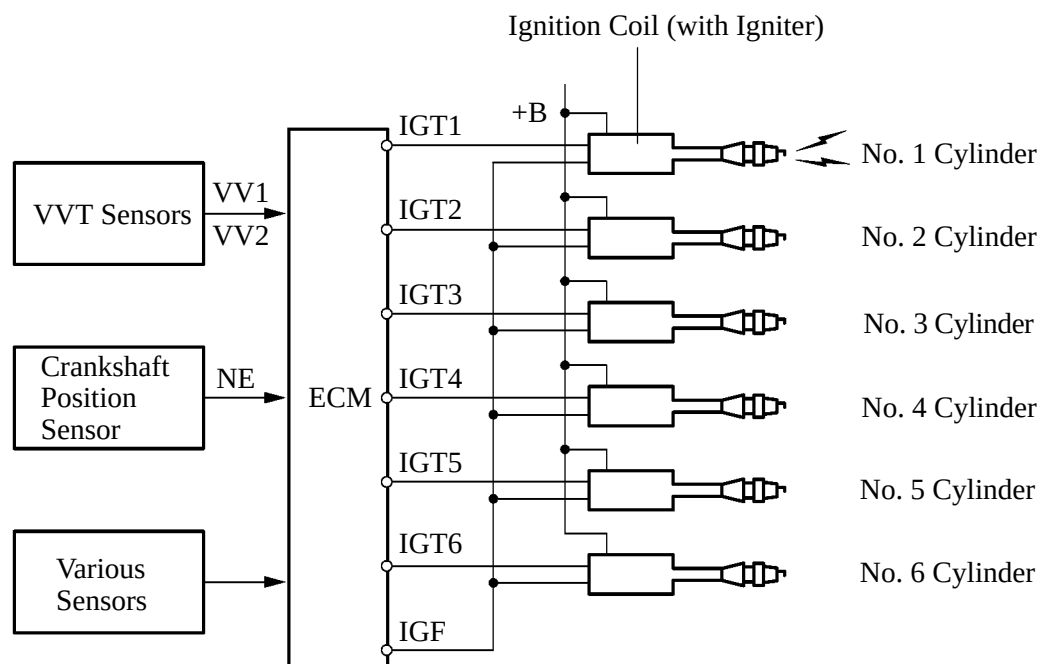
285EG38

■ IGNITION SYSTEM

1. General

A DIS (Direct Ignition System) is used. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor.

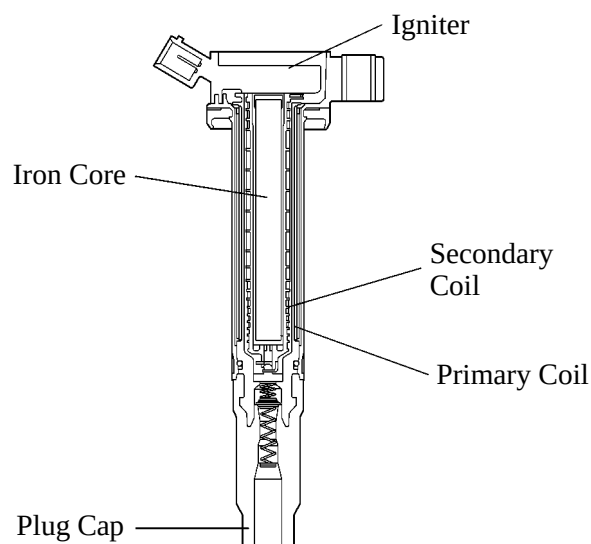
The DIS is an independent ignition system which has one ignition coil (with igniter) for each cylinder.



238EG68

2. Ignition Coil

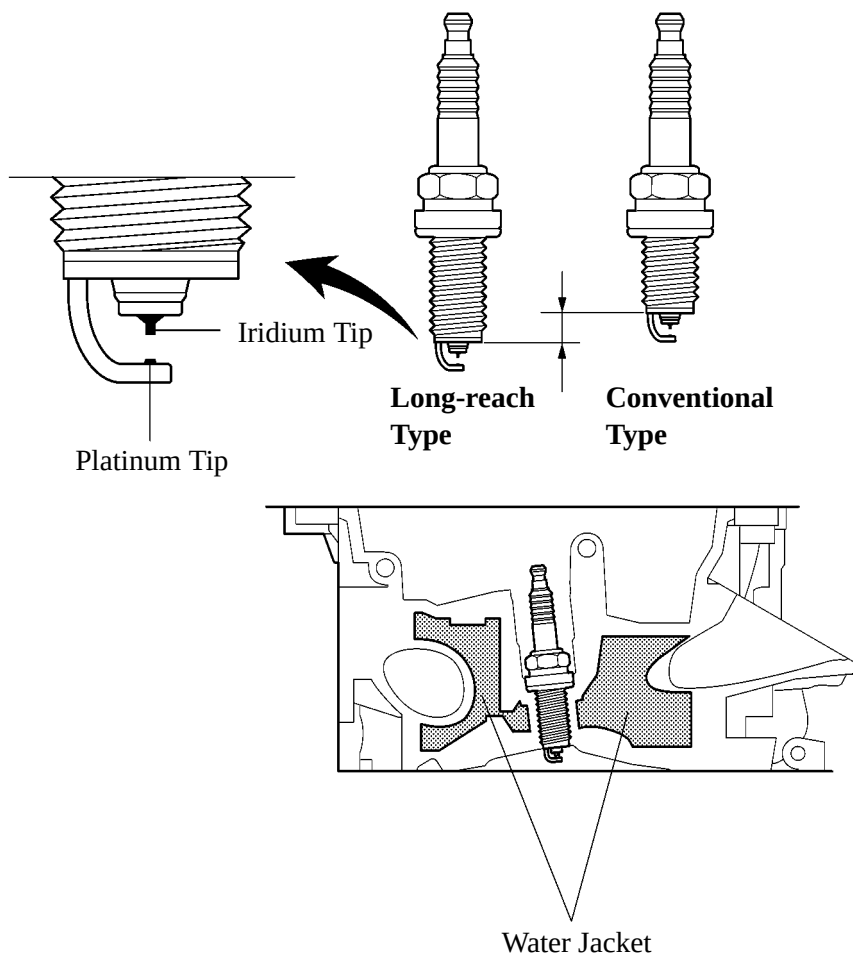
The DIS provides 6 ignition coils, one for each cylinder. The spark plug cap, which provides contact to the spark plug, are integrated with an ignition coil. Also, an igniter is enclosed to simplify the system.



285EG39

3. Spark Plug

- Long-reach type spark plugs are used. This type of spark plugs allow the area of the cylinder head to receive the spark plugs to be made thick. Thus, the water jacket can be extended near the combustion chamber, which contributes to cooling performance.
- Iridium-tipped spark plugs are used to achieve a 120,000 miles (193,000 km) maintenance interval. By making the center electrode of iridium, the superior ignition performance as platinum-tipped spark plugs is achieved and durability has been increased.



CHARGING SYSTEM

1. General

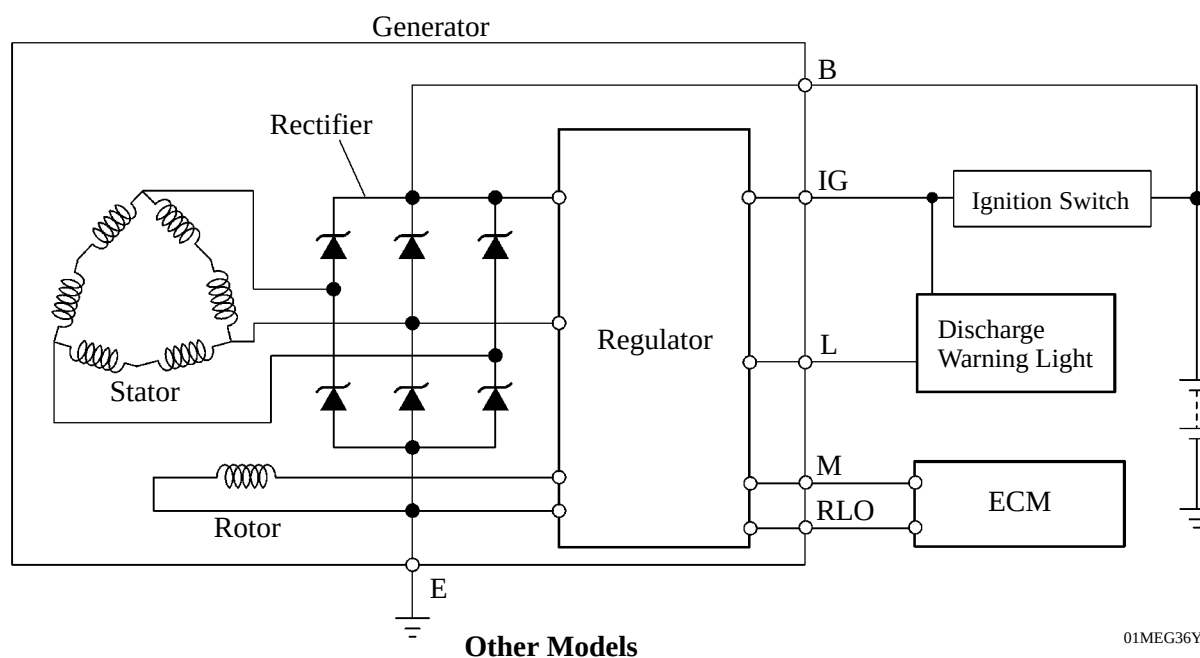
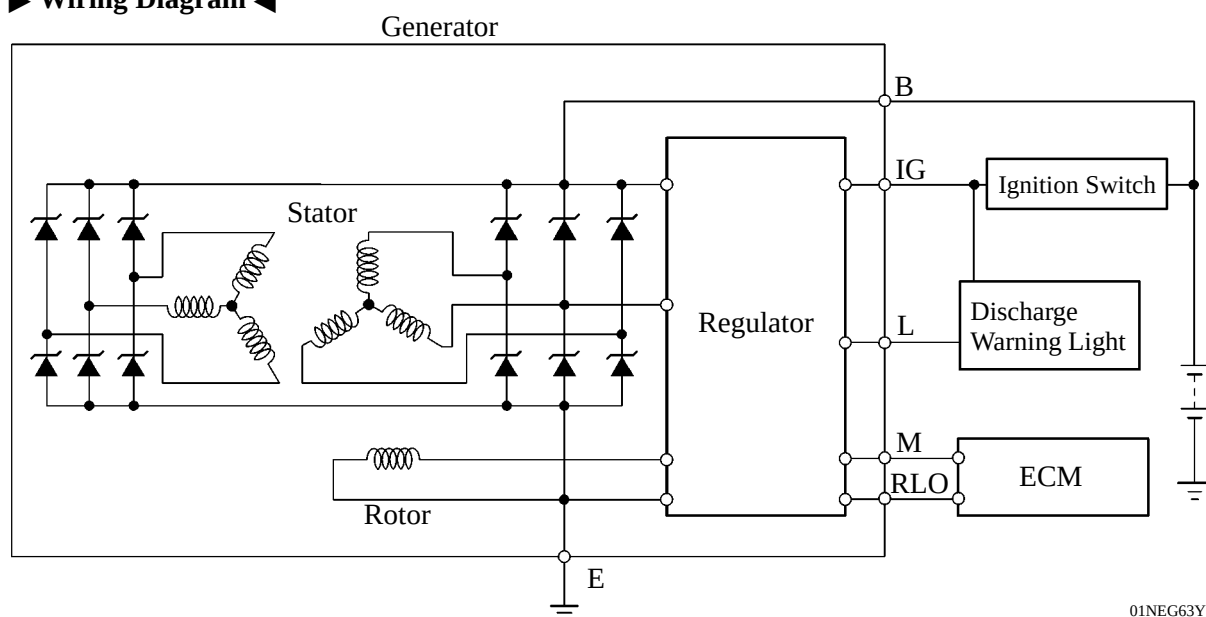
A compact and lightweight segment conductor type generator is used. For details of the segment conductor type generator, see page EG-25.

► Specification ◀

Model	Towing Package	With RSES*	Others
Type	SC2		SE0
Rated Voltage	12 V		12 V
Output Rated	150 A		100 A

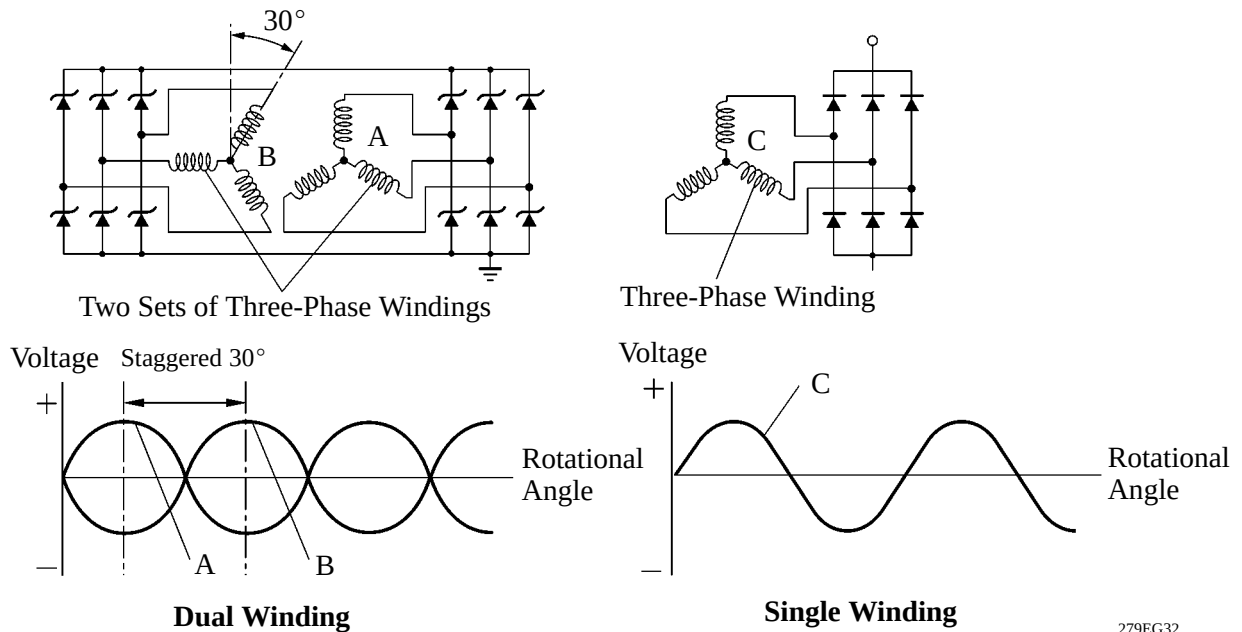
*: Rear Seat Entertainment System

► Wiring Diagram ◀



2. Dual Winding System (For Towing Package Models and Models with RSES)

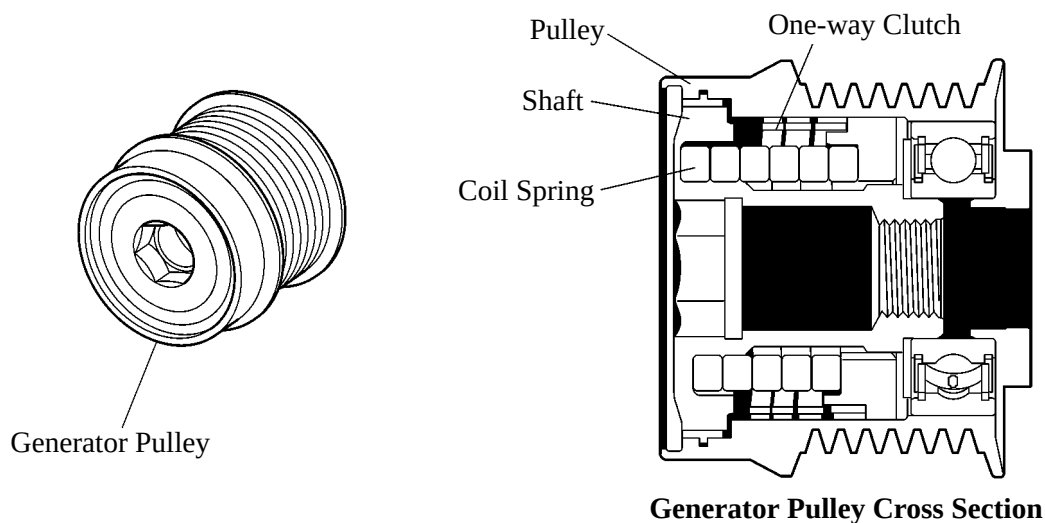
A dual winding system is used. This system consists of two sets of three-phase windings whose phases are staggered 30° . Because the generated waves from the respective windings cancel out each other, magnetic noise is reduced.



279EG32

3. Generator Pulley

A one-way clutch is set to the generator pulley. Operation of the one-way clutch cancels generator pulley inertia and helps to prevent slipping of the V-ribbed belt. This realizes a low tension V-ribbed belt that achieves reduced friction.



281EG12

281EG13

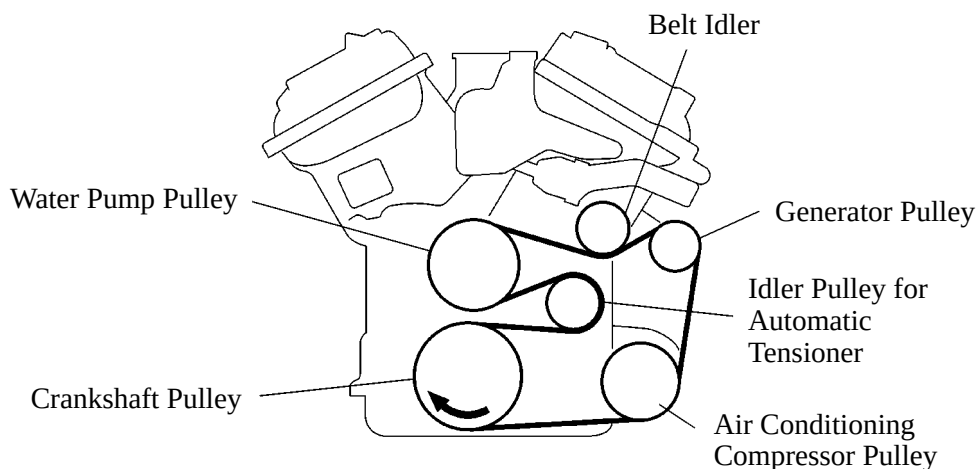
■ STARTING SYSTEM

The 2GR-FE engine uses the same starter as the 2AZ-FE engine. For details, see page EG-27.

■ SERPENTINE BELT DRIVE SYSTEM

1. General

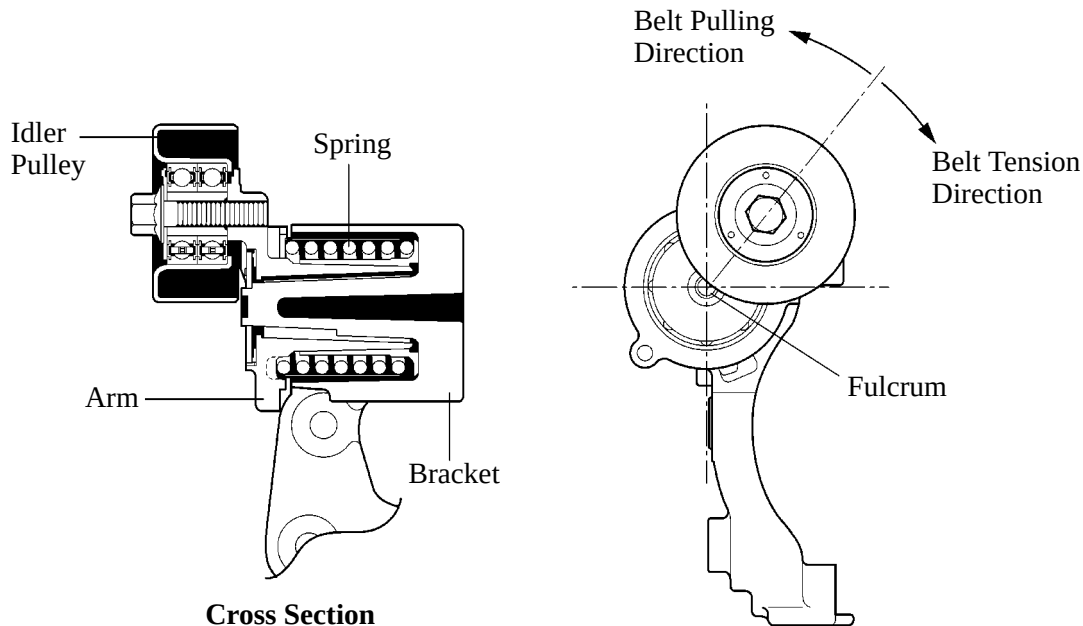
- Accessory components are driven by a serpentine belt consisting of a single V-ribbed belt. It reduces the overall engine length, weight and the number of engine parts.
- An automatic tensioner eliminates the need for tension adjustment.



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2. Automatic Tensioner

The tension of the V-ribbed belt is properly maintained by the tension spring that is enclosed in the automatic tensioner.



285EG78

■ ENGINE CONTROL SYSTEM

1. General

The engine control system of the 2GR-FE engine has the following features.

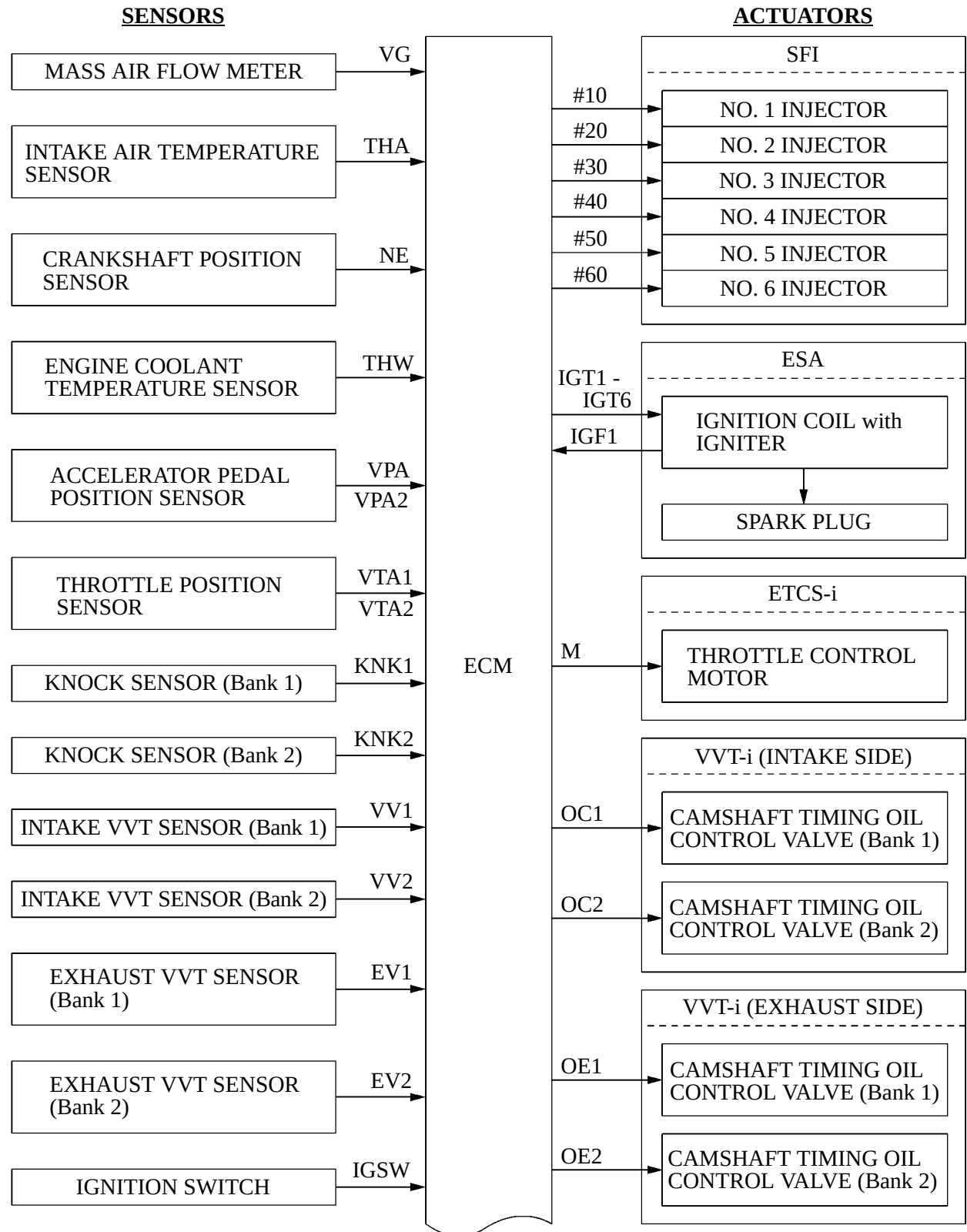
System	Outline
SFI (Sequential Multiport Fuel Injection) [See page EG-117]	An L-type SFI system detects the intake air mass with a hot-wire type air flow meter.
ESA (Electronic Spark Advance)	● Ignition timing is determined by the ECM based on signals from various sensors. The ECM corrects ignition timing in response to engine knocking. ● This system selects the optimal ignition timing in accordance with the signals received from the sensors and sends the (IGT) ignition signal to the igniter.
ETCS-i (Electronic Throttle Control System-intelligent) [See page EG-118]	Optimally controls the throttle valve opening in accordance with the amount of accelerator pedal effort and the condition of the engine and the vehicle.
Dual VVT-i (Variable Valve Timing-intelligent) System [See page EG-120]	Controls the intake and exhaust camshafts to an optimal valve timing in accordance with the engine condition.
ACIS (Acoustic Control Induction System) [See page EG-126]	The intake air passages are switched according to the engine speed and throttle valve opening angle to provided high performance in all speed ranges.
Air Intake Control System [See page EG-128]	The intake air duct is divided into two areas, and the ECM controls the air intake control valve and the actuator that are provided in one of the areas to reduce the amount of engine noise.
Fuel Pump Control [See page EG-53 in 2AZ-FE section]	● Fuel pump operation is controlled by signals from the ECM. ● The fuel pump is stopped, when the SRS airbag is deployed in a frontal, side, and rear side collision.
Air Conditioning Cut-off Control	By turning the air conditioning compressor ON or OFF in accordance with the engine condition, drivability is maintained.
Charging Control [See page EG-65 in 2AZ-FE section]	The engine ECU regulates the charging voltage of the generator in accordance with the driving conditions and the charging state of the battery.
Cooling Fan Control [See page EG-129]	The cooling fan ECU steplessly controls the speed of the fans in accordance with the engine coolant temperature, vehicle speed, engine speed, and air conditioning operating conditions. As a result, the cooling performance is improved.

(Continued)

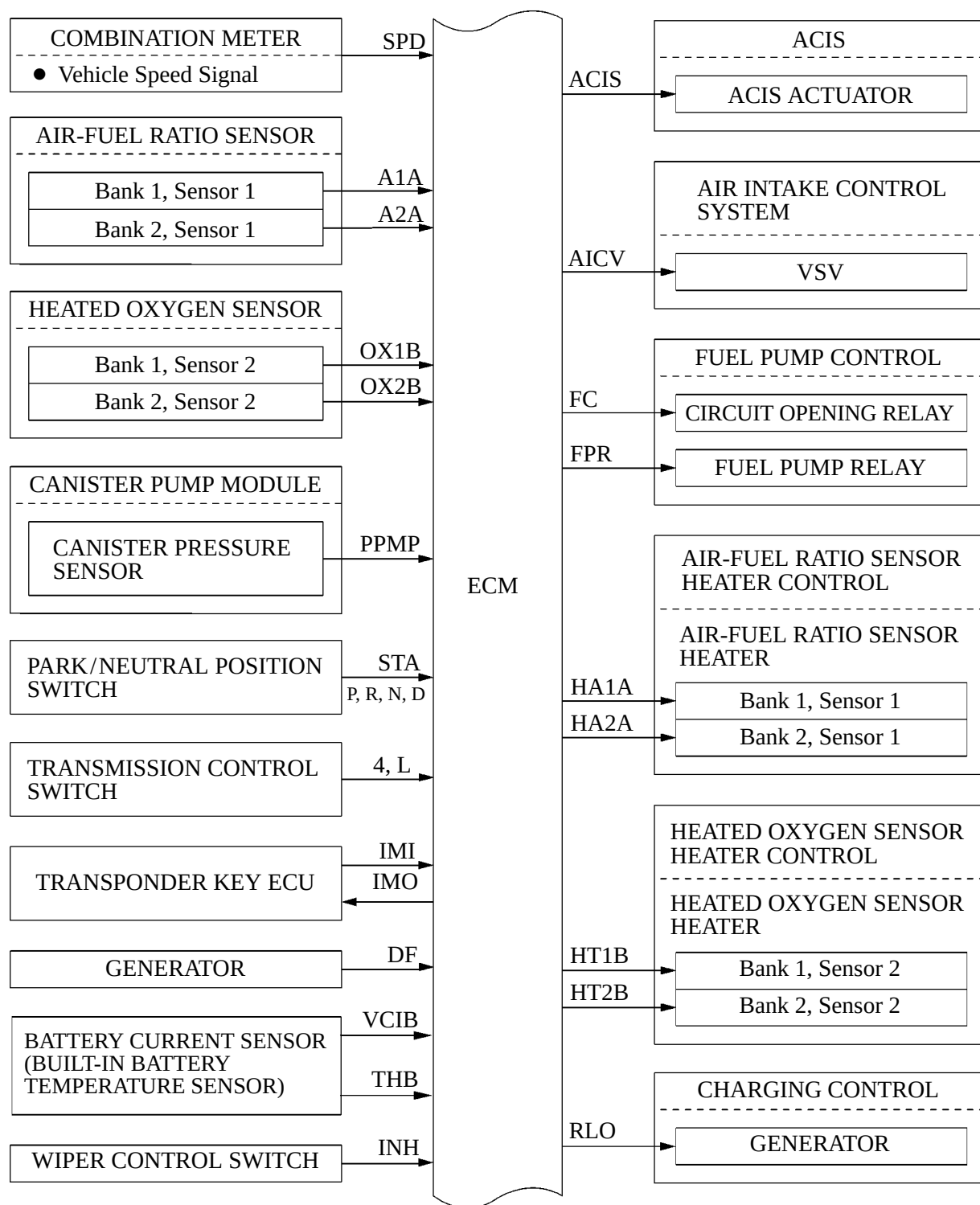
System	Outline
Air-fuel Ratio Sensor and Oxygen Sensor Heater Control	Maintains the temperature of the air-fuel ratio sensor or oxygen sensor at an appropriate level to increase accuracy of detection of the oxygen concentration in the exhaust gas.
Evaporative Emission Control [See page EG-131]	● The ECM controls the purge flow of evaporative emission (HC) in the canister in accordance with engine conditions. ● Approximately five hours after the ignition switch has been turned OFF, the ECM operates the canister pump module to detect any evaporative emission leakage occurring in the EVAP (evaporative emission) control system through changes in the EVAP control system pressure.
Engine Immobilizer	Prohibits fuel delivery and ignition if an attempt is made to start the engine with an invalid ignition key.
Diagnosis [See page EG-132]	When the ECM detects a malfunction, the ECM diagnoses and memorizes the failed section.
Fail-safe [See page EG-133]	When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in the memory.

2. Construction

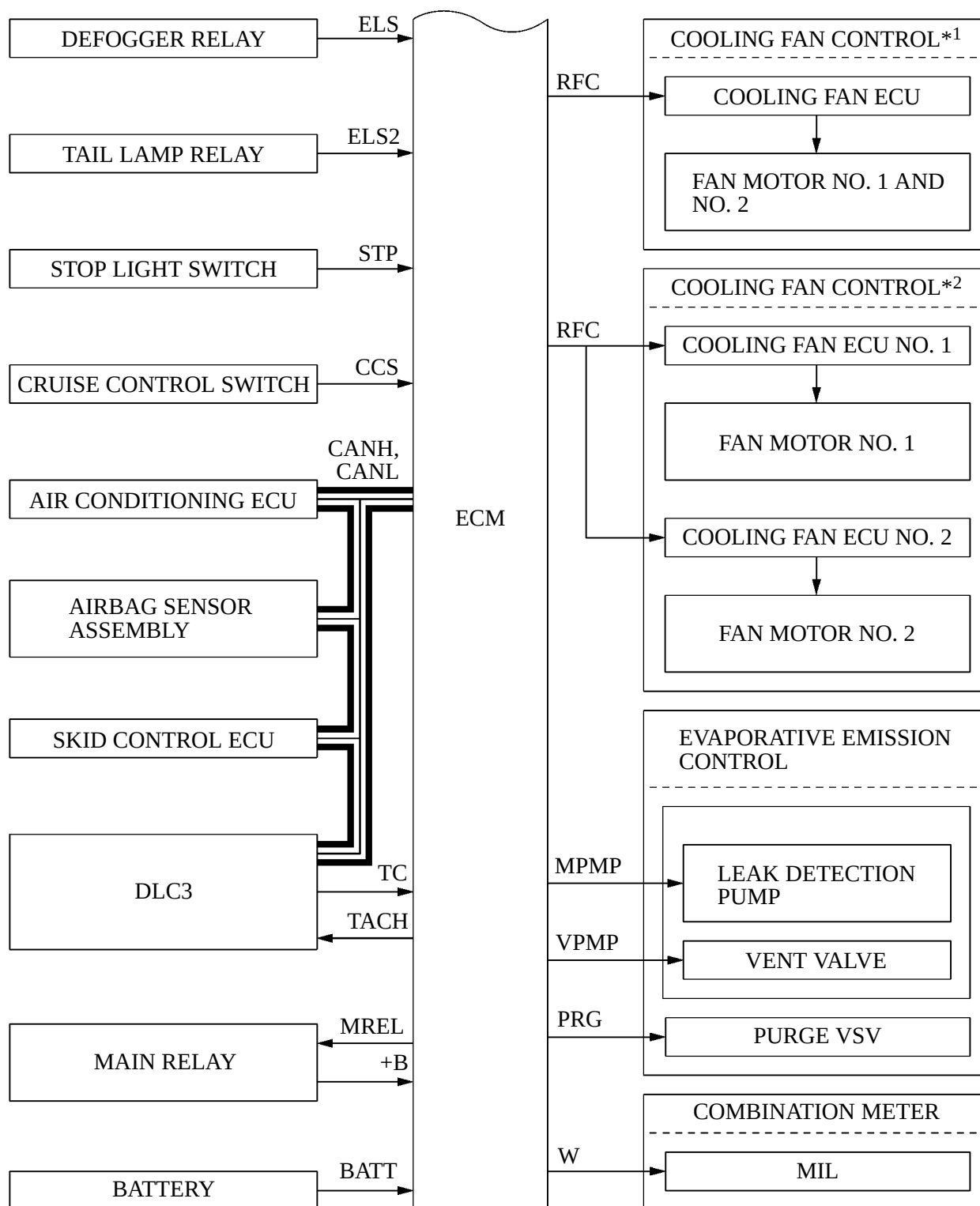
The configuration of the engine control system is as shown in the following chart.



(Continued)



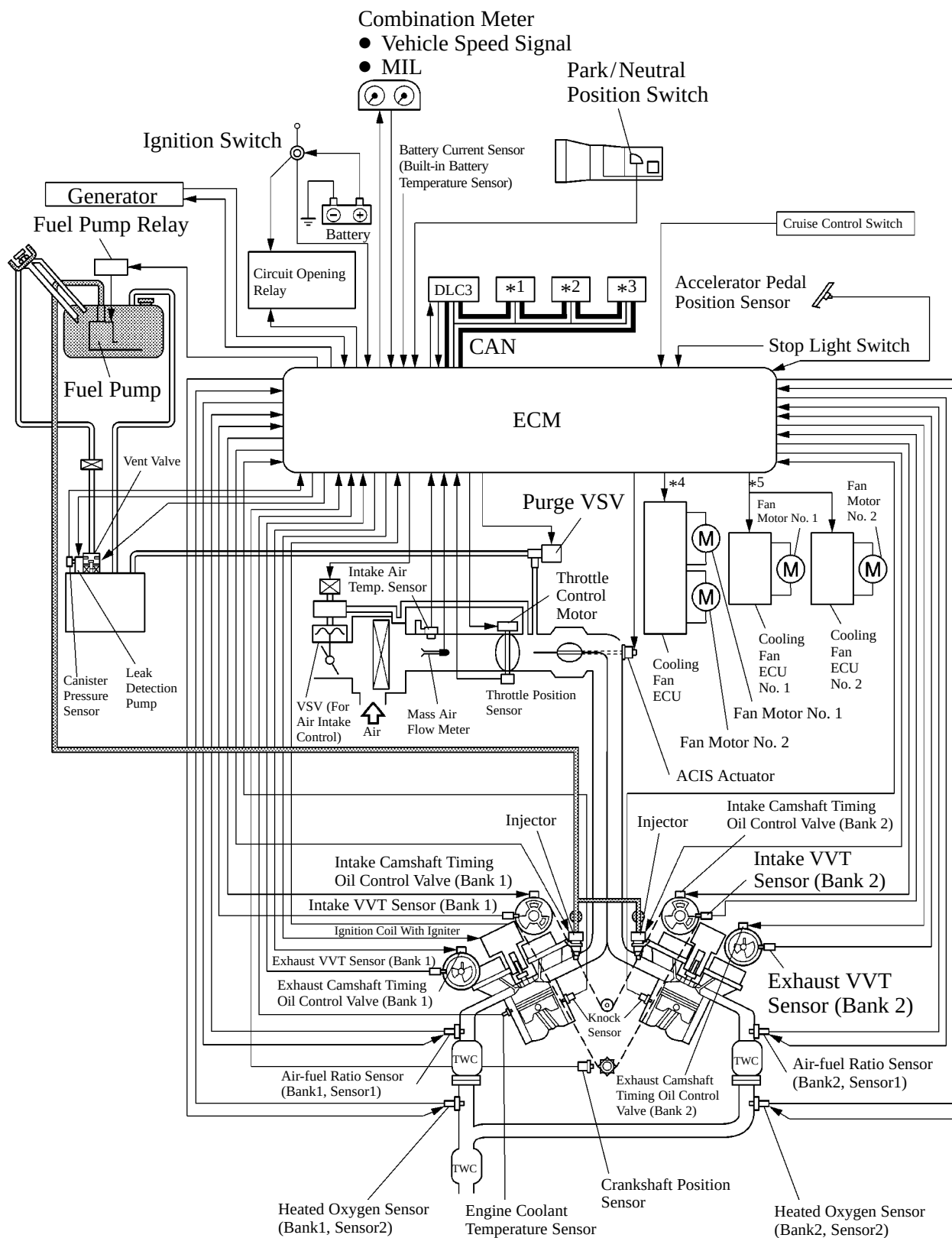
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*1: Except Towing Package Models

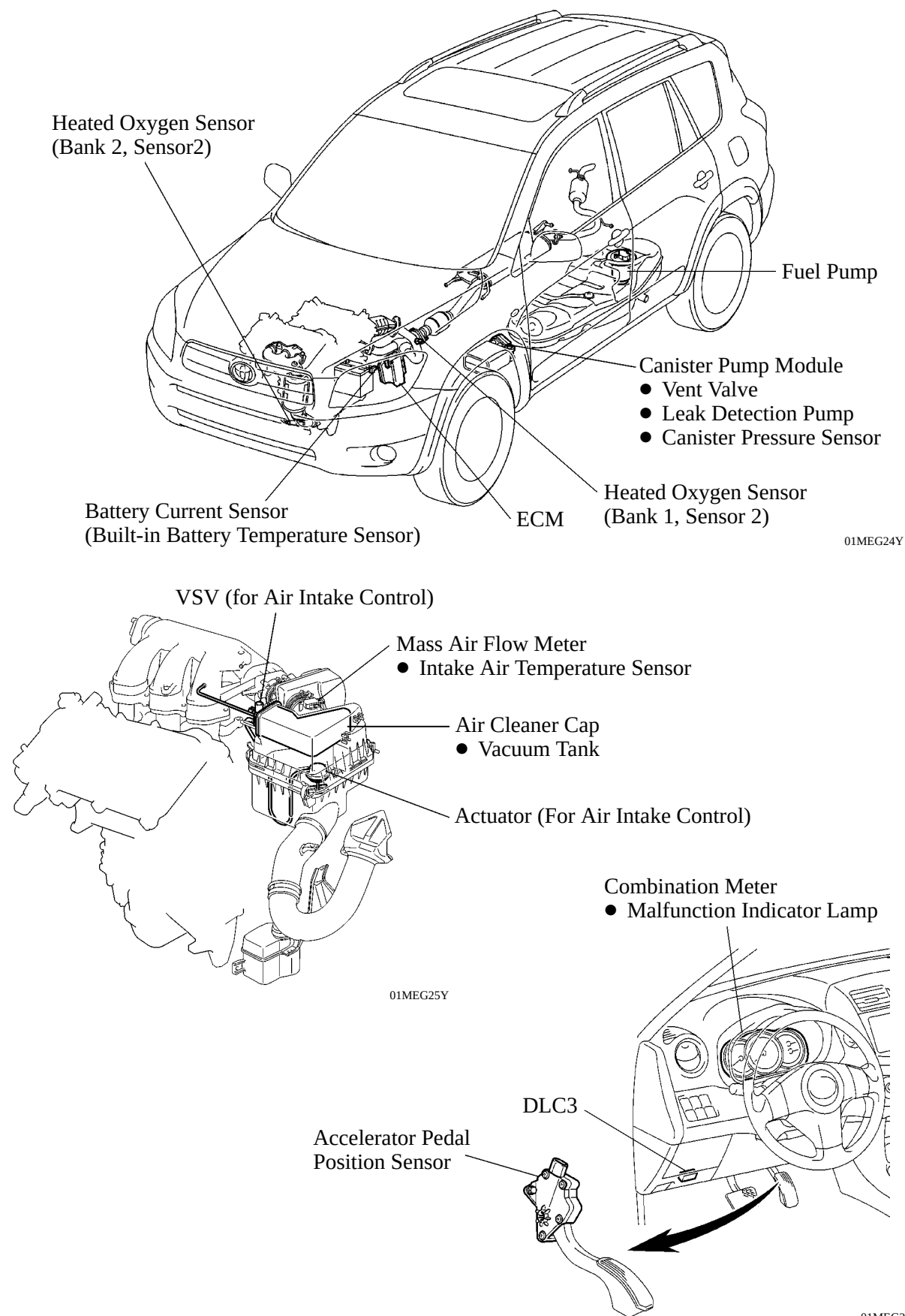
*2: Towing Package Models

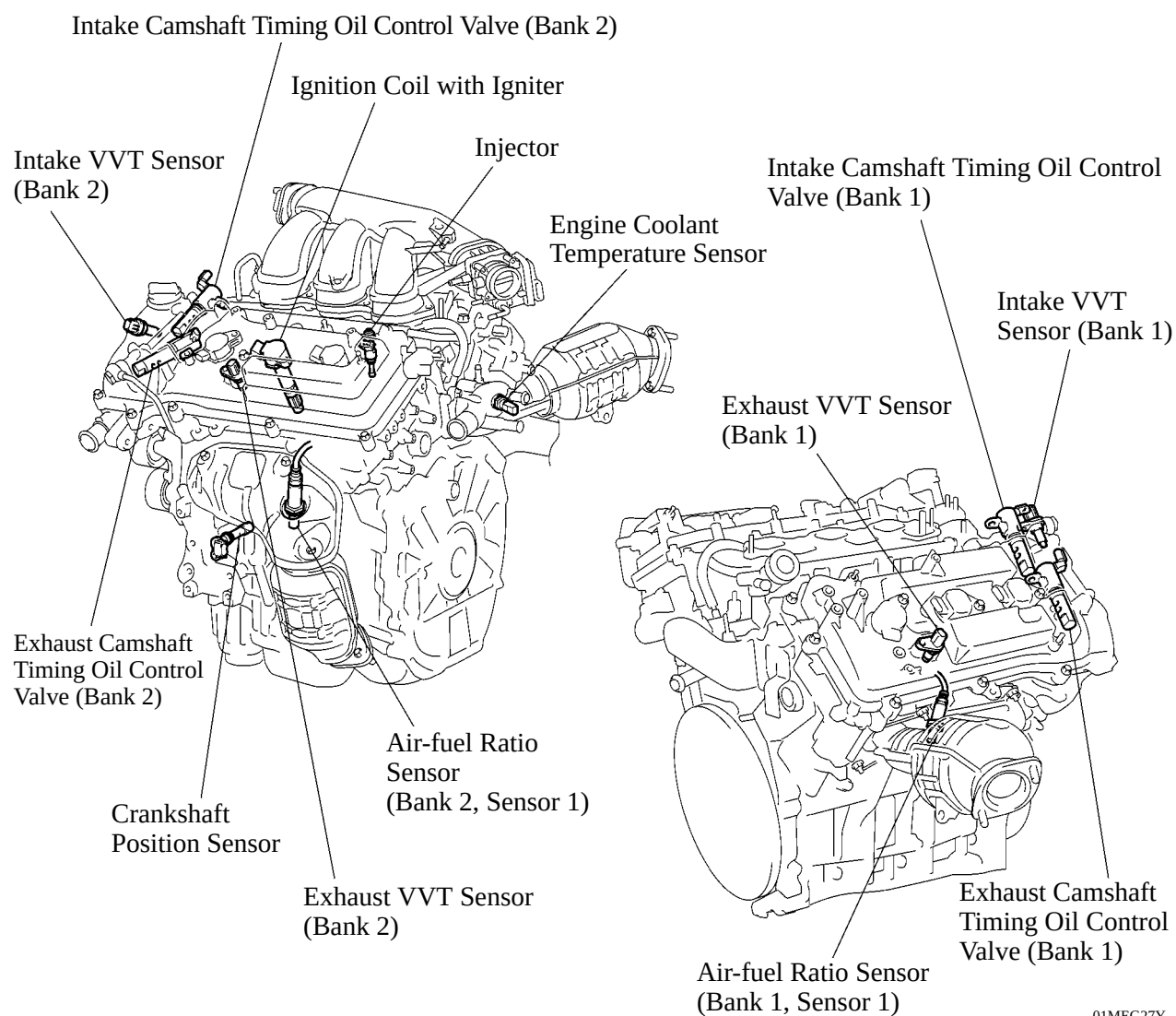
3. Engine Control System Diagram



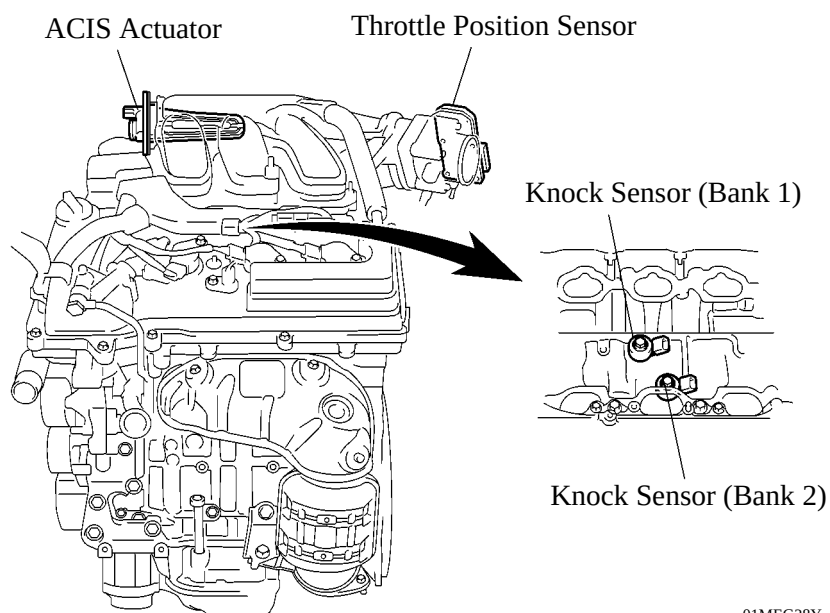
- *1: Air Conditioning ECU
- *2: Airbag Sensor Assembly
- *3: Skid Control ECU
- *4: Except Towing Package Models
- *5: Towing Package Models

4. Layout of Main Components





01MEG27Y



01MEG28Y

5. Main Components of Engine Control System

General

The main components of the 2GR-FE engine control system are as follows:

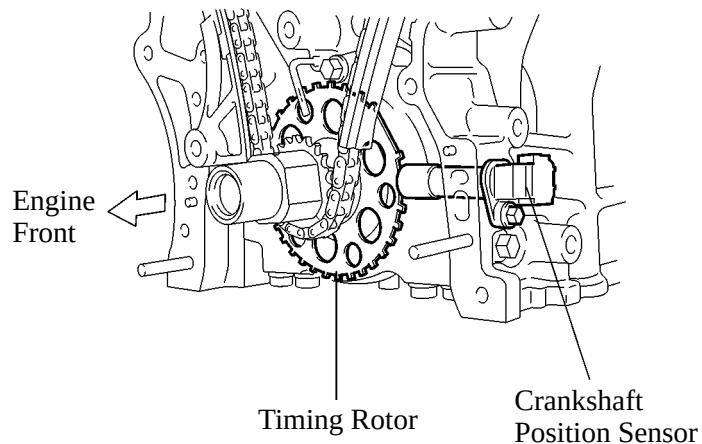
Component		Outline	Quantity
ECM		32-bit CPU	1
Mass Air Flow Meter		Hot-wire Type	1
Crankshaft Position Sensor (Rotor Teeth)		Pick-up Coil Type (36 - 2)	1
Intake VVT Sensor (Rotor Teeth)		MRE (Magnetic Resistance Element) Type (3)	2
Exhaust VVT Sensor (Rotor Teeth)		MRE (Magnetic Resistance Element) Type (3)	2
Accelerator Pedal Position Sensor		Non-contact Type	1
Throttle Position Sensor		Non-contact Type	1
Knock Sensor		Built-in Piezoelectric Type (Non-resonant Type/Flat Type)	2
Air-fuel Ratio Sensor	(Bank 1, Sensor 1)	Type with Heater (Planar Type)	1 each
	(Bank 2, Sensor 1)		
Heated Oxygen Sensor	(Bank 1, Sensor 2)	Type with Heater (Cup Type)	1 each
	(Bank 2, Sensor 2)		
Injector		12-hole Type	6

Mass Air Flow Meter

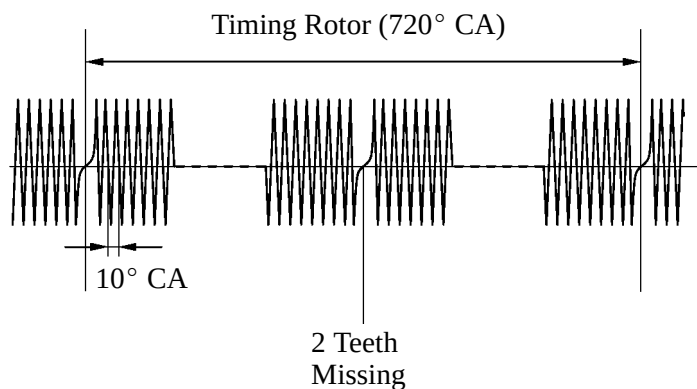
The 2GR-FE engine uses the same mass air flow meter as the 2AZ-FE engine. For details, see page EG-38.

Crankshaft Position Sensor

The timing rotor of the crankshaft consists of 34 teeth, with 2 teeth missing. The crankshaft position sensor outputs the crankshaft rotation signals every 10° , and the missing teeth are used to determine the top-dead-center.



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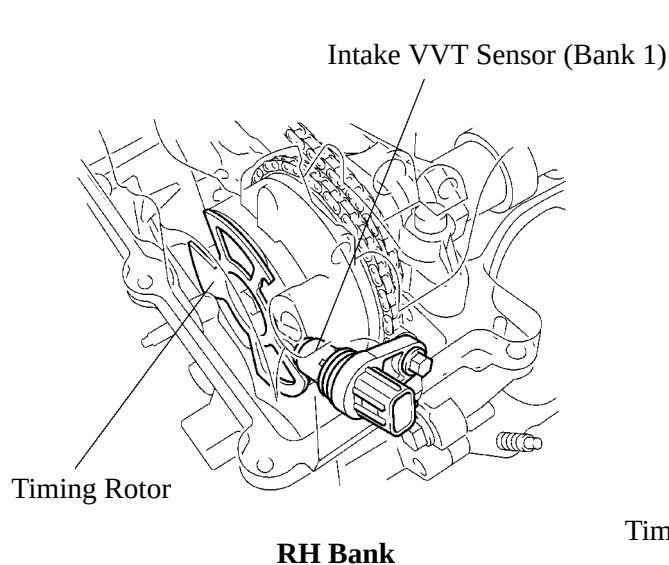


279EG50

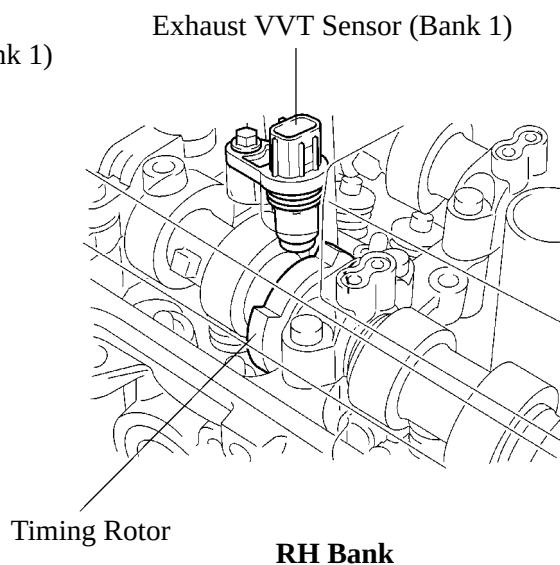
Intake and Exhaust VVT Sensors

1) General

The MRE (Magnetic Resistance Element) type intake and exhaust VVT sensors are used. To detect the camshaft position, a timing rotor that is secured to the camshaft in front of the VVT controller is used to generate 6 (3 Hi Output, 3 Lo Output) pulses for every 2 revolutions of the crankshaft.

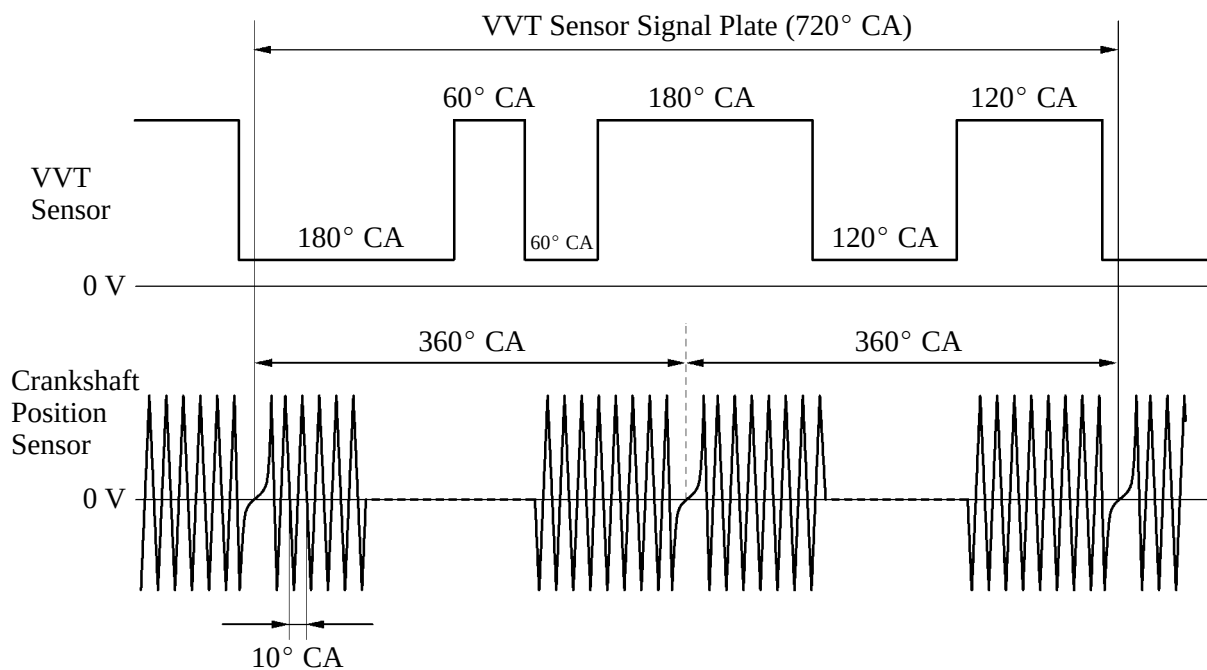


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285EG83

► Sensor Output Waveforms ◀



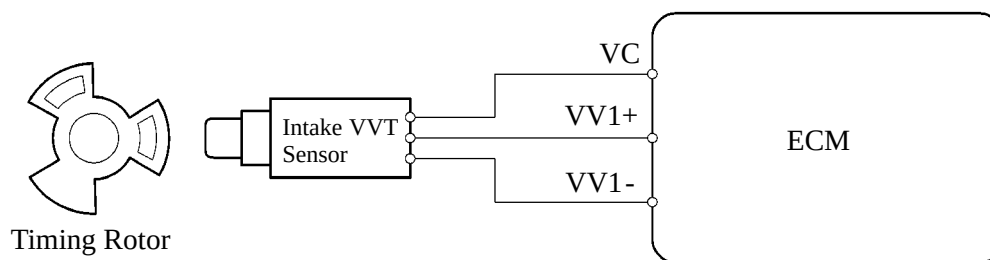
285EG84

2) MRE Type VVT Sensor

- The MRE type VVT sensor consists of an MRE, a magnet and a sensor. The direction of the magnetic field changes due to the different shapes (protruded and non-protruded portions) of the timing rotor, which passes by the sensor. As a result, the resistance of the MRE changes, and the output voltage to the ECM changes to Hi or Lo. The ECM detects the camshaft position based on this output voltage.
- The differences between the MRE type VVT sensor and the pick-up coil type VVT sensor used on the conventional models are as follows.

Item	Sensor Type	
	MRE	Pick-up Coil
Signal Output	Constant digital output starts from low engine speeds.	Analog output changes with the engine speed.
Camshaft Position Detection	Detection is made by comparing the NE signals with the Hi/Lo output switch timing due to the protruded/non-protruded portions of the timing rotor, or made based on the number of the input NE signals during Hi/Lo outputs.	Detection is made by comparing the NE signals with the change of waveform that is output when the protruded portion of the timing rotor passes.

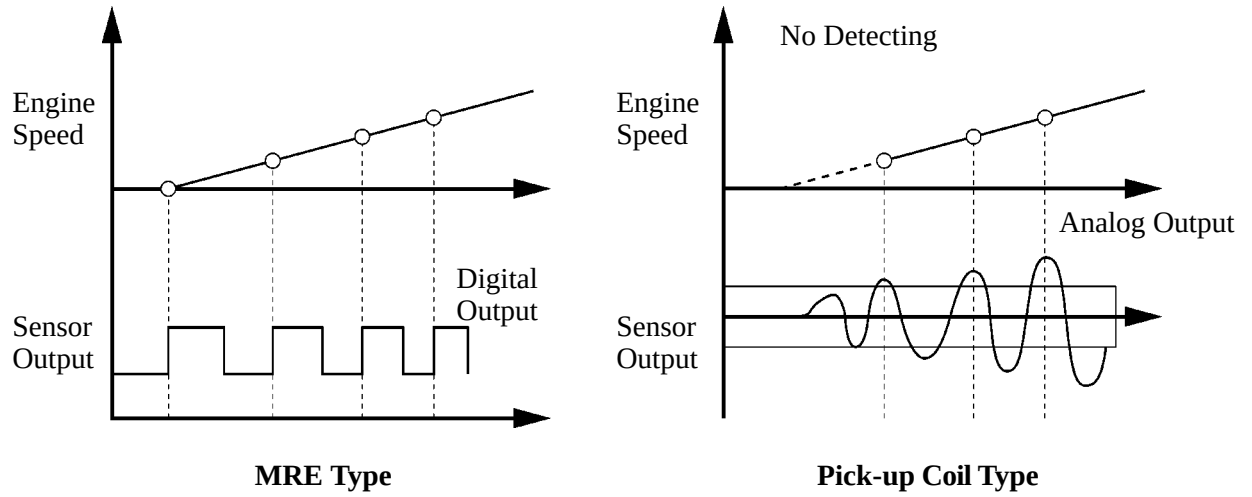
► Wiring Diagram ◀



Intake VVT Sensor (Bank 1)

271EG160

► Comparison between MRE Type and Pick-up Coil Type Output Waveform Images ◀



232CH41

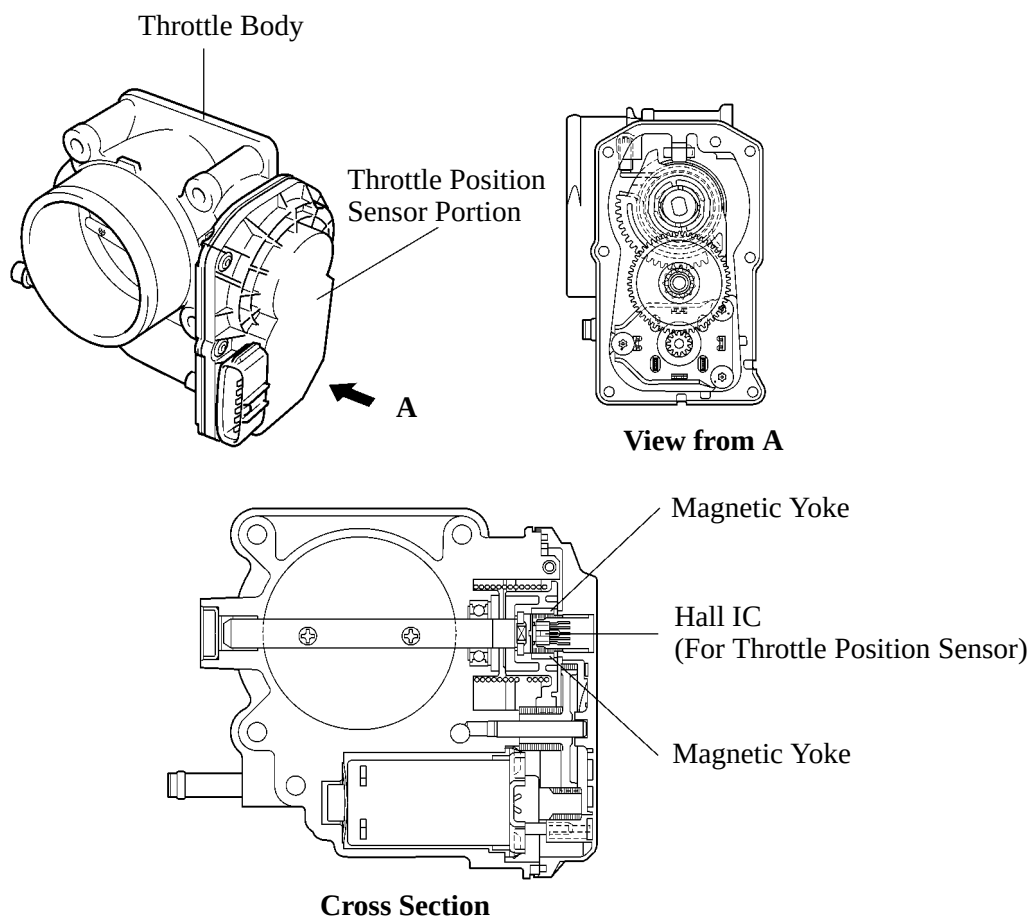
Accelerator Pedal Position Sensor

The 2GR-FE engine uses the same accelerator pedal position sensor as the 2AZ-FE engine. For details, see page EG-42.

Throttle Position Sensor

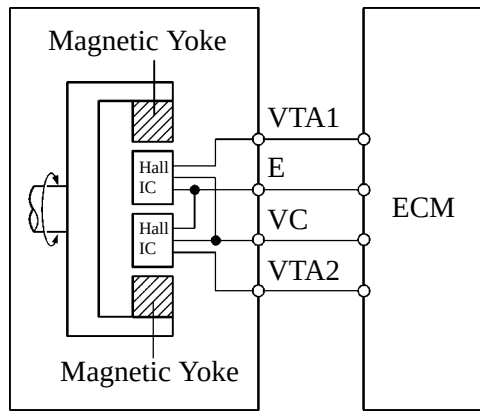
The non-contact type throttle position sensor uses a Hall IC, which is mounted on the throttle body.

- The Hall IC is surrounded by a magnetic yoke. The Hall IC converts the changes that occur in the magnetic flux at that time into electrical signals and outputs them in the form of a throttle valve effort to the ECM.
- The Hall IC contains circuits for the main and sub signals. It converts the throttle valve opening angles into electric signals with two differing characteristics and outputs them to the ECM.

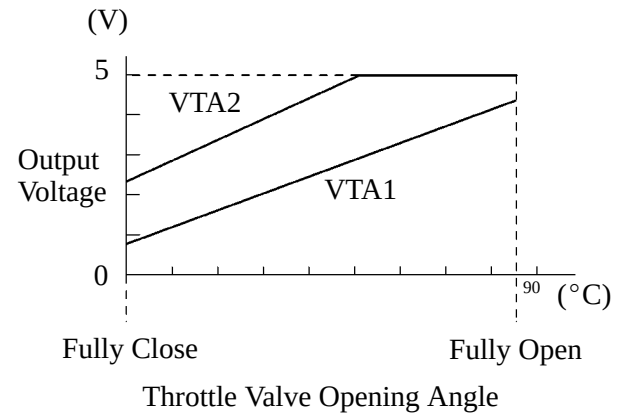


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Throttle Position Sensor



230LX12



238EG79

Service Tip

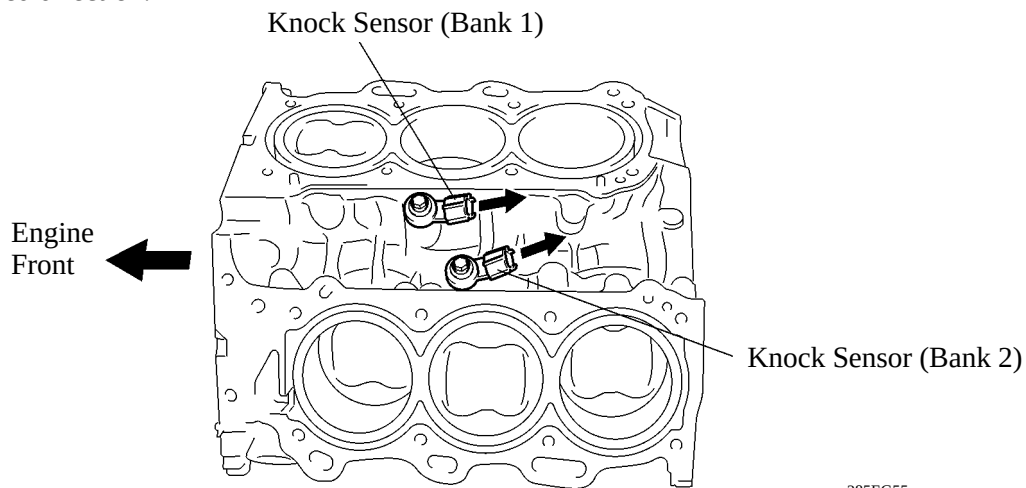
The inspection method differs from the conventional contact type throttle position sensor because this non-contact type sensor uses a hall IC. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

Knock Sensor (Flat Type)

The 2GR-FE engine uses the same knock sensor as the 2AZ-FE engine. For details, see page EG-39.

Service Tip

These knock sensors are mounted in the specific directions and angles as illustrated. To prevent the right and left bank connectors from being interchanged, make sure to install each sensor in its prescribed direction.



285EG55

Air-fuel Ratio Sensor and Heated Oxygen Sensor

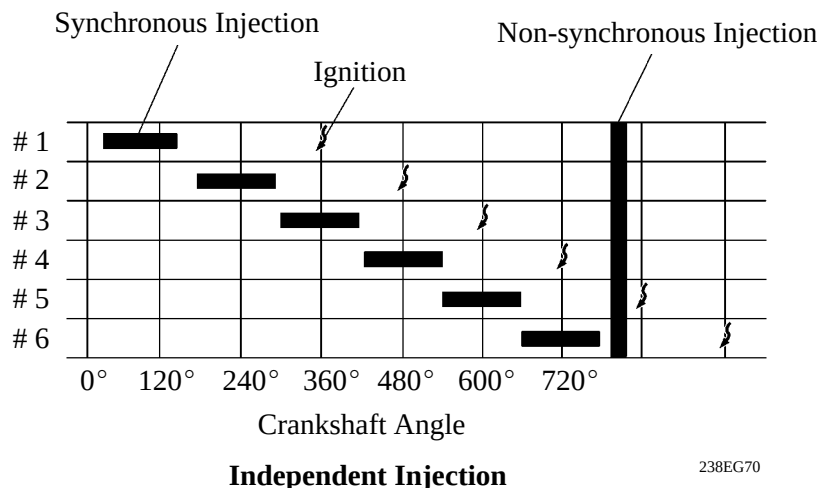
The planar type air-fuel ratio sensor and the cup type heated oxygen sensor are used. For details, see page EG-37.

6. SFI (Sequential Multiport Fuel Injection) System

- An L-type SFI system directly detects the intake air mass with a hot wire type mass air flow meter.
- An independent injection system (in which fuel is injected once into each cylinder for each two revolution of the crankshaft) is used.
- There are two (synchronous and non-synchronous) injections:
 - a) The synchronous injection in which corrections based on the signals from the sensors are added to the basic injection time so that injection occurs always at the same position.
 - b) The non-synchronous injection in which injection is effected by detecting the requests from the signals of the sensors regardless of the crankshaft angle.

Furthermore, to protect the engine and achieve lower fuel consumption, the system uses a fuel cutoff in which the injection of fuel is stopped temporarily in accordance with the driving conditions.

- This system performs group injection when the engine coolant temperature is extremely low and the engine is operating at a low speed.



7. ESA (Electronic Spark Advance) System

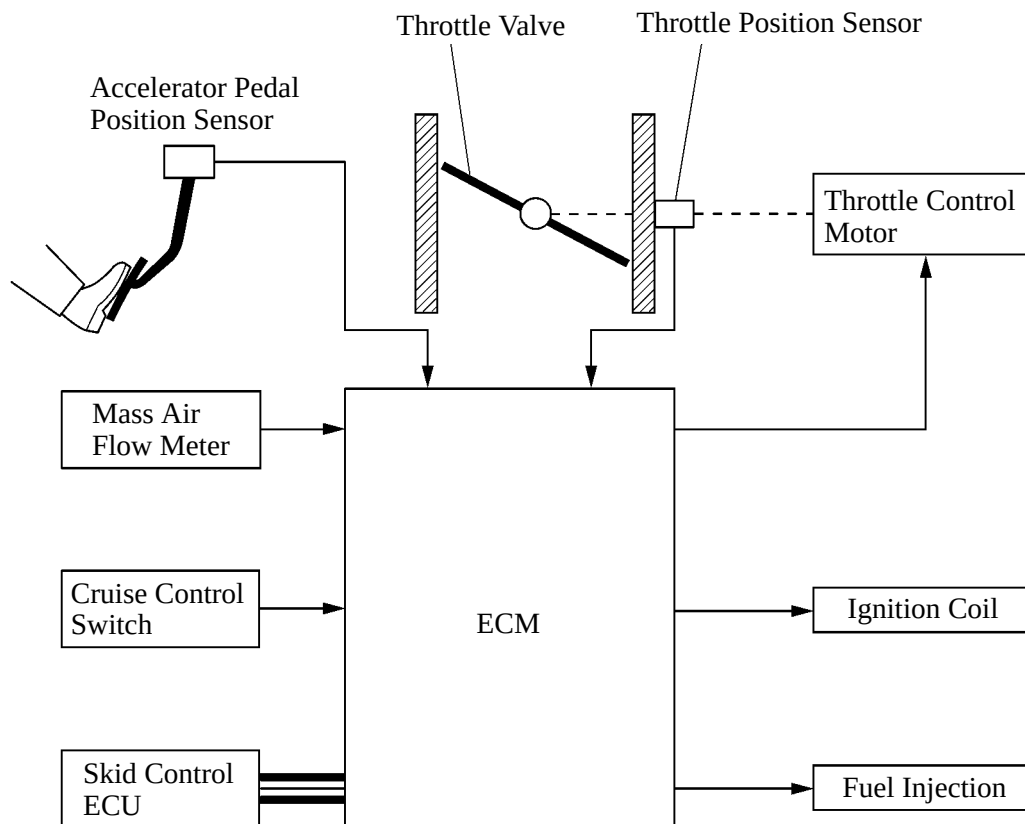
This system selects the optimal ignition timing in accordance with the signals received from the sensors and sends the (IGT) ignition signal to the igniter.

8. ETCS-i (Electronic Throttle Control System-intelligent)

General

In the conventional throttle body, the throttle valve angle is determined invariably by the amount of the accelerator pedal effort. In contrast, ETCS-i uses the ECM to calculate the optimal throttle valve angle that is appropriate for the respective driving condition and uses a throttle control motor to control the angle.

► System Diagram ◀



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Control

1) General

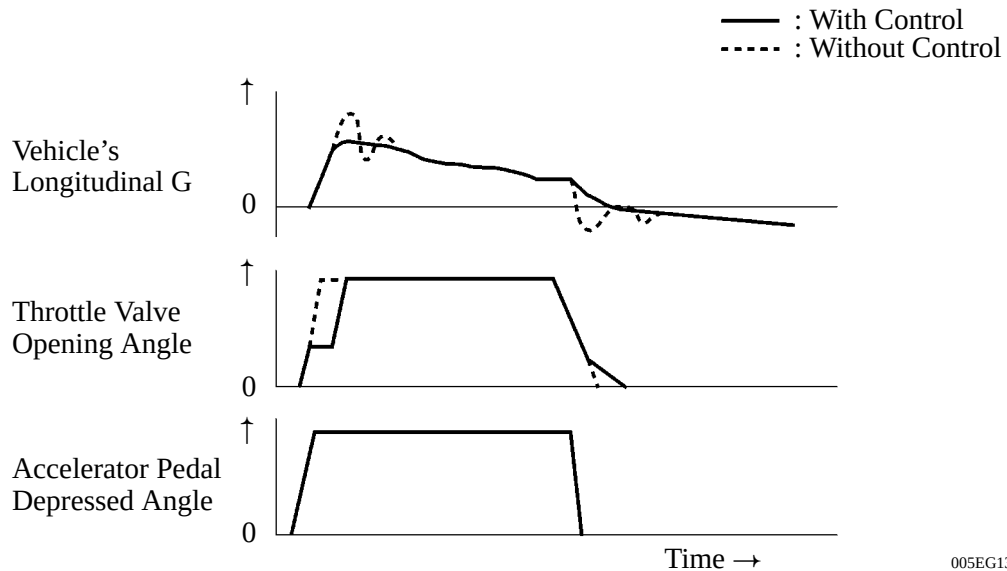
The ETCS-i consists of the following five functions:

- Normal Throttle Control (Non-linear Control)
- IAC (Idle Air Control)
- TRAC (Traction Control)
- VSC (Vehicle Stability Control)
- Cruise Control

2) Normal Throttle Control (Non-linear Control)

The ECM controls the throttle to an optimal throttle valve angle that is appropriate for the driving condition such as the amount of the accelerator pedal effort and the engine speed in order to realize excellent throttle control and comfort in all operating ranges.

► Control Examples during Acceleration and Deceleration ◀



005EG13Y

3) Idle Air Control

The ECM controls the throttle valve in order to constantly maintain an ideal idle speed.

4) TRAC Throttle Control

As part of the TRAC system, the throttle valve is closed by a demand signal from the skid control ECU if an excessive amount of slippage is created at a driving wheel, thus facilitates the vehicle in ensuring excellent vehicle stability and driving force.

5) VSC Coordination Control

In order to bring the effectiveness of the VSC system control into full play, the throttle valve angle is controlled by effecting a coordination control with the skid control ECU.

6) Cruise Control

An ECM with an integrated cruise control ECU directly actuates the throttle valve for operation of the cruise control.

Fail-safe of Accelerator Pedal Position Sensor

For details, see page 46 in 2AZ-FE engine section.

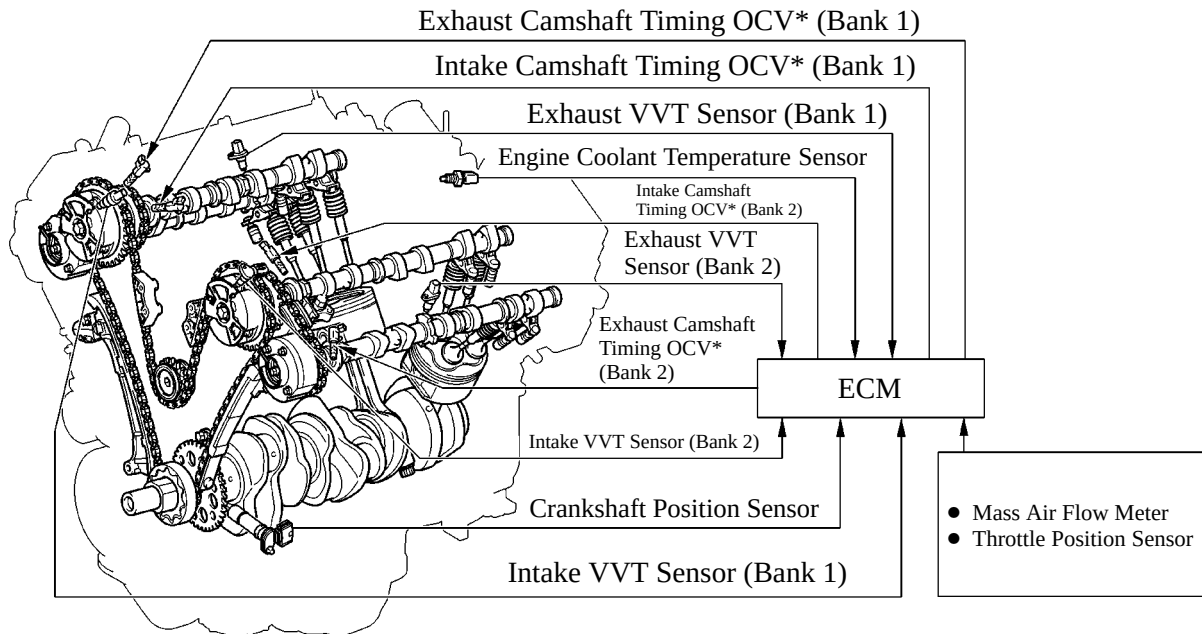
Fail-safe of Throttle Position Sensor

For details, see page 47 in 2AZ-FE engine section.

9. Dual VVT-i (Variable Valve Timing-intelligent) System

General

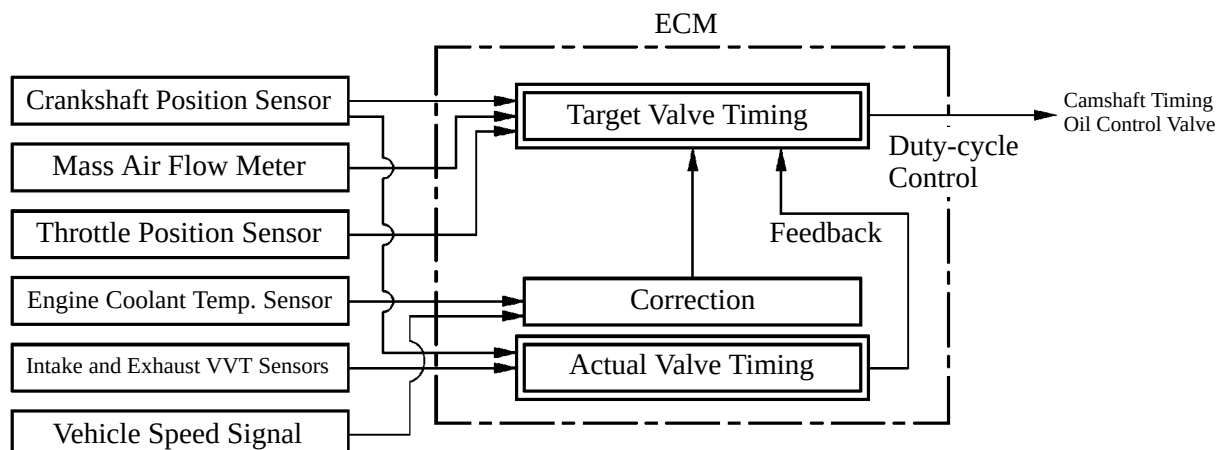
- The Dual VVT-i system is designed to control the intake and exhaust camshafts within a range of 40° and 35° respectively (of Crankshaft Angle) to provide valve timing that is optimally suited to the engine condition. This improves torque in all the speed ranges as well as increasing fuel economy, and reducing exhaust emissions.



285EG57

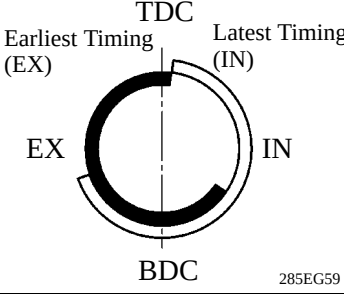
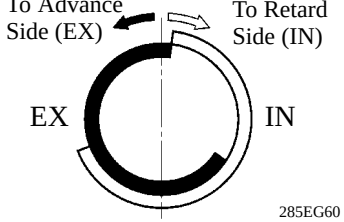
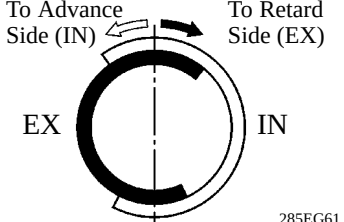
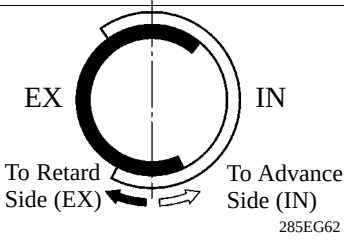
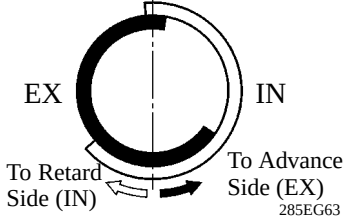
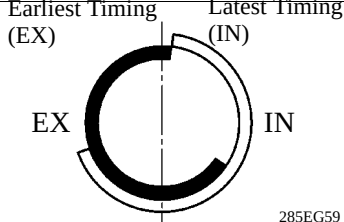
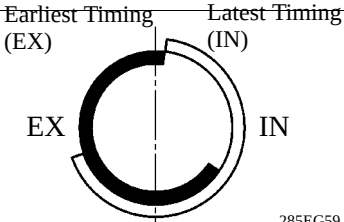
*: Oil Control Valve

- Using the engine speed signal, vehicle speed signal, and the signals from mass air flow meter, throttle position sensor and engine coolant temperature sensor, the ECM calculates optimal valve timing for each driving condition and controls the camshaft timing oil control valve. In addition, the ECM uses signals from the camshaft position sensor and the crankshaft position sensor to detect the actual valve timing, thus providing feedback control to achieve the target valve timing.



221EG16

Effectiveness of the VVT-i System

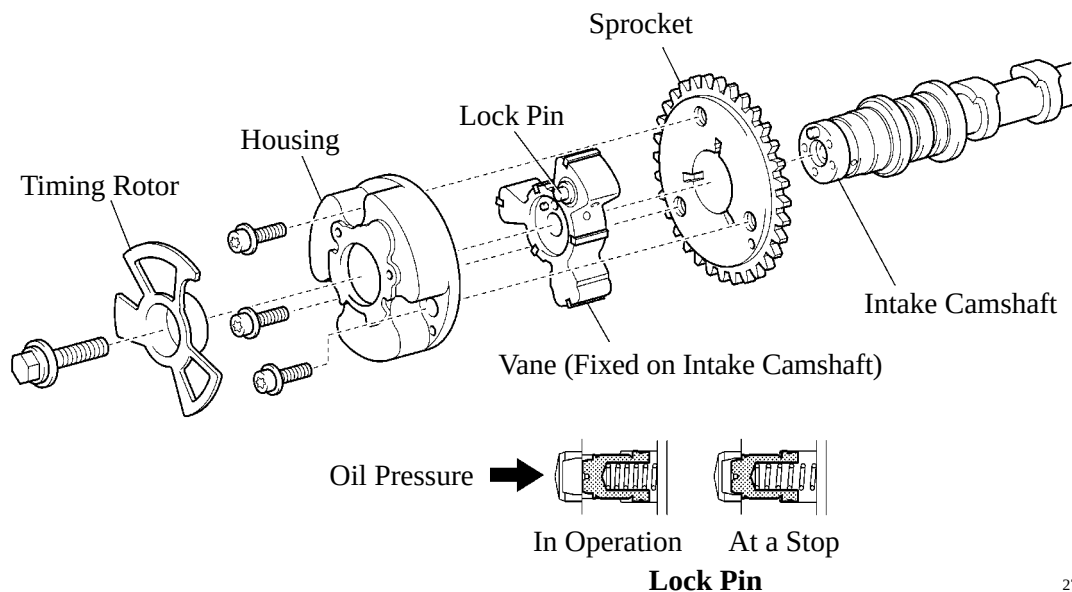
Operation State	Objective	Effect
During Idling	 Eliminating overlap to reduce blow back to the intake side.	• Stabilized idling rpm • Better fuel economy
At Light Load	 Eliminating overlap to reduce blow back to the intake side.	Ensured engine stability
At Medium Load	 Increasing overlap increases internal EGR, reducing pumping loss.	• Better fuel economy • Improved emission control
In Low to Medium Speed Range with Heavy Load	 Advancing the intake valve close timing for volumetric efficiency improvement.	Improved torque in low to medium speed range
In High Speed Range with Heavy Load	 Retarding the intake valve close timing for volumetric efficiency improvement.	Improved output
At Low Temperatures	 Eliminating overlap to reduce blow back to the intake side leads to the lean burning condition, and stabilizes the idling speed at fast idle.	• Stabilized fast idle rpm • Better fuel economy
• Upon Starting • Stopping the Engine	 Eliminating overlap to minimize blow back to the intake side.	Improved startability

Construction

1) VVT-i Controller

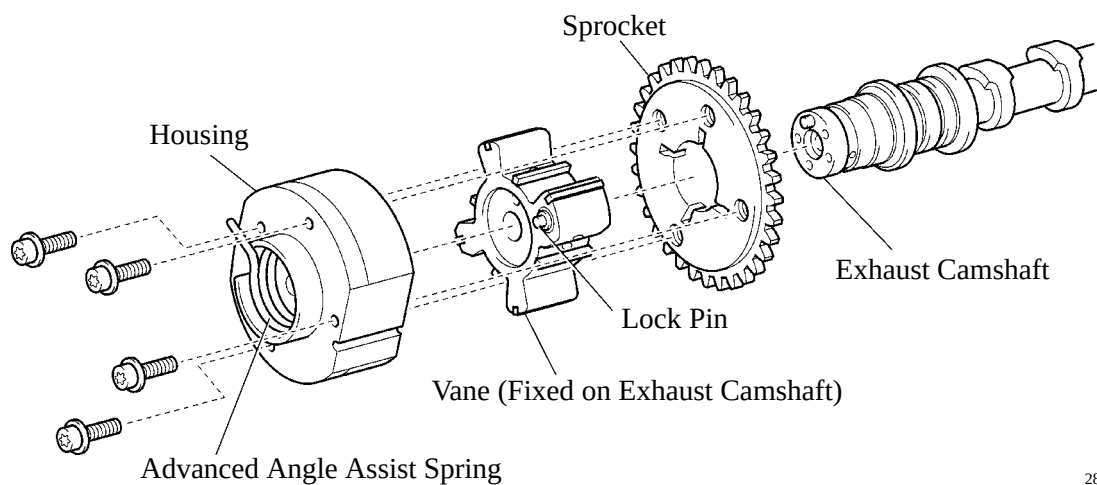
- This controller consists of the housing driven by the timing chain and the vane coupled with the intake and exhaust camshafts.
- The intake side uses a VVT-i controller with 3 vanes, and the exhaust side uses one with 4 vanes.
- When the engine stops, the intake side VVT-i controller is locked on the most retarded angle side by the lock pin, and the exhaust side VVT-i controller is locked on the most advanced angle side. This ensures excellent engine startability.
- The oil pressure sent from the advance or retard side path at the intake and exhaust camshaft causes rotation in the VVT-i controller vane circumferential direction to vary the intake valve timing continuously.
- An advanced angle assist spring is provided on the exhaust side VVT-i controller. This helps to apply torque in the advanced angle direction so that the vane lock pin securely engages with the housing when the engine stops.

► Intake Side VVT-i Controller ◀



271EG93

► Exhaust Side VVT-i Controller ◀

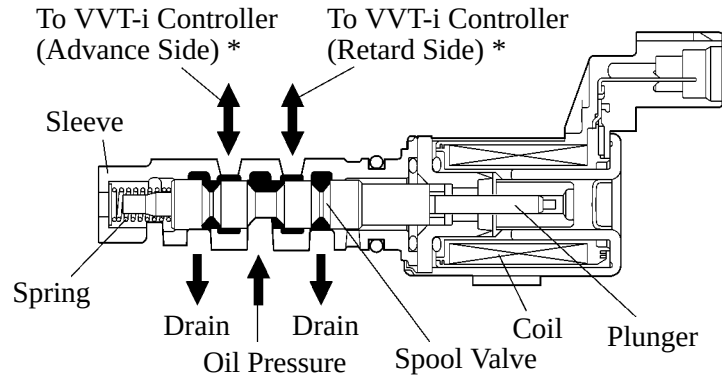


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2) Camshaft Timing Oil Control Valve

This camshaft timing oil control valve controls the spool valve using duty-cycle control from the ECM. This allows hydraulic pressure to be applied to the VVT-i controller advance or retard side. When the engine is stopped, the camshaft timing oil control valve is in the most retard position.

► Intake Camshaft Timing Oil Control Valve ◀



238EG62

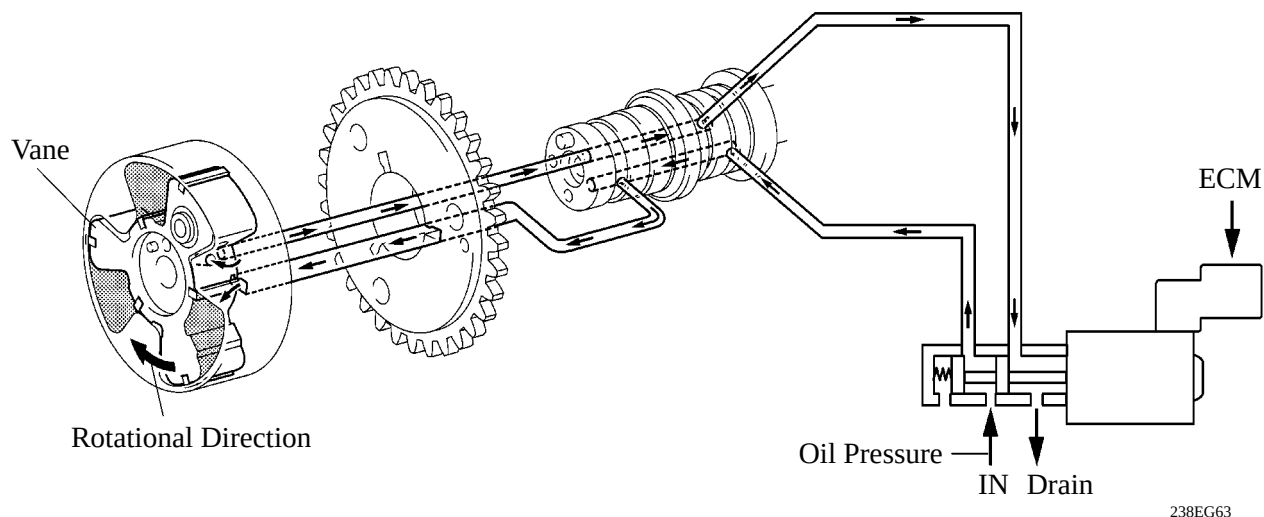
*: The advance and retard sides of the exhaust camshaft timing oil control valve are reverse of the intake side.

Operation

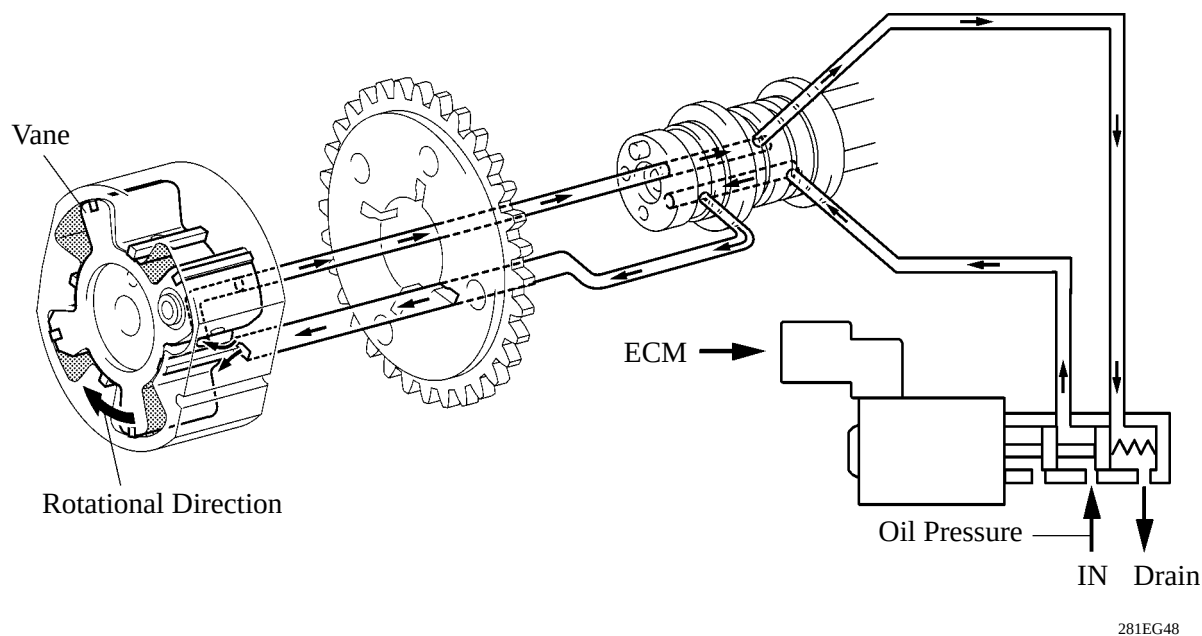
1) Advance

When the camshaft timing oil control valve is positioned as illustrated below by the advance signals from the ECM, the resultant oil pressure is applied to the timing advance side vane chamber to rotate the camshaft in the timing advance direction.

► Intake Side ◀



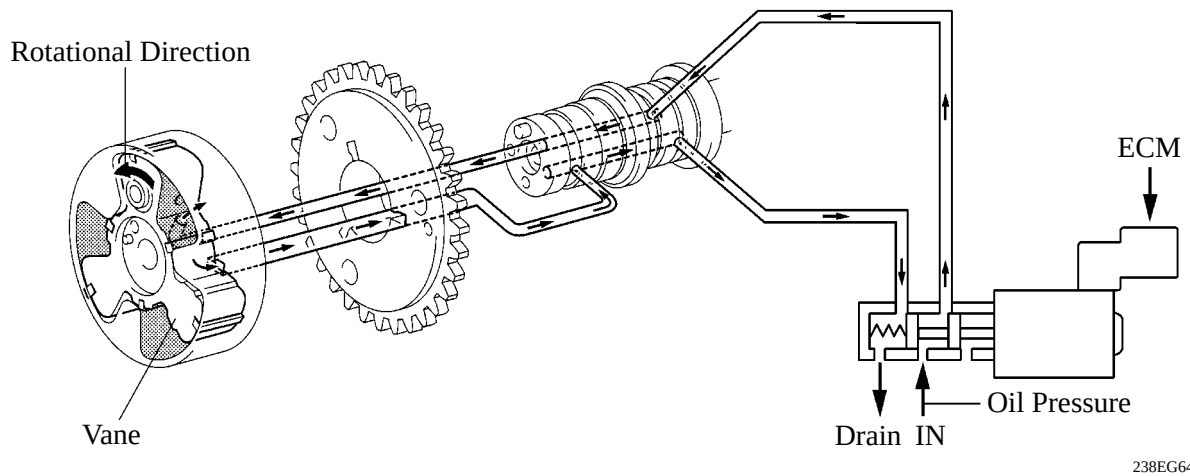
► Exhaust Side ◀



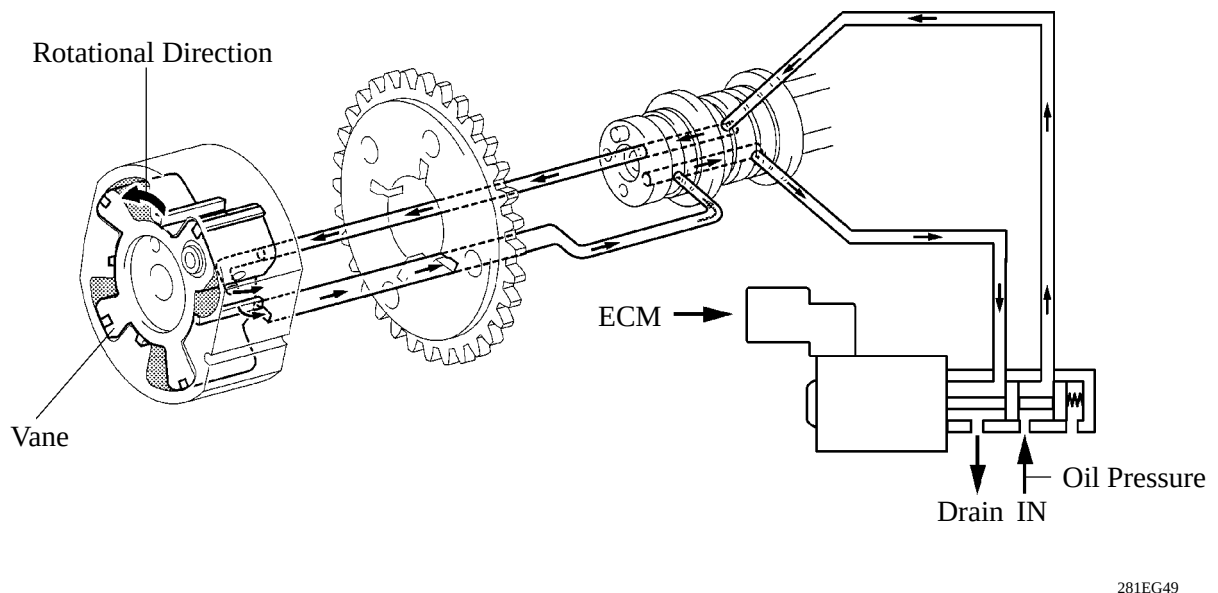
2) Retard

When the camshaft timing oil control valve is positioned as illustrated below by the retard signals from the ECM, the resultant oil pressure is applied to the timing retard side vane chamber to rotate the camshaft in the timing retard direction.

► Intake Side ◀



► Exhaust Side ◀



3) Hold

After reaching the target timing, the valve timing is held by keeping the camshaft timing oil control valve in the neutral position unless the traveling state changes.

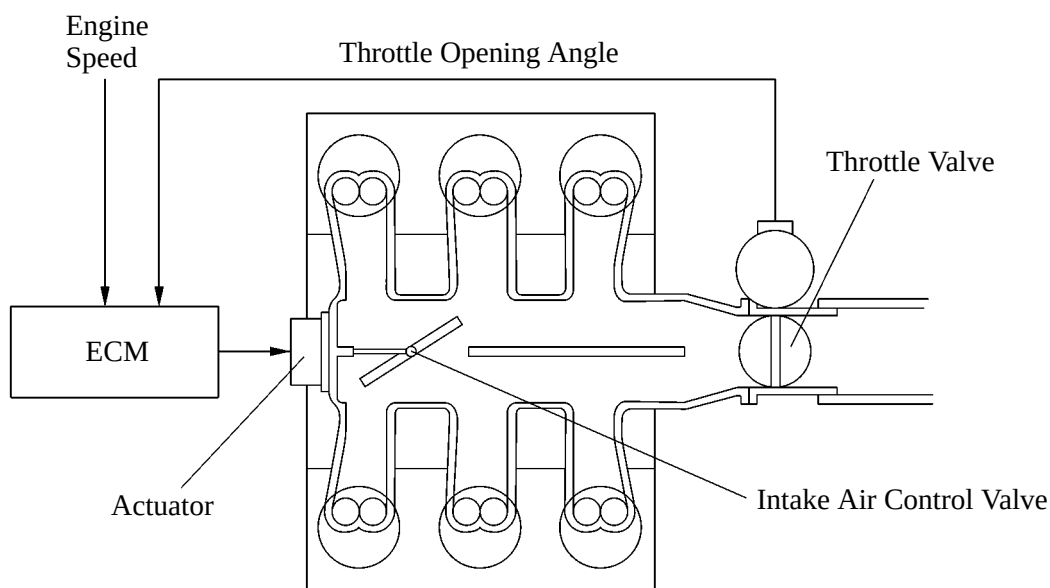
This adjusts the valve timing at the desired target position and prevents the engine oil from running out when it is unnecessary.

10. ACIS (Acoustic Control Induction System)

General

The ACIS consists of a bulkhead to divide the intake manifold into 2 stages, and an intake air control valve in the bulkhead which opens and closes to vary the effective length of the intake manifold in accordance with the engine speed and throttle valve opening angle. This increases the power output in all ranges from low to high speed.

► System Diagram ◀



285EG58

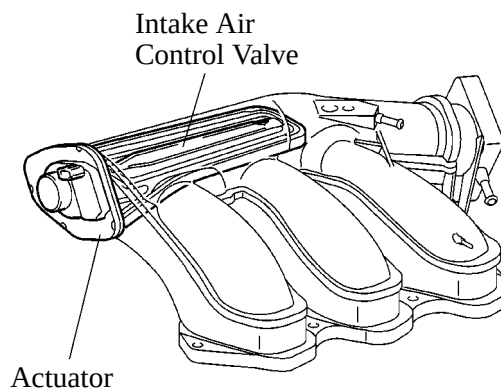
Construction

1) Intake Air Control Valve

The intake air control valve, which is provided in the intake air chamber, opens and closes to change the effective length of the intake manifold in 2 stages.

2) Actuator (Motor)

The actuator activates the intake air control valve based on signals from the ECM.

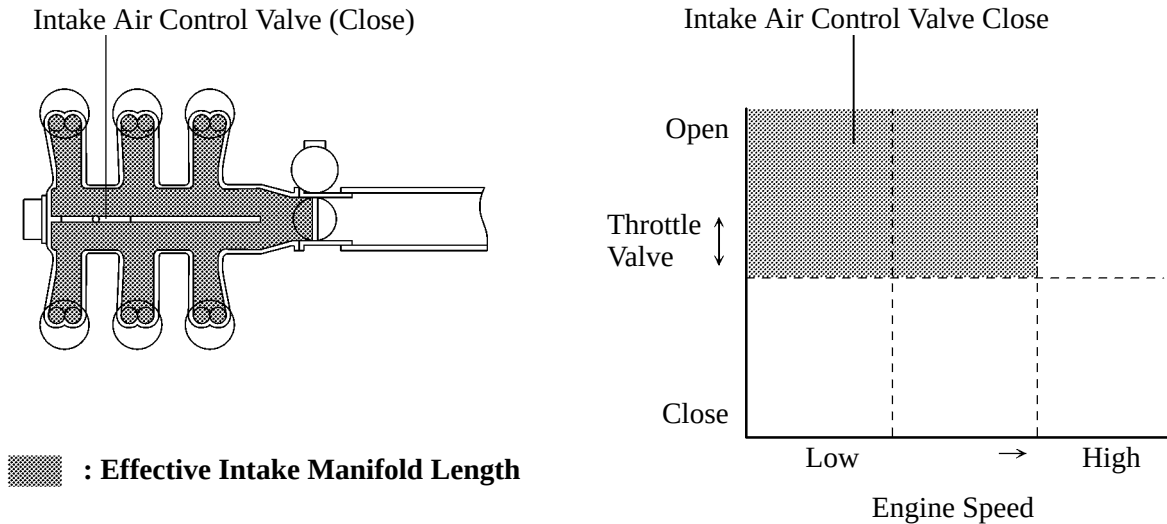


285EG64

Operation

1) When the Intake Air Control Valve Closes

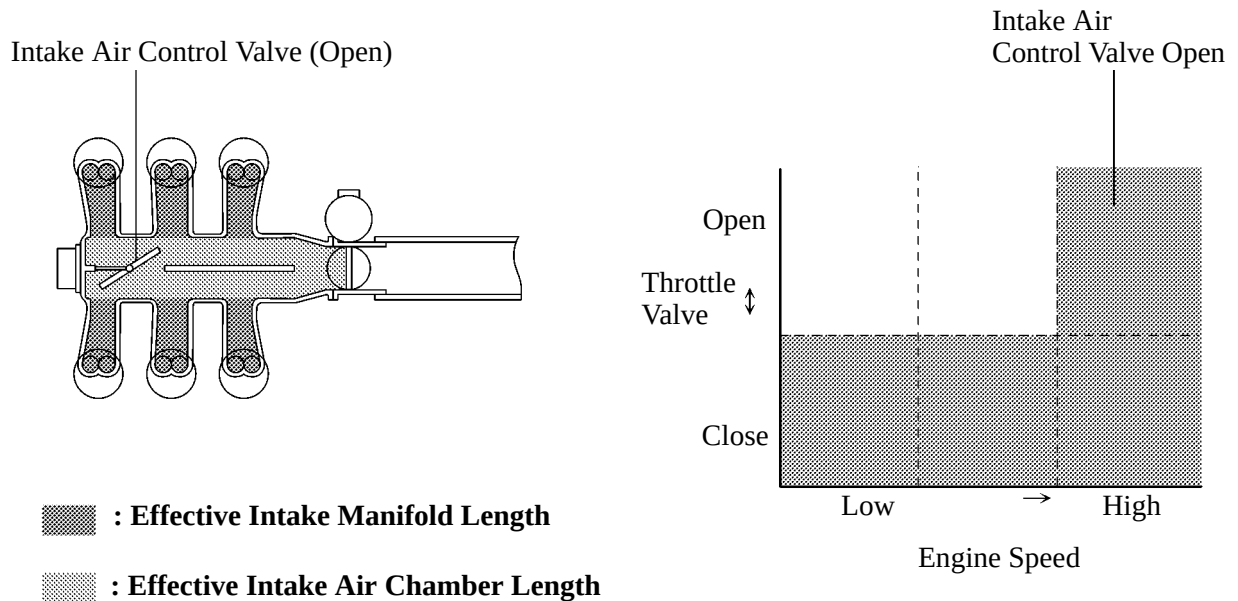
While the engine is running at middle speed under high load, the ECM controls the actuator to close the intake air control valve. As a result, the effective length of the intake manifold is lengthened and the intake efficiency, in the medium speed range, is improved due to the dynamic effect of the intake air, thereby increasing power output.



285EG65

2) When the Intake Air Control Valve Open

Under any condition except when the engine is running at middle speed under high load, the ECM controls the actuator to open the intake air control valve. When the intake air control valve is open, the effective length of the intake manifold is shortened and the peak intake efficiency is shifted to the low-to-high engine speed range, thus providing greater output at low-to-high engine speeds.



285EG66

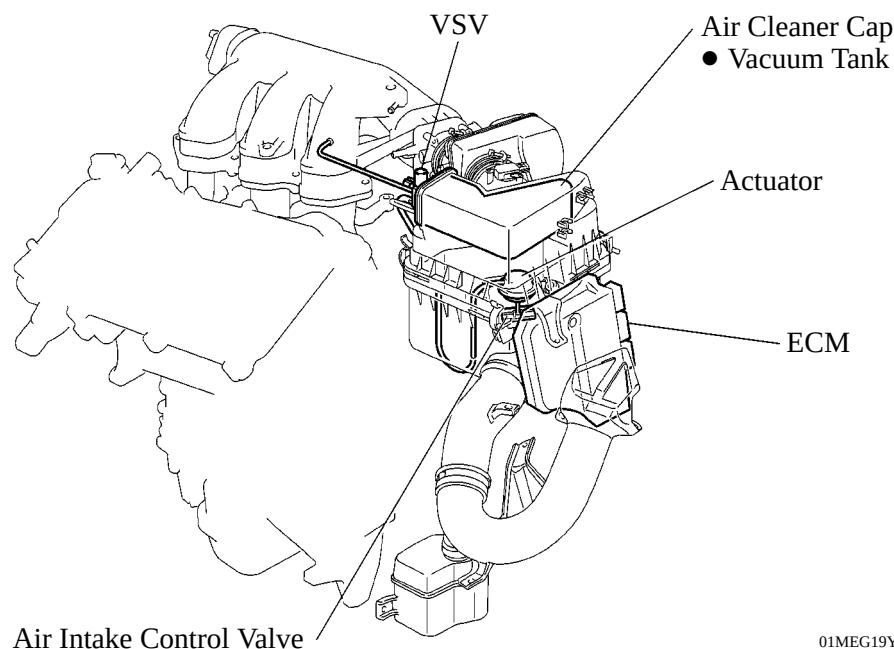
11. Air Intake Control System

General

The system has a dual path design for air intake. An air intake control valve and actuator control the air flow path.

As a result, a reduction in intake noise in the low-speed range and an increase in the power output in the high-speed range are realized.

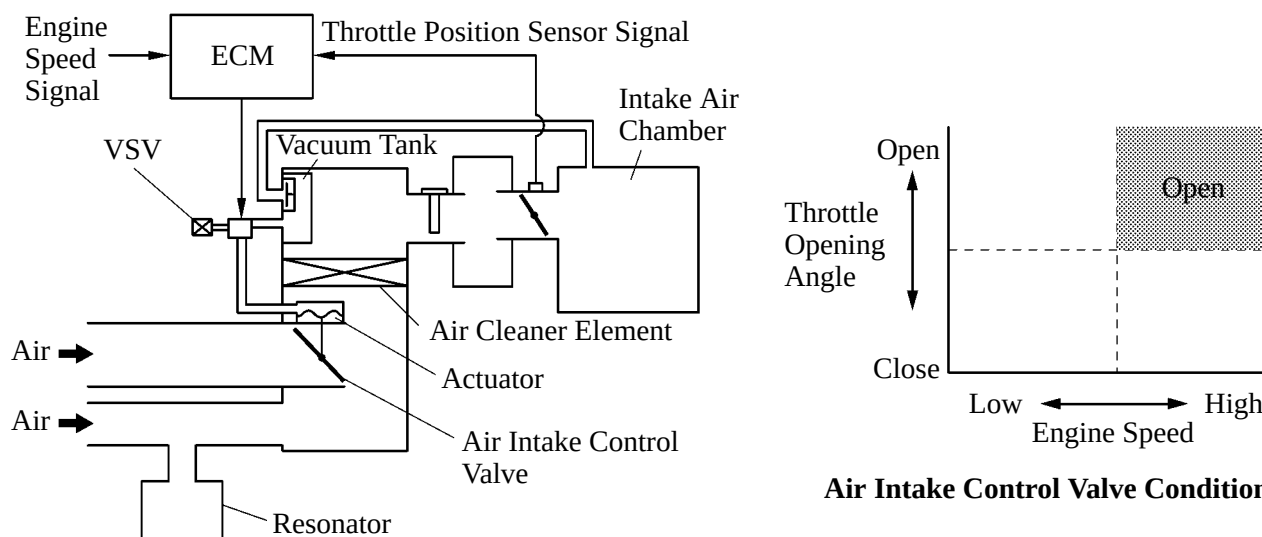
► Layout of Components ◀



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Operation

- When the engine is operating in the low-to-mid speed range, this control operates the air intake control valve to close one side of the air cleaner inlet. As a result, the intake area has been minimized and the intake noise is reduced.
- When the engine is operating in the high-speed range, this control operates the air intake control valve to open both sides of the air cleaner inlet. As a result, the intake area has been maximized and the intake efficiency is improved.



Air Intake Control Valve Condition

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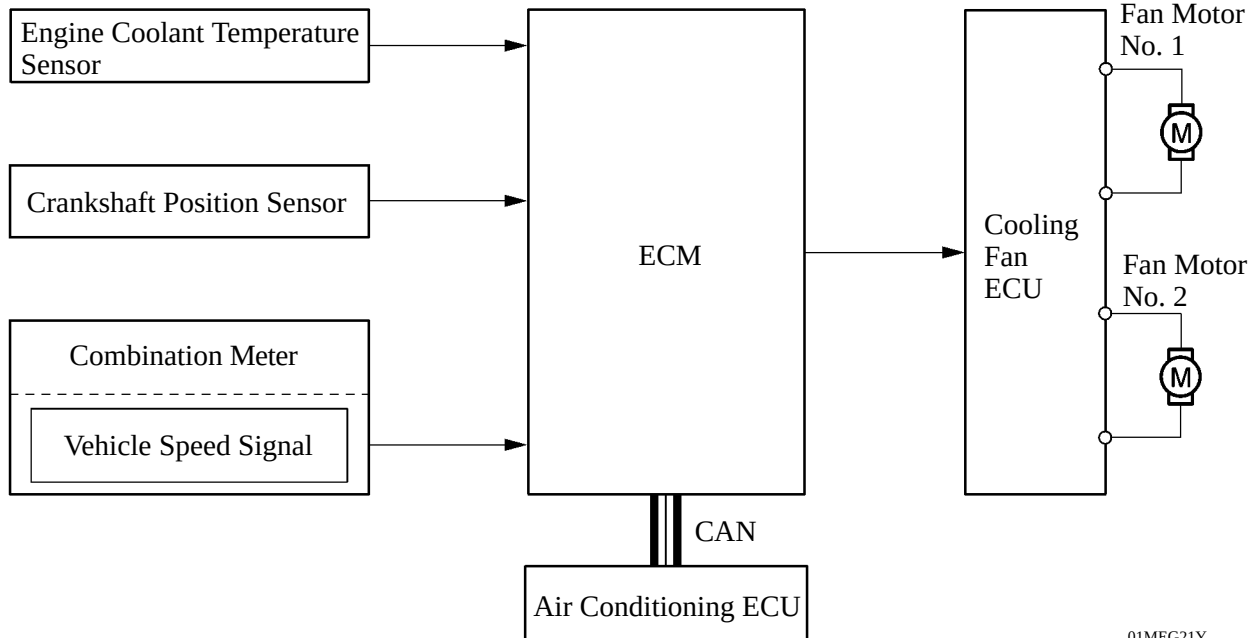
12. Cooling Fan Control System

General

A cooling fan control system is used. To achieve an optimal fan speed in accordance with the engine coolant temperature, vehicle speed, engine speed, and air conditioning operating conditions, the ECM calculates the proper fan speed and sends the signals to the front controller. By receiving the signals from the ECM, the front controller sends proper fan speed control signals to the cooling fan ECU.

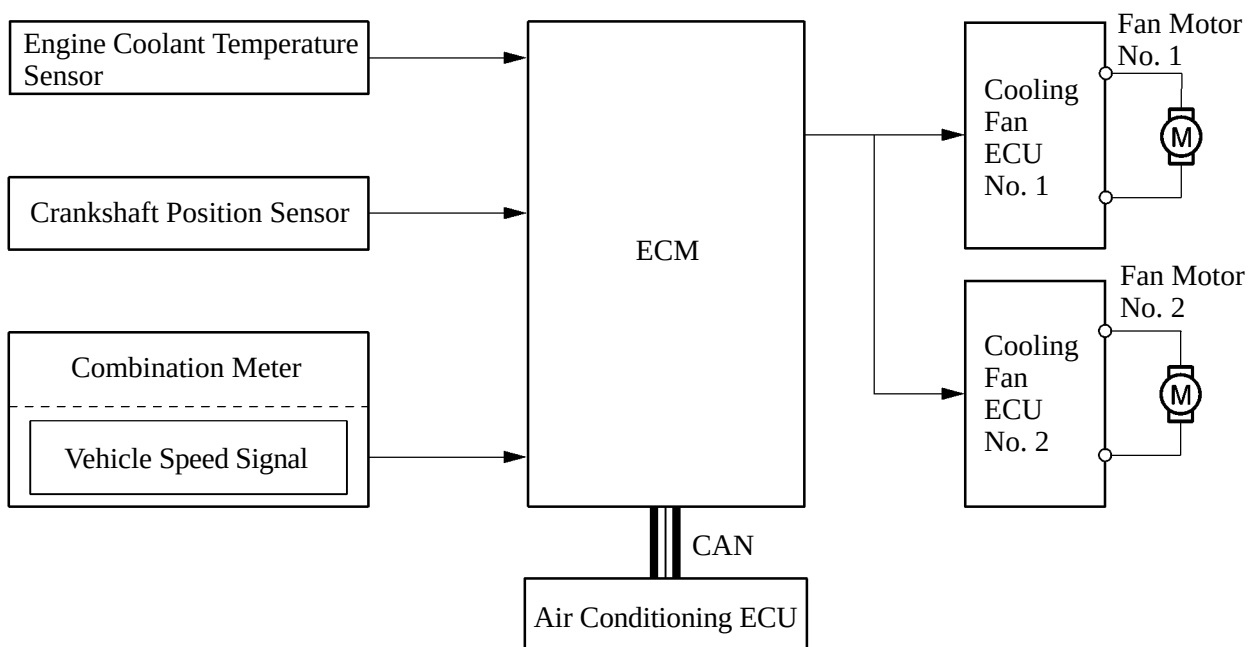
Upon receiving the signals from the front controller, the cooling fan ECU actuates the fan motors.

► Wiring Diagram ◀



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Except Towing Package Models



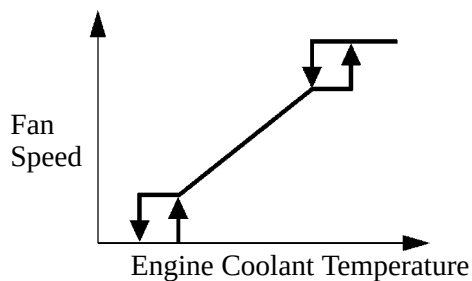
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Towing Package Models

Operation

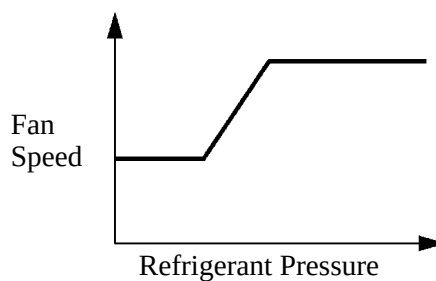
As illustrated below, the ECM determines the required fan speed by selecting the fastest fan speed from among the following:

- (A) Fan speed required by the engine coolant temperature
- (B) Fan speed required by the air conditioning refrigerant pressure
- (C) Fan speed required by the engine speed
- (D) Fan speed required by the vehicle speed



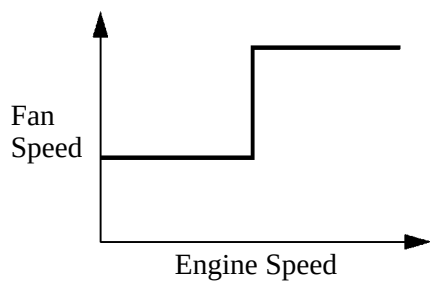
(A) Fan speed required by engine coolant temperature

189EG13



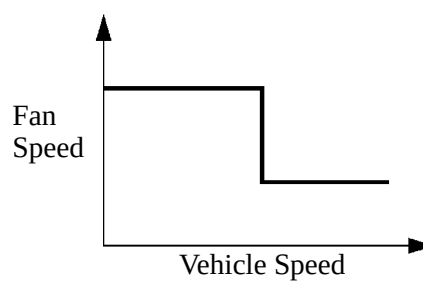
(B) Fan speed required by air conditioning refrigerant pressure

189EG14



(C) Fan speed required by engine speed

189EG15



(D) Fan speed required by vehicle speed

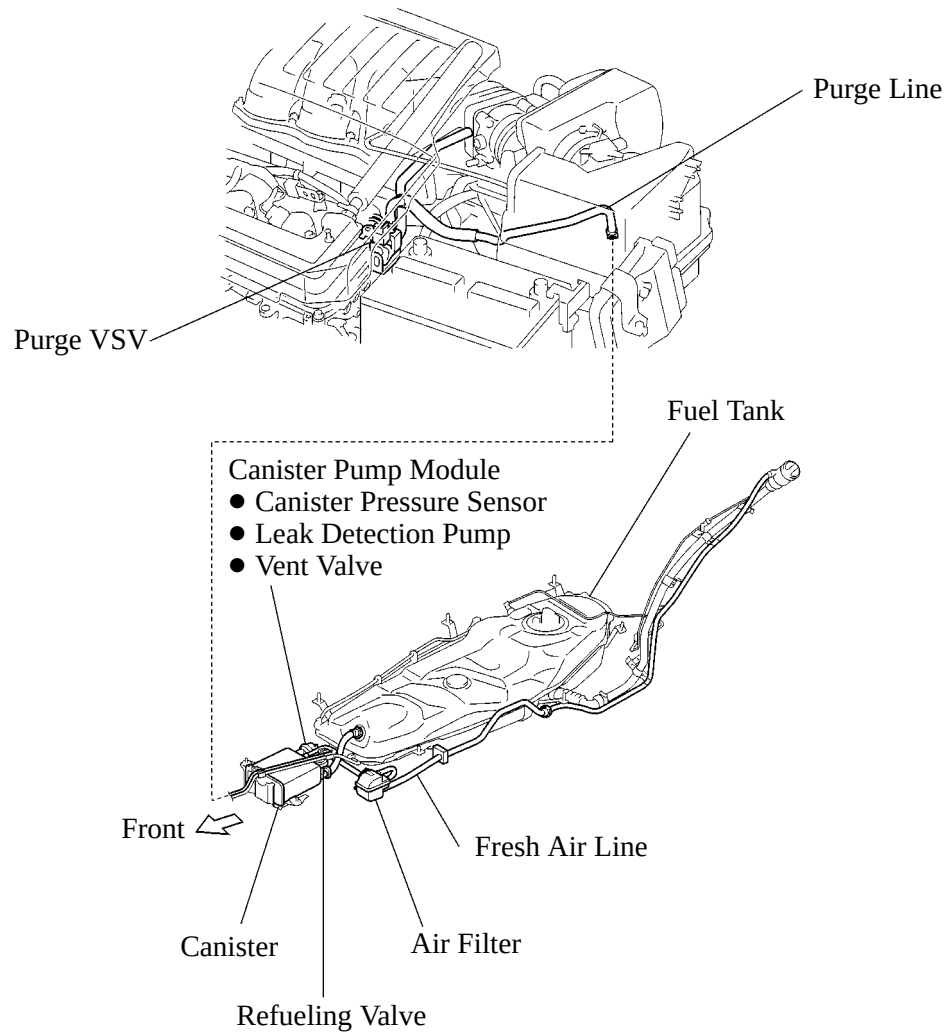
189EG16

13. Evaporative Emission Control System

General

The 2GR-FE engine uses the same type of evaporative emission control system as the 2AZ-FE engine. For details, see page EG-54.

Layout of Main Components



14. Diagnosis

- When the ECM detects a malfunction, the ECM makes a diagnosis and memorizes the failed section. Furthermore, the MIL (Malfunction Indicator Lamp) in the combination meter illuminates or blinks to inform the driver.
- The ECM will also store the DTCs (Diagnostic Trouble Codes) of the malfunctions. The DTCs can be accessed by using the hand-held tester.
- For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

Service Tip

- The ECM of the '06 RAV4 uses the CAN protocol for diagnostic communication. Therefore, a hand-held tester and a dedicated adapter [CAN VIM (Vehicle Interface Module)] are required for accessing diagnostic data. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).
- To clear the DTC that is stored in the ECM, use a hand-held tester, and disconnect the battery terminal or remove the EFI fuse for 1 minute or longer.

15. Fail-safe

When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in the memory.

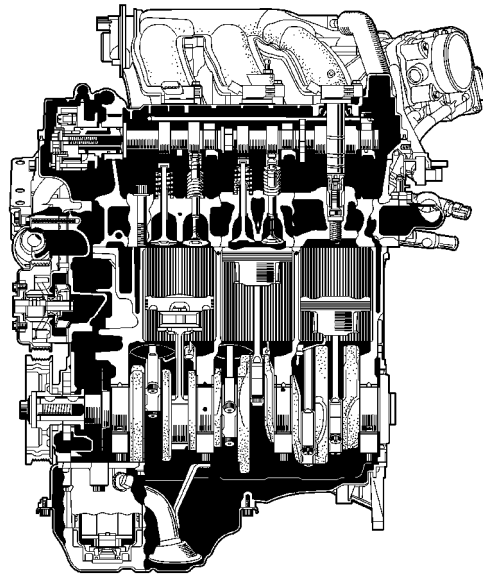
► Fail-safe Chart ◀

DTC No.	Fail-safe Operation	Fail-safe Deactivation Conditions
P0031, P0032, P0051, P0052	ECM turns off air-fuel ratio sensor heater.	Ignition switch OFF.
P0037, P0038, P0057, P0058	ECM turns off heated oxygen sensor heater.	Ignition switch OFF.
P0100, P0102, P0103	Ignition timing is calculated from engine speed and throttle angle.	“Pass” condition detected.
P0110, P0112, P0113	Intake air temperature is fixed at 20°C (68°F).	“Pass” condition detected.
P0115, P0117, P0118	Engine coolant temperature is fixed at 80°C (176°F).	“Pass” condition detected.
P0120, P0121, P0122, P0123, P0220, P0222, P0223, P0604, P0606, P0607, P0657, P2102, P2103, P2111, P2112, P2118, P2119, P2135	If ETCS-i (Electronic Throttle Control System-intelligent) has a malfunction, ECM cuts off current to throttle control motor. Throttle control valve returns to predetermined opening angle (approximately 6.5°) by force of return spring. ECM then adjusts engine output by controlling fuel injection (intermittent fuel-cut) and ignition timing in accordance with accelerator pedal opening angle to enable vehicle to continue driving at minimal speed. If accelerator pedal is depressed firmly and slowly, vehicle can be driven slowly. If accelerator pedal is depressed quickly, vehicle may speed up and slow down erratically.	If “Pass” condition is detected and then the ignition switch is turned OFF, fail-safe operation will stop and system will return to normal operating conditions.
P0327, P0328, P0332, P0333	Max. timing retardation.	Ignition switch OFF.
P0351, P0352, P0353, P0354, P0355, P0356	Fuel is cut.	“Pass” condition detected.
P2120, P2121, P2122, P2123, P2125, P2127, P2128, P2138	Accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of sensor circuits, ECM detects abnormal signal voltage difference between two sensor circuits and switches into limp mode. In limp mode, remaining circuit is used to calculate accelerator pedal opening to allow vehicle to continue driving. If both circuits malfunction, ECM regards opening angle of accelerator pedal to be fully closed. In this case, throttle valve will remain closed as if engine is idling.	If “Pass” condition is detected and then the ignition switch is turned OFF, fail-safe operation will stop and system will return to normal operating conditions.

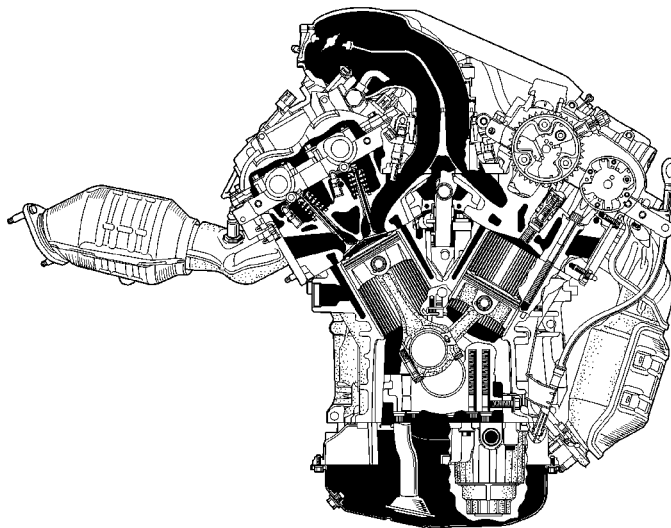
2GR-FE ENGINE

■ DESCRIPTION

The 2GR-FE engine on the '06 RAV4 is a newly developed, V6 3.5-liter, 24-valve DOHC engine. This engine uses the Dual VVT-i (Variable Valve Timing-intelligent) system, DIS (Direct Ignition System), ACIS (Acoustic Control Induction System), and ETCS-i (Electronic Throttle Control System-intelligent). These control functions achieve improved engine performance, fuel economy, and reduced exhaust emissions.



285EG01



01MEG11Y

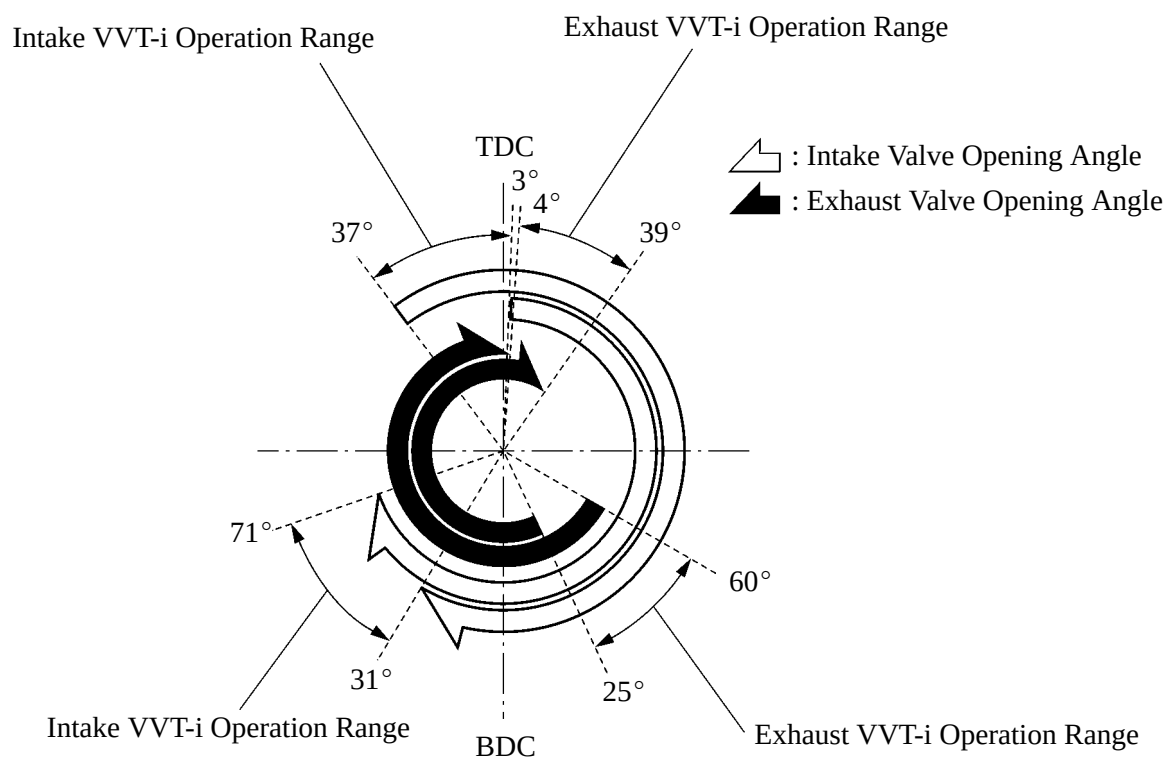
► Engine Specifications ◀

No. of Cyls. & Arrangement			6-cylinder, V Type
Valve Mechanism			24-valve DOHC, Chain Drive (with Dual VVT-i)
Combustion Chamber			Pentroof-type
Manifolds			Parallel-flow
Fuel System			SFI
Ignition System			DIS
Displacement		cm ³ (cu. in.)	3456 (210.9)
Bore x Stroke		mm (in.)	94.0 x 83.0 (3.70 x 3.27)
Compression Ratio			10.8 : 1
Max. Output (SAE-NET)* ¹			201 kW @ 6200 rpm (269 HP @ 6200 rpm)
Max. Torque (SAE-NET)* ¹			333 N·m @ 4700 rpm (247 ft·lbf @ 4700 rpm)
Valve Timing	Intake Valve	Open	- 3° to 37° BTDC
		Close	71° to 31° ABDC
	Exhaust Valve	Open	60° to 25° BBDC
		Close	4° to 39° ATDC
Firing Order			1 - 2 - 3 - 4 - 5 - 6
Octane Rating			91 or higher
Engine Oil Grade			ILSAC multigrade engine oil
Emission Regulation	Tailpipe	California	ULEVII, SFTP
		Except California	Tier2-Bin5, SFTP
	Evaporative		LEVII, ORVR
Engine Service Mass* ² (Reference)		kg (lb)	163 (359)

*¹: Maximum output and torque rating is determined by revised SAE J1349 standard.

*²: Weight shows the figure with the oil and engine coolant fully filled.

► Valve Timing ◀

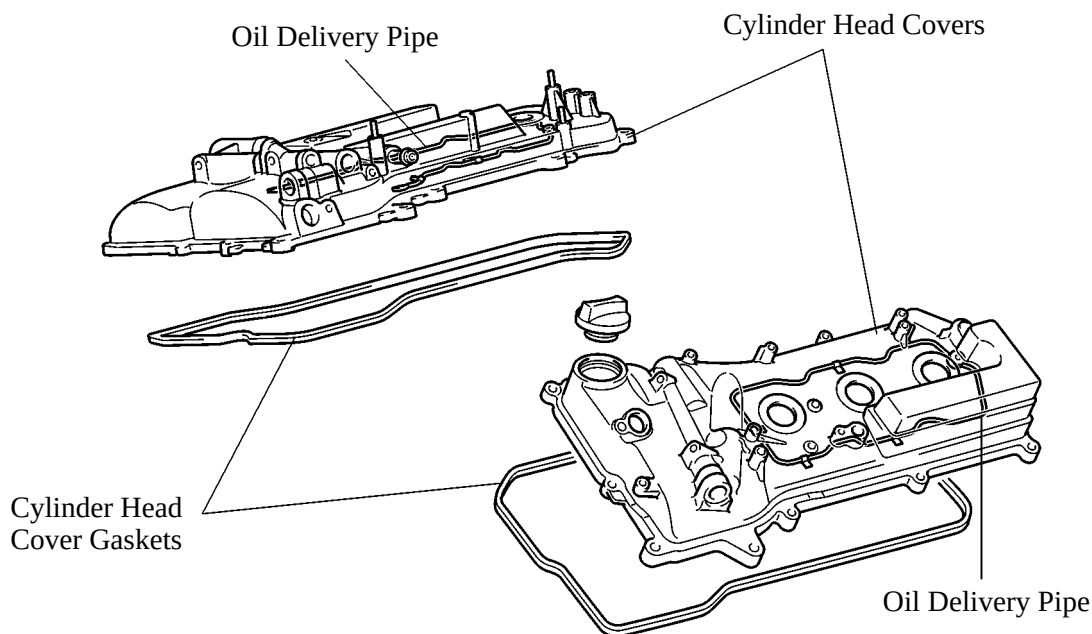


285EG03

ENGINE PROPER

1. Cylinder Head Cover

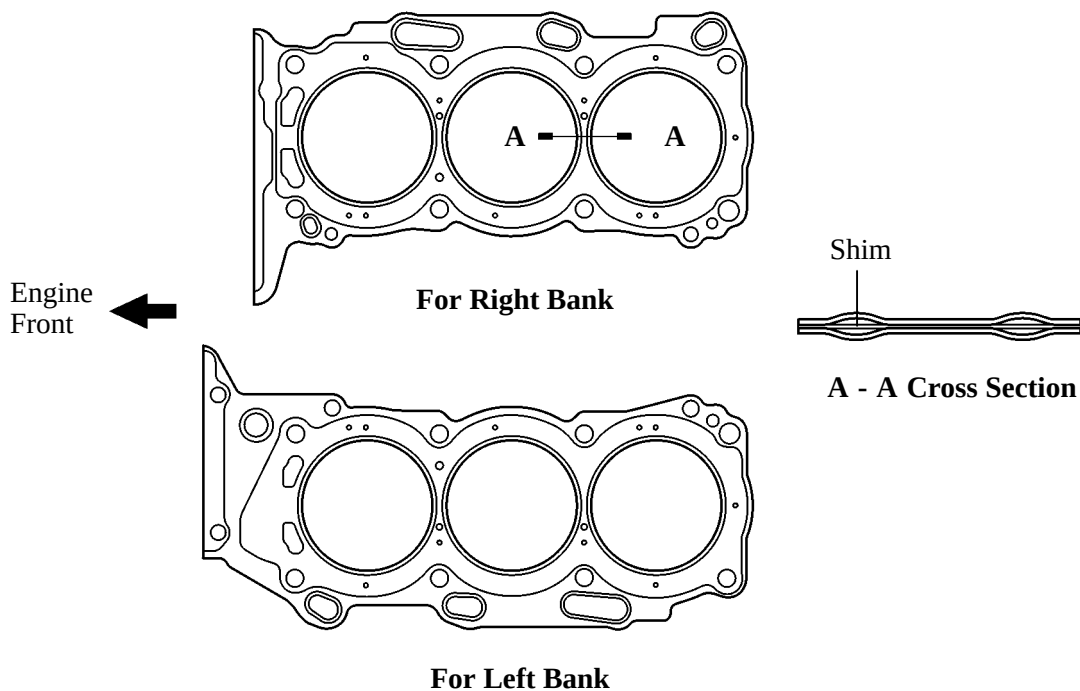
- Lightweight yet high-strength aluminum cylinder head covers are used.
- An oil delivery pipe is installed inside the cylinder head cover. This ensures lubrication to the sliding parts of the roller rocker arm, improving reliability.



285EG05

2. Cylinder Head Gasket

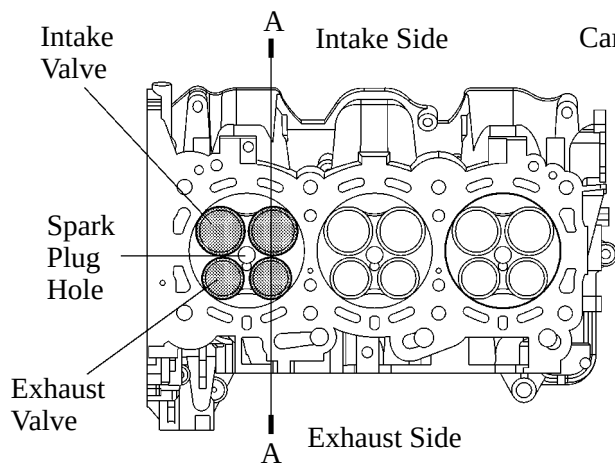
A steel-laminate type cylinder head gasket is used. A shim is used around the cylinder bore of the gasket to help enhance sealing performance and durability.



285EG06

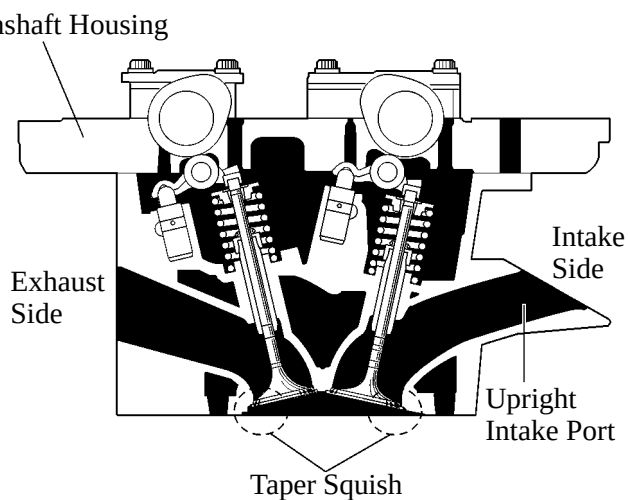
3. Cylinder Head

- The cylinder head structure has been simplified by separating the cam journal portion (camshaft housing) from the cylinder head.
- The cylinder head, which is made of aluminum, contains a pentroof-type combustion chamber. The spark plug is located in the center of the combustion chamber in order to improve the engine's anti-knocking performance.
- The intake ports are on the inside and the exhaust ports are on the outside of the left and right banks respectively.
- Upright intake ports are used to improve the intake efficiency.
- A taper squish combustion chamber is used to improve anti-knocking performance and intake efficiency. In addition, engine performance and fuel economy have been improved.
- The siamese type intake port is used to reduce the overall surface area of the intake port walls. This prevents the fuel from adhering onto the intake port walls, thus reducing HC exhaust emissions.



View from Back Side

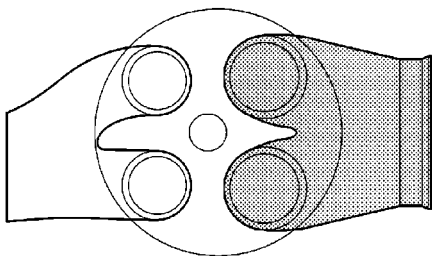
285EG07



A - A Cross Section

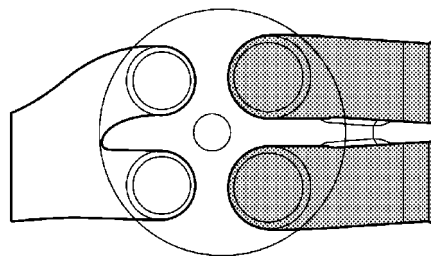
285EG08

— REFERENCE —



215EG18

Siamese Type

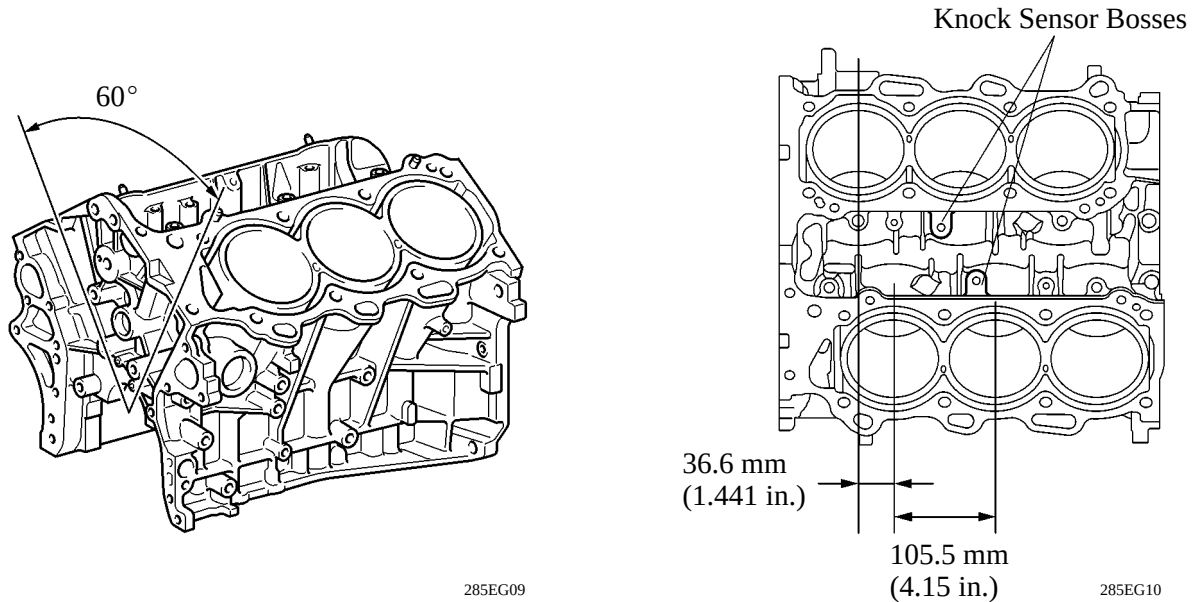


215EG19

Independent Type

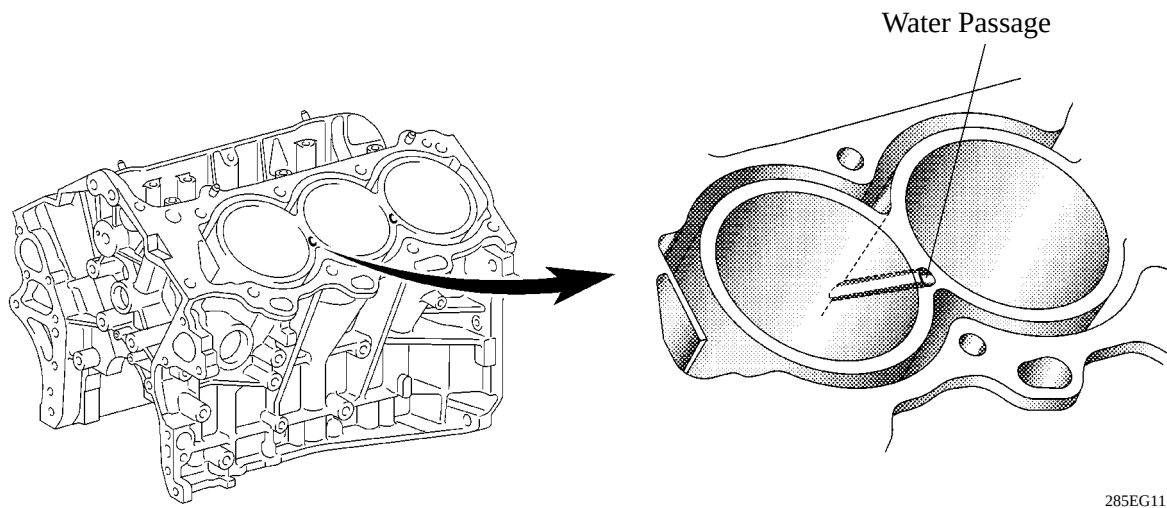
4. Cylinder Block

- The cylinder block is made of aluminum alloy, so it is lightweight.
- The cylinder block has a bank angle of 60° , a bank offset of 36.6 mm (1.441 in.) and a bore pitch of 105.5 mm (4.15 in.), resulting in a compact block in its length and width even for its displacement.
- Installation bosses of the two knock sensors are located on the inside of left and right banks.

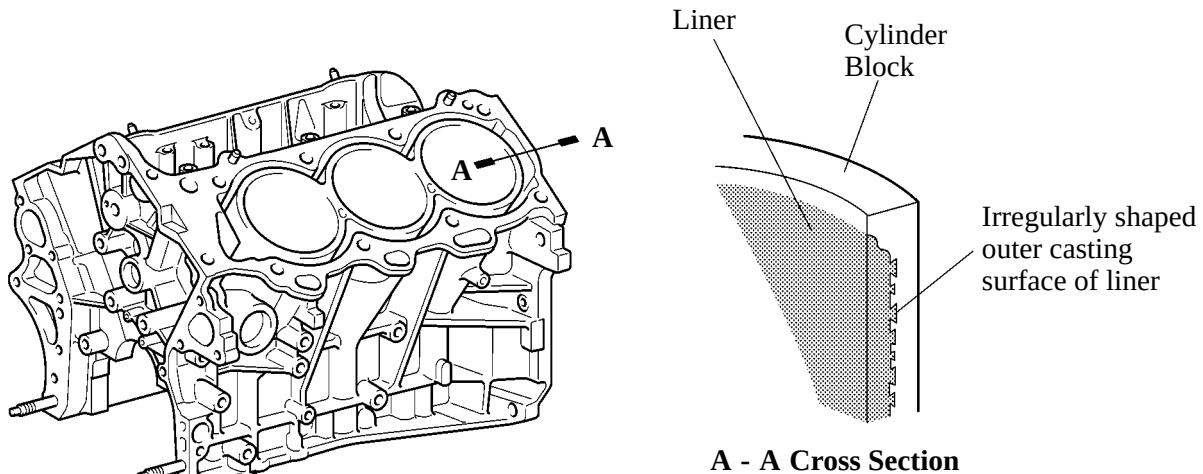


View from Top Side

- A water passage has been provided between the cylinder bores. By allowing the engine coolant to flow between the cylinder bores, this construction enables the temperature of the cylinder walls to be kept uniform.



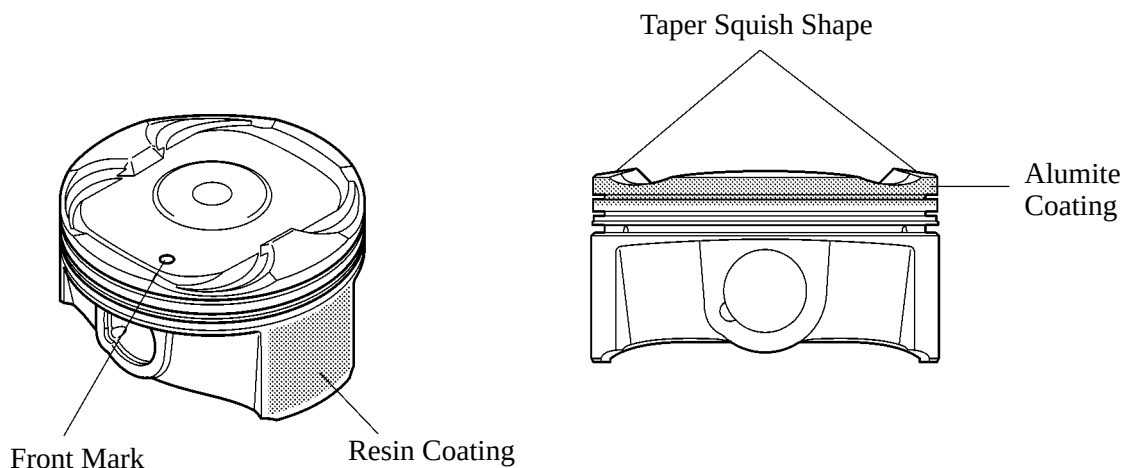
- A compact block has been achieved by producing the thin cast-iron liners and cylinder block as a unit. It is not possible to bore the block with this liner.
- The liners are the spiny-type, which have been manufactured so that their casting exteriors form large irregular surfaces in order to enhance the adhesion between the liners and the aluminum cylinder block. The enhanced adhesion helps improve heat dissipation, resulting in a lower overall temperature and heat deformation of the cylinder bores.



285EG12

5. Piston

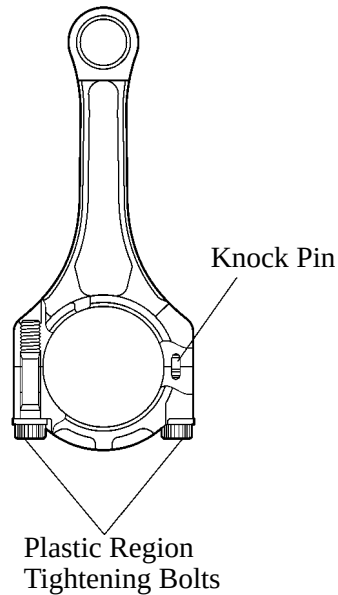
- The piston is made of aluminum alloy.
- The piston head portion uses a taper squish shape to accomplish fuel combustion efficiency.
- The piston skirt is coated with resin to reduce the friction loss.
- The groove of the top ring is coated with alumite to ensure wear resistance.
- By increasing the machining precision of the cylinder bore diameter, the outer diameter of the piston is made into one size.



285EG13

6. Connecting Rod and Connecting Rod Bearing

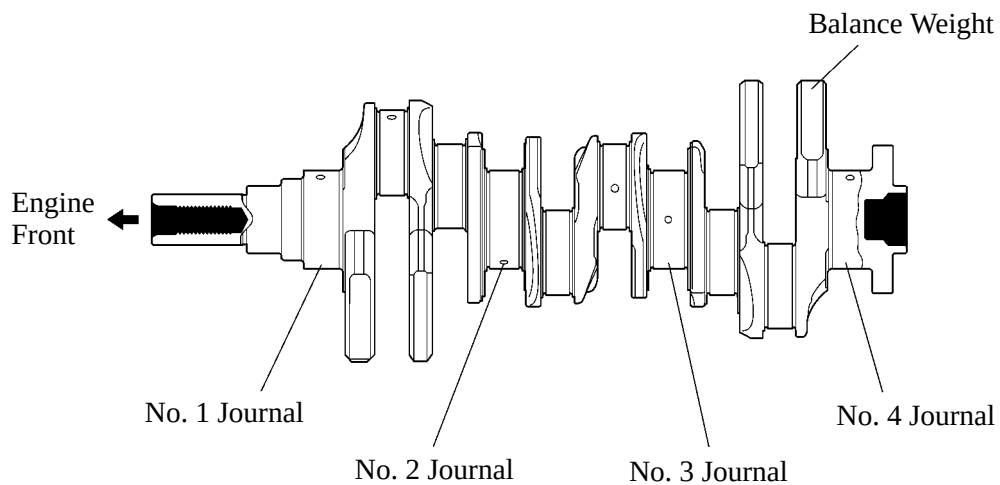
- Connecting rods that have been forged for high strength are used for weight reduction.
- Knock pins are used at the mating surfaces of the bearing caps of the connecting rod to minimize the shifting of the bearing caps during assembly.
- The connecting rods and caps are made of high-strength steel for weight reduction.
- Nutless-type plastic region tightening bolts are used on the connecting rods for a lighter design.
- An aluminum bearing is used for the connecting rod bearings.
- The connecting rod bearings are reduced in width to reduce friction.



285EG14

7. Crankshaft

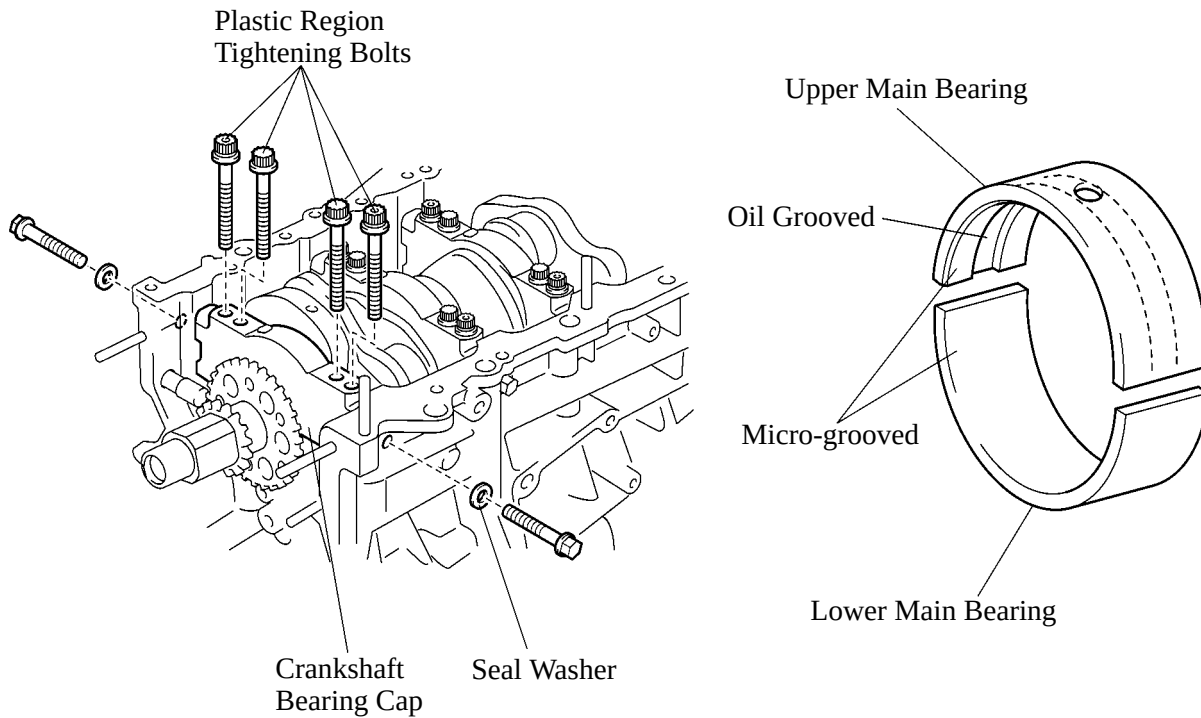
- A crankshaft made of forged steel, which excels in rigidity and wear resistance, is used.
- The crankshaft has 4 journals and 5 balance weights.
- All pin and journal fillets are IH-finished to maintain adequate strength.



285EG15

8. Crankshaft Bearing and Crankshaft Bearing Cap

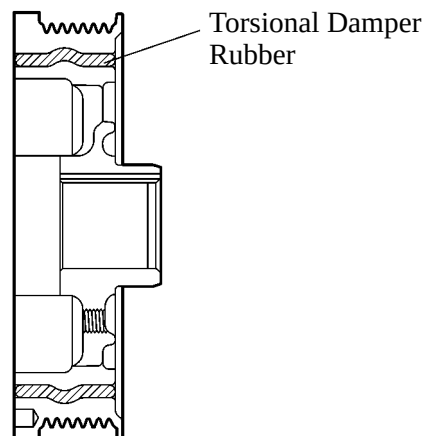
- The crankshaft bearing is made of aluminum alloy.
- As the connecting rod bearings, the lining surface of the crankshaft bearings is micro-grooved to realize an optimal amount of oil clearance. As a result, cold-engine cranking performance is improved and engine vibration is reduced.
- The upper main bearing has an oil groove around its inside circumference.
- The crankshaft bearing caps are tightened using 4 plastic region tightening bolts for each journal. In addition, each cap is tightened laterally to improve its reliability.



285EG81

9. Crankshaft Pulley

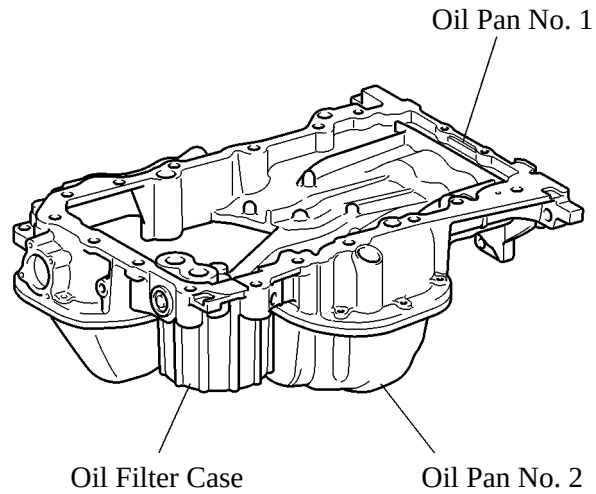
The rigidity of the crankshaft pulley with its built-in torsional damper rubber reduces noise.



285EG80

10. Oil Pan

- The oil pan No. 1 is made of aluminum alloy.
- The oil pan No. 2 is made of steel.
- The oil pan No. 1 is secured to the cylinder block and the transmission housing and is increasing rigidity.
- The oil filter case is integrated with the oil pan No. 1.



PERFORMANCE

Power Train

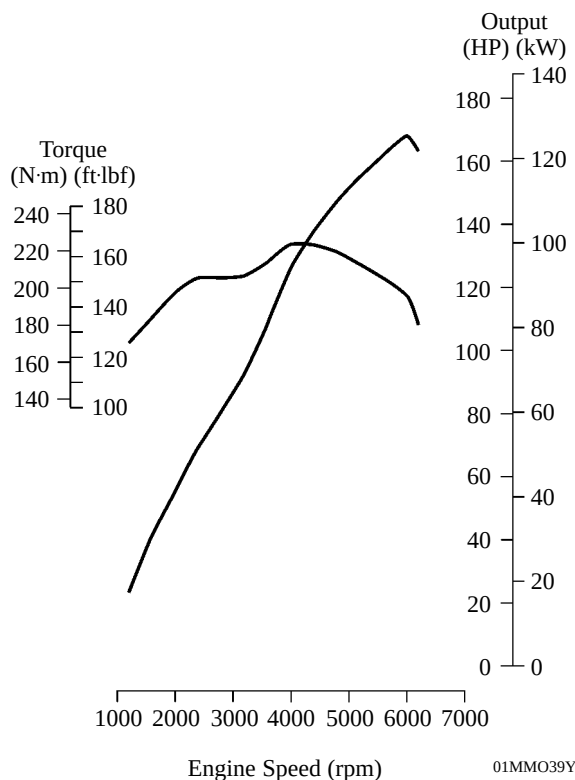
Engine

- The 2AZ-FE engine has been carried over from the '05 model. This engine realizes high performance, quietness, fuel economy, and clean emissions through the use of the VVT-i (Variable Valve Timing-intelligent) system, DIS (Direct Ignition System), and ETCS-i (Electronic Throttle Control System-intelligent).
- A new 2GR-FE engine is used. It realizes high performance, quietness, fuel economy, and clean emission through the use of the Dual VVT-i (Dual Variable Valve Timing-intelligent) system, DIS, and ETCS-i.

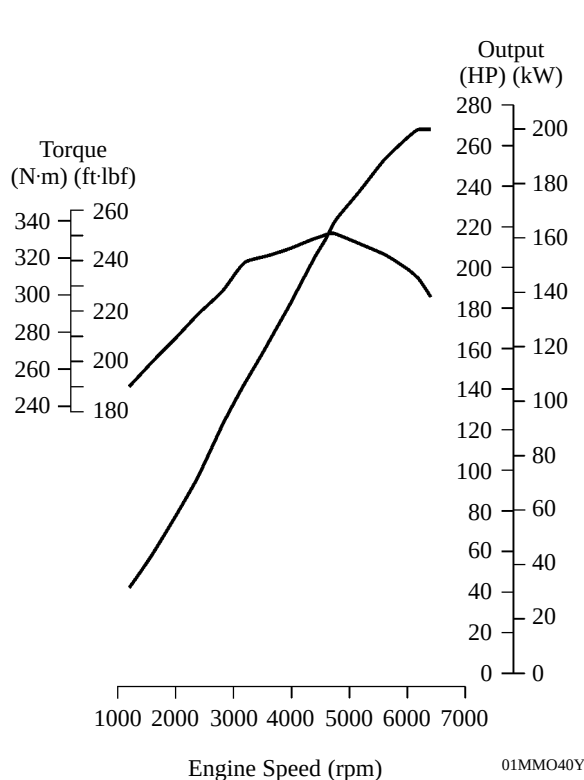
Engine Type	2AZ-FE	2GR-FE
No. of Cyls. & Arrangement	4-cylinder, In-line Type	6-cylinder, V Type
Valve Mechanism	16-valve DOHC, Chain Drive (with VVT-i)	24-valve DOHC, Chain Drive (with Dual VVT-i)
Displacement cm ³ (cu. in.)	2362 (144.2)	3456 (210.9)
Bore x Stroke mm (in.)	88.5 x 96.0 (3.48 x 3.78)	94.0 x 83.0 (3.70 x 3.27)
Compression Ratio	9.8 : 1	10.8 : 1
Maximum Output [SAE-NET]*	124 kW @ 6000 rpm (166 HP @ 6000 rpm)	200 kW @ 6200 rpm (268 HP @ 6200 rpm)
Maximum Torque [SAE-NET]*	224 N·m @ 4000 rpm (165 ft·lbf @ 4000 rpm)	336 N·m @ 4700 rpm (248 ft·lbf @ 4700 rpm)

*: Maximum output and torque rating are determined by revised SAE J1349 standard.

► 2AZ-FE Engine ◀



► 2GR-FE Engine ◀



Transaxle

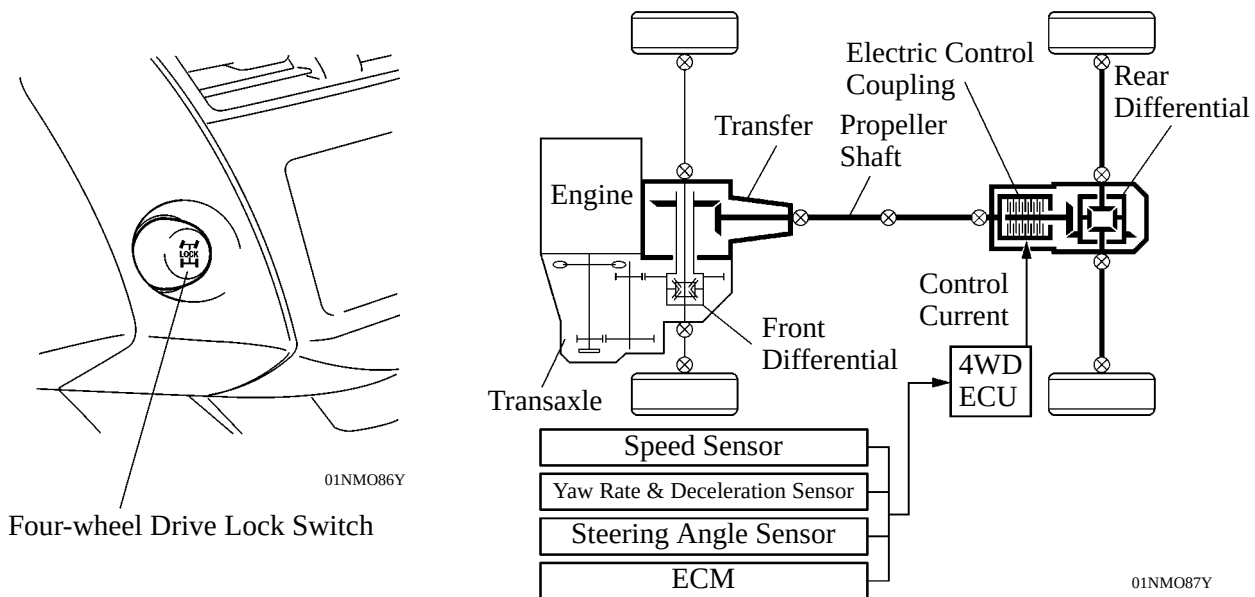
- The U140F and U241E 4-speed automatic transaxles have been carried over from the '05 model.
- New U151E and U151F 5-speed automatic transaxles are used.
- A new GF1A transfer is used.

Transaxle Type		4-speed Automatic		5-speed Automatic	
		U140F	U241E	U151F	U151E
Transfer Type		GF1A	—	GF1A	—
Combination with Engine		2AZ-FE		2GR-FE	
Drive Type		4WD	2WD	4WD	2WD
Gear Ratio*	1st	3.938	3.943	4.235	←
	2nd	2.194	2.197	2.360	←
	3rd	1.411	1.413	1.517	←
	4th	1.019	1.020	1.047	←
	5th	—	—	0.756	←
	Reverse	3.141	3.145	3.378	←

*: Counter Gear Ratio Included

Active Torque Control 4WD System

- A new active torque control 4WD system with an electric control coupling is used.
- The active torque control 4WD system, which has an electric control coupling in the front part of the rear differential, transmits torque to the rear wheels when needed, and only in the amount needed, based on information provided by various sensors.
- By operating the four-wheel drive lock switch provided on the instrument panel, the driver can select the following modes: the AUTO mode to optimally control the torque that is transmitted to the rear wheels, and the LOCK mode that locks the torque that is transmitted to the rear wheels to the maximum amount.



System Configuration Diagram

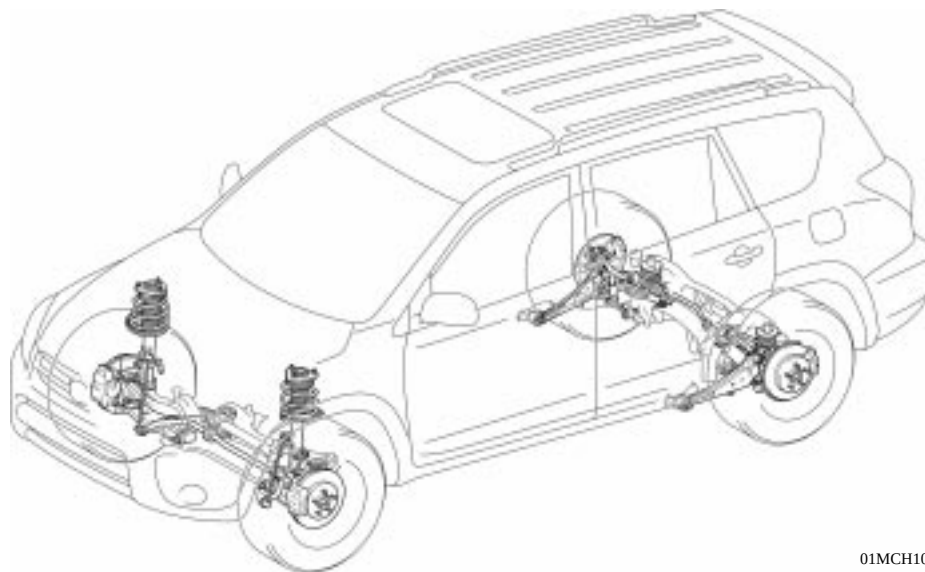
Chassis

Front Suspension

Type	MacPherson Strut Type Independent Suspension
------	---

Rear Suspension

Type	Double Wishbone Type Independent Suspension
------	--



01MCH100Y

Steering

Type	EPS (Electronic Power Steering)
Gear Type	Rack & Pinion

Brake

Front Brake Type	Ventilated Disc
Front Rotor Size	15 inch: 275 x 25 mm (10.82 x 0.87 in.)* ¹ 16 inch: 296 x 28 mm (11.84 x 1.10 in.)* ²
Rear Brake Type	Solid Disc
Rear Rotor Size	15 inch: 281 x 12 mm (11.24 x 0.48 in.)
Parking Brake Type	Lever Type
Brake Control	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & Hill-start Assist Control* ³ & DAC (Downhill Assist Control)* ³ & VSC (Vehicle Stability Control)* ⁴

*¹: 2AZ-FE Engine Models with Rear No. 1 Seat Only

*²: 2GR-FE Engine Models and Models with Rear No. 2 Seat

*³: Standard Equipment on 2GR-FE Engine Models and Models with Rear No. 2 Seat

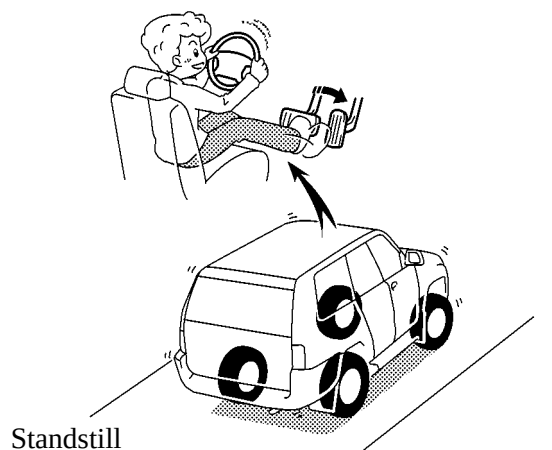
*⁴: 2WD models have been provided with Auto LSD (Limited Slip Differential).

Enhanced VSC System

- The enhanced VSC (Vehicle Stability Control) system is standard equipment on all models.
- In addition to the ABS, TRAC, and VSC controls provided by the conventional system, the enhanced VSC system effects cooperative control with the EPS (Electric Power Steering) and active torque control 4WD system in order to realize excellent driving stability and maneuverability.
- See CH-92 for details on the enhanced VSC system.

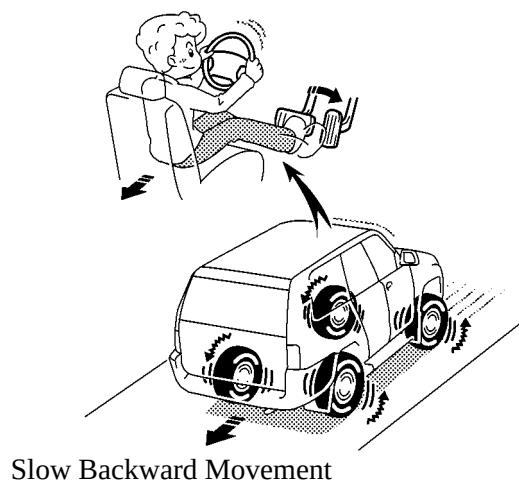
Hill-start Assist Control

- The hill-start assist control is standard equipment on the 2GR-FE engine models and the models with rear No. 2 seat.
- When the driver transfers his/her foot from the brake pedal to the accelerator pedal while starting off on an uphill, the hill-start assist control momentarily maintains the hydraulic pressure in the wheel cylinders of the four wheels, in order to prevent the vehicle from rolling backward.
- The hill-start assist control used on the '06 model effects control to prevent the vehicle from rolling backward. This control has evolved further from the hill-start assist control of the '05 model, which slowed the backward rolling of the vehicle while starting off on a hill.
- See CH-120 for details on the hill-start assist control.



'06 Model

01NMO88Y



'05 Model

01NMO89Y

FOREWORD

To assist you in your sales and service activities, this manual explains the main characteristics of the new RAV4, in particular providing a technical explanation of the construction and operation of new mechanisms and new technology used.

Applicable models: ACA33. 38, GSA33, 38 series

This manual is divided into 3 sections.

- 1. New Model Outline** - Explanation of the product to give a general understanding of its features.
- 2. Technical Description** - Technical explanation of the construction and operation of each new system and component.
- 3. Appendix** - Major technical specifications of the vehicle.

CAUTION, **NOTICE**, **REFERENCE** and **NOTE** are used in the following ways:

CAUTION	A potentially hazardous situation which could result in injury if instructions are ignored.
NOTICE	Damage to the vehicle or components may occur if instructions are ignored.
REFERENCE	Explains the theory behind mechanisms and techniques.
NOTE	Notes or comments not included under the above 3 titles.

For detailed service specifications and repair procedures, refer to the following Repair Manuals:

Manual Name	Pub. No.
● 2006 RAV4 Repair Manual	RM01M1U
● 2006 RAV4 Electrical Wiring Diagram	EM01M1U

All information contained herein is the most up-to-date at the time of publication. We reserve the right to make changes without prior notice.

TOYOTA MOTOR CORPORATION

MODEL CODE

ACA33 L - A N P X K A

1

2

3

4

5

6

7

8

1	BASIC MODEL CODE		
	CODE	DRIVE TYPE	ENGINE
	ACA33	4WD	2AZ-FE
	ACA38	2WD	
	GSA33	4WD	2GR-FE
	GSA38	2WD	

2	STEERING WHEEL POSITION
	L: Left-hand Drive

3	MODEL NAME
	A: RAV4

4	BODY TYPE
	N: 5-door Wagon

5	GEAR SHIFT TYPE
	P: 4-speed Automatic, Floor A: 5-speed Automatic, Floor

6	GRADE
	X: — (Standard) G: Limited S: Sport

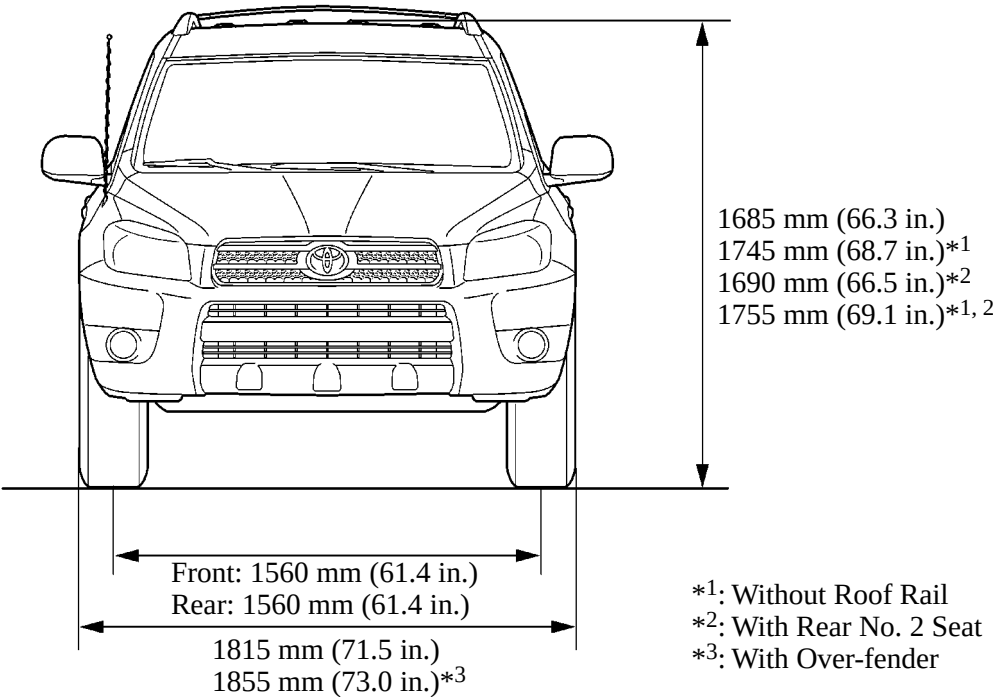
7	ENGINE SPECIFICATION
	K: DOHC and SFI

8	DESTINATION
	A: U.S.A. K: Canada

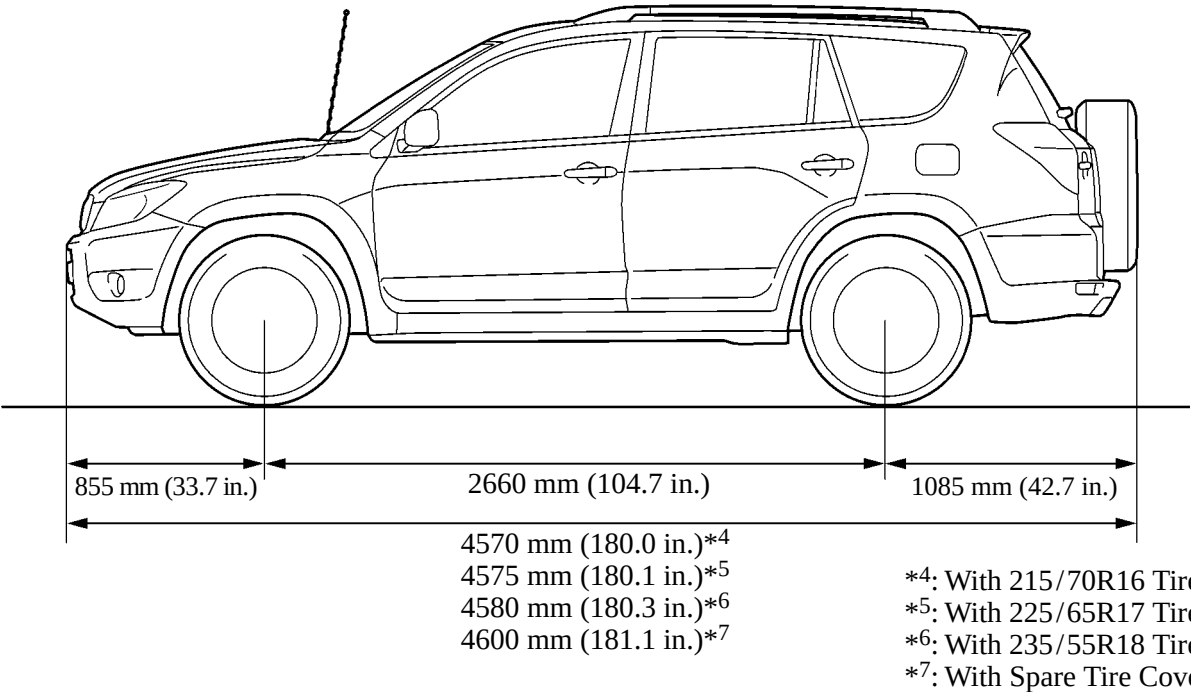
MODEL LINE-UP

DESTI- NATION	ENGINE	BODY TYPE	GRADE	TRANSAXLE			
				4-speed Automatic		5-speed Automatic	
				2WD	4WD	2WD	4WD
				U241E	U140F	U151E	U151F
U. S. A.	2AZ-FE	5-door Wagon	—	ACA38L-ANPXKA	ACA33L-ANPXKA	—	—
			Limited	ACA38L-ANPGKA	ACA33L-ANPGKA	—	—
			Sport	ACA38L-ANPSKA	ACA33L-ANPSKA	—	—
	2GR-FE		—	—	—	GSA38L-ANAXKA	GSA33L-ANAXKA
			Limited	—	—	GSA38L-ANAGKA	GSA33L-ANAGKA
			Sport	—	—	GSA38L-ANASKA	GSA33L-ANASKA
Canada	2AZ-FE		—	—	ACA33L-ANPXKK	—	—
			Limited	—	ACA33L-ANPGKK	—	—
			Sport	—	ACA33L-ANPSKK	—	—
	2GR-FE		—	—	—	—	GSA33L-ANAXKK
			Limited	—	—	—	GSA33L-ANAGKK
			Sport	—	—	—	GSA33L-ANASKK

DIMENSIONS



01MMO41Y



01MMO42Y

EQUIPMENT LIST

► U.S.A. ◀

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE				
Grade				—	Limited	Sport	—	Limited	Sport		
Exterior	Bumper	Colored		●	●	●	●	●	●		
		Radiator Grille	Material	●	—	●	●	—	●		
			Material Partially Plated	—	●	—	—	●	—		
	Outside Door Handle	Material		●	—	—	●	—	—		
			Colored	—	●	●	—	●	●		
	Back Door Handle	Colored		●	●	●	●	●	●		
	Outside Rear View Mirror	Material / Remote Control		●	—	—	●	—	—		
			Color / Remote Control / Heater	—	●	●	—	●	●		
	Roof Rail			OP	●	●	OP	●	●		
	Rear Spoiler			●	●	●	●	●	●		
Spats	Front & Rear			OP	●	●	●	●	●		
	Rear			●	—	—	—	—	—		
Chassis	Tire	215/70R16		●	—	—	—	—	—		
		225/65R17		OP	●	—	●	●	—		
		235/55R18		—	—	●	—	—	●		
	Disc Wheel	16 x 6 1/2 J Steel		●	—	—	—	—	—		
		17 x 6 1/2 J Steel		OP	—	—	●	—	—		
		17 x 7 J Aluminum		OP	●	—	OP	●	—		
		18 x 7 1/2 J Aluminum		—	—	●	—	—	●		
	Tire Pressure Warning System			●	●	●	●	●	●		
	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & VSC (Vehicle Stability Control) *1			●	●	●	●	●	●		
	Hill-start Assist Control			OP*2	OP*2	—	●	●	●		
	DAC (Downhill Assist Control)			OP*2	OP*2	—	●	●	●		
	Steering	Wheel	3-spoke Urethane	●	—	●	●	—	●		
			3-spoke Urethane with Steering Pad Switch (Audio)	—	—	OP	—	—	OP		
			3-spoke Leather with Steering Pad Switch (Audio)	—	●	—	—	●	—		
		Column	Manual Tilt &Telescopic	●	●	●	●	●	●		
			EPS (Electrical Power Steering)	●	●	●	●	●	●		
Shift Knob	PVC (Polyvinyl Chloride)		●	—	●	●	—	●			
	Leather		—	●	—	—	●	—			
Body	Seat	Cover	Fabric		●	●	●	●	●	●	
			Leather		—	OP*3	—	—	OP*3	—	
		Front	Driver	6-way Manual	●	—	●	●	—	●	
				8-way Power	—	●	—	—	●	—	
			Passenger	4-way Manual	●	●	●	●	●	●	
		Rear	No. 1	60/40 Split Retractable*4		●	●	●	●	●	●
			No. 2			OP	OP	—	OP	OP	—
		Seat Heater			—	OP*5	—	—	OP*5	—	
	Seat Belt	Front	Driver	3-point, Pretensioner & Force Limiter	●	●	●	●	●	●	
			Passenger	3-point, Pretensioner & Force Limiter & ALR*6	●	●	●	●	●	●	
		Rear	Rear No.1	3-point ELR*7, ALR*6	●	●	●	●	●	●	
			Rear No.2		OP*2	OP*2	—	OP*2	OP*2	—	

*1: 2WD models have been provided with Automatic LSD (Limited Slip Differential).

(Continued)

*2: Only for Models with Rear No. 2 Seat

*3: Except Models with Rear No.2 Seat

*4: Models with rear No. 2 seat have been provided with walk-in function.

*5: Models with Leather Seat

*6: Automatic Locking Retractor

*7: Emergency Locking Retractor

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE			
Grade				—	Limited	Sport	—	Limited	Sport	
Body Electrical	Headlight		Halogen		●	●	●	●	●	●
	Light Auto Turn-OFF System				●	●	●	●	●	●
	Front Fog Light				—	●	●	—	●	●
	Daytime Running Lighting System				OP	OP	OP	OP	OP	OP
	Windshield Wiper		Intermittent Type		●	●	●	●	●	●
	Rear Wiper		Intermittent Type		●	●	●	●	●	●
	Audio System		Radio/CD, 6 Speakers		●	—	●	●	—	●
			Radio/In-dash CD Changer, 6 Speakers		OP	●	OP	OP	●	OP
			Radio/In-dash CD Changer, 9 Speakers		—	OP	OP	—	OP	OP
			Rear Seat Entertainment System		—	—	—	—	OP	—
	Air Conditioning		Manual Type		●	—	●	●	—	●
			Automatic Type		—	●	—	—	●	—
			Clean Air Filter		●	●	●	●	●	●
	Heater		Conventional Type		●	●	●	●	●	●
	Cruise Control System				●	●	●	●	●	●
	Illuminated Entry System		Key Illumination & Room Light & Front Personal Light		●	—	●	●	—	●
			Key Illumination & Room Light & Front Personal Light & Foot Light		—	●	—	—	●	—
	Power Window System		All Door Power Type Only for Driver's Seat: One Motion Auto Up-and-down, Jam Protection Function		●	●	●	●	●	●
	Door Lock Control		Power Door Lock Control System		●	●	●	●	●	●
			Wireless Door Lock Remote Control System		●	●	●	●	●	●
	Engine Immobilizer System				—	●	—	—	●	—
	Sliding Roof				—	OP	OP	—	OP	OP
	SRS* ⁸ Airbag System		Driver	Dual-stage	●	●	●	●	●	●
			Front Passenger	Dual-stage with Occupant Classification System	●	●	●	●	●	●
			Side & Roll Sensing Type Curtain Shield		OP	OP	OP	OP	OP	OP

*⁸: Supplemental Restraint System

► Canada ◀

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE					
Grade				—	Limited	Sport	—	Limited	Sport			
Exterior	Bumper		Colored		●	●	●	●	●	●		
	Radiator Grille		Material		●	—	●	●	—	●		
			Material Partially Plated		—	●	—	—	●	—		
	Outside Door Handle		Material		●	—	—	●	—	—		
			Colored		—	●	●	—	●	●		
	Back Door Handle		Colored		●	●	●	●	●	●		
	Outside Rear View Mirror		Color/Remote Control/Heater		●	●	●	●	●	●		
	Roof Rail			OP	●	●	OP	●	●			
	Rear Spoiler			●	●	●	●	●	●			
Spats		Front & Rear		OP	●	●	OP	●	●			
Chassis	Tire		215/70R16		●	—	—	—	—	—		
			225/65R17		OP	●	—	●	●	—		
			235/55R18		—	—	●	—	—	●		
	Disc Wheel		16 x 6 1/2 J Steel		●	—	—	—	—	—		
			17 x 6 1/2 J Steel		OP	—	—	●	—	—		
			17 x 7 J Aluminum		OP	●	—	OP	●	—		
			18 x 7 1/2 J Aluminum		—	—	●	—	—	●		
	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & VSC (Vehicle Stability Control) *1			●	●	●	●	●	●			
	Hill-start Assist Control			OP*1	OP*1	—	●	●	●			
	DAC (Downhill Assist Control)			OP*1	OP*1	—	●	●	●			
	Steering		Wheel	3-spoke Urethane		●	—	●	●	—	●	
				3-spoke Urethane with Steering Pad Switch (Audio)		—	—	OP	—	—	OP	
				3-spoke Leather with Steering Pad Switch (Audio)		—	●	—	—	●	—	
			Column	Manual Tilt &Telescopic		●	●	●	●	●	●	
			EPS (Electrical Power Steering)		●	●	●	●	●	●		
	Shift Knob		PVC (Polyvinyl Chloride)		●	—	●	●	—	●		
			Leather		—	●	—	—	●	—		
Body	Seat		Cover	Fabric		●	●	●	●	●	●	
				Leather		—	OP*2	—	—	OP*2	—	
			Front	Driver	6-way Manual		●	—	●	●	—	●
					8-way Power		—	●	—	—	●	—
				Passenger	4-way Manual		●	●	●	●	●	●
			Rear	No. 1	60/40 Split Retractable*3		●	●	●	●	●	●
				No. 2			OP	OP	—	OP	OP	—
			Seat Heater			—	OP*4	—	—	OP*4	—	
	Seat Belt		Front	Driver	3-point, Pretensioner & Force Limiter		●	●	●	●	●	●
				Passenger	3-point, Pretensioner & Force Limiter & ALR*5		●	●	●	●	●	●
			Rear	Rear No. 1	3-point ELR*6, ALR*5		●	●	●	●	●	●
				Rear No. 2			OP*1	OP*1	—	OP*1	OP*1	—

*1: Only for Models with Rear No. 2 Seat

*2: Except Models with Rear No.2 Seat

*3: Models with rear No. 2 seat have been provided with walk-in function.

*4: Models with Leather Seat

*5: Automatic Locking Retractor

*6: Emergency Locking Retractor

(Continued)

●: Standard OP: Option —: None

Engine				2AZ-FE			2GR-FE			
Grade				—	Limited	Sport	—	Limited	Sport	
Body Electrical	Headlight	Halogen		●	●	●	●	●	●	
	Light Auto Turn-OFF System			●	●	●	●	●	●	
	Front Fog Light			—	●	●	—	●	●	
	Daytime Running Lighting System			●	●	●	●	●	●	
	Windshield Wiper	Intermittent Type		●	●	●	●	●	●	
	Windshield Deicer			●	●	●	●	●	●	
	Rear Wiper	Intermittent Type		●	●	●	●	●	●	
	Audio System	Radio/CD, 6 Speakers		●	—	●	●	—	●	
		Radio/In-dash CD Changer, 6 Speakers		OP	●	OP	OP	●	OP	
		Radio/In-dash CD Changer, 9 Speakers		—	OP	OP	—	OP	OP	
		Rear Seat Entertainment System		—	—	—	—	OP	—	
	Air Conditioning	Manual Type		●	—	●	●	—	●	
		Automatic Type		—	●	—	—	●	—	
		Clean Air Filter		●	●	●	●	●	●	
	Heater	Conventional Type		●	●	●	●	●	●	
	Cruise Control System			●	●	●	●	●	●	
	Illuminated Entry System	Key Illumination & Room Light & Front Personal Light		●	—	●	●	—	●	
		Key Illumination & Room Light & Front Personal Light & Foot Light		—	●	—	—	●	—	
	Power Window System	All Door Power Type Only for Driver's Seat: One Motion Auto Up-and-down, Jam Protection Function		●	●	●	●	●	●	
	Door Lock Control	Power Door Lock Control System		●	●	●	●	●	●	
		Wireless Door Lock Remote Control System		●	●	●	●	●	●	
	Engine Immobilizer System			●	●	●	●	●	●	
	Sliding Roof			—	OP	OP	—	OP	OP	
	SRS* ⁷ Airbag System	Driver	Dual-stage		●	●	●	●	●	●
		Front Passenger	Dual-stage with Occupant Classification System		●	●	●	●	●	●
		Side & Roll Sensing Type Curtain Shield		OP	OP	OP	OP	OP	OP	

*⁷: Supplemental Restraint System

EQUIPMENT

Audio System

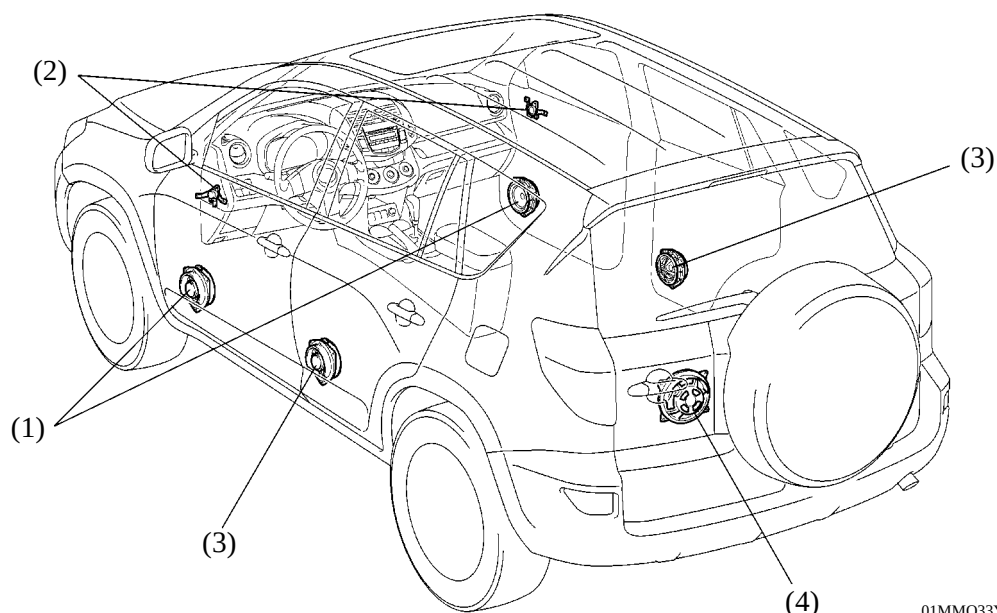
- Three types of audio systems are provided, as detailed below.
- The CD player has a CD-TEXT display function that displays the text information when playing CDs that contain CD text.
- The CD player on the all models has MP3 (MPEG Audio Layer-3) and WMA (Windows Media Audio) format playback functions.

► Head Unit Specifications ◀

●: Standard OP: Option —: None

Design	Specification	Provided		
		Standard	Limited	Sport
01MMO30Y	• AM/FM Tuner • CD Player • CD-TEXT Display Function • MP3 and WMA Playback Function • 6-speaker System • Manufacturer: Fujitsu TEN	●	—	●
01MMO31Y	• AM/FM Tuner • In-dash-6-CD Changer • CD-TEXT Display Function • MP3 and WMA Playback Function • 6-speaker System • Manufacturer: Fujitsu TEN	OP	●	OP
01MMO32Y	• AM/FM Tuner • In-dash-6-CD Changer • CD-TEXT Display Function • MP3 and WMA Playback Function • 9-speaker System • Manufacturer: Fujitsu TEN	—	OP	OP

► Speaker Location ◀



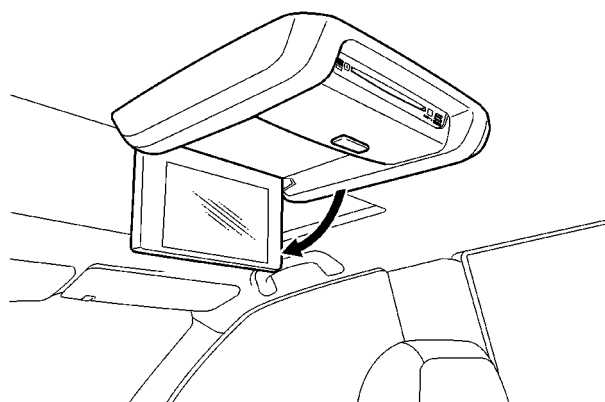
01MMO33Y

► Speaker Specification ◀

Type		Caliber	Impedance	Input Range
(1)	Front Door	JBL	16.0 cm	2.2 Ω
		Standard	16.0 cm	4 Ω
(2)	Tweeter	JBL	6.5 cm	2 Ω
		Standard	6.5 cm	4 Ω
(3)	Rear Door	JBL	16.0 cm/2.0 cm	2.6 Ω
		Standard	16.0 cm	4 Ω
(4)	Woofer	JBL	20.0 cm	2.0 Ω

RSES (Rear Seat Entertainment System)

- The RSES with which the rear seat occupants can enjoy a video DVD (Digital Versatile Disc) has been made available as optional equipment on the Limited grade for the 2GR-FE engine model.
- The RSES consists of a 9-inch wide LCD (Liquid Crystal Display), a DVD player that are located under the roof, and a remote controller.
- The RSES is operated by the remote controller.



Remote Controller

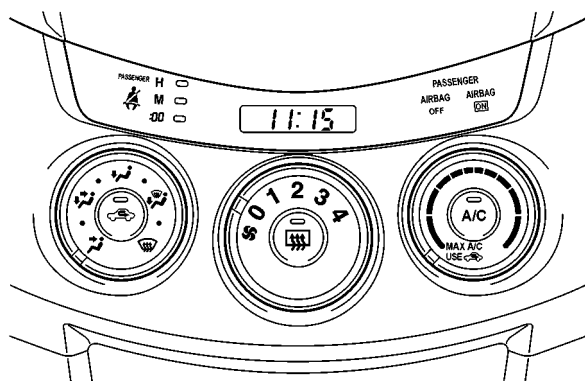


01MMO34Y

01MMO35Y

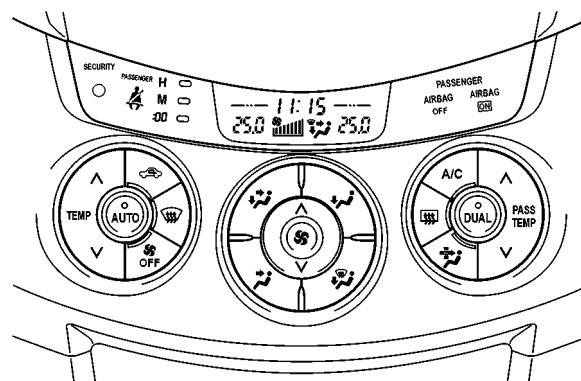
Air Conditioning System

- Manual air conditioning is provided as standard equipment for the Standard and Sport grades.
- An automatic air conditioning that can set the temperature independently for the driver and front passenger areas is provided as standard equipment for the Limited grade.
- The automatic air conditioning is provided with the micro dust and pollen filter control.



01MMO36Y

Manual A/C Model



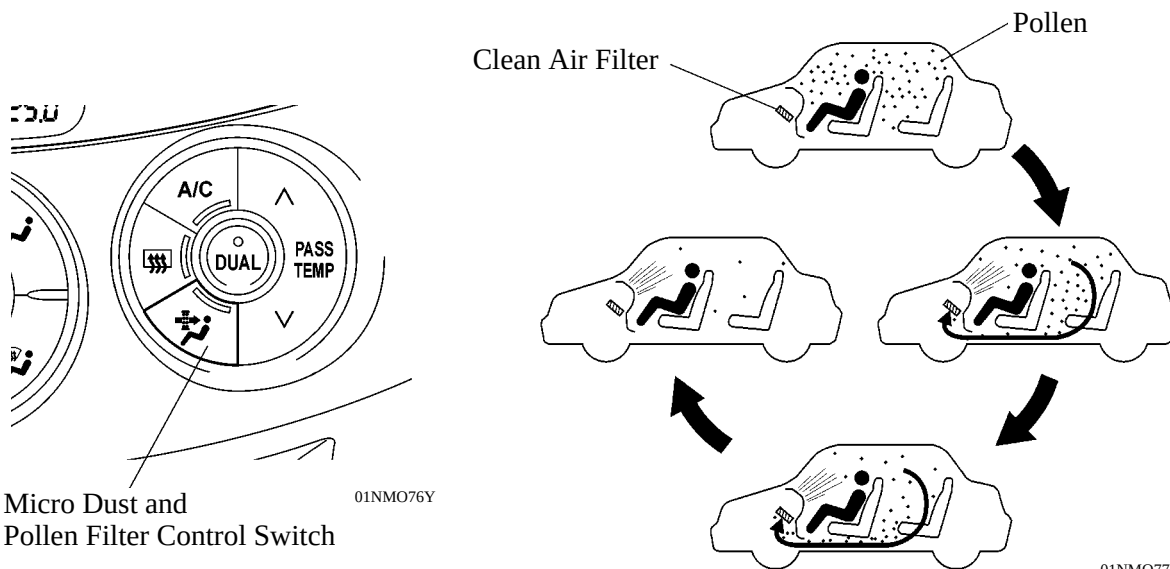
01MMO37Y

Automatic A/C Model

Micro Dust and Pollen Filter Control

- The micro dust and pollen filter control quickly removes pollen from the front seat occupant area with the pressing of the micro dust and pollen filter control switch on the heater control panel, without requiring any complex air conditioning operation.
- When the user pushes the micro dust and pollen filter control switch, the air conditioning operates in the recirculation mode. The clean air that has passed through the clean air filter blows out from the face outlet to the occupant area.

The filtered clean air quickly removes pollen from the occupant area. After that, the air in the cabin recirculates and continues to remove pollen in the air by allowing the clean air filter to capture the pollen. When the amount of pollen in the cabin as a whole diminishes to a certain level, the air conditioning automatically resumes operating in the auto mode.



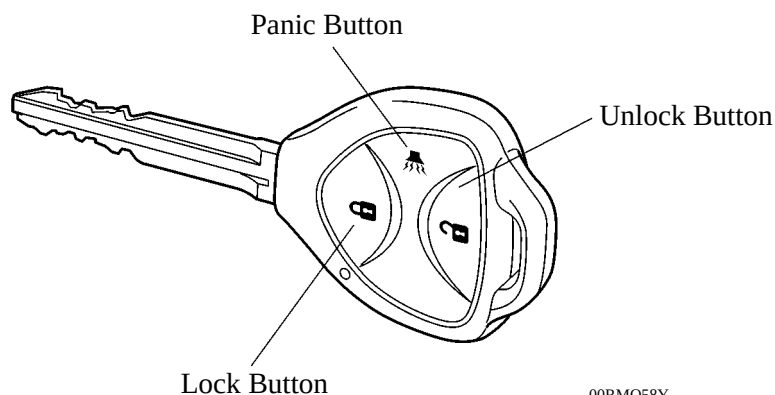
01NMO76Y

01NMO77Y

Conceptual Image of Pollen Removal

Wireless Door Lock Remote Control System

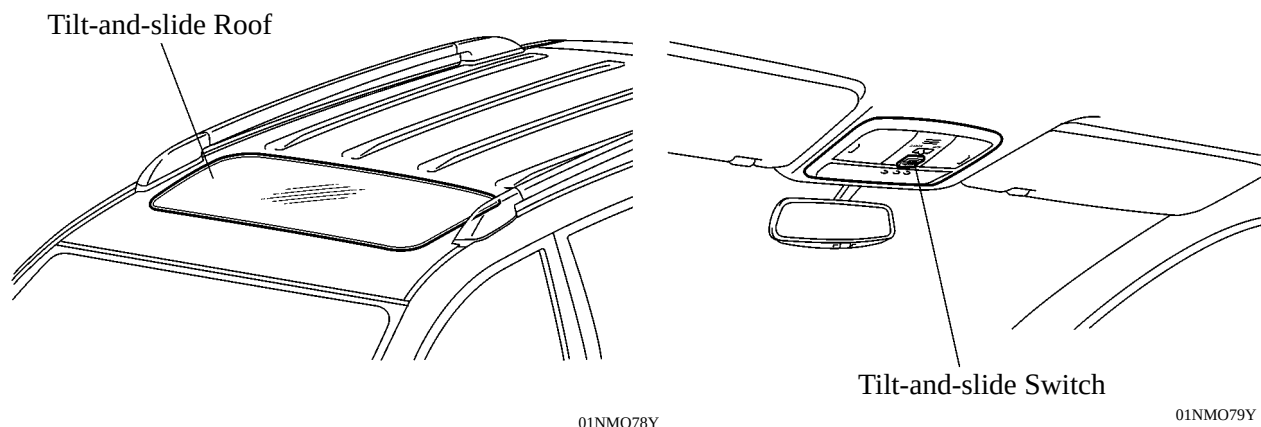
A wireless door lock remote control system with a panic button and answer back function which blinks the hazard warning lights when locking or unlocking is available as standard equipment.



00RMO58Y

Sliding Roof System

- A tilt-and-slide roof, which is provided with a one-touch function (slide open/close and tilt up/down) and a jam protection function, is available as optional equipment on the Sport and Limited grades.
- A tilt-and-slide switch is provided at the overhead console.



01NMO78Y

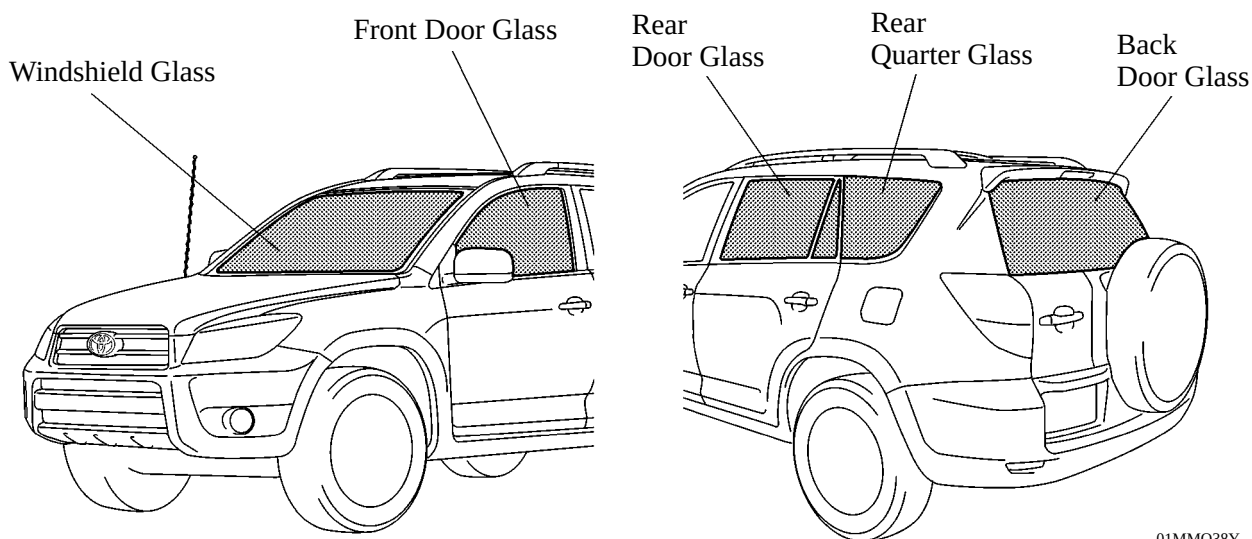
01NMO79Y

Windshield and Door Glass

The windshield and door glasses are provided as follows:

Glass Portion	Windshield	Front Door Glass	Rear Door Glass		Rear Quarter Glass		Back Door Glass	
Grade	—	—	Standard	Sport and Limited	Standard	Sport and Limited	Standard	Sport and Limited
Glass	Green	UV Reduction Green	UV Reduction Green	Dark Gray*	UV Reduction Green	Dark Gray*	UV Reduction Green	Dark Gray*

*: Optional equipment on Standard grade

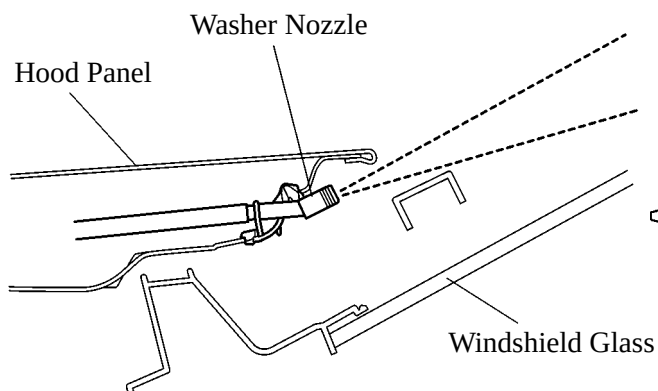


01MMO38Y

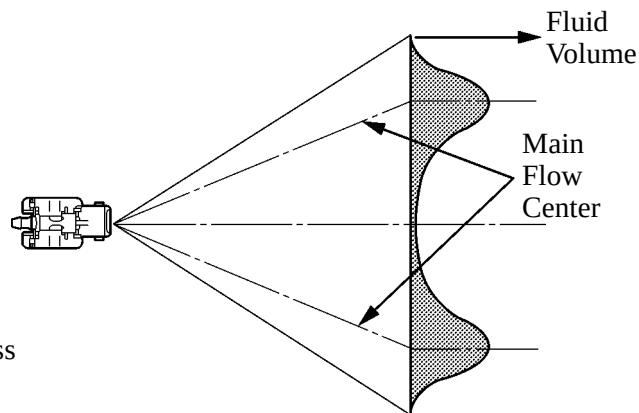
Washer System

Front

- Spray type washer nozzles are provided under the hood panel for improved appearance.
- The spray type washer nozzle sprays the washer fluid over a wide area by spraying it in a fan shape. The washer fluid volume sprayed in the center of the spray area has been reduced so as not to hinder the driver's view when the washer system is operated.



281MO41



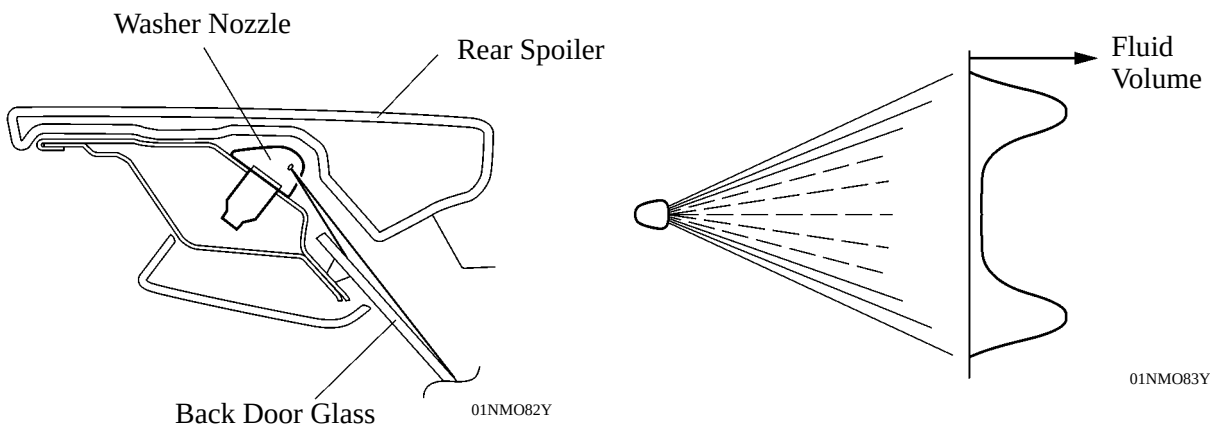
281MO42Y

NOTICE:

The construction of the spray type washer nozzle does not allow adjustment of the spray angle. Do not adjust the spray angle as this could damage the washer nozzle. To change the spray angle, replace the nozzle by a nozzle with a different spray angle. For details, refer to the 2006 RAV4 Repair Manual (Pub. No. RM01M1U).

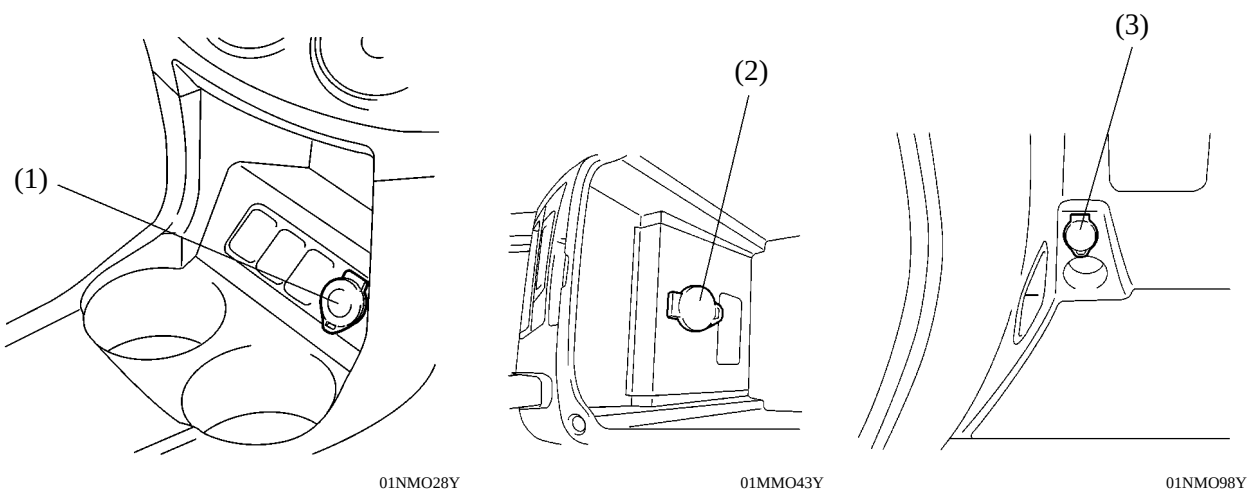
Rear

- A flat-spray type washer nozzle is used on all models.
- The washer nozzle is located below the rear spoiler for an enhanced appearance.
- The flat-spray type washer nozzle sprays washer fluid in a fan shape over a wide area for enhanced wiping performance.

**Power Outlet**

Three power outlets are provided:

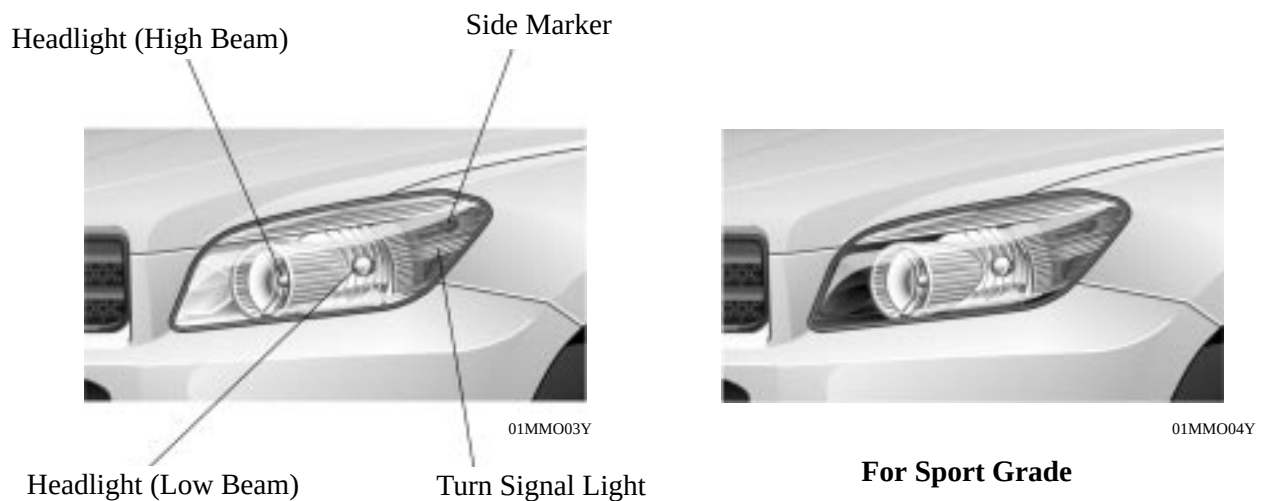
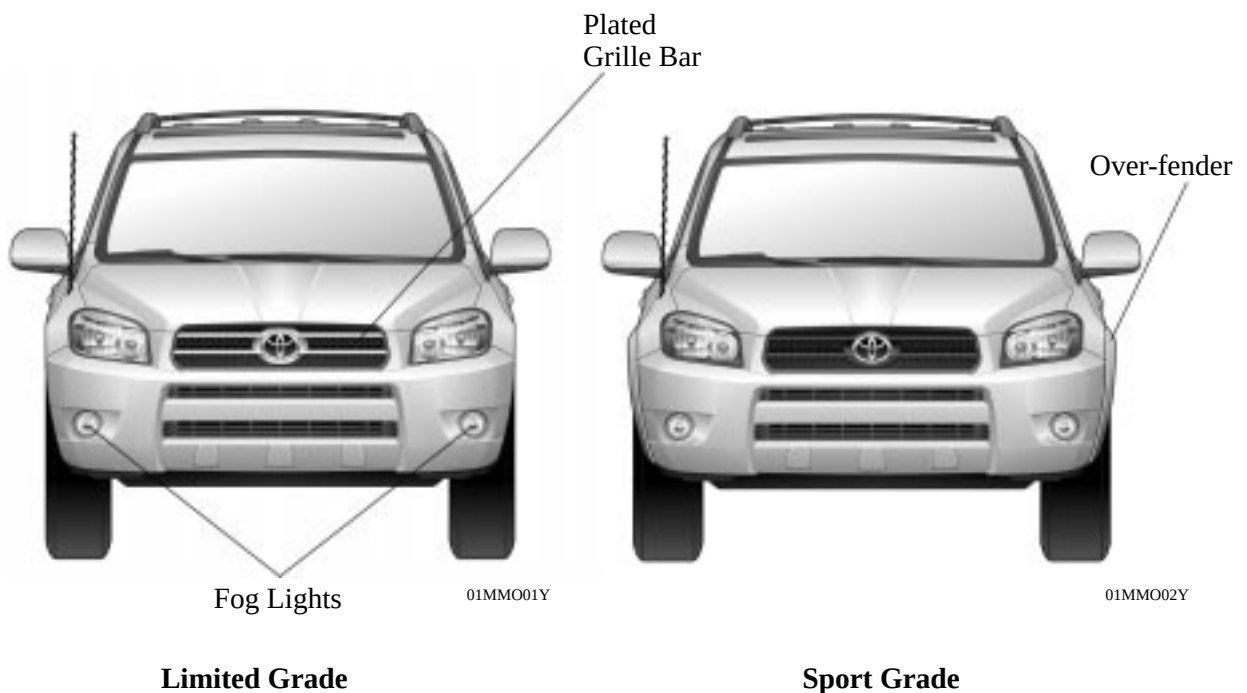
- (1) Under the center console
- (2) Inside console box
- (3) Under the left deck side trim



EXTERIOR

Front Design

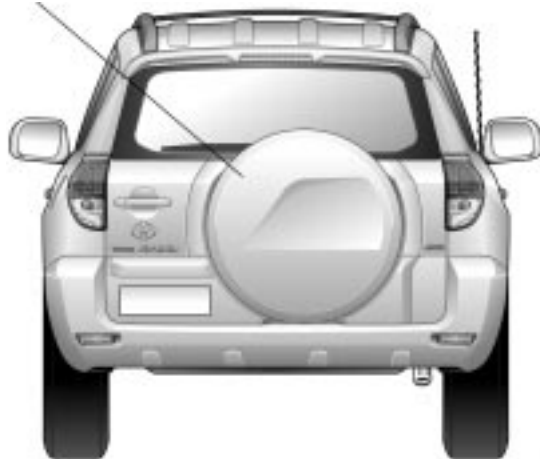
- The front of the vehicle has been designed with a powerful look that emphasizes the large-diameter tires.
- The four-beam headlight that accommodates clearance light and turn signal light is used.
- The combination of the multi-reflector type reflectors and the see-through outer lenses is used in the headlight create a crystal appearance. Furthermore, smoke-painted extensions are used for the headlights of the Sport grade to achieve a sporty design.
- The radiator grille consists of a mesh portion and two grille bars to express powerfulness. The Limited grade uses plated grille bars to achieve an elegant design.
- The round front fog lights in the sides of the front bumper are available as standard equipment for the Limited and Sport grades.



Rear Design

- The rear of the vehicle has been shaped to integrate with the spare tire cover, realizing a design that emphasizes its SUV-ness.
- The spare tire cover is standard equipment for the Limited grade.
- The combination lights are arranged vertically. LEDs (Light Emitting Diodes) are used for the stop light and taillight, for enhanced visibility and an elegant look.

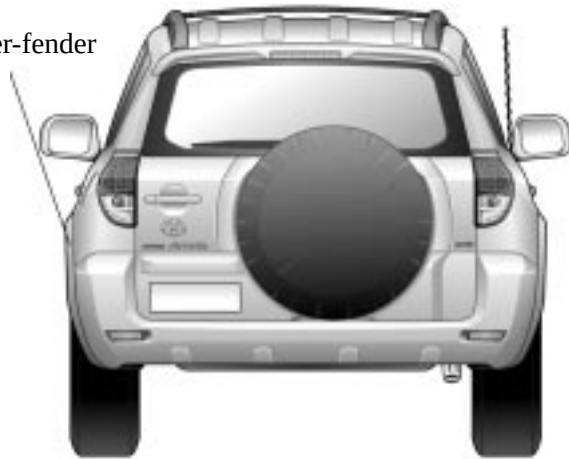
Spare Tire Cover



01MMO05Y

Limited Grade

Over-fender



01MMO06Y

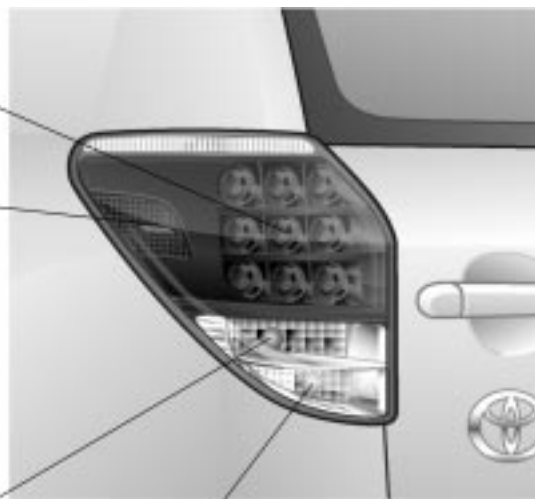
Sport Grade

Stop Light and Taillight

Side Marker

Turn Signal Light

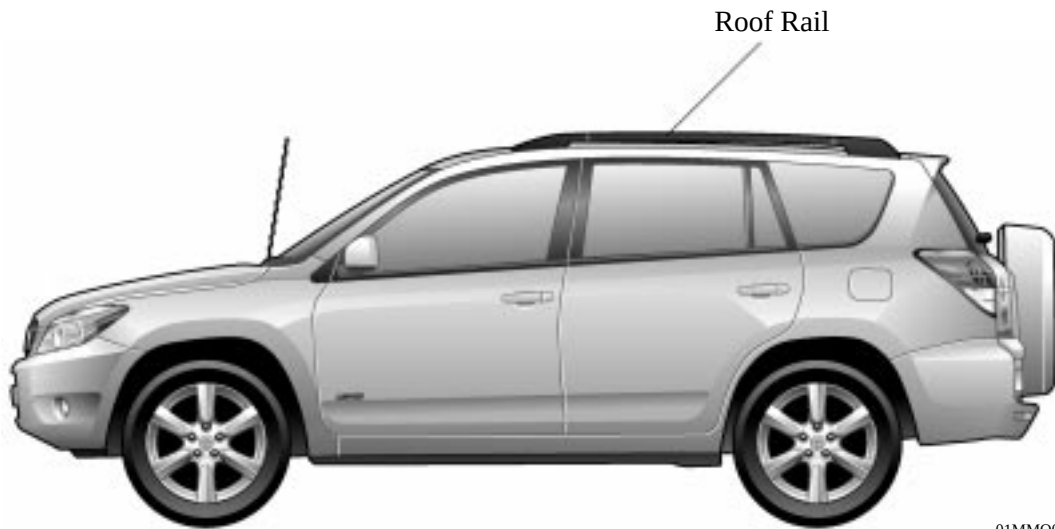
Back-up Light



01MMO07Y

Side Design

- The side of the vehicle portrays a unique cabin design consisting of a wedged surface composition and a dynamically drawn arc.
- Roof rails are available as optional equipment on the Standard grade, and provided as standard equipment on the Limited and Sport grades.
- Over-fenders are available as optional equipment on the Limited grade, and provided as standard equipment on the Sport grade.



01MMO08Y

Limited Grade

01MMO09Y

Over-fender**Sport Grade**

Exterior Color

Exterior colors for new model are as follows:

Color No.	Color Name
040	Super White II
070	White Pearl Crystal Shine
1F7	Silver Metallic
1E0	Dark Gray Mica
202	Black
3R3	Red Mica Metallic
4R4	Beige Metallic
6T6	Light Green Metallic
8R3	Grayish Blue Metallic
8S6	Dark Blue Mica

Exterior Parts Color

Exterior parts colors are provided as follows:

●: Standard OP: Option —: None

Destination	U.S.A. and Canada					
Grade	Standard		High		High	
Color Parts Name	Material	Exterior Color	Material	Exterior Color	Material	Exterior Color
Front/Rear Bumper	—	●	—	●	—	●
Radiator Grille	●	—	●*1	—	●	—
Rear Spoiler	—	●	—	●	—	●
Spare Tire Cover	—	—	—	●	—	—
Roof Rail	●	—	●	—	●	—
Outside Rear View Mirror	●*2	●*3	—	●	—	●
Outside Door Handle	●	—	—	●	—	●
Back Door Handle	—	●	—	●	—	●
Over-fender	—	—	—	OP	—	●

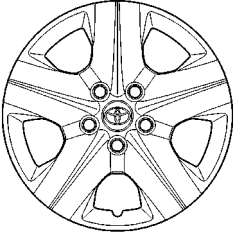
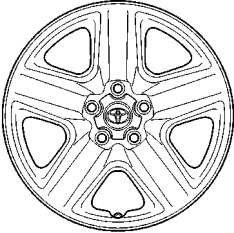
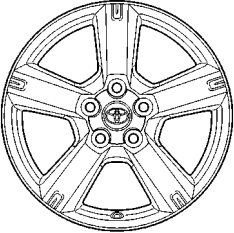
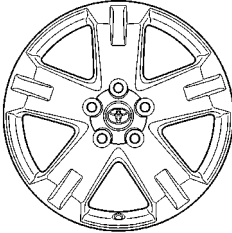
*1: Partially plated on the Limited Grade

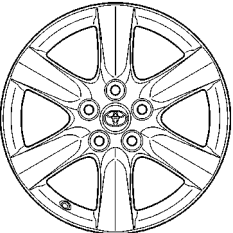
*2: U.S.A. Model

*3: Canada Model

Tire and Disc Wheel

Tires and disc wheels are provided as follows:

Destination	U.S.A and Canada				
Grade	Standard				Sport
Engine	2AZ-FE	2AZ-FE	2GR-FE	2AZ-FE & 2GR-FE	2AZ-FE & 2GR-FE
Provided	Standard	Option	Standard	Option	Standard
Tire Size	215/70R16	225/65R17		←	235/55R18
Disc Wheel Size	16 x 6 1/2 J	17 x 6 1/2 J		17 x 7 J	18 x 7 1/2 J
Disc Wheel Material	Steel	←		Aluminum	←
P.C.D.* mm (in.)	114.3 (4.5)	←		←	←
Offset mm (in.)	45 (1.8)	←		←	←
Wheel Design	Full Wheel Cap	Center Cap	Aluminum Wheel	Aluminum Wheel	
	 01NMO10Y	 01NMO11Y	 01NMO12Y	 01NMO13Y	

Destination	U.S.A and Canada
Grade	Limited
Engine	2AZ-FE & 2GR-FE
Provided	Standard
Tire Size	225/65R17
Disc Wheel Size	17 x 7 J
Disc Wheel Material	Aluminum
P.C.D.* mm (in.)	114.3 (4.5)
Offset mm (in.)	45 (1.8)
Wheel Design	Aluminum Wheel  01NMO14Y

*: Pitch Circle Diameter

EXTERIOR APPEARANCE

01MIN01Y

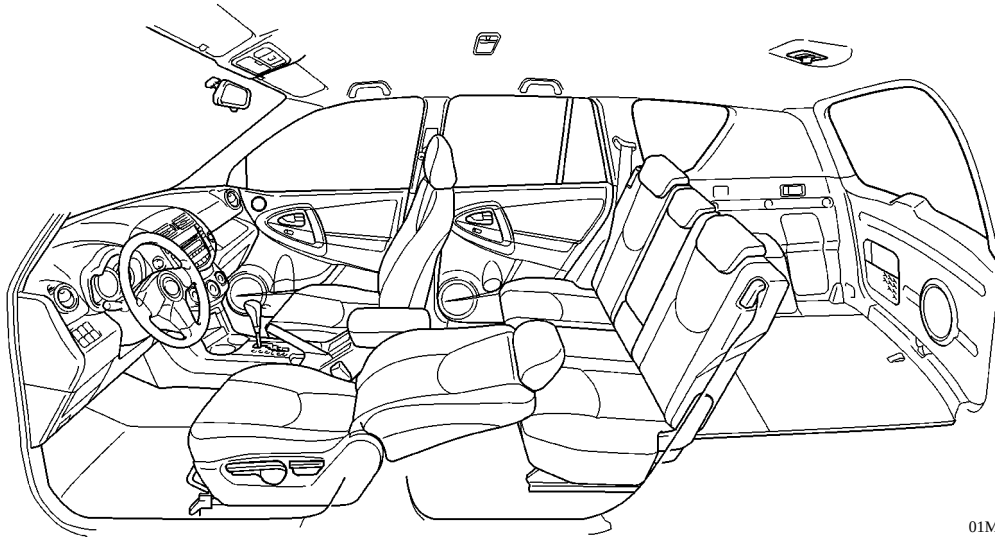


01MIN02Y

INTERIOR

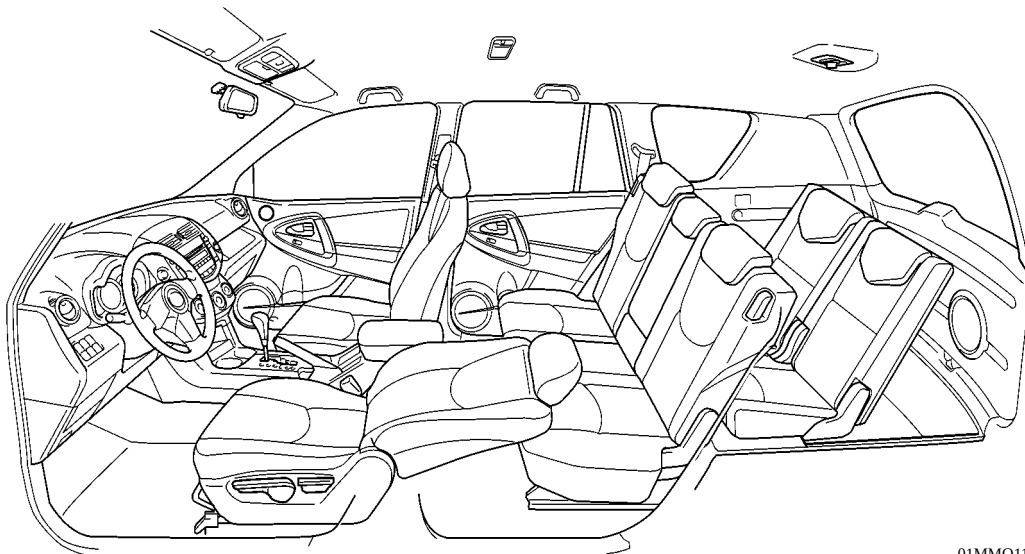
Interior Design

- The vehicle interior uses roundish, slim-shaped seats to make the interior more spacious, realizing an expansive and roomy space.
- A unique, boomerang-shaped ornament is placed on each door trim to express a sporty image.



01MMO10Y

Standard Model

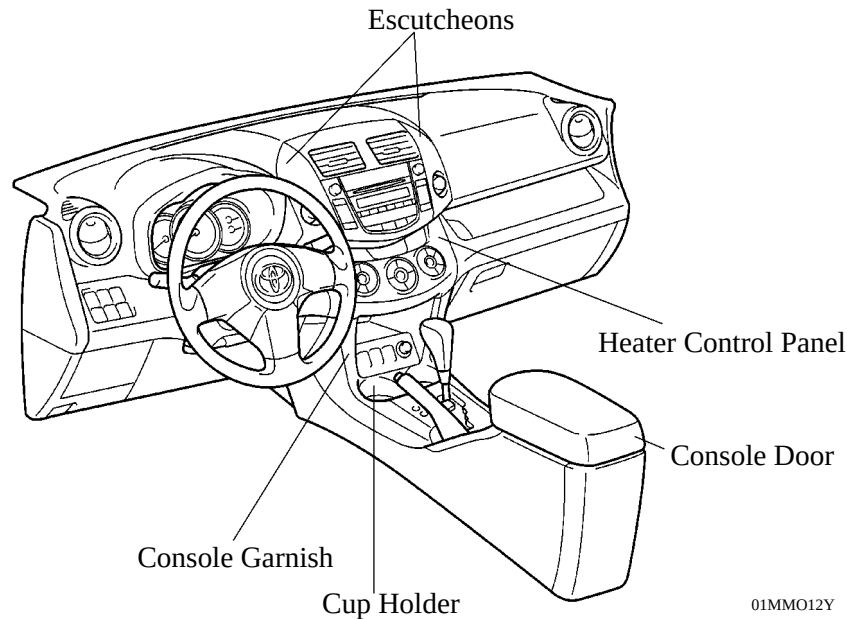


01MMO11Y

With Rear No. 2 Seat

Instrument Panel

- The instrument panel blends an arrangement that emphasizes a horizontal spaciousness with a vertical flow along its center area, in order to portray a sporty image.
- Metallic paint and hairline grain have been applied to the escutcheon, console garnish, and heater control panel in order to express a premium image.
- Shut-fin type side registers are used. Their surface becomes flush when they are closed, thus achieving a simple and streamlined design.
- An illumination is provided for the cup holder in the center console.
- The console door in the center console is covered with the urethane from in order to achieve a soft touch.

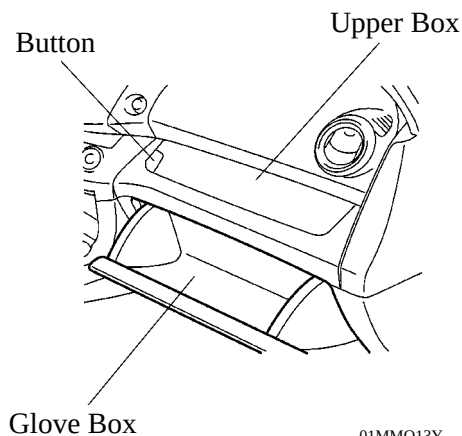


01MMO12Y

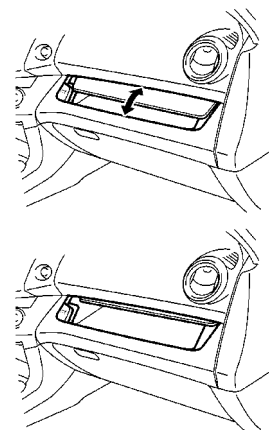
Storage Space

Instrument Panel

- A glove box that uses an air damper is provided on the front passenger side.
- An upper box, with a door that can be opened and closed by pushing a button located above the glove box, is provided.

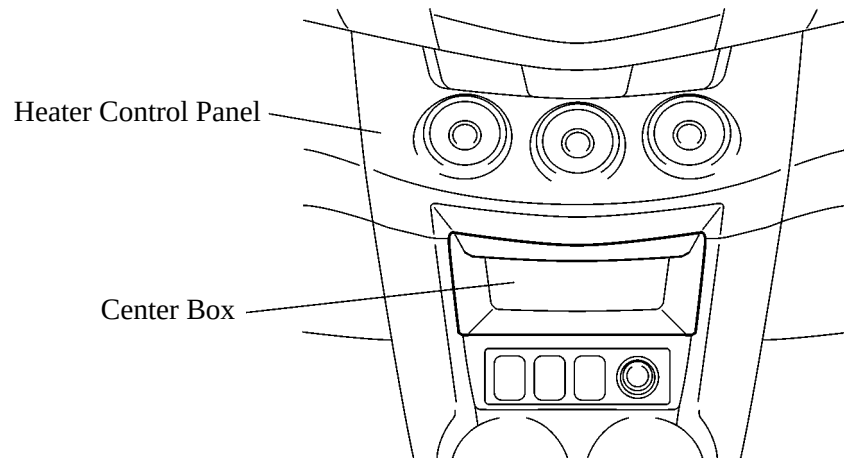


01MMO13Y



01NMO19Y

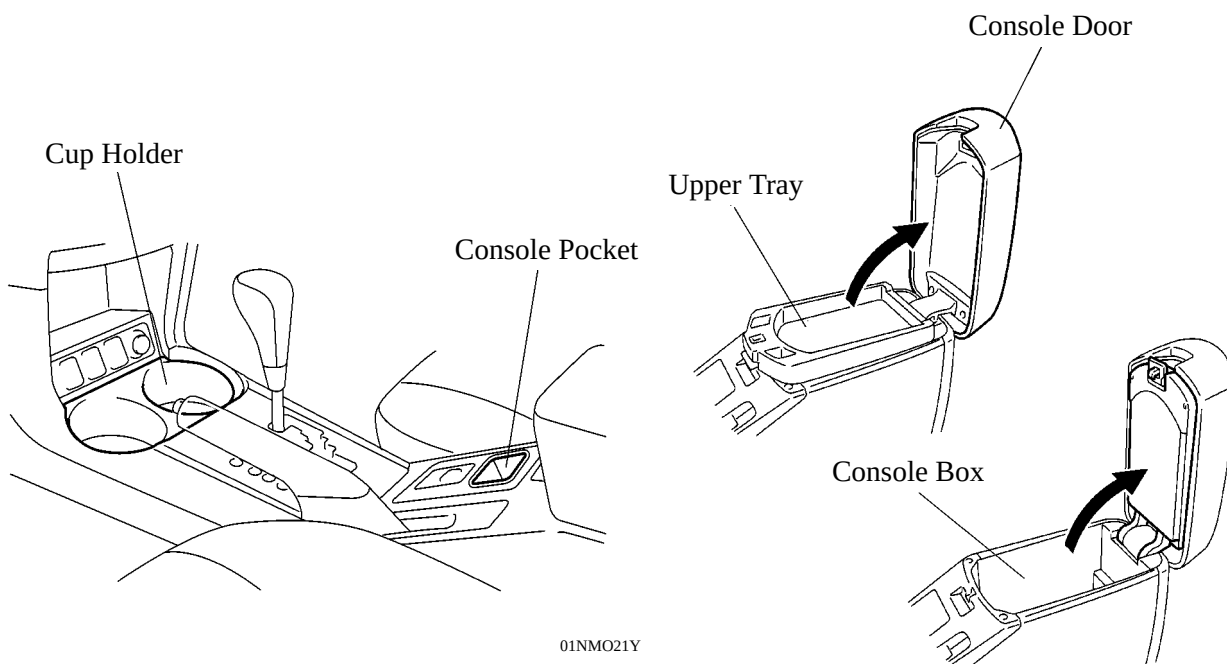
- A center box is provided below the heater control panel.



01NMO20Y

Center Console

- Console pocket, cup holder and console box are provided in the center console.
- The console has dual doors to provide storage space.



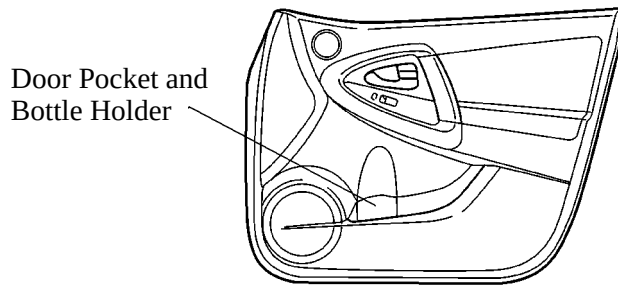
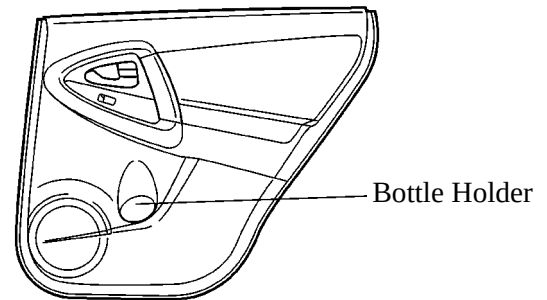
01NMO21Y

01NMO22Y

Console Box

Door Trim

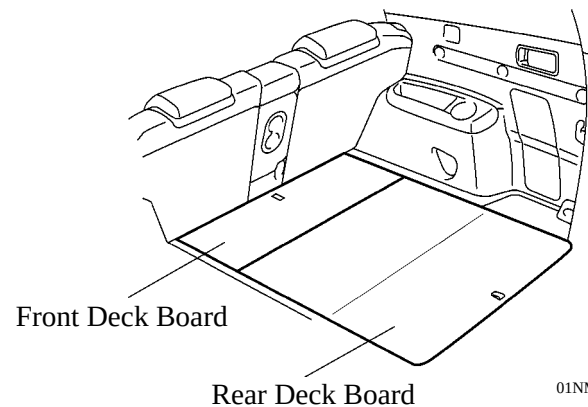
- A door pocket and bottle holder is provided in the front door trim.
- A bottle holder is provided in the rear door trim.

**Front Door Trim****Rear Door Trim**

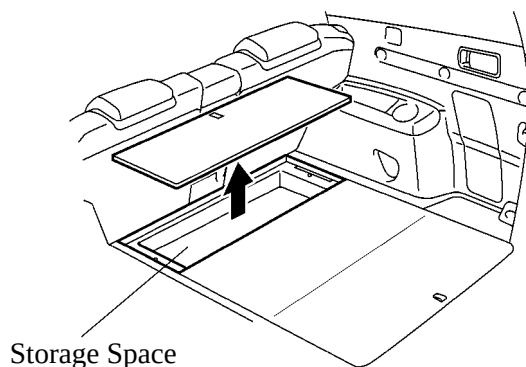
01MMO14Y

Luggage Space

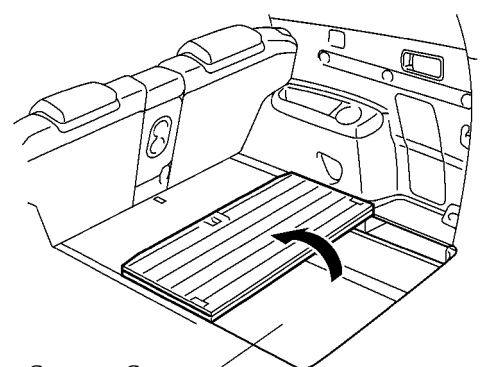
- Front and rear deck boards covered with water-repellent skin have been provided on the models without the rear No. 2 seat.
- The front deck board is a removable type, and a storage space is provided below it.
- The rear deck board is a type that folds in two, for ease of operation and the in-and-out access of cargo under the floor.



01NMO24Y

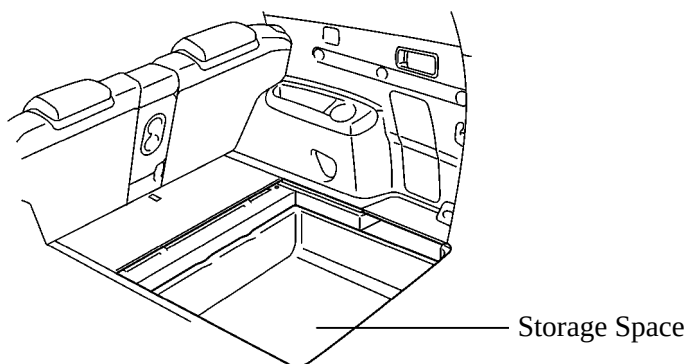
► Deck Board Arrangement ◀

01NMO25Y

Storage Below Front Deck Board

01NMO26Y

Semi-open Rear Deck Board

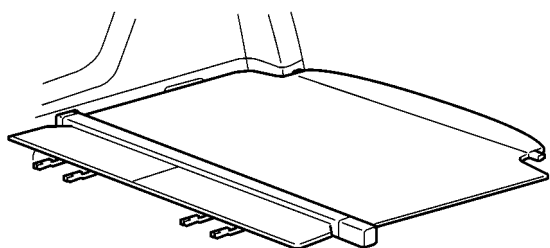


01NMO27Y

Fully Open Rear Deck Board

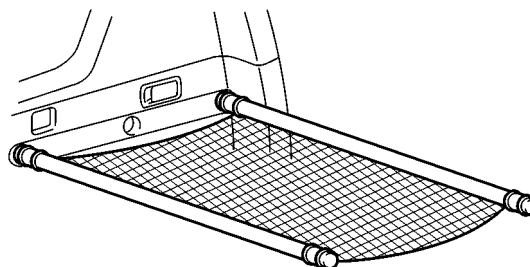
Tonneau Cover and Utility Pipes with Net

A tonneau cover to block the view of the cargo area from the outside of the vehicle, and utility pipes with a net, which can be arranged in various ways, are standard equipment on the Limited grade. They are available as optional equipment on the Standard and Sport grades.



01NMO29Y

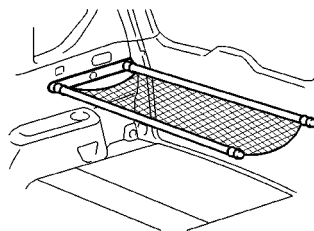
Tonneau Cover



01NMO30Y

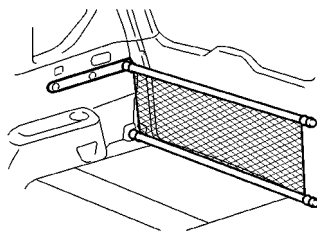
Utility Pipes with Net

► Utility Pipes with Net Arrangement ◀



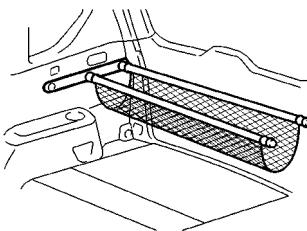
01NMO31Y

Partition



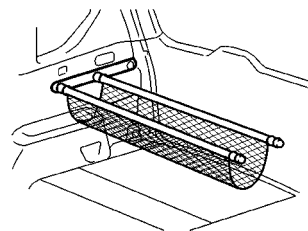
01NMO32Y

**Prevent items from
falling out**



01NMO33Y

Hammock A

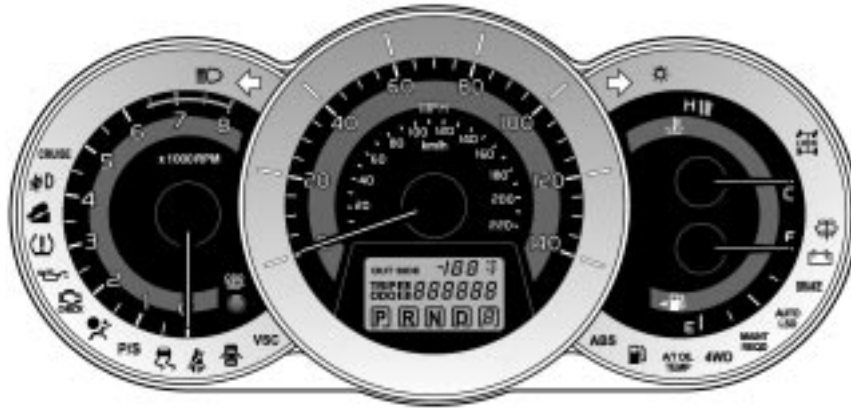


01NMO34Y

Hammock B

Combination Meter

An analog triple-dial type Optitron meter is provided in the combination meter as standard equipment on all models.

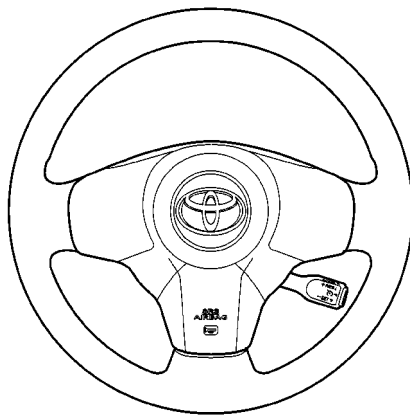


01MMO15Y

Steering Wheel

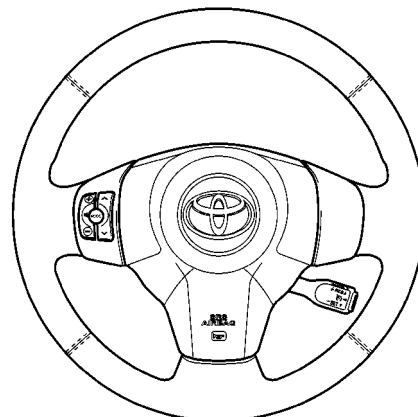
- A 3-spoke urethane steering wheel is provided as standard equipment on the Standard and Sport grades.
- A 3-spoke urethane steering wheel with steering pad switch* is provided as optional equipment on the Sport grade.
- A 3-spoke leather steering wheel with steering pad switch* is provided as standard equipment on the Limited grade.

*: Audio Switch



01MMO45Y

3-spoke Urethane Type

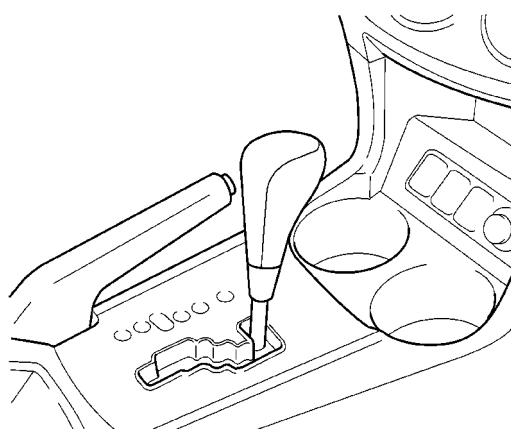


01MMO16Y

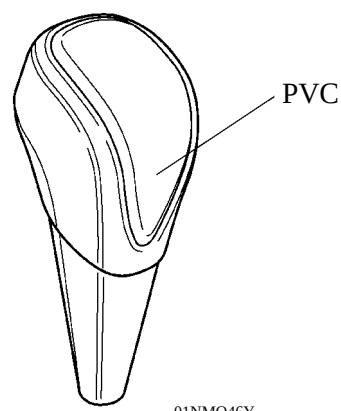
**3-spoke Leather Type with
Steering Pad Switch**

Shift Lever

- PVC (Polyvinyl Chloride) shift lever knob is provided as standard equipment on the Standard and Sport grades.
- Leather shift lever knob is provided as standard equipment on the Limited grade.
- A gate type shift lever is used on the automatic transaxle models for luxuriousness.

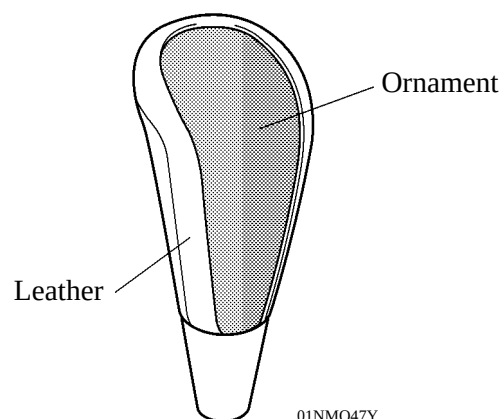


01NMO44Y



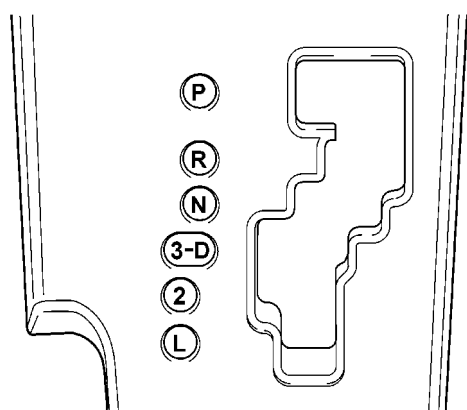
01NMO46Y

For Standard and Sport Grades



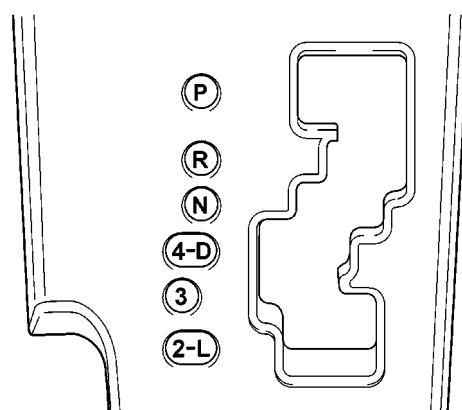
01NMO47Y

For Limited Grade



01NMO45Y

For 4-speed Automatic Transaxle



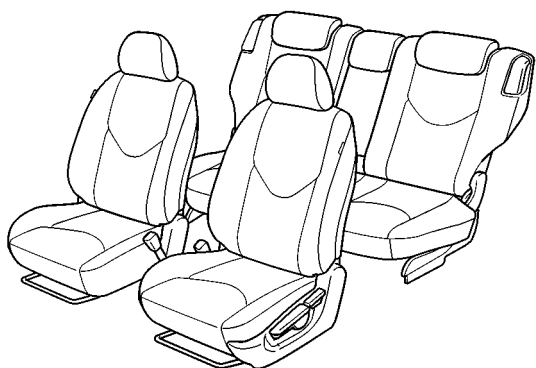
01MMO17Y

For 5-speed Automatic Transaxle

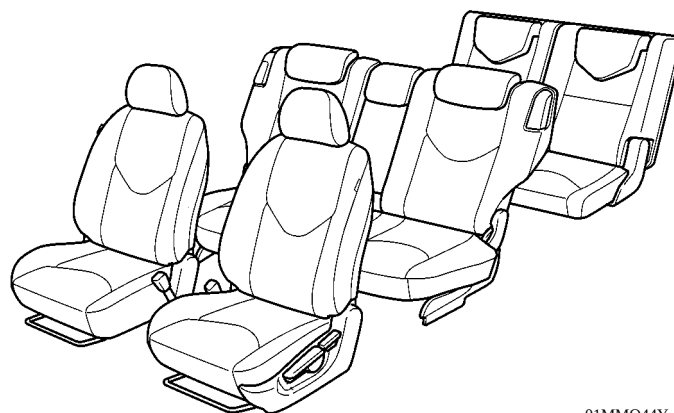
Seat

- Manual type front seats and 60/40 split retractable type rear seats are provided as standard equipment on the Standard and Sport grades.
- Power type front seats are provided as standard equipment on the Limited grade.
- A rear No. 2 seat is available as optional equipment on the Standard and Limited grades.
- Fabric seat covers are provided as standard equipment on all the models, and leather seat covers are available as optional equipment on the Limited grade*.

*: Except Models with Rear No.2 Seat



01NMO48Y

Standard

01MMO44Y

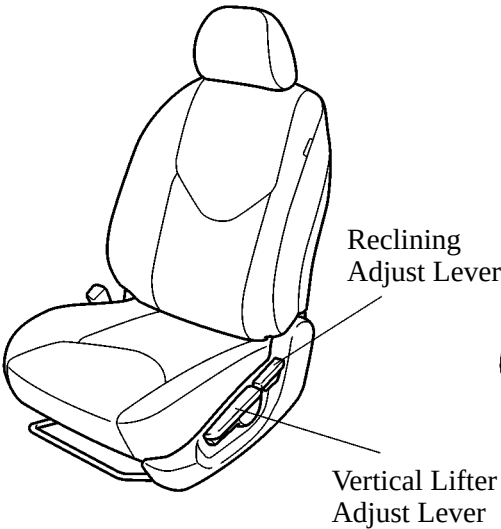
With Rear No. 2 Seat

Front Seat

- 6-way manual seat is provided for the driver seat, and 4-way manual seat is provided for the front passenger seat as standard equipment on the Standard and Sport grades.
- 8-way power seat is provided for the driver seat as standard equipment on the Limited grade.
- On both the driver and front passenger seats, seat back pockets are provided as standard equipment on the Standard grade, and net type seat back pockets are provided as standard equipment on the Limited and Sport grades.

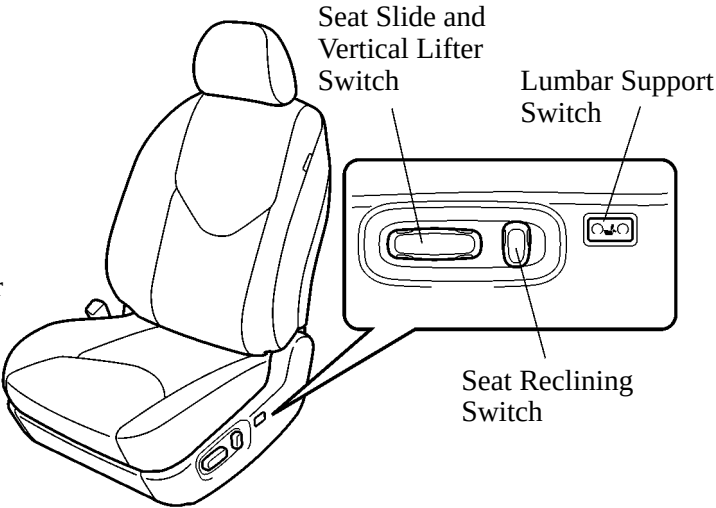
Model Item	New		Previous	
	Driver Seat	Front Passenger Seat	Driver Seat	Front Passenger Seat
Seat Slide	240 mm (9.4 in.) 15 mm (0.6 in.) x 16 Steps		240 mm (9.4 in.) 15 mm (0.6 in.) x 16 Steps	
Seat Reclining	82° (2° x 41 Steps), 78°*		76° (2° x 38 Steps)	
Vertical Lifter	45 mm (1.8 in.)	—	45 mm (1.8 in.)	—
Front Vertical*	10°	—	—	—
Front Tilt*	26 mm (1.0 in.)	—	—	—

*: Power Seat Only



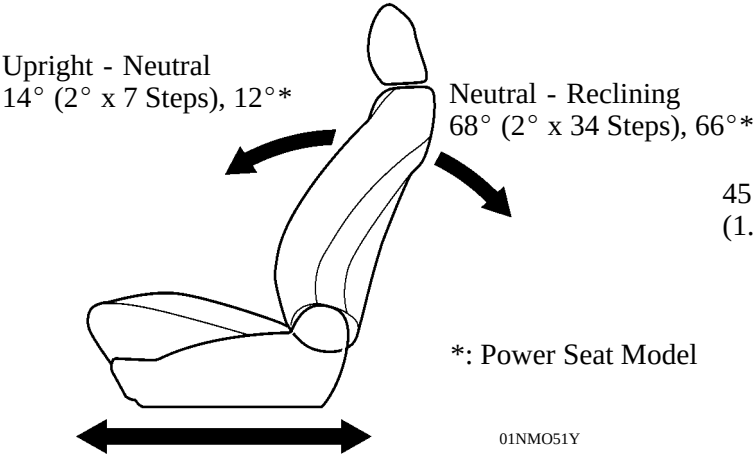
Manual Seat

01NMO49Y



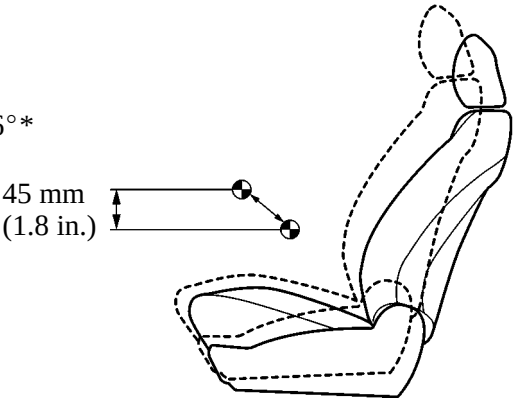
Power Seat

01NMO50Y



Seat Slide: 240 mm (9.4 in.)

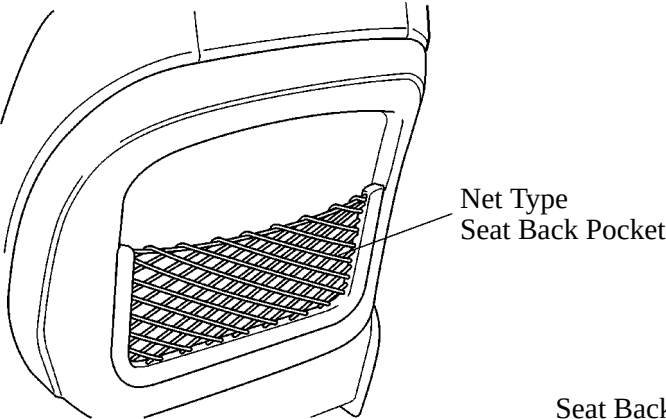
01NMO51Y



01NMO52Y

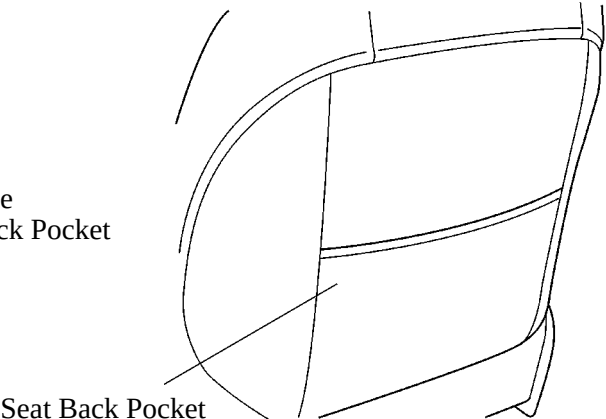
Vertical Lifter

Seat Slide and Reclining



01NMO53Y

For Limited and Sport Grades

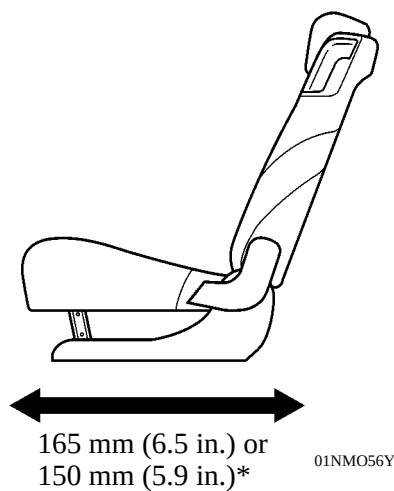
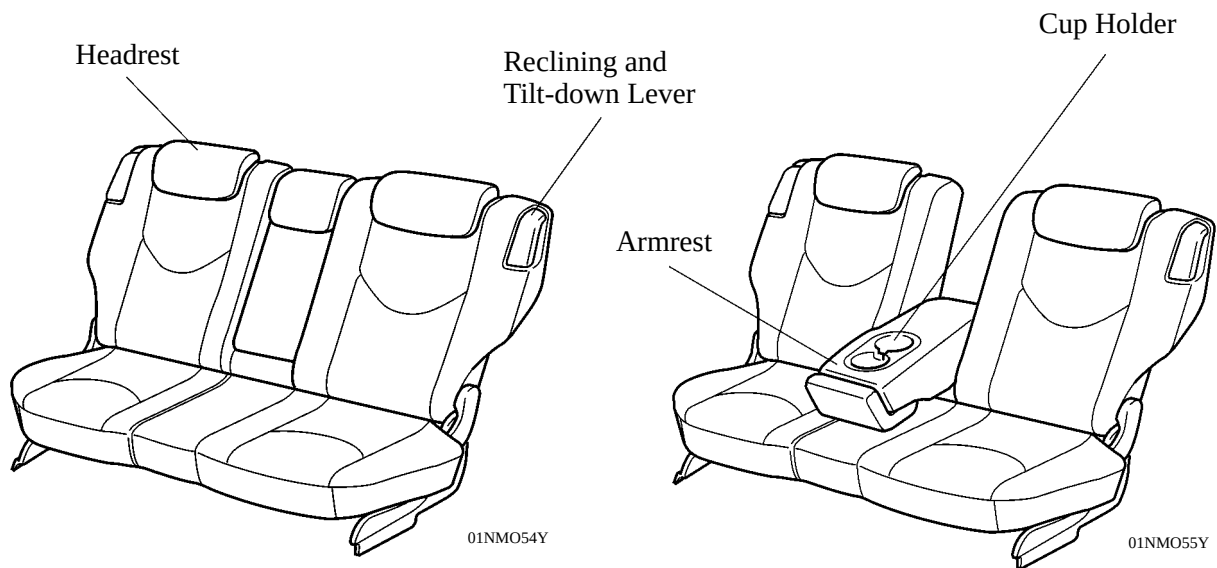
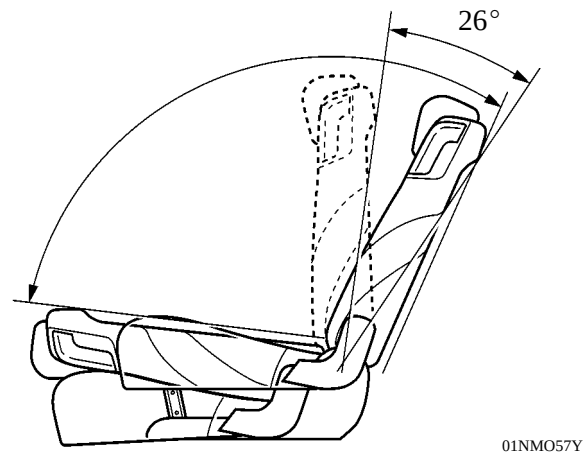


01NMO101Y

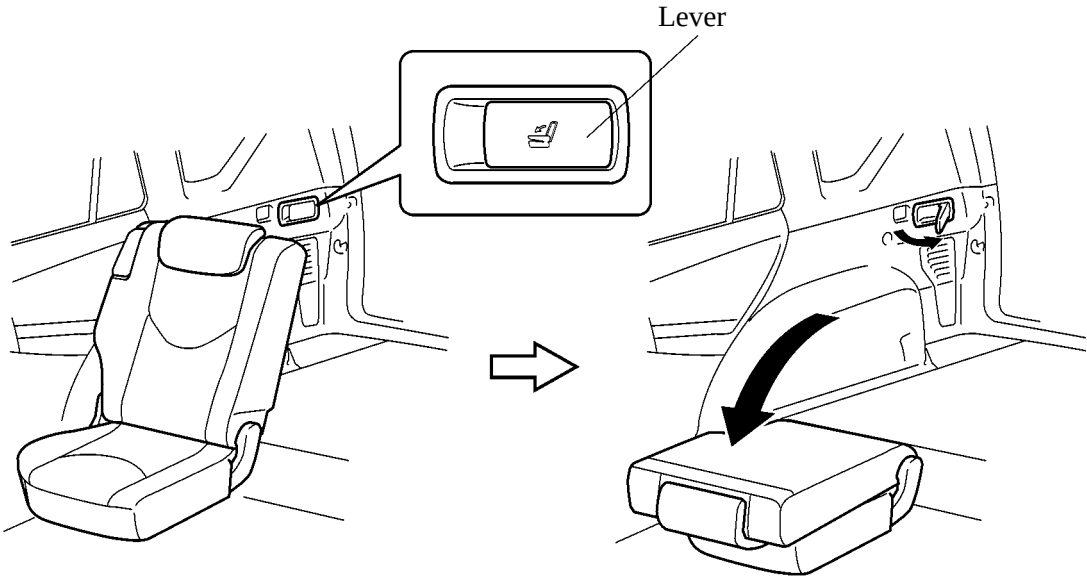
For Standard Grade

Rear Seat**Rear No. 1 Seat**

- A 60/40 split retractable type rear seat with tilt-down function is provided as standard equipment.
- An L-shaped headrest is used to achieve excellent rearward visibility.
- The seat slide movement is 165 mm (6.5 in.), and seat reclining angle is 26°.
- On the models with a rear No. 2 seat, the amount of seat slide is 150 mm (5.9 in.).
- An armrest with a cup holder is provided for the center seat.
- A remote operation mechanism is used to enable the user to operate a lever in the luggage compartment in order to tilt-down the rear seat.
- The models with a rear No. 2 seat have been provided with a walk-in function.

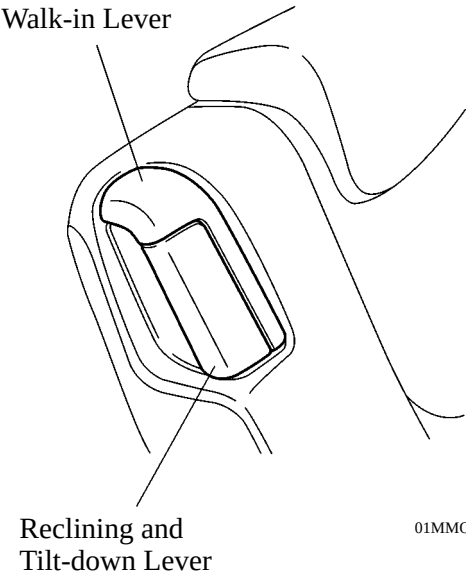
**Seat Slide****Seat Reclining and Tilt-down**

*: Models with a Rear No. 2 Seat

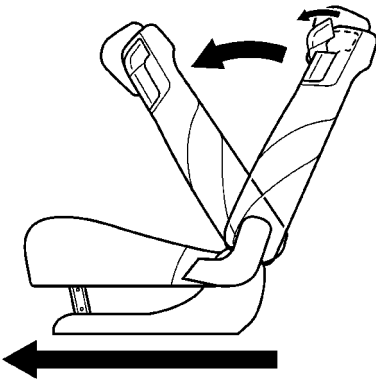


01NMO58Y

Remote Operation Mechanism



01MMO18Y



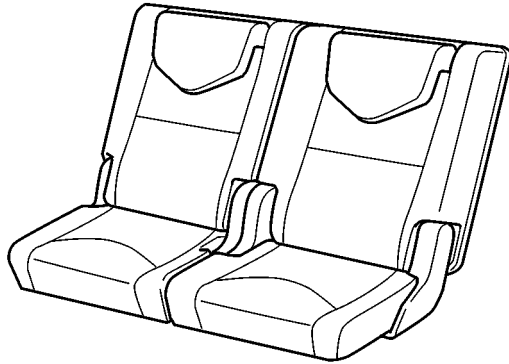
Passenger Side Slide Movement: 120 mm (4.7 in.)

01MMO19Y

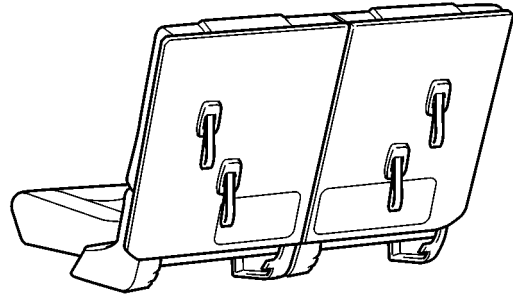
Walk-in Function

Rear No. 2 Seat

- A storable rear No. 2 seat is available as optional equipment on the Standard and Limited grades.
- An L-shaped headrest is used to achieve excellent rearward visibility.

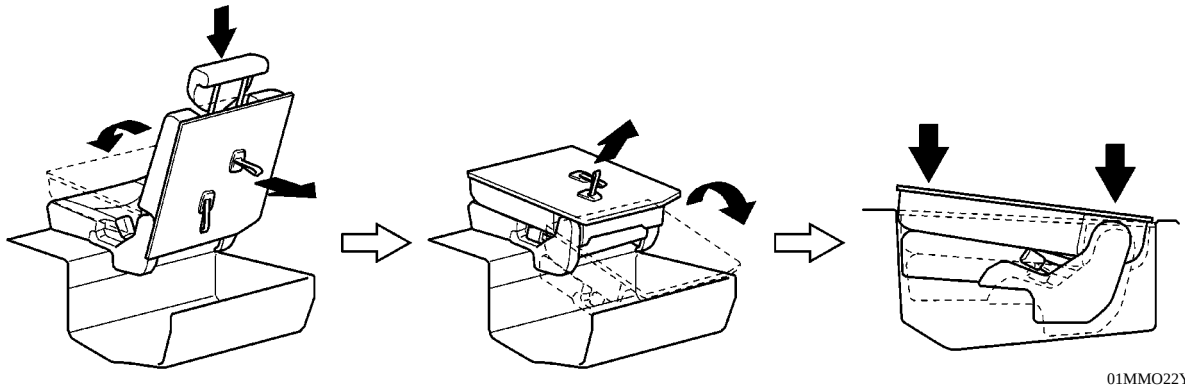


01MMO20Y



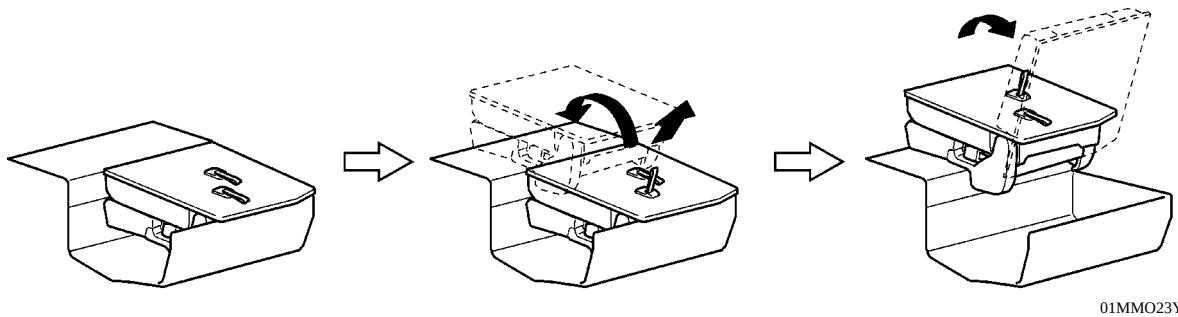
01MMO21Y

1) Storage Operation

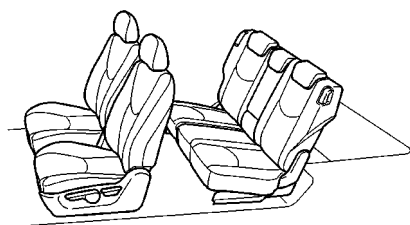


01MMO22Y

2) Set up Operation

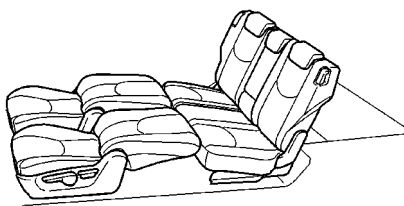


01MMO23Y

Seat Arrangement**Without Rear No. 2 Seat**

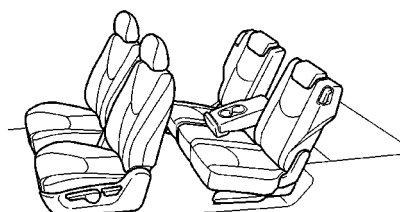
01NMO59Y

Default



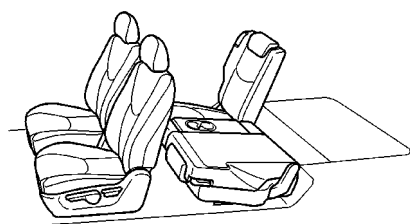
01NMO60Y

Front Seat: Full Flat



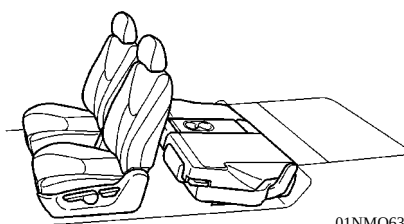
01NMO61Y

Rear Center Seat: Retracted



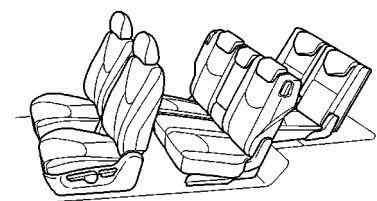
01NMO62Y

Rear Seat: One Side Tilt-down



01NMO63Y

Rear Seat: Tilt-down

With Rear No. 2 Seat

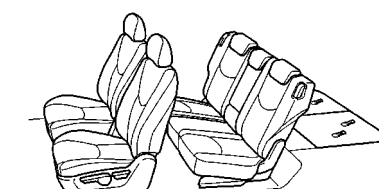
01MMO24Y

Default



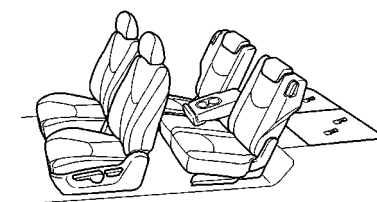
01MMO25Y

Front Seat: Full Flat



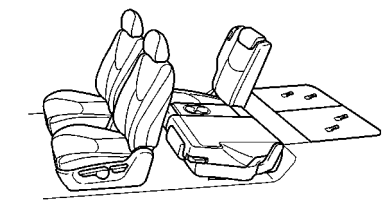
01MMO26Y

Rear No. 2 Seat: Stored



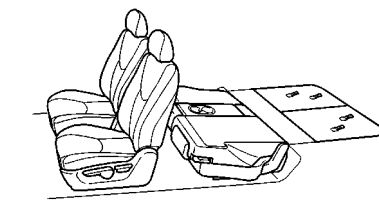
01MMO27Y

Rear No. 1 Center Seat: Retracted



01MMO28Y

Rear No. 1 Seat: One Side Tilt-down



01MMO29Y

Rear No. 1 Seat: Tilt-down

MODEL CODE

ACA33 L - A N P X K A

1

2

3

4

5

6

7

8

1	BASIC MODEL CODE		
	CODE	DRIVE TYPE	ENGINE
	ACA33	4WD	2AZ-FE
	ACA38	2WD	
	GSA33	4WD	2GR-FE
	GSA38	2WD	

2	STEERING WHEEL POSITION
	L: Left-hand Drive

3	MODEL NAME
	A: RAV4

4	BODY TYPE
	N: 5-door Wagon

5	GEAR SHIFT TYPE
	P: 4-speed Automatic, Floor A: 5-speed Automatic, Floor

6	GRADE
	X: — (Standard) G: Limited S: Sport

7	ENGINE SPECIFICATION
	K: DOHC and SFI

8	DESTINATION
	A: U.S.A. K: Canada

MODEL LINE-UP

DESTI- NATION	ENGINE	BODY TYPE	GRADE	TRANSAXLE			
				4-speed Automatic		5-speed Automatic	
				2WD	4WD	2WD	4WD
				U241E	U140F	U151E	U151F
U. S. A.	2AZ-FE	5-door Wagon	—	ACA38L-ANPXKA	ACA33L-ANPXKA	—	—
			Limited	ACA38L-ANPGKA	ACA33L-ANPGKA	—	—
			Sport	ACA38L-ANPSKA	ACA33L-ANPSKA	—	—
	2GR-FE		—	—	—	GSA38L-ANAXKA	GSA33L-ANAXKA
			Limited	—	—	GSA38L-ANAGKA	GSA33L-ANAGKA
			Sport	—	—	GSA38L-ANASKA	GSA33L-ANASKA
Canada	2AZ-FE		—	—	ACA33L-ANPXKK	—	—
			Limited	—	ACA33L-ANPGKK	—	—
			Sport	—	ACA33L-ANPSKK	—	—
	2GR-FE	—	—	—	—	GSA33L-ANAXKK	
		Limited	—	—	—	GSA33L-ANAGKK	
		Sport	—	—	—	GSA33L-ANASKK	

PERFORMANCE

Power Train

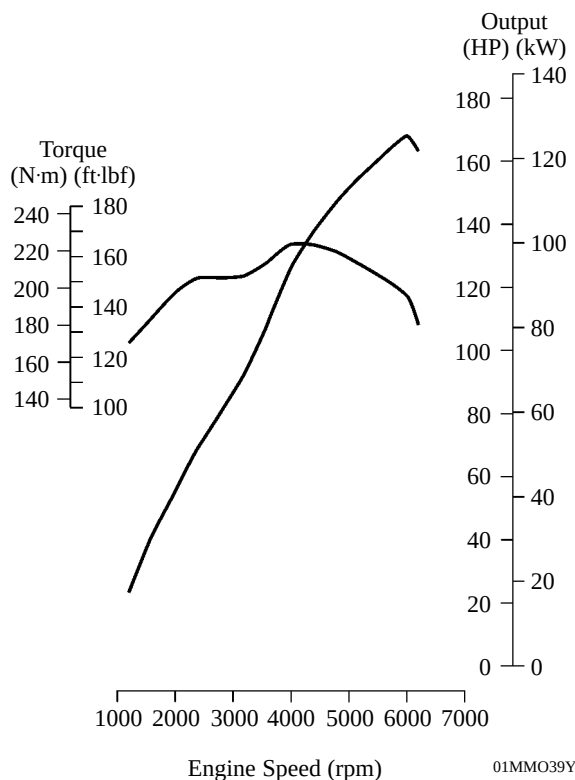
Engine

- The 2AZ-FE engine has been carried over from the '05 model. This engine realizes high performance, quietness, fuel economy, and clean emissions through the use of the VVT-i (Variable Valve Timing-intelligent) system, DIS (Direct Ignition System), and ETCS-i (Electronic Throttle Control System-intelligent).
- A new 2GR-FE engine is used. It realizes high performance, quietness, fuel economy, and clean emission through the use of the Dual VVT-i (Dual Variable Valve Timing-intelligent) system, DIS, and ETCS-i.

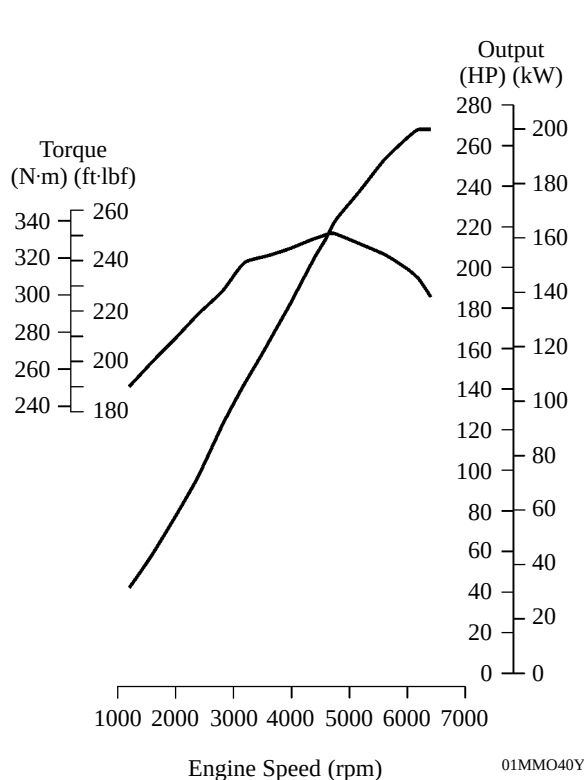
Engine Type	2AZ-FE	2GR-FE
No. of Cyls. & Arrangement	4-cylinder, In-line Type	6-cylinder, V Type
Valve Mechanism	16-valve DOHC, Chain Drive (with VVT-i)	24-valve DOHC, Chain Drive (with Dual VVT-i)
Displacement cm ³ (cu. in.)	2362 (144.2)	3456 (210.9)
Bore x Stroke mm (in.)	88.5 x 96.0 (3.48 x 3.78)	94.0 x 83.0 (3.70 x 3.27)
Compression Ratio	9.8 : 1	10.8 : 1
Maximum Output [SAE-NET]*	124 kW @ 6000 rpm (166 HP @ 6000 rpm)	200 kW @ 6200 rpm (268 HP @ 6200 rpm)
Maximum Torque [SAE-NET]*	224 N·m @ 4000 rpm (165 ft·lbf @ 4000 rpm)	336 N·m @ 4700 rpm (248 ft·lbf @ 4700 rpm)

*: Maximum output and torque rating are determined by revised SAE J1349 standard.

► 2AZ-FE Engine ◀



► 2GR-FE Engine ◀



Transaxle

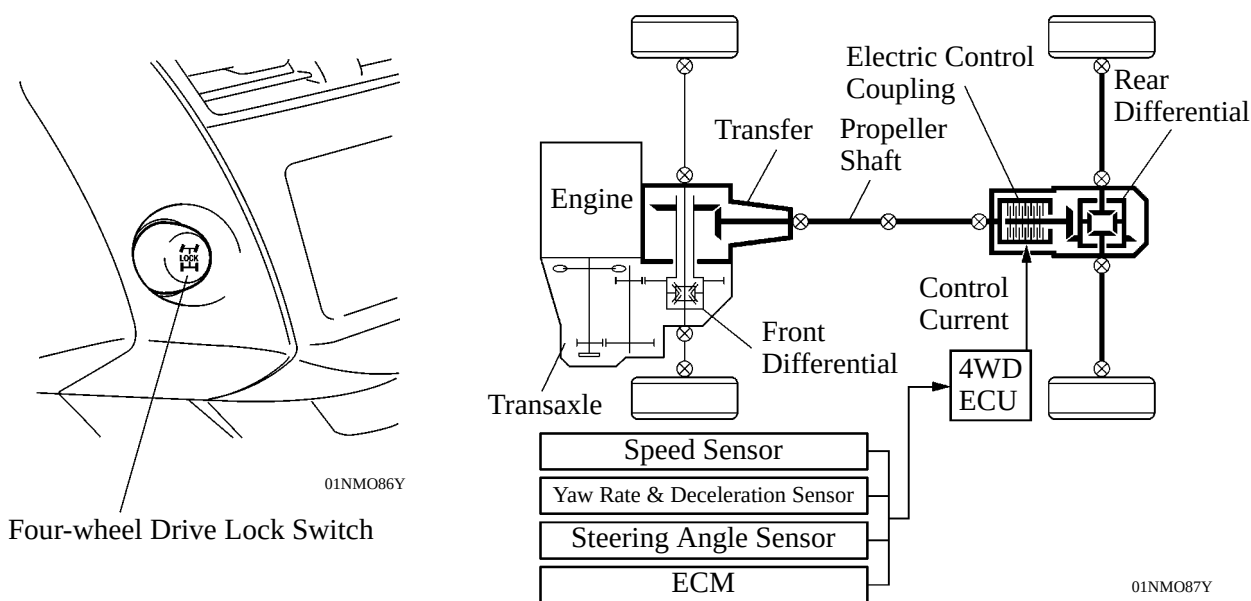
- The U140F and U241E 4-speed automatic transaxles have been carried over from the '05 model.
- New U151E and U151F 5-speed automatic transaxles are used.
- A new GF1A transfer is used.

Transaxle Type		4-speed Automatic		5-speed Automatic	
		U140F	U241E	U151F	U151E
Transfer Type		GF1A	—	GF1A	—
Combination with Engine		2AZ-FE		2GR-FE	
Drive Type		4WD	2WD	4WD	2WD
Gear Ratio*	1st	3.938	3.943	4.235	←
	2nd	2.194	2.197	2.360	←
	3rd	1.411	1.413	1.517	←
	4th	1.019	1.020	1.047	←
	5th	—	—	0.756	←
	Reverse	3.141	3.145	3.378	←

*: Counter Gear Ratio Included

Active Torque Control 4WD System

- A new active torque control 4WD system with an electric control coupling is used.
- The active torque control 4WD system, which has an electric control coupling in the front part of the rear differential, transmits torque to the rear wheels when needed, and only in the amount needed, based on information provided by various sensors.
- By operating the four-wheel drive lock switch provided on the instrument panel, the driver can select the following modes: the AUTO mode to optimally control the torque that is transmitted to the rear wheels, and the LOCK mode that locks the torque that is transmitted to the rear wheels to the maximum amount.



System Configuration Diagram

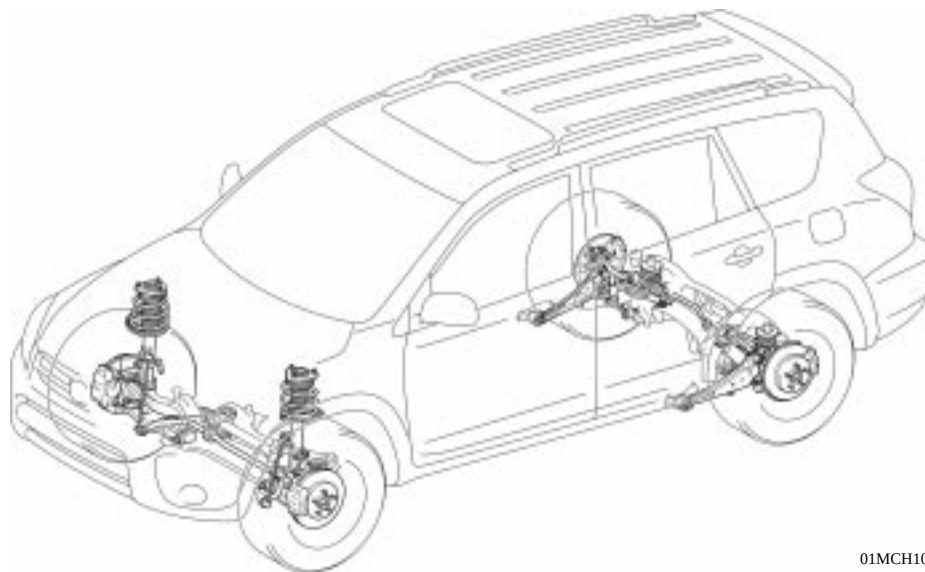
Chassis

Front Suspension

Type	MacPherson Strut Type Independent Suspension
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Rear Suspension

Type	Double Wishbone Type Independent Suspension
------	--



01MCH100Y

Steering

Type	EPS (Electronic Power Steering)
Gear Type	Rack & Pinion

Brake

Front Brake Type	Ventilated Disc
Front Rotor Size	15 inch: 275 x 25 mm (10.82 x 0.87 in.)* ¹ 16 inch: 296 x 28 mm (11.84 x 1.10 in.)* ²
Rear Brake Type	Solid Disc
Rear Rotor Size	15 inch: 281 x 12 mm (11.24 x 0.48 in.)
Parking Brake Type	Lever Type
Brake Control	ABS (Anti-lock Brake System) with EBD (Electronic Brake force Distribution) & Brake Assist & TRAC (Traction Control) & Hill-start Assist Control* ³ & DAC (Downhill Assist Control)* ³ & VSC (Vehicle Stability Control)* ⁴

*¹: 2AZ-FE Engine Models with Rear No. 1 Seat Only

*²: 2GR-FE Engine Models and Models with Rear No. 2 Seat

*³: Standard Equipment on 2GR-FE Engine Models and Models with Rear No. 2 Seat

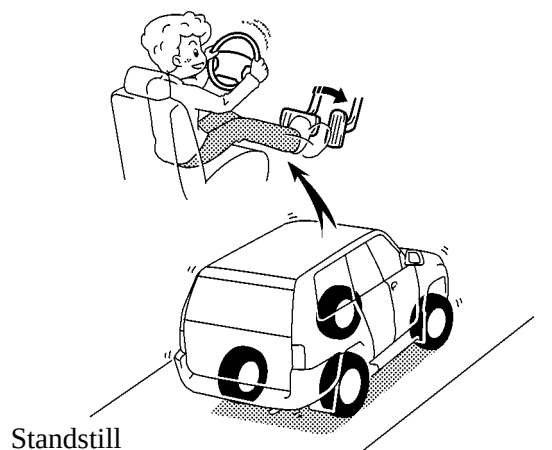
*⁴: 2WD models have been provided with Auto LSD (Limited Slip Differential).

Enhanced VSC System

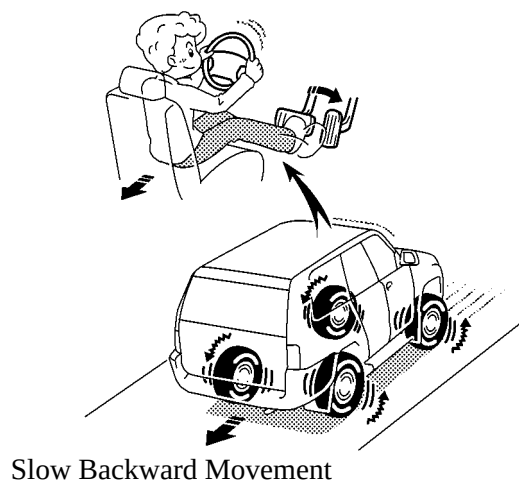
- The enhanced VSC (Vehicle Stability Control) system is standard equipment on all models.
- In addition to the ABS, TRAC, and VSC controls provided by the conventional system, the enhanced VSC system effects cooperative control with the EPS (Electric Power Steering) and active torque control 4WD system in order to realize excellent driving stability and maneuverability.
- See CH-92 for details on the enhanced VSC system.

Hill-start Assist Control

- The hill-start assist control is standard equipment on the 2GR-FE engine models and the models with rear No. 2 seat.
- When the driver transfers his/her foot from the brake pedal to the accelerator pedal while starting off on an uphill, the hill-start assist control momentarily maintains the hydraulic pressure in the wheel cylinders of the four wheels, in order to prevent the vehicle from rolling backward.
- The hill-start assist control used on the '06 model effects control to prevent the vehicle from rolling backward. This control has evolved further from the hill-start assist control of the '05 model, which slowed the backward rolling of the vehicle while starting off on a hill.
- See CH-120 for details on the hill-start assist control.



'06 Model

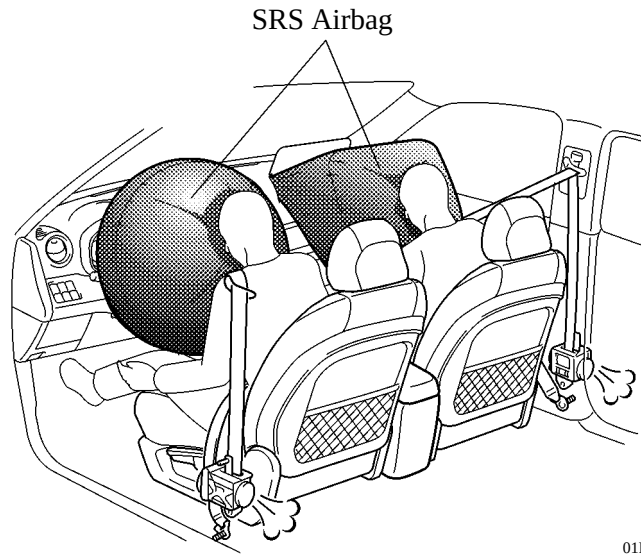


'05 Model

SAFETY

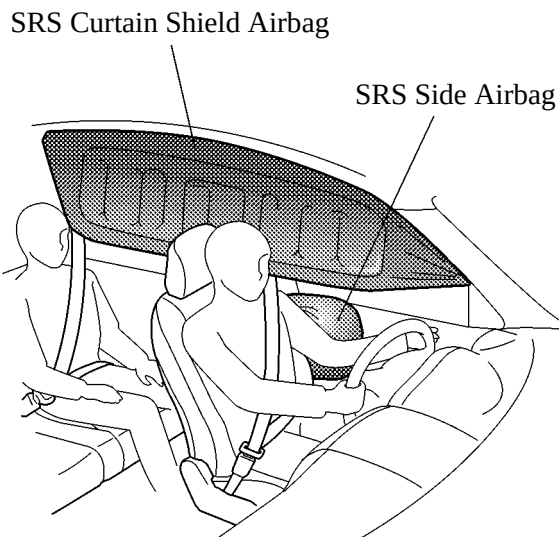
SRS Airbag System

- Dual-stage SRS (Supplemental Restraint System) airbags are standard equipment for the driver and front passenger seats. In the event of a severe frontal collision, the airbags function with the seat belts to help reduce the impact on the driver's and front passenger's heads and chests. The seat position sensor is used only for the driver's seat to help the SRS driver side air bag deploy at the right moment.



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- The SRS side airbags (driver and front passenger seats) which help reduce side impacts are available as optional equipment.
- The SRS curtain shield airbags (front and rear seats) which help reduce side impacts are available as optional equipment.



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