2006 Mazda RX-8 Service Highlights

FOREWORD

This manual explains components, system operations and functions for the Mazda RX-8.

For proper repair and maintenance, a thorough familiarization with this manual is important, and it should always be kept in a handy place for quick and easy reference.

All the contents of this manual, including drawings and specifications, are the latest available at the time of printing.
As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers.
This manual should be kept up-to-date.

Mazda Motor Corporation reserves the right to alter the specifications and contents of this manual without obligation or advance notice.

Mazda Motor Corporation
HIROSHIMA, JAPAN

APPLICATION:
This manual is applicable to vehicles beginning with the Vehicle Identification Numbers (VIN), and related materials shown on the following page.

CONTENTS

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VEHICLE IDENTIFICATION NUMBERS (VIN)

JM1 FE173⁎6# 200001—
JM1 FE17N⁎6# 200001—

RELATED MATERIALS

Material Name	MNAO Part No.	Mazda Material No.
2004 Mazda RX-8 Service Highlights	9999–95–102F–04	3378–1U–03C
2005 Mazda3, Mazda MX-5 Miata/MX-5, MAZDASPEED MX-5, Mazda MPV, Mazda RX-8 Service Highlights	9999–95–MODL–05	3400–1U–04H
1995, 1996, 1997, 1998, 1999, 2000 OBD-II Service Highlights	9999–95–OBD2–00	3344–1U–99K
2006 Mazda RX-8 Workshop Manual	9999–95–064B–06	1857–1U–05J
Engine Workshop Manual 13B-MSP	9999–95–E13B–MSP	1773–1U–03C
Manual Transmission Workshop Manual Y16M-D	9999–95–T15M–D	1774–1U–03C
Automatic Transmission Workshop Manual RC4A-EL	9999–95–RC4A–EL	1775–1U–03C
2004 Mazda RX-8 Bodyshop Manual	9999–95–120F–04	3379–1U–03D
2006 Mazda RX-8 Wiring Diagram	9999–95–040G–06	5650–1U–05J

00–00 GENERAL INFORMATION

VEHICLE IDENTIFICATION NUMBER (VIN) CODE

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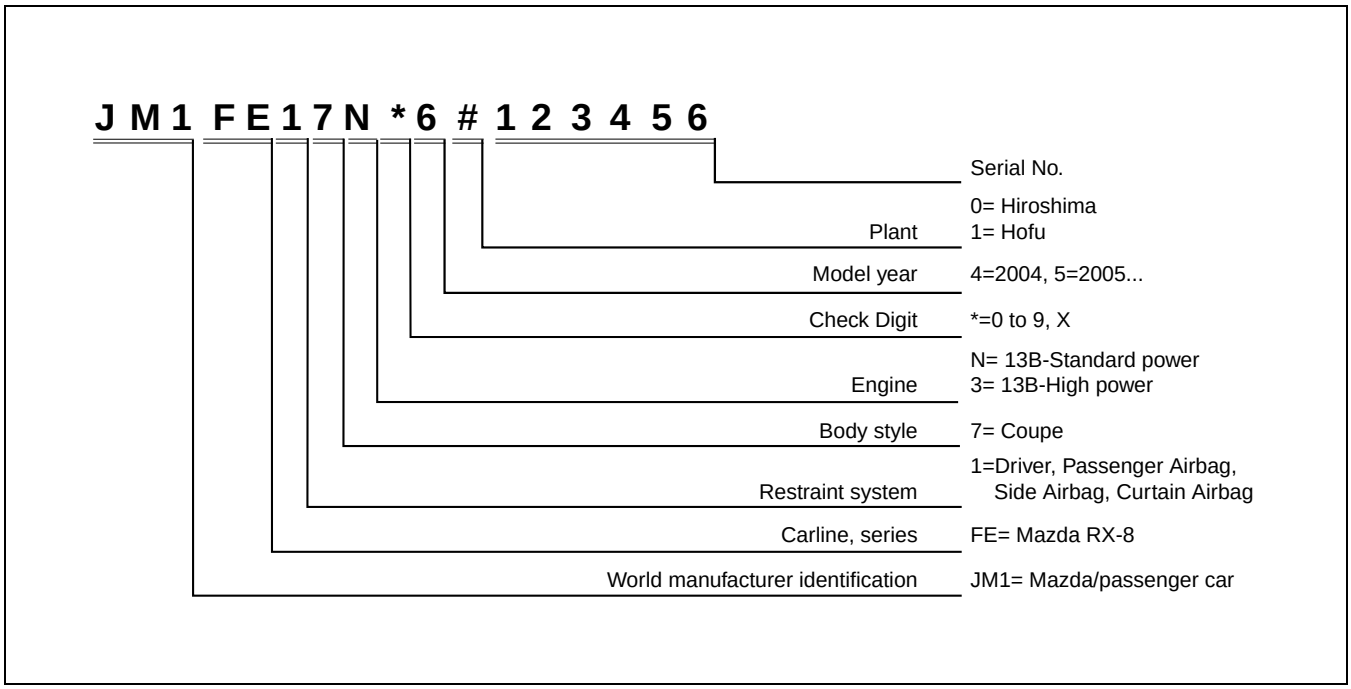

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VEHICLE IDENTIFICATION NUMBER (VIN)

EHU000000000106

JM1 FE173*6# 200001—
JM1 FE17N*6# 200001—

UNITS

EHU000000000103

Electrical current	A (ampere)
Electric power	W (watt)
Electric resistance	ohm
Electric voltage	V (volt)
Length	mm (millimeter)
	in (inch)
Negative pressure	kPa (kilo pascal)
	mmHg (millimeters of mercury)
	inHg (inches of mercury)
Positive pressure	kPa (kilo pascal)
	kgf/cm^2 (kilogram force per square centimeter)
	psi (pounds per square inch)
Torque	N·m (Newton meter)
	kgf·m (kilogram force meter)
	kgf·cm (kilogram force centimeter)
	ft·lbf (foot pound force)
	in·lbf (inch pound force)
Volume	L (liter)
	US qt (U.S. quart)
	Imp qt (Imperial quart)
	ml (milliliter)
	cc (cubic centimeter)
	cu in (cubic inch)
	fl oz (fluid ounce)
Weight	g (gram)
	oz (ounce)

Conversion to SI Units (Système International d'Unités)

- All numerical values in this manual are based on SI units. Numbers shown in conventional units are converted from these values.

Rounding Off

- Converted values are rounded off to the same number of places as the SI unit value. For example, if the SI unit value is 17.2 and the value after conversion is 37.84, the converted value will be rounded off to 37.8.

Upper and Lower Limits

- When the data indicates upper and lower limits, the converted values are rounded down if the SI unit value is an upper limit and rounded up if the SI unit value is a lower limit. Therefore, converted values for the same SI unit value may differ after conversion. For example, consider 2.7 kgf/cm^2 in the following specifications:

  210—260 kPa {2.1—2.7 kgf/cm^2, 30—38 psi}
  270—310 kPa {2.7—3.2 kgf/cm^2, 39—45 psi}

- The actual converted values for 2.7 kgf/cm^2 are 265 kPa and 38.4 psi. In the first specification, 2.7 is used as an upper limit, so the converted values are rounded down to 260 and 38. In the second specification, 2.7 is used as a lower limit, so the converted values are rounded up to 270 and 39.

SAE STANDARD

EHU000000000104

- In accordance with new regulations, SAE (Society of Automotive Engineers) standard names and abbreviations are now used in this manual. The table below lists the names and abbreviations that have been used in Mazda manuals up to now and their SAE equivalents.

SAE Standard		Remark		SAE Standard		Remark
Abbreviation	**Name**			**Abbreviation**	**Name**	
AP	Accelerator Pedal			MAP	Manifold Absolute Pressure	
APP	Accelerator Pedal Position			MAF sensor	Mass Air Flow Sensor	
ACL	Air Cleaner			MFL	Multiport Fuel Injection	
A/C	Air Conditioning			OBD	On-board Diagnostic System	
BARO	Barometric Pressure			OL	Open Loop	
B+	Battery Positive Voltage			OC	Oxidation Catalytic Converter	
CMP sensor	Camshaft Position Sensor			O2S	Oxygen sensor	
CAC	Charge Air Cooler			PNP	Park/Neutral Position	
CLS	Closed Loop System			PSP	Power Steering Pressure	
CTP	Closed Throttle Position			PCM	Powertrain Control Module	#3
CPP	Clutch Pedal Position			PAIR	Pulsed Secondary Air Injection	Pulsed injection
CIS	Continuous Fuel Injection System					
CKP sensor	Crankshaft Position Sensor			AIR	Secondary Air Injection	Injection with air pump
DLC	Data Link Connector					
DTM	Diagnostic Test Mode	#1				
DTC	Diagnostic Test Code(s)			SAPV	Secondary Air Pulse Valve	
DI	Distributor Ignition			SFI	Sequential Multiport Fuel Injection	
DLI	Distributorless Ignition					
EI	Electronic Ignition	#2		3GR	Third Gear	
ECT	Engine Coolant Temperature			TWC	Three Way Catalytic Converter	
EM	Engine Modification			TB	Throttle Body	
EVAP	Evaporative Emission			TP sensor	Throttle Position Sensor	
EGR	Exhaust Gas Recirculation			TCC	Torque Converter Clutch	
FC	Fan Control			TCM	Transmission (Transaxle) Control Module	
FF	Flexible Fuel					
4GR	Fourth Gear			TR	Transmission (Transaxle) Range	
GEN	Generator			TC	Turbocharger	
GND	Ground			VSS	Vehicle Speed Sensor	
HO2S	Heated Oxygen Sensor	With heater		VR	Voltage Regulator	
				VAF sensor	Volume Air Flow Sensor	
IAC	Idle Air Control			WU-TWC	Warm Up Three Way Catalytic Converter	#4
IAT	Intake Air Temperature					
KS	Knock Sensor			WOP	Wide Open Throttle	
MIL	Malfunction Indicator Lamp					

#1: Diagnostic trouble codes depend on the diagnostic test mode.
#2: Controlled by the PCM
#3: Device that controls engine and powertrain
#4: Directly connected to exhaust manifold

ENGINE

01 SECTION

01–00 OUTLINE

ENGINE ABBREVIATIONS

EHU010002000101

A/C	Air Conditioner
APV	Auxiliary Port Valve
CCM	Comprehensive Component Monitor
DC	Drive Cycle
CSERS	Cold Start Emission Reduction Strategy
FP1	Front Primary 1
KOEO	Key On Engine Off
KOER	Key On Engine Running
L/F	Leading Front
L/R	Leading Rear
MT	Manual Transmission
RP1	Rear Primary 1
SSV	Secondary Shutter Valve
SW	Switch
T/F	Trailing Front
T/R	Trailing Rear
VDI	Variable Dynamic Effect Intake
VFAD	Variable Fresh Air Duct

ENGINE FEATURES

EHU010002000102

To meet OBD-II regulations	• Modes 01, 02, 03, and 06 of diagnostic test modes changed

ENGINE SPECIFICATIONS

EHU010002000103

Item					Specification			
					2006MY Mazda RX-8		2005MY Mazda RX-8	
					13B-MSP (Standard power)	13B-MSP (High power)	13B-MSP (Standard power)	13B-MSP (High power)
MECHANICAL								
Engine type					Rotary		←	
Rotor arrangement and number					In-line 2-rotor, longitudinal		←	
Combustion chamber type					Bathtub		←	
Displacement (ml {cc, cu in})					654 {654, 40.0}×2		←	
Compression ratio					10.0		←	
Compression pressure (kPa {kgf/cm^2, psi} [rpm])					830 {8.5, 120}[250]		←	
Port timing	IN	Open	Primary port	ATDC	3°		←	
			Secondary port		12°		←	
			Auxiliary port		–	38°	←	
		Close	Primary port	ABDC	60°	65°	←	
			Secondary port		45°	36°	←	
			Auxiliary port		–	80°	←	
	EX	Open		BBDC	40°	50°	←	
		Close		BTDC	3°		←	
LUBRICATION SYSTEM								
Type					Force-fed type		←	
Oil pump	Type				Trochoid gear		←	
	Relief valve opening pressure (approx. quantity) (kPa {kgf/cm^2, psi})				441—490 {4.5—5.0, 64.0—71.0}		←	
Oil filter	Type				Full-flow		←	
	Relief valve opening pressure (approx. quantity) (kPa {kgf/cm^2, psi})				78—118 {0.8—1.2, 11.4—17.1}		←	
Oil pressure (approx. quantity) [oil temperature 100°C {212°F}] (kPa {kgf/cm^2, psi} [rpm])					350 {3.57, 50.8} [3,000]		←	
Oil capacity (approx. quantity) (L {US qt, lmp qt})			Oil replacement		3.3 {3.5, 2.9}		←	
			Oil and oil filter replacement		3.5 {3.7, 3.1}		←	
			Engine overhaul		4.7 {5.0, 4.1}		←	
			Total (dry engine)		5.7 {6.0, 5.0}	6.4 {6.7, 5.6}	←	
Recommended oil			API service		SL		←	
			SAE viscosity		5W–20		←	
			ILSAC		GF–3		←	
COOLING SYSTEM								
Type					Water-cooled, forced circulation		←	
Coolant capacity (L {US qt, lmp qt})					9.8 {10.4, 8.6}		←	
Water pump					Centrifugal, V-ribbed belt-driven		←	
Thermostat	Type				Wax		←	
	Opening temperature (°C {F°})				80—84 {176—183}		←	
	Full-open temperature (°C {F°})				95 {203}		←	
	Full-open lift (mm {in})				8.5 {0.33} or more		←	
Radiator	Type				Corrugated fin		←	
Cooling system cap	Cap valve opening pressure (kPa {kgf/cm^2, psi})				73.3—103.3 {0.748—1.053, 10.63—14.98}		←	
							←	

Item			Specification			
			2006MY Mazda RX-8		2005MY Mazda RX-8	
			13B-MSP (Standard power)	13B-MSP (High power)	13B-MSP (Standard power)	13B-MSP (High power)
Cooling fan	Type		Electronic		←	
	Number of blades		Cooling fan No.1: 5, Cooling fan No.2: 7		←	
	Outer diameter	(mm {in})	300 {11.8}		←	
FUEL SYSTEM						
Injector	Type		Multiple hole design		←	
	Type of fuel delivery		Top-feed		←	
	Type of drive		Electronic		←	
Pressure regulator control pressure		(kPa {kgf/cm^2, psi})	Approx. 390 {3.98, 56.6}		←	
Fuel pump type			Electric		←	
Fuel tank capacity (approx. quantity)		(L {US gal, lmp gal})	60 {15.9, 13.2}		←	
Fuel type			Unleaded premium (unleaded high-octane) gasoline		←	
EMISSION SYSTEM						
AIR system			Air pump, air control valve		←	
Catalyst type			Three-way catalyst (monolithic)		←	
EVAP control system			Canister design		←	
PCV system			Closed design		←	
CHARGING SYSTEM					←	
Battery	Voltage	(V)	12		←	
	Type and capacity (5 hour rate)	(A·h)	75D23L (52)		50D20L (40), 55D23L (48) 75D23L (52), 75D26L (52)	
Generator	Out-put	(V–A)	12—100		←	
	Regulated voltage	(V)	Controlled by PCM		←	
	Self diagnosis function				←	
IGNITION SYSTEM						
Ignition system	Type		Distributorless Ignition (DLI)		←	
	Spark advance		Electronic		←	
	Firing order		When idling: T/F-L/F-T/R-L/R Except for idling: L/F-T/F-L/R-T/R (Independent ignition control)		←	
Spark plug	Type	Leading side	N3H5 18 110 (RE7C-L)[*1], N3Y8 18 110 (RE7C-L)[*1], N3Y9 18 110 (RE6C-L)[*2]		N3H2 18 110C (RE7A-L)[*1], N3Y2 18 110 (RE7A-L)[*1], N3Y3 18 110 (RE6A-L)[*2], N3H5 18 110 (RE7C-L)[*1], N3Y8 18 110 (RE7C-L)[*1], N3Y9 18 110 (RE6C-L)[*2]	
		Trailing side	N3H1 18 110C (RE9B-T)[*1], N3Y1 18 110 (RE9B-T)[*1]		←	
STARTING SYSTEM						
Starter	Type		Coaxial reduction		←	
	Output	(kW)	2.0		AT: 1.8[*3], MT: 1.4[*3]	
					2.0[*4]	

Item	Specification			
	2006MY Mazda RX-8		2005MY Mazda RX-8	
	13B-MSP (Standard power)	13B-MSP (High power)	13B-MSP (Standard power)	13B-MSP (High power)
CONTROL SYSTEM				
Neutral switch (MT)	ON/OFF		←	
CPP switch (MT)	ON/OFF		←	
SSV switch	ON/OFF		←	
APV position sensor	–	Hall element	←	
ECT sensor	Thermistor		←	
IAT sensor	Thermistor		←	
TP sensor	Hall element		←	
APP sensor	Hall element		←	
MAF sensor (Inside MAF)	Hot-wire		←	
Front HO2S	Zirconia element (all range air/fuel ratio sensor)		←	
Rear HO2S	Zirconia element (Stoichiometric air/fuel ratio sensor)		←	
BARO sensor	Piezoelectric element		←	
KS	Piezoelectric element		←	
Eccentric shaft position sensor	Magnetic pickup		←	
Metering oil pump switch	ON/OFF		←	
Brake switch	ON/OFF		←	
Throttle valve actuator	DC motor		←	
APV motor	–	DC motor	←	
Fuel injector (primary 1)	Multiple hole type (12 holes)		←	
Fuel injector (secondary)	Multiple hole type (4 holes)		←	
Fuel injector (primary 2)	–	Multiple hole type (4 holes)	←	
Stepping motor (in metering oil pump)	Stepping motor		←	

*1 : Standard equipment
*2 : Hot type plug: Available only for customers who often drive their car at very low speed which causes the plugs to foul easily.

*3 : Applied VIN (Assumed)

JM1 FE173*5# 100001–150736
JM1 FE17N*5# 100001–150736

*4 : Applied VIN (Assumed)

JM1 FE173*5# 150737–
JM1 FE17N*5# 150737–

01–02 ON-BOARD DIAGNOSTIC

ON-BOARD DIAGNOSTIC OUTLINE

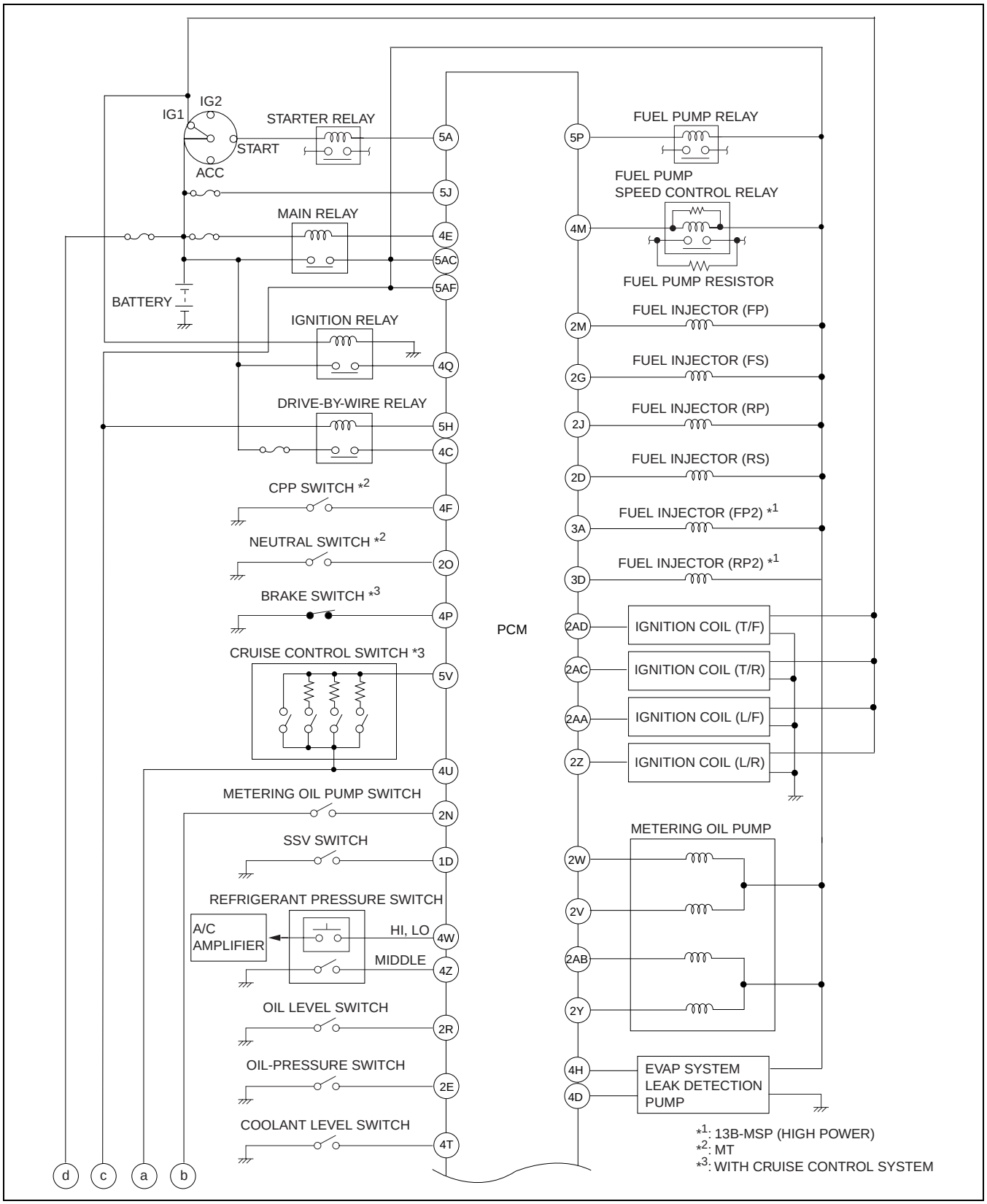
EHU010200000101

Features

To meet OBD-II regulations	• Modes 02, 03, and 06 of diagnostic test modes changed

ON-BOARD DIAGNOSTIC WIRING DIAGRAM

EHU010200000107



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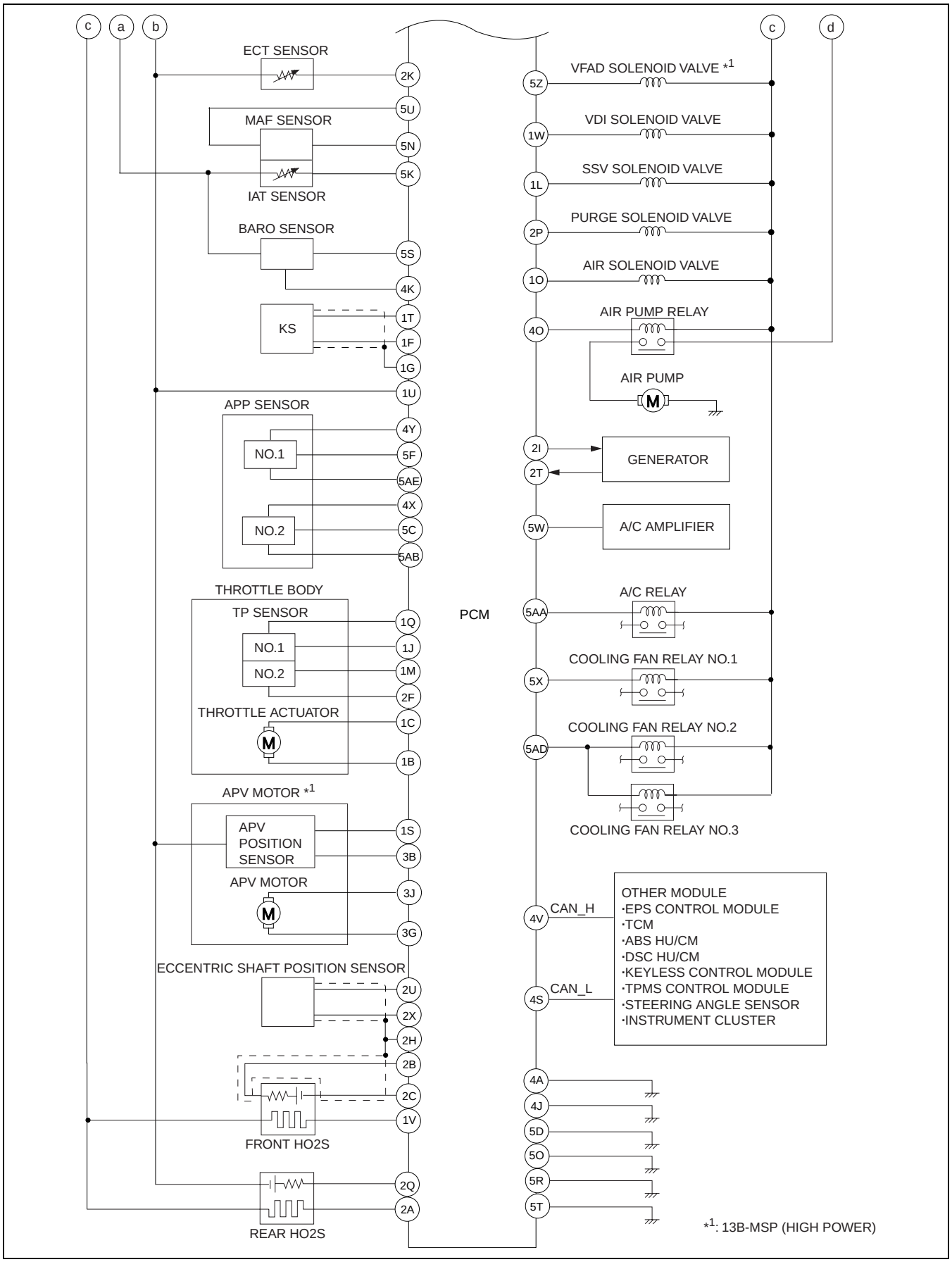

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DIAGNOSTIC TEST MODE

EHU010200000102

- The diagnostic test mode is essentially carried over from that of the 2005 MY except for following.
  — To meet OBD-II regulations, modes 02, 03, and 06 have been changed.

Diagnostic test mode	Item
Mode 01	Sending diagnostic data (PID data monitor/On-board system readiness test)
Mode 02	Sending freeze frame data
Mode 03	Sending emission-related malfunction code (DTC)
Mode 04	Clearing/resetting emission-related malfunction information
Mode 06	Sending intermittent monitoring system test results (DMTR)
Mode 07	Sending continuous monitoring system test results (pending code)
Mode 08	On-board device control (simulation test, active command mode)
Mode 09	Request vehicle information

On-board system readiness test

- The items supported by the on-board system readiness test are shown below.
  Continuous monitoring system
  — HO2S heater
  — Thermostat
  — Fuel system
  — Misfire
  — CCM
  Intermittent monitoring system
  — HO2S
  — AIR system
  — Catalyst
  — EVAP system
  — Engine cooling system
  — CSERS

OBD-II Freeze Frame Data (Mode 02)

- Differences between the 2006 MY and 2005 MY Freeze Frame Data monitor items are shown below.

Freeze Frame Data monitor table

X: Applicable
—: Not applicable

2006 MY	2005 MY	Full names	Unit
X	X	DTC that caused required Freeze Frame Data storage	—
X	X	Fuel system status	Refer to list below.
X	X	Calculated LOAD Value	%
X	X	Engine Coolant Temperature	°C | °F
X	X	Short term fuel trim	%
X	X	Long term fuel trim	%
X	X	Engine RPM	rpm
X	X	Vehicle Speed Sensor	km/h | mph
X	X	Ignition Timing Advance	°
X	X	Intake Air Temperature	°C | °F
X	X	Air Flow Rate from Mass Air Flow Sensor	g/s
X	X	Absolute Throttle Position	%
X	X	Commanded Secondary Air Status	—
X	—	Rear HO2S	%
X	X	Time since engine start	s
X	X	Commanded Evaporative Purge	%
X	X	Fuel Level Input	%
X	X	Number of warm-ups since DTCs cleared	—
X	X	Distance travelled since DTCs cleared	km | miles
X	X	Barometric Pressure	kPa
X	X	Catalyst Temperature	°C | °F
X	X	Control module voltage	V
X	X	Absolute load value	%

2006 MY	2005 MY	Full names	Unit
X	X	Commanded Equivalence Ratio	—
X	X	Relative Throttle Position	%
X	X	Ambient air temperature	°C
X	X	Absolute Throttle Position No.2	%
X	X	Accelerator Pedal Position No.3	%
X	X	Accelerator Pedal Position No.4	%
X	X	Commanded Throttle Actuator Control	%

Meaning of fuel system loop status

- The following information is displayed on the tester.
  - — Feedback operating: HO2S being used for feedback is normal.
  - — Feedback stops: ECT is lower than the determined feedback zone.
  - — Feedback stops: Open loop due to driving condition.
  - — Feedback stops: Open loop due to detected system fault.

OBD-II Diagnostic Trouble Code (Mode 03)

- The following DTCs have been adopted.
  - — P0116, P0134, P0137, P0411, P050A
- Differences between the 2006 MY and 2005 MY DTCs are shown below.

DTC table

×: Applicable
—: Not applicable

DTC No.		Condition	MIL	DC	Monitor item[*1]	Self -test type[*4]	Memory function
2006 MY	2005 MY						
P0030	←	Front HO2S heater control circuit problem	ON	2	HO2S heater	C, O, R	×
P0031	←	Front HO2S heater control circuit low	ON	2	HO2S heater	C, O, R	×
P0032	←	Front HO2S heater control circuit high	ON	2	HO2S heater	C, O, R	×
P0037	←	Rear HO2S heater control circuit low	ON	2	HO2S heater	C, O, R	×
P0038	←	Rear HO2S heater control circuit high	ON	2	HO2S heater	C, O, R	×
P0076	←	VDI solenoid valve control circuit low	OFF	2	Other	C, O, R	×
P0077	←	VDI solenoid valve control circuit high	OFF	2	Other	C, O, R	×
P0101	←	MAF sensor circuit range/performance problem	ON	2	CCM	C	×
P0102	←	MAF sensor circuit low input	ON	1	CCM	C, O, R	×
P0103	←	MAF sensor circuit high input	ON	1	CCM	C, O, R	×
P0107	←	BARO sensor circuit low input	ON	1	CCM	C, O, R	×
P0108	←	BARO sensor circuit high input	ON	1	CCM	C, O, R	×
P0111	←	IAT sensor circuit range/performance problem	ON	2	CCM	C	×
P0112	←	IAT sensor circuit low input	ON	1	CCM	C, O, R	×
P0113	←	IAT sensor circuit high input	ON	1	CCM	C, O, R	×
P0116[*3]	—	Engine coolant temperature circuit range/ performance	ON	2	Engine cooling system	C	×
P0117	←	ECT sensor circuit low input	ON	1	CCM	C, O, R	×
P0118	←	ECT sensor circuit high input	ON	1	CCM	C, O, R	×
P0122	←	TP sensor No.1 circuit low input	ON	1	CCM	C, O, R	×
P0123	←	TP sensor No.1 circuit high input	ON	1	CCM	C, O, R	×
P0125	←	Insufficient coolant temperature for closed loop fuel control	ON	2	Engine cooling system	C	×
P0126	←	Insufficient coolant temperature for stable operation	ON	2	Thermostat	C	×
P0130	←	Front HO2S circuit problem	ON	2	HO2S	C, O, R	×
P0131	←	Front HO2S circuit low voltage	ON	2	HO2S	C, O, R	×
P0132	←	Front HO2S circuit high voltage	ON	2	HO2S	C, O, R	×
P0133	←	Front HO2S circuit slow response	ON	2	HO2S	C	×
P0134[*3]	—	Front HO2S no activity detected	ON	2	HO2S	C, R	×
P0137[*3]	—	Rear HO2S circuit low input	ON	2	HO2S	C	×
P0138	←	Rear HO2S circuit high voltage	ON	2	HO2S	C, R	×

DTC No.		Condition	MIL	DC	Monitor item[*1]	Self-test type[*4]	Memory function
2006 MY	2005 MY						
P0139	←	Rear HO2S circuit slow response	ON	2	HO2S	C, R	×
P0171	←	System too lean	ON	2	Fuel system	C, R	×
P0172	←	System too rich	ON	2	Fuel system	C, R	×
P0222	←	TP sensor No.2 circuit low input	ON	1	CCM	C, O, R	×
P0223	←	TP sensor No.2 circuit high input	ON	1	CCM	C, O, R	×
P0300	←	Random misfire detected	Flash/ON	1 or 2	Misfire	C	×
P0301	←	Front rotor misfire detected	Flash/ON	1 or 2	Misfire	C	×
P0302	←	Rear rotor misfire detected	Flash/ON	1 or 2	Misfire	C	×
P0327	←	KS circuit low input	ON	1	CCM	C, O, R	×
P0328	←	KS circuit high input	ON	1	CCM	C, O, R	×
P0335	←	Eccentric shaft position sensor circuit problem	ON	1	CCM	C	×
P0336	←	Eccentric shaft position sensor circuit range/performance problem	ON	1	CCM	C, R	×
P0410	←	Secondary air injection system problem	ON	2	AIR system	C, R	×
P0411[*3]	—	Secondary air injection system incorrect upstream flow	ON	2	AIR system	C	×
P0420	←	Catalyst system efficiency below threshold	ON	2	Catalyst	C	×
P0441	←	EVAP system incorrect purge flow	ON	2	EVAP system	C, R	×
P0442	←	EVAP system leak detected (small leak)	ON	2	EVAP system	C, R	×
P0443	←	Purge solenoid valve circuit problem	ON	2	CCM	C, R	×
P0446	←	EVAP system vent control circuit problem	ON	2	EVAP system	C, R	×
P0455	←	EVAP system leak detected (large leak)	ON	2	EVAP system	C, R	×
P0456[*2]	←	EVAP system leak detected (very small leak)	ON	2	EVAP system	C, R	×
P0461	←	Fuel gauge sender unit circuit range/performance problem	ON	2	CCM	C	×
P0462	←	Fuel gauge sender unit (main) circuit low input	ON	2	CCM	C, O, R	×
P0463	←	Fuel gauge sender unit (main) circuit high input	ON	2	CCM	C, O, R	×
P0480	←	Cooling fan No.1 control circuit problem	OFF	2	Other	C, O, R	×
P0481	←	Cooling fan No.2 control circuit problem	OFF	2	Other	C, O, R	×
P0500	←	VSS circuit problem	ON	2	CCM	C	×
P0505	←	Idle air control system problem	OFF	—	—	R	—
P0506	←	Idle air control system RPM lower than expected	ON	2	CCM	C	×
P0507	←	Idle air control system RPM higher than expected	ON	2	CCM	C	×
P050A[*3]	—	Cold start idle air control system performance	ON	2	CSERS	C	×
P0562	←	System voltage low (KAM)	ON	1	CCM	C, O, R	×
P0564	←	Cruise control switch input circuit problem	OFF	1	Other	C, O, R	×
P0571	←	Brake switch input circuit problem	OFF	1	Other	C, O, R	×
P0601	←	PCM memory check sum error	ON	1	CCM	C, O, R	×
P0602	←	PCM programming error	ON	1	CCM	C, O, R	×
P0604	←	PCM random access memory error	ON	1	CCM	C, O, R	×
P0610	←	PCM vehicle options error	ON	1	CCM	C, O, R	×
P0638	←	Throttle actuator control circuit range/performance problem	ON	1	CCM	C	×
P0661	←	SSV solenoid valve control circuit low	ON	2	CCM	C, O, R	×
P0662	←	SSV solenoid valve control circuit high	ON	2	CCM	C, O, R	×
P0703	←	Brake switch input circuit problem	ON	2	CCM	C	×
P0704[*3]	←	CPP switch input circuit problem	ON	2	CCM	C	×
P0850[*3]	←	Neutral switch input circuit problem	ON	2	CCM	C	×
P1260	←	Immobilizer system problem	OFF	1	Other	C, O	—
P1686	←	Metering oil pump control circuit low flow side problem	ON	1	CCM	C, R	×

DTC No.		Condition	MIL	DC	Monitor item[*1]	Self-test type[*4]	Memory function
2006 MY	2005 MY						
P1687	←	Metering oil pump control circuit high flow side problem	ON	1	CCM	C, R	×
P1688	←	Metering oil pump control circuit initial check problem	ON	1	CCM	C, R	×
P2004[*3]	←	APV stuck open	ON	2	CCM	C, O, R	×
P2006[*3]	←	APV motor control driver IC problem	ON	2	CCM	C	×
P2009[*3]	←	APV motor control circuit low	ON	2	CCM	C, O, R	×
P2010[*3]	←	APV motor control circuit high	ON	2	CCM	C, O, R	×
P2016[*3]	←	APV position sensor circuit low	ON	2	CCM	C, O, R	×
P2017[*3]	←	APV position sensor circuit high	ON	2	CCM	C, O, R	×
P2067	←	Fuel gauge sender unit (sub) circuit low input	ON	2	CCM	C, O, R	×
P2068	←	Fuel gauge sender unit (sub) circuit high input	ON	2	CCM	C, O, R	×
P2070	←	SSV stuck open	ON	2	CCM	C, O, R	×
P2096	←	Target A/F feedback system too lean	ON	2	Fuel system	C, R	×
P2097	←	Target A/F feedback system too rich	ON	2	Fuel system	C, R	×
P2102	←	Drive-by-wire relay control circuit low	ON	1	CCM	C, O, R	×
P2103	←	Drive-by-wire relay control circuit high	ON	1	CCM	C, O, R	×
P2106	←	Throttle actuator control system-forced limited power	ON	1	CCM	C	×
P2107	←	Throttle actuator control module processor error	ON	1	CCM	C, O, R	×
P2108	←	Throttle actuator control module performance error	ON	1	CCM	C	×
P2109	←	TP sensor minimum stop range/performance problem	ON	1	CCM	C	×
P2112	←	Throttle actuator control system range/performance problem	ON	1	CCM	C	×
P2119	←	Throttle actuator control throttle body range/ performance problem	ON	2	CCM	C, O, R	×
P2122	←	APP sensor No.1 circuit low input	ON	1	CCM	C, O, R	×
P2123	←	APP sensor No.1 circuit high input	ON	1	CCM	C, O, R	×
P2127	←	APP sensor No.2 circuit low input	ON	1	CCM	C, O, R	×
P2128	←	APP sensor No.2 circuit high input	ON	1	CCM	C, O, R	×
P2135	←	TP sensor No.1/No.2 voltage correlation problem	ON	1	CCM	C, O, R	×
P2136	←	TP sensor No.1/No.3 (calculation value in PCM) voltage correlation problem	ON	1	CCM	C, O, R	×
P2138	←	TP sensor No.3 (calculation value in PCM)/No.4 (calculation value in PCM) voltage correlation problem	ON	1	CCM	C, O, R	×
P2195	←	Front HO2S signal stuck lean	ON	2	HO2S	C, R	×
P2196	←	Front HO2S signal stuck rich	ON	2	HO2S	C, R	×
P2257	←	AIR pump relay control circuit low	ON	2	AIR system	C, O, R	×
P2258	←	AIR pump relay control circuit high	ON	2	AIR system	C, O, R	×
P2259	←	AIR solenoid valve control circuit low	ON	2	AIR system	C, O, R	×
P2260	←	AIR solenoid valve control circuit high	ON	2	AIR system	C, O, R	×
P2270	←	Rear HO2S signal stuck lean	ON	2	HO2S	C, R	×
P2271	←	Rear HO2S signal stuck rich	ON	2	HO2S	C, R	×
P2401	←	EVAP system leak detection pump control circuit low	ON	2	EVAP system	C, O, R	×
P2402	←	EVAP system leak detection pump control circuit high	ON	2	EVAP system	C, O, R	×
P2404	←	EVAP system leak detection pump sense circuit range/performance problem	ON	2	EVAP system	C	×
P2405	←	EVAP system leak detection pump sense circuit low	ON	2	EVAP system	C, O, R	×
P2407	←	EVAP system leak detection pump sense circuit intermittent/erratic problem	ON	2	EVAP system	C, O, R	×

DTC No.		Condition	MIL	DC	Monitor item*1	Self-test type*4	Memory function
2006 MY	2005 MY						
P2502	←	Charging system voltage problem	OFF	1	Other	C, R	×
P2503	←	Charging system voltage low	OFF	1	Other	C, R	×
P2504	←	Charging system voltage high	OFF	1	Other	C, R	×

*1 : Indicates the applicable item in the On-Board System Readiness Test as defined by CARB.
*2 : California emission regulation applicable model
*3 : 13B-MSP (HIGH POWER)
*4 : C: CMDTC self-test, O: KOEO self-test, R: KOER self-test

OBD-II Diagnostic Monitoring System Test Results (Mode 06)

- Differences between the 2006 MY and 2005 MY diagnostic monitoring system test results are shown below.

DMTR table

Test ID		Description	Related system
2006 MY	2005 MY		
10:01:80	←	Response lean to rich	HO2S (front HO2S)
10:01:81	←	Response rich to lean	
10:01:82	—	Response lean to rich delayed	
10:01:83	—	Response rich to lean delayed	
10:02:03	←	Low sensor voltage for switch time calculation	HO2S (rear HO2S)
10:02:04	←	High sensor voltage for switch time calculation	
10:02:05	←	Rich to lean sensor switching time	
10:21:80	←	Front and rear HO2S switching time ratio	Catalyst
10:3A:80	←	Large leak check	EVAP system
10:3B:80	←	Small leak check	
10:3C:80*1	←	Very small leak check	
10:3D:80	←	Purge flow monitor	
10:71:80	←	Secondary airflow test 1 (secondary air functional check)	AIR system
10:71:81	—	Secondary airflow test 2 (secondary airflow rate check)	
10:A2:0B	←	Exponentially weighted moving average misfire counts for last 10 driving cycles	Misfire
10:A2:0C	←	Misfire counts for last/current driving cycles	
10:A3:0B	←	Exponentially weighted moving average misfire counts for last 10 driving cycles	
10:A3:0C	←	Misfire counts for last/current driving cycles	
10:E1:81	←	ECT	Thermostat

*1 : California emission regulation applicable model

DTC DETECTION LOGIC AND CONDITIONS

EHU010200000103

- The following DTCs have been adopted detection condition.
  — P0116, P0134, P0137, P0411, P050A
- The following DTCs have been changed detection condition.
  — P0030
- Detection conditions are shown below.

P0030 Front HO2S heater control circuit problem

- The PCM monitors the front HO2S impedance when under the front HO2S heater control for **190 s**. If the impedance is **more than 44 ohms** while PCM turns front HO2S heater on, the PCM determines that there is a front HO2S heater control circuit problem.

P0116 Engine coolant temperature circuit range/performance

- The PCM monitors the maximum value and minimum value of engine coolant temperature when the engine is started and **5 min** have been passed after leaving the vehicle **6 h or more**. If difference between maximum and minimum values of engine coolant temperature is **below 5.6 °C {42.1 °F}** the PCM determines that there is an ECT circuit range/performance problem.

P0134 Front HO2S no activity detected

- The PCM monitors the front HO2S element impedance when the following conditions are met. If the front HO2S element impedance is **50 ohms or more**, the PCM determines that front HO2S is not activated.
  MONITORING CONDITIONS
  — HO2S, HO2S heater and TWC Repair Verification Drive Mode
  — Following conditions are met
    - Time from engine start is **above 40 s** (ECT when engine start is **20 °C {68 °F}**).

P0137 Rear HO2S circuit low input

- The PCM monitors input voltage from rear HO2S. If the input voltage from the rear HO2S is below **0.1 V** for **35.2 s** the PCM determines that circuit input is low.
  MONITORING CONDITIONS
  — HO2S, HO2S heater and TWC repair verification drive mode
  — Following conditions are met.
    - Engine speed is **above 1,500 rpm**.
    - Engine coolant temperature is **above 70 °C {158 °F}**.
    - Fuel injector control in rear HO2S closed loop control.
- The PCM monitors the input voltage from the rear HO2S when the following conditions are met. Under the following monitoring conditions, if the input voltage from the rear HO2S does not even **exceed 0.1 V** though the short term fuel trim is controlled, the PCM determines that sensor circuit input is low.

P0411 Secondary air injection system incorrect upstream flow

- The PCM monitors the front HO2S output current when the Secondary air injection system is operating. If the output current is less than the specification, the PCM determines that there is a Secondary air injection system problem.

P050A Cold start idle air control system performance

- The PCM monitors actual idle speed while fast idle up correction operating. If the idle speed is out of specified range, the PCM determines that the idle air control has performance problem.

KOEO/KOER SELF-TEST

EHU010200000104

- Differences between the 2006 MY and 2005 MY KOEO/KOER self-test items are shown below.

KOEO/KOER self-test table

×: Applicable
—: Not applicable

DTC No.		Condition	Test condition	
2006 MY	2005 MY		KOEO	KOER
P0030	←	Front HO2S heater control circuit problem	×	×
P0031	←	Front HO2S heater control circuit low	×	×
P0032	←	Front HO2S heater control circuit high	×	×
P0037	←	Rear HO2S heater control circuit low	×	×
P0038	←	Rear HO2S heater control circuit high	×	×
P0076	←	VDI solenoid valve control circuit low	×	×
P0077	←	VDI solenoid valve control circuit high	×	×
P0101	←	MAF sensor circuit range/performance problem	—	—
P0102	←	MAF sensor circuit low input	×	×
P0103	←	MAF sensor circuit high input	×	×
P0107	←	BARO sensor circuit low input	×	×
P0108	←	BARO sensor circuit high input	×	×
P0111	←	IAT sensor circuit range/performance problem	—	—
P0112	←	IAT sensor circuit low input	×	×
P0113	←	IAT sensor circuit high input	×	×
P0116	—	Engine coolant temperature circuit range/performance	—	—
P0117	←	ECT sensor circuit low input	×	×
P0118	←	ECT sensor circuit high input	×	×
P0122	←	TP sensor No.1 circuit low input	×	×
P0123	←	TP sensor No.1 circuit high input	×	×
P0125	←	Insufficient coolant temperature for closed loop fuel control	—	—
P0126	←	Insufficient coolant temperature for stable operation	—	—
P0130	←	Front HO2S circuit problem	×	×
P0131	←	Front HO2S circuit low voltage	×	×
P0132	←	Front HO2S circuit high voltage	×	×

DTC No.		Condition	Test condition	
2006 MY	2005 MY		KOEO	KOER
P0133	←	Front HO2S circuit slow response	—	—
P0134	—	Front HO2S no activity detected	—	×
P0137	—	Rear HO2S circuit low input	—	—
P0138	←	Rear HO2S circuit high voltage	—	×
P0139	←	Rear HO2S circuit slow response	—	×
P0171	←	System too lean	—	×
P0172	←	System too rich	—	×
P0222	←	TP sensor No.2 circuit low input	×	×
P0223	←	TP sensor No.2 circuit high input	×	×
P0300	←	Random misfire detected	—	—
P0301	←	Front rotor misfire detected	—	—
P0302	←	Rear rotor misfire detected	—	—
P0327	←	KS circuit low input	×	×
P0328	←	KS circuit high input	×	×
P0335	←	Eccentric shaft position sensor circuit problem	—	—
P0336	←	Eccentric shaft position sensor circuit range/performance problem	—	×
P0410	←	Secondary air injection system problem	—	×
P0411	—	Secondary air injection system incorrect upstream flow	—	—
P0420	←	Catalyst system efficiency below threshold	—	—
P0441	←	EVAP system incorrect purge flow	—	×
P0442	←	EVAP system leak detected (small leak)	—	×
P0443	←	Purge solenoid valve circuit problem	—	×
P0446	←	EVAP system vent control circuit problem	—	×
P0455	←	EVAP system leak detected (large leak)	—	×
P0456	←	EVAP system leak detected (very small leak)	—	×
P0461	←	Fuel gauge sender unit circuit range/performance problem	—	—
P0462	←	Fuel gauge sender unit (main) circuit low input	×	×
P0463	←	Fuel gauge sender unit (main) circuit high input	×	×
P0480	←	Cooling fan No.1 control circuit problem	×	×
P0481	←	Cooling fan No.2 control circuit problem	×	×
P0500	←	VSS circuit problem	—	—
P0505	←	Idle air control system problem	—	×
P0506	←	Idle air control system RPM lower than expected	—	—
P0507	←	Idle air control system RPM higher than expected	—	—
P050A	—	Cold start idle air control system performance	—	—
P0562	←	System voltage low (KAM)	×	×
P0564	←	Cruise control switch input circuit problem	×	×
P0571	←	Brake switch input circuit problem	×	×
P0601	←	PCM memory check sum error	×	×
P0602	←	PCM programming error	×	×
P0604	←	PCM random access memory error	×	×
P0610	←	PCM vehicle options error	×	×
P0638	←	Throttle actuator control circuit range/performance problem	—	—
P0661	←	SSV solenoid valve control circuit low	×	×
P0662	←	SSV solenoid valve control circuit high	×	×
P0703	←	Brake switch input circuit problem	—	—
P0704	←	CPP switch input circuit problem	—	—
P0850	←	Neutral switch input circuit problem	—	—
P1260	←	Immobilizer system problem	×	—
P1686	←	Metering oil pump control circuit low flow side problem	—	×
P1687	←	Metering oil pump control circuit high flow side problem	—	×
P1688	←	Metering oil pump control circuit initial check problem	—	×
P2004	←	APV stuck open	×	×

DTC No.		Condition	Test condition	
2006 MY	2005 MY		KOEO	KOER
P2006	←	APV motor control driver IC problem	—	—
P2009	←	APV motor control circuit low	×	×
P2010	←	APV motor control circuit high	×	×
P2016	←	APV position sensor circuit low	×	×
P2017	←	APV position sensor circuit high	×	×
P2067	←	Fuel gauge sender unit (sub) circuit low input	×	×
P2068	←	Fuel gauge sender unit (sub) circuit high input	×	×
P2070	←	SSV stuck open	×	×
P2096	←	Target A/F feedback system too lean	—	×
P2097	←	Target A/F feedback system too rich	—	×
P2102	←	Drive-by-wire relay control circuit low	×	×
P2103	←	Drive-by-wire relay control circuit high	×	×
P2106	←	Throttle actuator control system-forced limited power	—	—
P2107	←	Throttle actuator control module processor error	×	×
P2108	←	Throttle actuator control module performance error	—	—
P2109	←	TP sensor minimum stop range/performance problem	—	—
P2112	←	Throttle actuator control system range/performance problem	—	—
P2119	←	Throttle actuator control throttle body range/performance problem	×	×
P2122	←	APP sensor No.1 circuit low input	×	×
P2123	←	APP sensor No.1 circuit high input	×	×
P2127	←	APP sensor No.2 circuit low input	×	×
P2128	←	APP sensor No.2 circuit high input	×	×
P2135	←	TP sensor No.1/No.2 voltage correlation problem	×	×
P2136	←	TP sensor No.1/No.3 (calculation value in PCM) voltage correlation problem	×	×
P2138	←	TP sensor No.3 (calculation value in PCM)/No.4 (calculation value in PCM) voltage correlation problem	×	×
P2195	←	Front HO2S signal stuck lean	—	×
P2196	←	Front HO2S signal stuck rich	—	×
P2257	←	AIR pump relay control circuit low	×	×
P2258	←	AIR pump relay control circuit high	×	×
P2259	←	AIR solenoid valve control circuit low	×	×
P2260	←	AIR solenoid valve control circuit high	×	×
P2270	←	Rear HO2S signal stuck lean	—	×
P2271	←	Rear HO2S signal stuck rich	—	×
P2401	←	EVAP system leak detection pump control circuit low	×	×
P2402	←	EVAP system leak detection pump control circuit high	×	×
P2404	←	EVAP system leak detection pump sense circuit range/performance problem	—	—
P2405	←	EVAP system leak detection pump sense circuit low	×	×
P2407	←	EVAP system leak detection pump sense circuit intermittent/erratic problem	×	×
P2502	←	Charging system voltage problem	—	×
P2503	←	Charging system voltage low	—	×
P2504	←	Charging system voltage high	—	×

PID/DATA MONITOR AND RECORD

EHU010200000105

- Differences between the 2006 MY and 2005 MY PID/DATA monitor items are shown below.

PID/DATA monitor item table

—: Not applicable

Item		Definition	Unit/Condition	PCM terminal
2006 MY	2005 MY			
AC_REQ*1	—	Refrigerant pressure switch (high, low)	On/Off	4W
ACCS	←	A/C relay control signal in PCM	On/Off	5AA
ACSW*2	←	Input signal from A/C switch	On/Off	4W
AIP RLY	←	AIR pump relay control signal in PCM	On/Off	4O
ALTF	←	Generator field coil control signal in PCM	%	2I
ALTT V	←	Input voltage from generator	V	2T
APP	←	APP	%	5C, 5F
APP1	←	APP from APP sensor No.1	%	5F
	←	Input voltage from APP sensor No.1	V	
APP2	←	APP from APP sensor No.2	%	5C
	←	Input voltage from APP sensor No.2	V	
APV	←	APV motor control signal in PCM	Opening/Closing	3G, 3J
APV_POS	←	Input voltage from APV position sensor	V	3B
ARPMDES	←	Target engine speed	RPM	—
B+*2	←	Input voltage from battery	V	5J
BARO	←	BARO	kPa / Bar / psi	5S
	←	Input voltage from BARO sensor	V	
BOO	←	Input signal from brake switch No.2	On/Off	4P
CATT11_DSD	←	Estimated catalyst converter temperature	°C / °F	—
CHRGLP	←	Generator warning light control signal in PCM	On/Off	—
COLP	←	Input signal from refrigerant pressure switch (medium-pressure)	On/Off	4Z
CPP*3	←	Input signal from CPP switch	On/Off	4F
CPP/PNP	←	Input signal from neutral switch	Drive/Neutral	2O
DEI	←	VDI solenoid valve control signal in PCM	On/Off	1W
DTCCNT	←	DTC count (includes those needing no action)	—	—
ECT	←	ECT	°C / °F	2K
	←	Input voltage from ECT sensor	V	
EQ_RAT11	←	Lambda	—	2B
EQ_RAT11_DSD*1	—	Target lambda	—	—
ETC_ACT	←	Throttle valve opening angle	°	1J, 1M
ETC_DSD	←	Target throttle valve position	%	—
	←	Target throttle valve opening angle	°	
EVAPCP	←	Purge solenoid valve control signal in PCM	%	2P
FAN1	←	Cooling fan relay No.1 control signal in PCM	On/Off	5X
FAN2	←	Cooling fan relay No.2 control signal in PCM	On/Off	5AD
FLI	←	Fuel tank level	%	—
FP	←	Fuel pump relay control signal in PCM	On/Off	5P
FPRR	←	Fuel pump speed control relay control signal in PCM	On/Off	4M
FUELPW	←	Fuel injection duration in PCM	ms	2J, 2M
FUELSYS	←	Fuel system loop status	OL/CL/OL Drive/ OL Fault/CL Fault	—
GENVDSD	←	Target generator voltage	V	—
HTR11	←	Front HO2S heater control signal in PCM	On/Off	1V
HTR12	←	Rear HO2S heater control signal in PCM	On/Off	2A
IAC	←	Throttle actuator control signal in PCM	%	1B, 1C
IASV	←	VFAD solenoid valve control signal in PCM	On/Off	5Z

Item		Definition	Unit/Condition	PCM terminal
2006 MY	2005 MY			
IAT	←	IAT	°C | °F	5K
	←	Input voltage from IAT sensor	V	
INGEAR	←	In gear	On/Off	—
IVS	←	Idle validation	Idle/Off Idle	1J, 1M
KNOCKR	←	Spark retard value to prevent knocking	°	1T
LDP_MON	←	Indicates EVAP System leak detection pump monitoring current	mA	4D
LDP_REF	←	Indicates EVAP System leak detection pump reference current	mA	4D
LDP_IDL	←	Indicates EVAP System leak detection pump idle current	mA	4D
LDP_SLDV	←	Indicates EVAP Control system small leak detection value	mA	4D
LDP_VSLDV*4	←	Indicates EVAP Control system very small leak detection value	mA/sec	4D
LDP_EVAPCP	←	Indicates EVAP Control system incorrect purge flow detection value	mA	4D
LOAD	←	LOAD	%	—
LONGFT1	←	Long term fuel trim	%	—
MAF	←	MAF	g/s	5N
	←	Input voltage from MAF sensor	V	
MIL	←	MIL control signal in PCM	On/Off	—
MIL_DIS	←	Distance travelled while MIL is activated	km | mile	—
MOP_POS	←	Metering oil pump control status	—	2V, 2W, 2Y, 2AB
MOP_SW	←	Input signal from metering oil pump switch	On/Off	2N
O2S11	←	Front HO2S output current	mA	2B
O2S12	←	Input voltage from rear HO2S	V	2Q
PACNTV	←	AIR solenoid valve control signal in PCM	On/Off	1O
PCM_T	←	Input voltage from PCM temperature sensor	V	—
RO2FT1	←	Target A/F feedback system status	—	—
RPM	←	Engine speed	RPM	—
SC_SET	←	Cruise indicator light control signal in PCM	On/Off	—
SCCS	←	Input voltage from cruise control switch	V	5V
SELTESTDTC	←	DTC count by KOEO/KOER self-test	—	—
SHRTFT1	←	Short term fuel trim	%	—
SHRTFT12	←	Target A/F fuel trim	%	—
SPARK-L	←	Spark advance (L/F) in PCM	°	2AA
SPARK-T	←	Spark advance (T/F) in PCM	°	2AD
SSV	←	SSV solenoid valve control signal in PCM	On/Off	1L
Test	←	Test mode	On/Off	—
TIRESIZE	←	Tire revolution per mile	rev/mile	—
TP	←	Input voltage from TP sensor	V	1J, 1M
TP REL	←	Relative TP	%	1J, 1M
TP1	←	TP from TP sensor No.1	%	1J
	←	Input voltage from TP sensor No.1	V	
TP2	←	TP from TP sensor No.2	%	1M
	←	Input voltage from TP sensor No.2	V	
TPCT	←	Minimum input voltage from TP sensor at throttle closing	V	1J, 1M
VPWR*1	—	Input voltage from battery (battery positive voltage)	V	5J
VSS	←	Vehicle speed	KPH | MPH	—

*1 : 13B-MSP (HIGH POWER)
*2 : 13B-MSP (STANDARD POWER)
*3 : MT model
*4 : California emission regulation applicable model

SIMULATION TEST

EHU010200000106

- Differences between the 2006 MY and 2005 MY simulation items are shown below.

Simulation item table

×: Applicable
—: Not applicable

Item		Applicable component	Unit/condition	Test condition		PCM terminal
2006 MY	2005 MY			KOEO	KOER	
ACCS	←	A/C relay	On/Off	×	×	5AA
AIP RLY	←	AIR pump relay	On/Off	×	×	4O
ALTF	←	Generator (field coil)	%	—	×	2I
APV	←	APV motor	opening/closing	×	×	3G, 3J
ARPMDES	←	Target engine speed	RPM	×	×	—
DEI	←	VDI solenoid valve	On/Off	×	×	1W
ETC_DSD	←	Target throttle valve opening angle	°	×	×	—
EVAPCP	←	Purge solenoid valve	%	×	×	2P
FAN1	←	Cooling fan relay No.1	On/Off	×	×	5X
FAN2	←	Cooling fan relay No.2	On/Off	×	×	5AD
FP	←	Fuel pump relay	On/Off	×	×	5P
FPRR	←	Fuel pump speed control relay	On/Off	×	×	4M
FUELPW1	←	Fuel injector (FP1, RP1)	%	—	×	2J, 2M
GENVDSD	←	Target generator voltage	V	—	×	—
HTR12	←	Rear HO2S heater	On/Off	×	×	2A
IASV	←	VFAD solenoid valve	On/Off	×	×	5Z
MOP_POS	←	Metering oil pump	—	×	×	2V, 2W, 2Y, 2AB
PACNTV	←	AIR solenoid valve	On/Off	×	×	1O
SSV	←	SSV solenoid valve	On/Off	×	×	1L
test	←	Test mode	On/Off	×	×	—
Time_DR_LR*1	—	Lean-to-rich Delayed Response Time	sec	—	×	—
Time_DR_RL*1	—	Rich-to-lean Delayed Response Time	sec	—	×	—
Time_SR_LR*1	—	Lean-to-rich Slow Response Time	sec	—	×	—
Time_SR_RL*1	—	Rich-to-lean Slow Response Time	sec	—	×	—

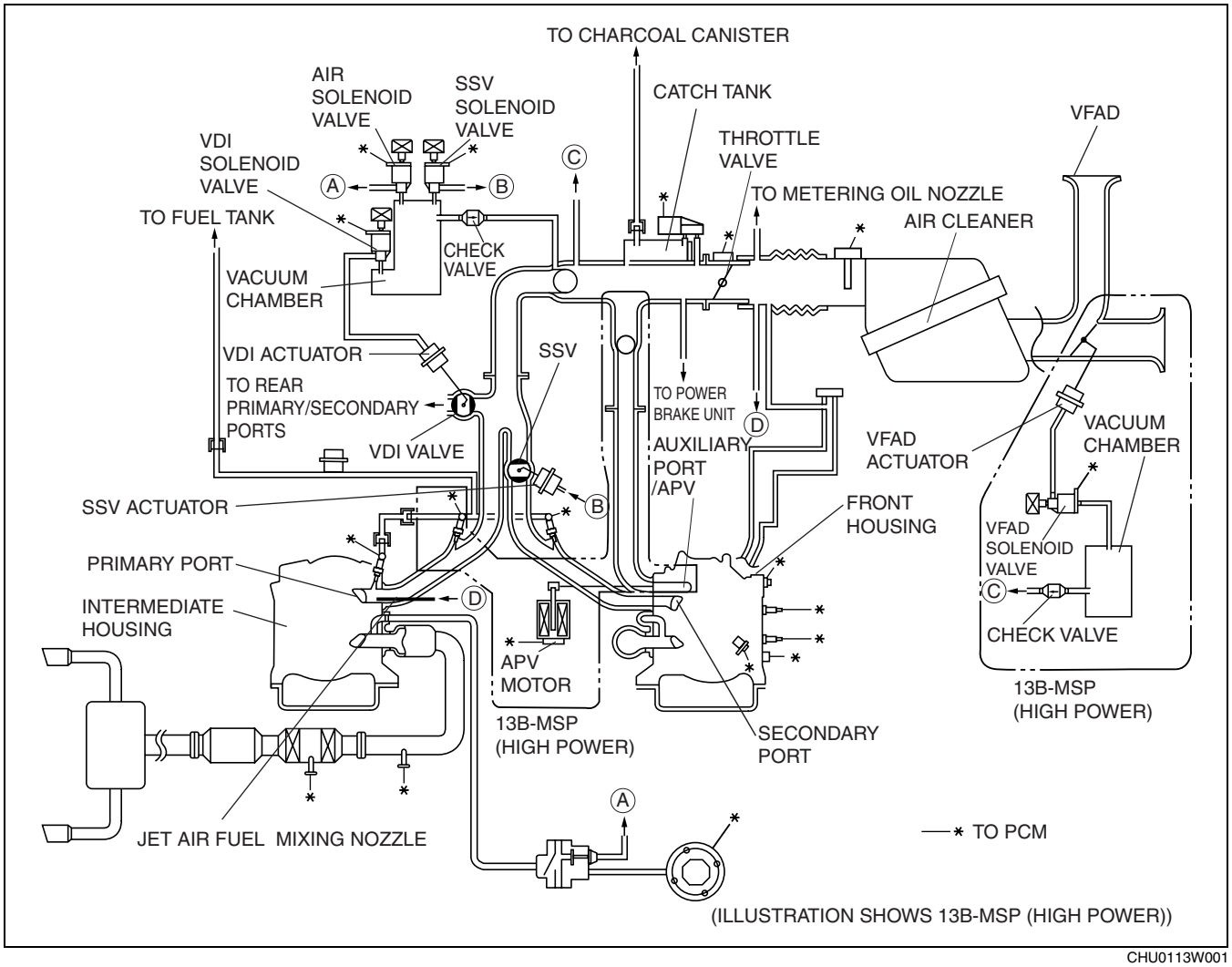
*1 : 13B-MSP (HIGH POWER)

01–13 INTAKE-AIR SYSTEM

INTAKE-AIR SYSTEM DIAGRAM

EHU011300000101

Applied VIN (assumed):
JM1 FE173*6# 200001—JM1 FE173*6# 200011
JM1 FE17N*6# 200001—JM1 FE17N*6# 200011



CHU0113W001

INTAKE-AIR SYSTEM

Applied VIN (assumed):
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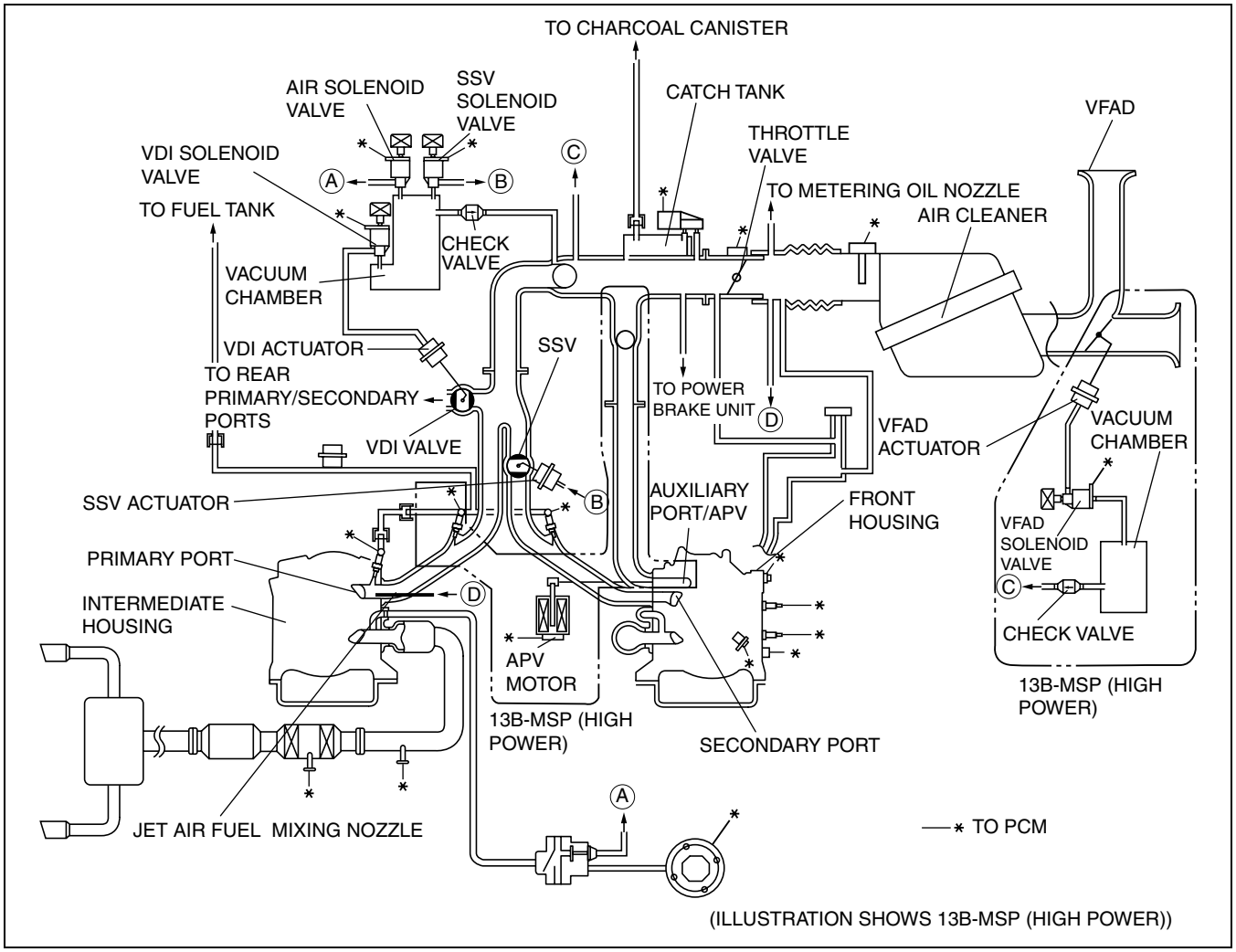
JM1 FE17N*6# 200012—



EHU113ZS4A02

INTAKE-AIR SYSTEM

INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM

EHU011300000102

Applied VIN (assumed):
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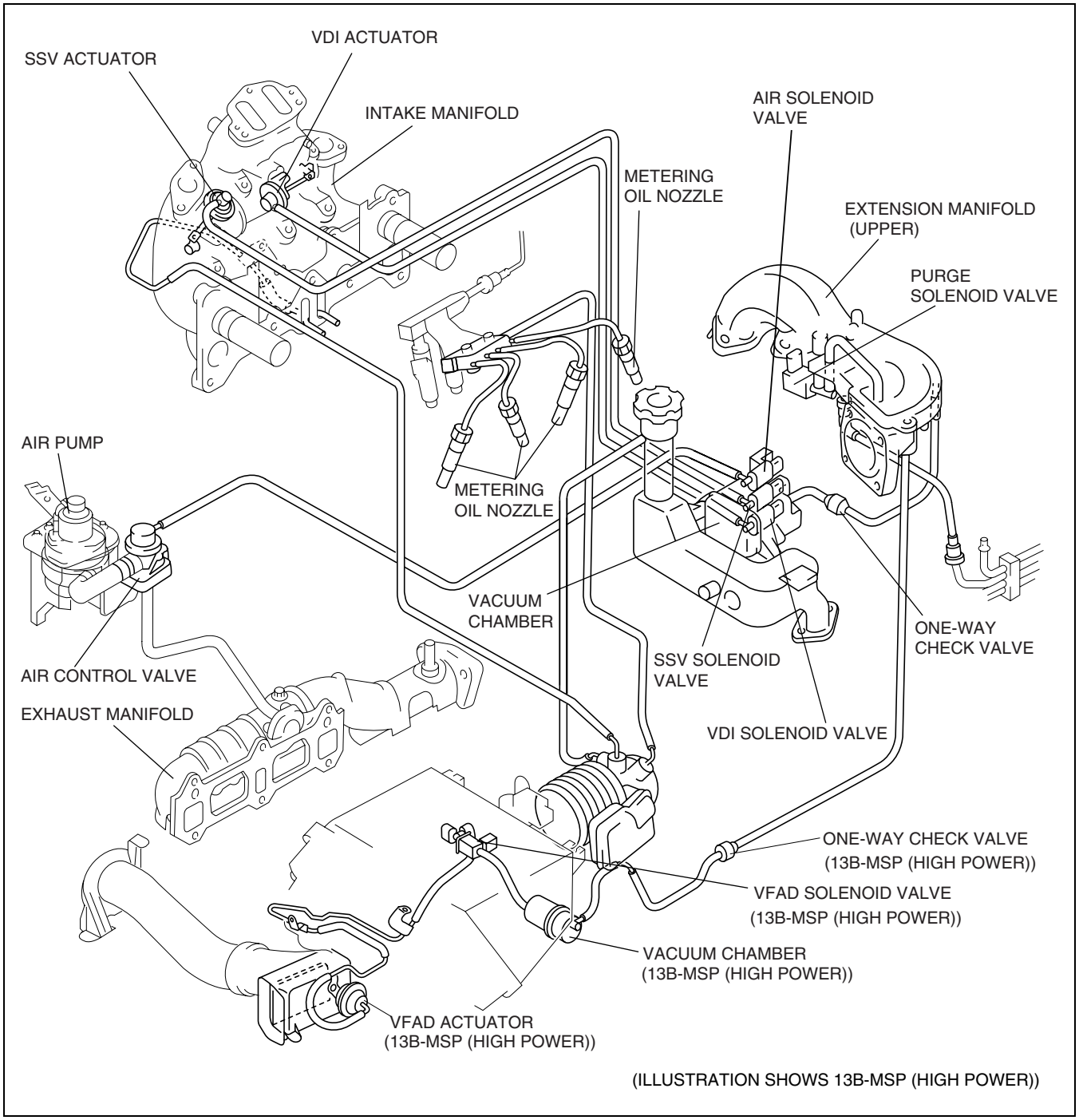
JM1 FE17N*6# 200001—JM1 FE17N*6# 200011



CHU0113W002

INTAKE-AIR SYSTEM

Applied VIN (assumed):
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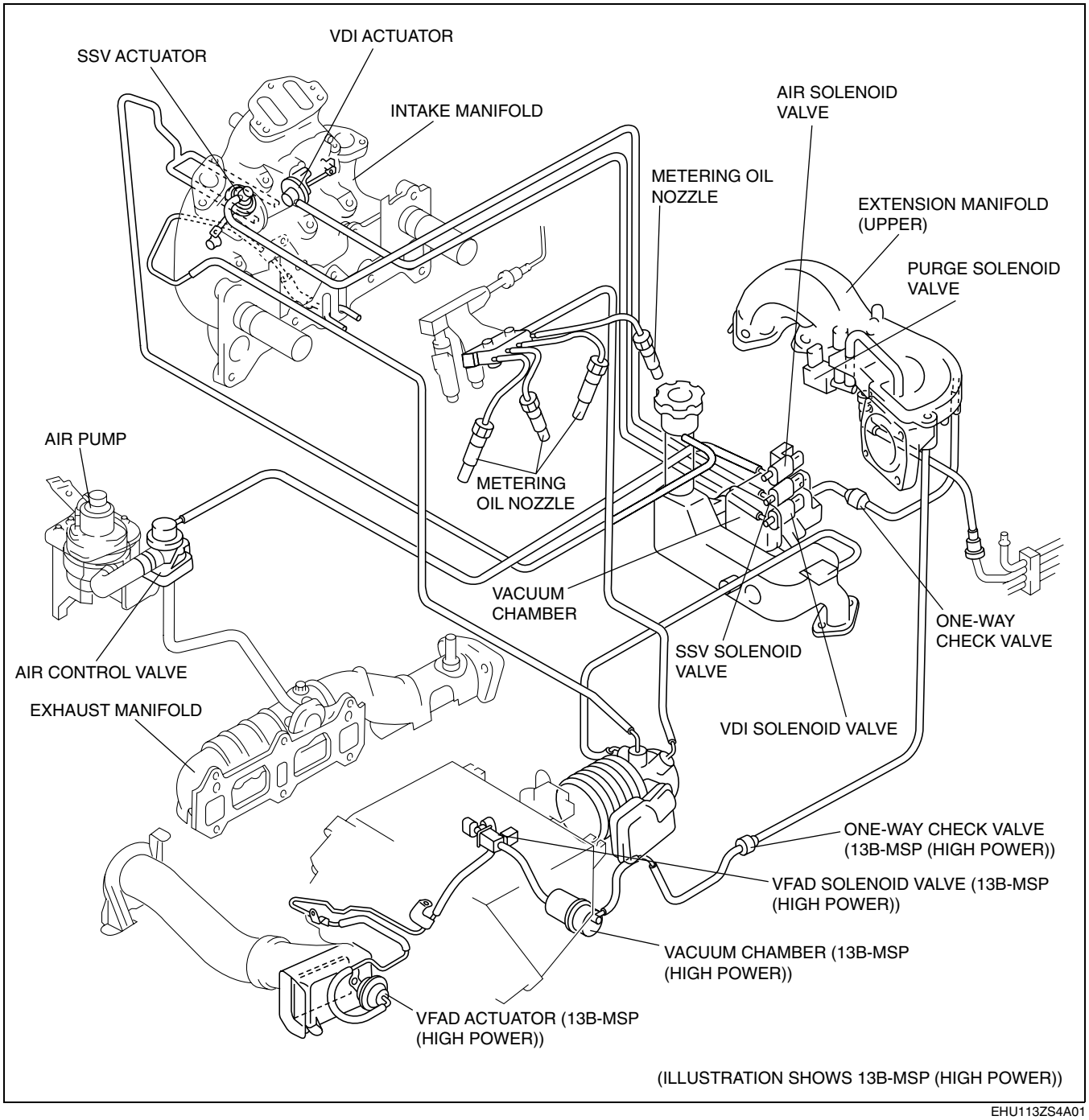
JM1 FE17N*6# 200012—



EHU113ZS4A01

TRANSMISSION/TRANSAXLE

05
SECTION

05–00 OUTLINE

TRANSMISSION/TRANSAXLE ABBREVIATIONS

EHU050000000101

AAS	Active Adaptive Shift
ATF	Automatic Transmission Fluid
AT	Automatic Transmission
CAN	Controller Area Network
CPU	Central Processing Unit
DC	Drive Cycle
EC-AT	Electronically Controlled Automatic Transmission
PPF	Power Plant Frame
1GR	First Gear
2GR	Second Gear
3GR	Third Gear
4GR	Fourth Gear
5GR	Fifth Gear
6GR	Sixth Gear

TRANSMISSION/TRANSAXLE FEATURES

EHU050000000108

6-SPEED AT [SJ6A-EL]	
Improved fuel economy	• Six-speed SJ6A-EL automatic transmission has been adopted.
Improved marketability	• Six-speed SJ6A-EL automatic transmission has been adopted. • The Sport AT has been adopted. With this feature up and downshifting can be performed with either the shift control switch on the steering wheel or with the one-touch operation of the selector lever. • A 5-6 shift inhibit control has been adopted for rapid engine warming.
Superior shift quality	• Torque reduction control and line pressure control has been adopted. • Shift learning control has been adopted.
Improved driveability	• To improve drivetrain rigidity, a closed section power plant frame (PPF) has been adopted. • A control feature for climbing/descending hills has been adopted, improving driveability when climbing/descending.

TRANSMISSION/TRANSAXLE SPECIFICATIONS

EHU050000000106

Automatic Transmission

Item		2005MY RX-8	2006MY RX-8	
Transmission type		RC4A-EL	←	SJ6A-EL
Gear ratio	1GR	2.785	←	3.538
	2GR	1.545	←	2.060
	3GR	1.000	←	1.404
	4GR	0.694	←	1.000
	5GR	—	—	0.713
	6GR	—	—	0.582
	Reverse	2.272	←	3.168
ATF	Type	ATF M-III or equivalent (e.g. Dexron®III)	←	JWS3309
	Capacity (Approx. quantity) (L {US qt, Imp qt})	8.7 {9.2, 7.7}	←	7.9 {8.4, 7.0}
Torque converter stall torque ratio		2.04:1	←	1.85:1
Hydraulic system (Number of drive/driven plates)	Low clutch	5/5	←	—
	High clutch	6/6	←	—
	Reverse clutch	2/2	←	—
	2-4 brake	4/4	←	—
	Low and reverse brake	4/5	←	—
	C1 clutch	—	—	4/4
	C2 clutch	—	—	5/5
	C3 clutch	—	—	4/3
	C4 clutch	—	—	4/4
	B1 brake	—	—	3/3
	B2 brake	—	—	4/3
	B3 brake	—	—	4/4
	B4 brake	—	—	5/4
Front planetary gear (Number of teeth)	Sun gear	33	←	←
	Pinion gear	21	←	—
	Pinion gear (inner)	—	—	19
	Pinion gear (outer)	—	—	18
	Internal gear	75	←	—
	Ring gear	—	—	75
Middle planetary gear (Number of teeth)	Sun gear	—	—	26
	Pinion gear	—	—	20
	Ring gear	—	—	66
Rear planetary gear (Number of teeth)	Sun gear	42	←	26
	Pinion gear	17	←	20
	Internal gear	75	←	—
	Ring gear	—	—	66

05–02 ON-BOARD DIAGNOSTIC [SJ6A-EL]

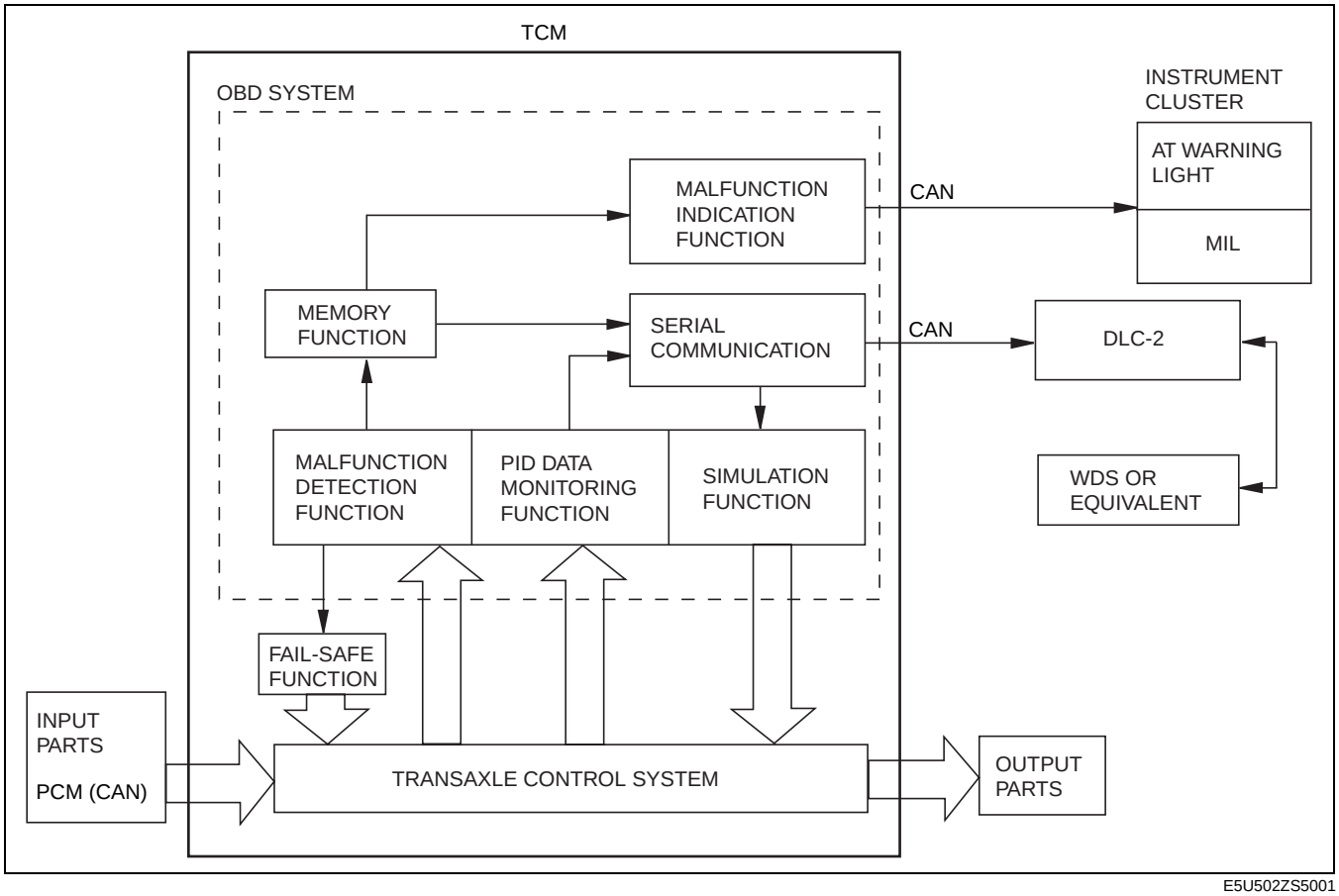
ON-BOARD DIAGNOSTIC (OBD) SYSTEM OUTLINE [SJ6A-EL]

EHU050200000101

- The OBD system has the following functions:
  - — Malfunction detection function: detects malfunctions of the input/output devices and system components of the AT.
  - — Fail-safe function: controls the output device function and input value of the sensors/switches to ensure minimum vehicle drivability when a failure is detected.
  - — Memory function: stores the DTC when a failure is detected.
  - — PID data monitoring function: monitors the input/output signal and calculated value of the TCM and sends the monitoring data to the scan tool.
  - — Simulation function: Allows override operation of simulation items for input/output system parts preset in the TCM.

ON-BOARD DIAGNOSTIC (OBD) SYSTEM BLOCK DIAGRAM [SJ6A-EL]

EHU050200000102



E5U502ZS5001

MALFUNCTION DETECTION FUNCTION [SJ6A-EL]

EHU050200000103

Malfunction Detection Function

- In the malfunction detection function, the TCM detects malfunctions in the automatic transmission while driving.
- When vehicle driving conditions correspond with a preset malfunction detection condition, the TCM determines that the automatic transmission has a malfunction and stores the corresponding DTC.
- When a malfunction is detected, stored DTCs can be retrieved using the WDS or equivalent connected to the DLC-2.

DTC Table

X: Available
–: N/A

DTC No.	Condition	MIL	AT warning light	DC	Memory function
P0601	Flash ROM malfunction	X	X	1	X
P0603	EEPROM malfunction	X	X	1	X
P0604	RAM malfunction	X	X	1	X
P0707	Transmission range (TR) switch circuit low input (short to ground)	X	X	1	X
P0708	Transmission range (TR) switch circuit high input (open circuit)	X	X	2	X
P0711	Transmission fluid temperature (TFT) sensor malfunction (stuck)	X	X	2	X
P0712	Transmission fluid temperature (TFT) sensor circuit malfunction (short to ground)	X	X	1	X
P0713	Transmission fluid temperature (TFT) sensor circuit malfunction (short to power/open circuit)	X	X	1	X
P0717	Turbine sensor circuit malfunction (open circuit/short circuit)	X	X	1	X
P0722	Vehicle speed sensor (VSS) circuit malfunction (open circuit/short circuit)	X	X	1	X
P0751	Shift solenoid A malfunction (stuck off)	X	X	2	X
P0752	Shift solenoid A malfunction (stuck on)	X	X	2	X
P0756	Shift solenoid B malfunction (stuck off)	X	X	2	X
P0757	Shift solenoid B malfunction (stuck on)	X	X	2	X
P0761	Shift solenoid C malfunction (stuck off)	X	X	2	X
P0762	Shift solenoid C malfunction (stuck on)	X	X	2	X
P0766	Shift solenoid D malfunction (stuck off)	X	X	2	X
	Shift solenoid G malfunction (stuck on)	X	X	2	X
P0781	1-2 shift valve malfunction	X	X	2	X
P0813	Reverse sequence valve malfunction	X	X	2	X
P0819	Manual switch/up switch/down switch circuit malfunction (open circuit/short circuit)	–	X	1	X
P0826	Steering shift switch circuit malfunction (open circuit/short to ground)	X	X	1	X
P0882	TCM B+ low (less than 9 V)	–	X	1	X
P0883	TCM B+ low (less than 11 V)	–	X	1	X
P0961	Line pressure control solenoid range/performance (stuck)	X	X	1	X
P0962	Line pressure control solenoid circuit malfunction (short to ground/open circuit)	X	X	1	X
P0963	Line pressure control solenoid circuit malfunction (short to power)	X	X	1	X
P0969	Shift solenoid F range/performance (stuck)	X	X	1	X
P0970	Shift solenoid F circuit malfunction (short to ground/open circuit)	X	X	1	X
P0971	Shift solenoid F circuit malfunction (short to power)	X	X	1	X
P0973	Shift solenoid A circuit malfunction (short to ground)	X	X	1	X
P0974	Shift solenoid A circuit malfunction (short to power/open circuit)	X	X	1	X
P0976	Shift solenoid B circuit malfunction (short to ground)	X	X	1	X
P0977	Shift solenoid B circuit malfunction (short to power/open circuit)	X	X	1	X
P0979	Shift solenoid C circuit malfunction (short to ground)	X	X	1	X
P0980	Shift solenoid C circuit malfunction (short to power/open circuit)	X	X	1	X
P0982	Shift solenoid D circuit malfunction (short to ground)	X	X	1	X
P0983	Shift solenoid D circuit malfunction (short to power/open circuit)	X	X	1	X
P0985	Shift solenoid E circuit malfunction (short to ground)	X	X	1	X
P0986	Shift solenoid E circuit malfunction (short to power/open circuit)	X	X	1	X

DTC No.	Condition	MIL	AT warning light	DC	Memory function
P2719	Shift solenoid G range/performance (stuck)	X	X	1	X
P2720	Shift solenoid G circuit malfunction (short to ground/open circuit)	X	X	1	X
P2721	Shift solenoid G circuit malfunction (short to power)	X	X	1	X
P2757	Torque converter clutch (TCC) stuck off	X	X	2	X
P2758	Torque converter clutch (TCC) stuck on	X	X	2	X
P2762	TCC control solenoid range/performance (stuck)	X	X	1	X
P2763	TCC control solenoid circuit malfunction (short to power)	X	X	1	X
P2764	TCC control solenoid circuit malfunction (short to ground/open circuit)	X	X	1	X
U0073	CAN BUS OFF	X	X	1	X
U0100	TCM cannot receive any signals from PCM	X	X	1	X
U0121	TCM cannot receive any signals from ABS HU/CM or DSC HU/CM	X	X	1	X

MIL: Malfunction Indicator Lamp
DC: Drive Cycle

MEMORY FUNCTION [SJ6A-EL]

EHU050200000104

- The memory function stores malfunction information detected in the malfunction detection function. Once malfunction information is stored, the memory will not be cleared even when the ignition switch is turned off (LOCK position) or the malfunction is repaired.
- The stored memory (malfunction information) can be cleared using the WDS or equivalent, or by disconnecting the negative battery cable.

MALFUNCTION INDICATION FUNCTION [SJ6A-EL]

EHU050200000105

- The malfunction indication function illuminates the MIL or AT warning light when the malfunction detection function determines there is a malfunction.

FAIL-SAFE FUNCTION [SJ6A-EL]

EHU050200000106

- In the fail-safe function, minimum vehicle drivability is obtained by changing the signals that are determined to be malfunctions by the malfunction detection function to the preset values, and limiting TCM control.

DTC No.	On-board diagnostic function	Detection condition	Fail-safe
P0601	Flash ROM malfunction	• Flash ROM (in TCM) internal circuit malfunction is detected.	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0603	EEPROM malfunction	• Different numeric values for EEPRROM and RAM (in TCM) are detected.	N/A
P0604	RAM malfunction	• RAM (in TCM) read/write error is detected.	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0707	Transmission range (TR) switch circuit low input (short to ground)	• TR switch position voltage input to TCM is **less than 0.127 V** when ignition switch is at ON position.	• D range is determined when there is no TR switch signal input. • Inhibits slope mode control
P0708	Transmission range (TR) switch circuit high input (open circuit)	• Vehicle speed is **30 km/h {18.6 mph} or more**, and no range signal is input from the TR switch.	• D range is determined when there is no TR switch signal input. • Inhibits slope mode control
P0711	Transmission fluid temperature (TFT) sensor malfunction (stuck)	• Change in ATF temperature cannot be detected for **10 min or more** when driving in D range.	• Fixes ATF temperature value at **80 °C {176 °F}** • Inhibits slope mode control • Inhibits self learning control • Inhibits slip control

DTC No.	On-board diagnostic function	Detection condition	Fail-safe
P0712	Transmission fluid temperature (TFT) sensor circuit malfunction (short to ground)	• TCM detects ATF temperature of **200 °C {392 °F} or more**.	• Fixes ATF temperature value at **80 °C {176 °F}** • Inhibits slope mode control • Inhibits self learning control • Inhibits slip control
P0713	Transmission fluid temperature (TFT) sensor circuit malfunction (short to power/open circuit)	• TCM detects ATF temperature of **less than -43 °C {-45.4 °F}** when engine is warmed-up and running.	• Fixes ATF temperature value at **80 °C {176 °F}** • Inhibits slope mode control • Inhibits self learning control • Inhibits slip control
P0717	Turbine sensor circuit malfunction (open circuit/ short circuit)	• Turbine speed signal is not input during vehicle speed signal **12 pulse** period when driving in D range.	• Substitutes vehicle speed signal for turbine speed signal. • Inhibits 5GR and 6GR • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits slip control
P0722	Vehicle speed sensor (VSS) circuit malfunction (open circuit/short circuit)	• Vehicle speed signal is not input during turbine speed signal **12 pulse** period when driving in D range.	• Substitutes turbine speed signal for vehicle speed signal. • Inhibits 5GR and 6GR • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits slip control
P0751	Shift solenoid A malfunction (stuck off)	• TCM detects that shift solenoid A does not change from off when engine is running	• Inhibits 4GR, 5GR and 6GR • Inhibits 1GR and 2GR (manual mode)
P0752	Shift solenoid A malfunction (stuck on)	• TCM detects that shift solenoid A does not change from on when engine is running	N/A
P0756	Shift solenoid B malfunction (stuck off)	• TCM detects that shift solenoid B does not change from off when engine is running	N/A
P0757	Shift solenoid B malfunction (stuck on)	• TCM detects that shift solenoid B does not change from on when engine is running	N/A
P0761	Shift solenoid C malfunction (stuck off)	• TMC detects that shift solenoid C does not change from off when engine is running	N/A
P0762	Shift solenoid C malfunction (stuck on)	• TMC detects that shift solenoid C doe not change from on when engine is running	• Inhibits 4GR, 5GR and 6GR
P0766	Shift solenoid D malfunction (stuck off)	• TCM detects that shift solenoid D does not change from off when engine is running	• Inhibits 4GR, 5GR and 6GR
	Shift solenoid G malfunction (stuck on)	• TCM detects that shift solenoid G does not change from on when engine is running	• Inhibits 4GR, 5GR and 6GR
P0781	1-2 shift valve malfunction	• TCM detects 1–2 shift valve malfunction.	• Inhibits 4GR, 5GR and 6GR • Inhibits 1GR and 2GR (manual mode)
P0813	Reverse sequence valve malfunction	• TCM detects reverse sequence valve malfunction.	• Inhibits 6GR
P0819	Manual switch/up switch/ down switch circuit malfunction (open circuit/ short circuit)	**M range switch circuit malfunction** • M range switch remains on for **2 s or more** except in D range.	• Inhibits manual mode control
		Up switch or down switch circuit malfunction • When all of the following conditions are met: — M range switch off. — Except D range — Up or down switch remains on for **10 s or more**.	• Inhibits manual mode control using selector lever

DTC No.	On-board diagnostic function	Detection condition	Fail-safe
P0826	Steering shift switch circuit malfunction (open circuit/ short to ground)	• TCM detects short circuit or short to ground in steering shift switch circuit when engine is running.	• Inhibits manual mode control
P0882	TCM B+ low (less than 9 V)	• Voltage of **less than 9 V** detected at TCM terminals 1AD when engine is running.	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0883	TCM B+ low (less than 11 V)	• Voltage of **less than 11 V** detected at TCM terminals 1AD when engine is running.	• Inhibits self learning control
P0961	Line pressure control solenoid range/ performance (stuck)	• Feedback current corresponding to solenoid current command value is irregular when engine is running.	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0962	Line pressure control solenoid circuit malfunction (short to ground/open circuit)	• Open or short circuit in line pressure control solenoid signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0963	Line pressure control solenoid circuit malfunction (short to power)	• Short circuit in line pressure control solenoid signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0969	Shift solenoid F range/ performance (stuck)	• Feedback current corresponding to solenoid current command value is irregular when engine is running.	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0970	Shift solenoid F circuit malfunction (short to ground/open circuit)	• Open or short circuit in shift solenoid F signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0971	Shift solenoid F circuit malfunction (short to power)	• Short circuit in shift solenoid F signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits N—D shift pressure control • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0973	Shift solenoid A circuit malfunction (short to ground)	• Short to ground in shift solenoid A signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0974	Shift solenoid A circuit malfunction (short to power/open circuit)	• Open or short circuit in shift solenoid A signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0976	Shift solenoid B circuit malfunction (short to ground)	• Short to ground in shift solenoid B signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0977	Shift solenoid B circuit malfunction (short to power/open circuit)	• Open or short circuit in shift solenoid B signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control

DTC No.	On-board diagnostic function	Detection condition	Fail-safe
P0979	Shift solenoid C circuit malfunction (short to ground)	• Short to ground in shift solenoid C signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0980	Shift solenoid C circuit malfunction (short to power/open circuit)	• Open or short circuit in shift solenoid C signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0982	Shift solenoid D circuit malfunction (short to ground)	• Short to ground in shift solenoid D signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0983	Shift solenoid D circuit malfunction (short to power/open circuit)	• Open or short circuit in shift solenoid D signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0985	Shift solenoid E circuit malfunction (short to ground)	• Short to ground in shift solenoid E signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P0986	Shift solenoid E circuit malfunction (short to power/open circuit)	• Open or short circuit in shift solenoid E signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P2719	Shift solenoid G range/ performance (stuck)	• Feedback current corresponding to solenoid current command value is irregular when engine is running.	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P2720	Shift solenoid G circuit malfunction (short to ground/open circuit)	• Open or short circuit in shift solenoid G signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P2721	Shift solenoid G circuit malfunction (short to power)	• Short circuit in shift solenoid G signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Emergency mode • Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits slip control
P2757	Torque converter clutch (TCC) stuck off	• TCM detects that TCC control solenoid does not change from off when engine is running	N/A
P2758	Torque converter clutch (TCC) stuck on	• TCM detects that TCC control solenoid does not change from on when engine is running	• Inhibits acceleration from 2GR
P2762	TCC control solenoid range/performance (stuck)	• Feedback current corresponding to solenoid current command value is irregular when engine is running.	• Inhibits acceleration from 2GR • Inhibits TCC control • Inhibits slip control
P2763	TCC control solenoid circuit malfunction (short to power)	• Short circuit in TCC control solenoid signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Inhibits acceleration from 2GR • Inhibits TCC control • Inhibits slip control
P2764	TCC control solenoid circuit malfunction (short to ground/open circuit)	• Open or short circuit in TCC control solenoid signal system (while TCM monitors solenoid output voltage, the voltage that differs from the signal output by CPU in TCM is detected).	• Inhibits acceleration from 2GR • Inhibits TCC control • Inhibits slip control

DTC No.	On-board diagnostic function	Detection condition	Fail-safe
U0073	CAN BUS OFF	• Bus off error is detected.	• Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits 5GR, 6GR • Inhibits slip control
U0100	TCM cannot receive any signals from PCM	• Communication error is detected between TCM and PCM.	• Inhibits self learning control • Inhibits driver adaptive shift control • Inhibits TCC control • Inhibits 5GR, 6GR • Inhibits slip control
U0121	TCM cannot receive any signals from ABS HU/CM or DSC HU/CM	• Communication error is detected between TCM and ABS HU/CM or DSC HU/CM.	• Inhibits self learning control • Inhibits TCC control • Inhibits slip control

Emergency Mode

- Emergency mode shifts as follows when in D range or R position.

Condition	Selector lever position						
	D range						R position
Normal shifting	1GR	2GR	3GR	4GR	5GR	6GR	Reverse
When there is any malfunction in shift solenoids A, B, C, D, E, F, G, line pressure, or TCC control solenoid	4GR						Reverse

PARAMETER IDENTIFICATION (PID) DATA MONITORING FUNCTION [SJ6A-EL]

EHU050200000107

- The PID mode allows access to certain data values, analog and digital input and output, calculations and system state information.

Monitor Item Table

Display on the tester	Definition	Unit/Condition	TCM terminal
BOO TCM	Brake switch	On/Off	N/A
DTCCNT	DTC count (includes those needing no action)	N/A	N/A
DWN SW	Down switch	On/Off	2F
ECT TCM	Engine coolant temperature	°C	N/A
FDPDTC	Freeze frame data	N/A	N/A
GEAR_RA	Gear ratio	N/A	N/A
GEAR_SEL	Calculated gear range in TCM	1/2/3/4/5/6	N/A
LPS	Line pressure control solenoid	A	1E, 1R
MNL SW	M range switch	On/Off	2G
OSS	Output shaft speed	RPM	2C, 2D
PNP_TCM	Park/Neutral	Drive/Neutral	2K, 2M, 2N, 2O
RPM TCM	Engine speed	RPM	N/A
SS SW-	Steering shift switch (shift down)	On/Off	2AB, 2AF
SS SW+	Steering shift switch (shift up)	On/Off	2AB, 2AF
SSA	Shift solenoid A	On/Off	1AF
SSB	Shift solenoid B	On/Off	1AB
SSC	Shift solenoid C	On/Off	1AA
SSD	Shift solenoid D	On/Off	1S
SSE	Shift solenoid E	On/Off	1V
SSF	Shift solenoid F	A	1O, 1Z
SSG	Shift solenoid G	A	1L, 1Y
TCCC	TCC control solenoid	A	1D, 1Q
TFT	ATF temperature	°C	1J, 1M
TFTV	ATF temperature signal voltage	V	1J, 1M
THOP	Throttle position	%	N/A
TR	TR switch	R/N/D/P	2K, 2M, 2N, 2O

Display on the tester	Definition	Unit/Condition	TCM terminal
TRD	TR switch [D range]	On/Off	2K
TRR	TR switch [R position]	On/Off	2M
TSS	Input/turbine speed sensor	RPM	2A, 2B
UP SW	Up switch	On/Off	2J
VPWR	Battery voltage	V	1AD
VSS	Vehicle speed	KPH	2C, 2D

SIMULATION FUNCTION [SJ6A-EL]

EHU050200000108

- By using the WDS or equivalent, simulation items for input/output parts preset in the TCM can be optionally selected and operated regardless of TCM control conditions.

Simulation Item Table

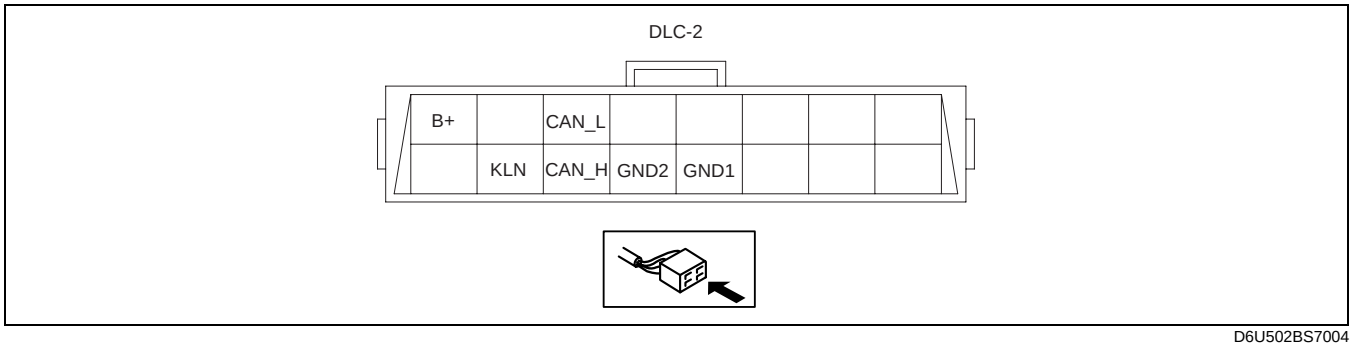
X: Available

Simulation item	Applicable component	Unit/Condition	Operation		TCM terminal
			IG ON	Idle	
LPS	Line pressure control solenoid	A	N/A	X	1E, 1R
SSA	Shift solenoid A	On/Off	N/A	X	1AF
SSB	Shift solenoid B	On/Off	N/A	X	1AB
SSC	Shift solenoid C	On/Off	N/A	X	1AA
SSD	Shift solenoid D	On/Off	N/A	X	1S
SSE	Shift solenoid E	On/Off	N/A	X	1V
SSF	Shift solenoid F	A	N/A	X	1O, 1Z
SSG	Shift solenoid G	A	N/A	X	1L, 1Y
TCCC	TCC control solenoid	A	N/A	X	1D, 1Q

DLC-2 OUTLINE [SJ6A-EL]

EHU050200000109

- A connector (DLC-2) conforming to International Organization for Standardization (ISO) standards has been added.
- Shape and terminal arrangement as stipulated by the ISO 15031-3 (SAE J1962) international standard has been adopted for this connector. The connector has a 16-pin construction that includes the B+, CAN_H, CAN_L, GND1, GND2 and KLN terminals.



D6U502BS7004

Terminal	Function
B+	Battery power supply terminal
CAN_L	Serial communication Lo terminal
CAN_H	Serial communication Hi terminal
GND1	Body ground terminal
GND2	Serial communication ground terminal
KLN	Serial communication terminal (malfunction diagnosis use)

05–13 AUTOMATIC TRANSMISSION [SJ6A-EL]

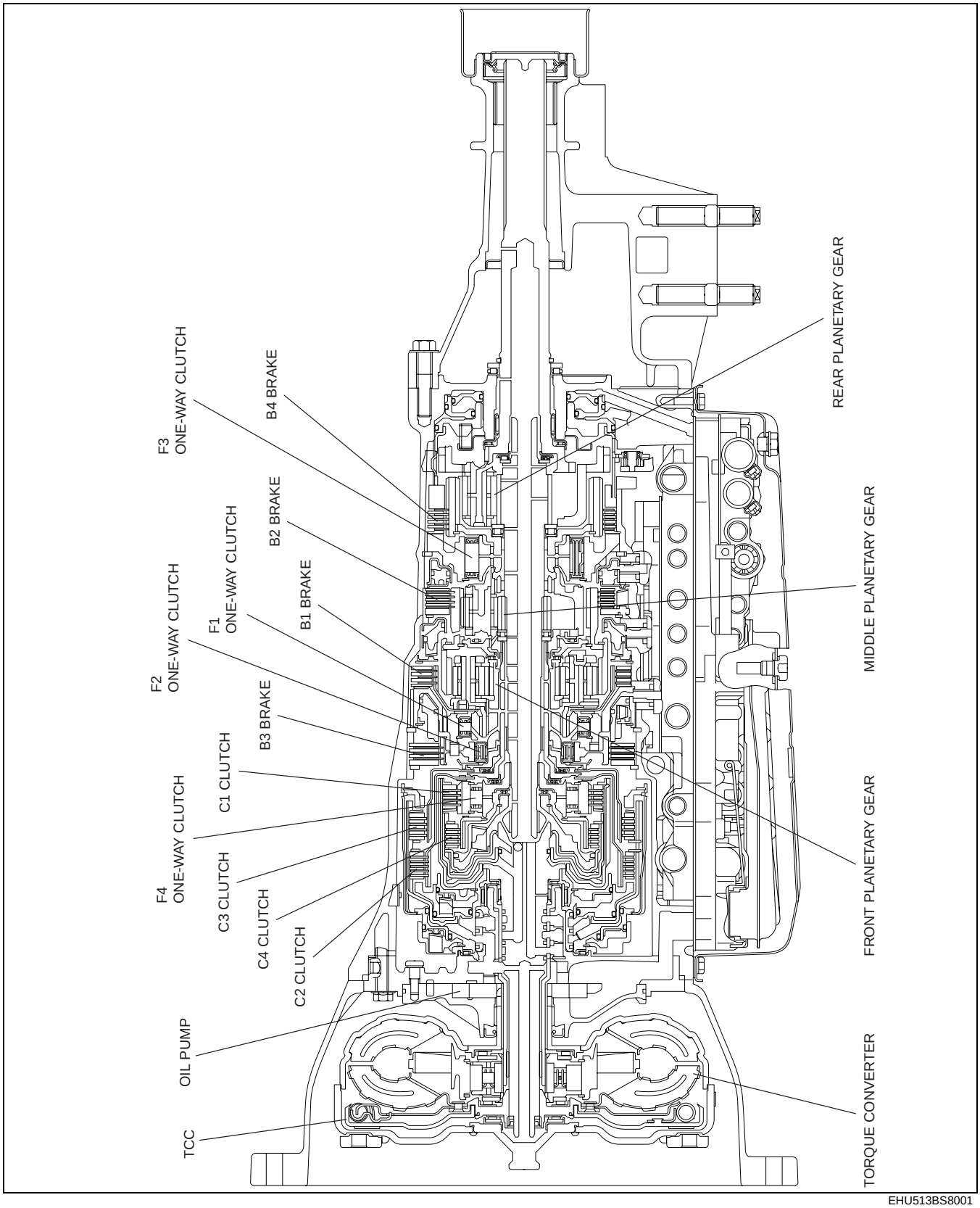
AUTOMATIC TRANSMISSION OUTLINE [SJ6A-EL]

EHU051300000101

- Newly developed SJ6A-EL type 6-speed AT has been adopted.
- With the adoption of the line pressure solenoid, TCC control solenoid, solenoid for C3 clutch (shift solenoid F), solenoid for B2 brake (shift solenoid G), and the linear type solenoid, dynamic shift quality has been realized.

AUTOMATIC TRANSMISSION CROSS-SECTIONAL VIEW [SJ6A-EL]

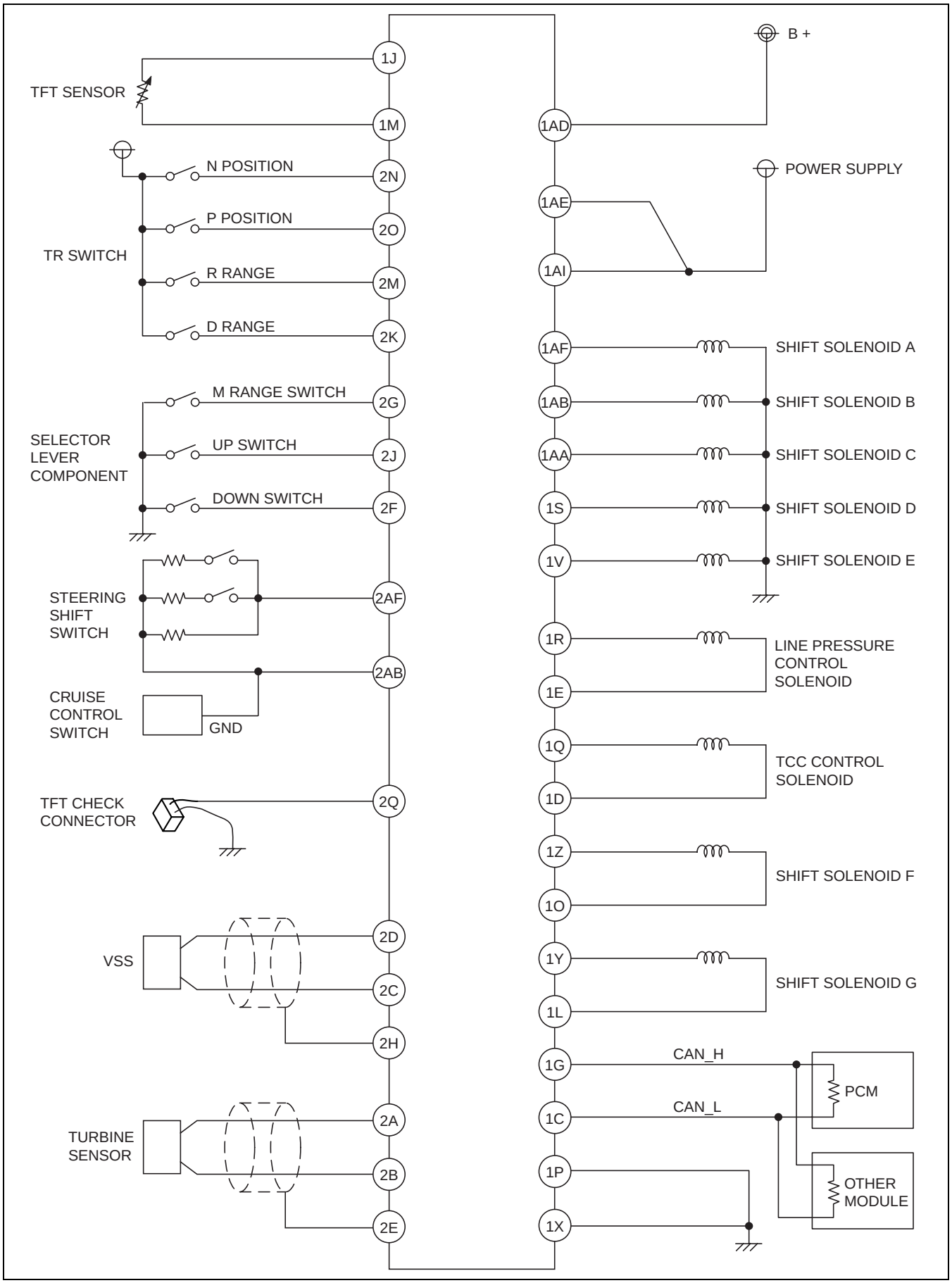
EHU051300000102



EHU513BS8001

AUTOMATIC TRANSMISSION CONTROL SYSTEM WIRING DIAGRAM [SJ6A-EL]

EHU051300000103



EHU513BS8007

EC-AT OPERATION CHART [SJ6A-EL]

EHU051300000104

Position/Range	Mode	Gear position		Shift pattern			Transmission												Solenoid							
																			ON/OFF type					Linear type		
				Shift	TCC	Engine brake	C1 clutch	C2 clutch	C3 clutch	C4 clutch	B1 brake	B2 brake	B3 brake	B4 brake	F1 one-way clutch	F2 one-way clutch	F3 one-way clutch	F4 one-way clutch	Shift solenoid A	Shift solenoid B	Shift solenoid C	Shift solenoid D	Shift solenoid E	Shift solenoid F	Shift solenoid G	TCC control solenoid
P	–	Neutral	–	–																○	○		○		○	
R	less than 11km/n {7mph}	Reverse	3.168	–		○			○		○			○	○					○	○		○		○	
	more than 11km/n {4mph}			–															○				○		○	
N	–	Neutral	–	–																○	○		○		○	
D	*1 AAS/ NORMAL	1GR	3.538	↕			○										○	○		○	○		○		○	
		2GR	2.060	↕			○						○		○	○		○	○	○	○		○		○	
		3GR	1.404	↕		○*3	○		○	◎	◎		△		○			○	○		○		○		○*2	
		4GR	1.000	↕		○	○	○	△	◎			△					○*2	○				○		○	
		5GR	0.713	↕		○	△	○	○		○		△						○			○		○		
		5GR TCC ON			○	○	△	○	○		○		△						○			○		○		○
		6GR	0.582	↕		○	△	○			△	○	△						○	○		○		○		
		6GR TCC ON			○	○	△	○			△	○	△						○	○		○		○		○
M	MANUAL	1GR	3.538	↕ ↕ ↕		○	○			◎				◎			○*2	○*2		○	○		○			
		2GR	2.060	↕ ↕ ↕		○	○			◎		◎	○		○*2	○*2		○*2	○	○	○	○	○			
		3GR	1.404	↕ ↕ ↕		○	○		○	◎	◎		△		○*2			○*2	○		○		○			
		4GR	1.000	↕ ↕ ↕		○	○	○	△	◎			△					○*2	○				○		○	
		5GR	0.713	↕ ↕ ↕		○	△	○	○		○		△						○			○		○		
		5GR TCC ON			○	○	△	○	○		○		△						○			○		○		○
		6GR	0.582	↕ ↕		○	△	○			△	○	△						○	○		○		○		
		6GR TCC ON			○	○	△	○			△	○	△						○	○		○		○		○

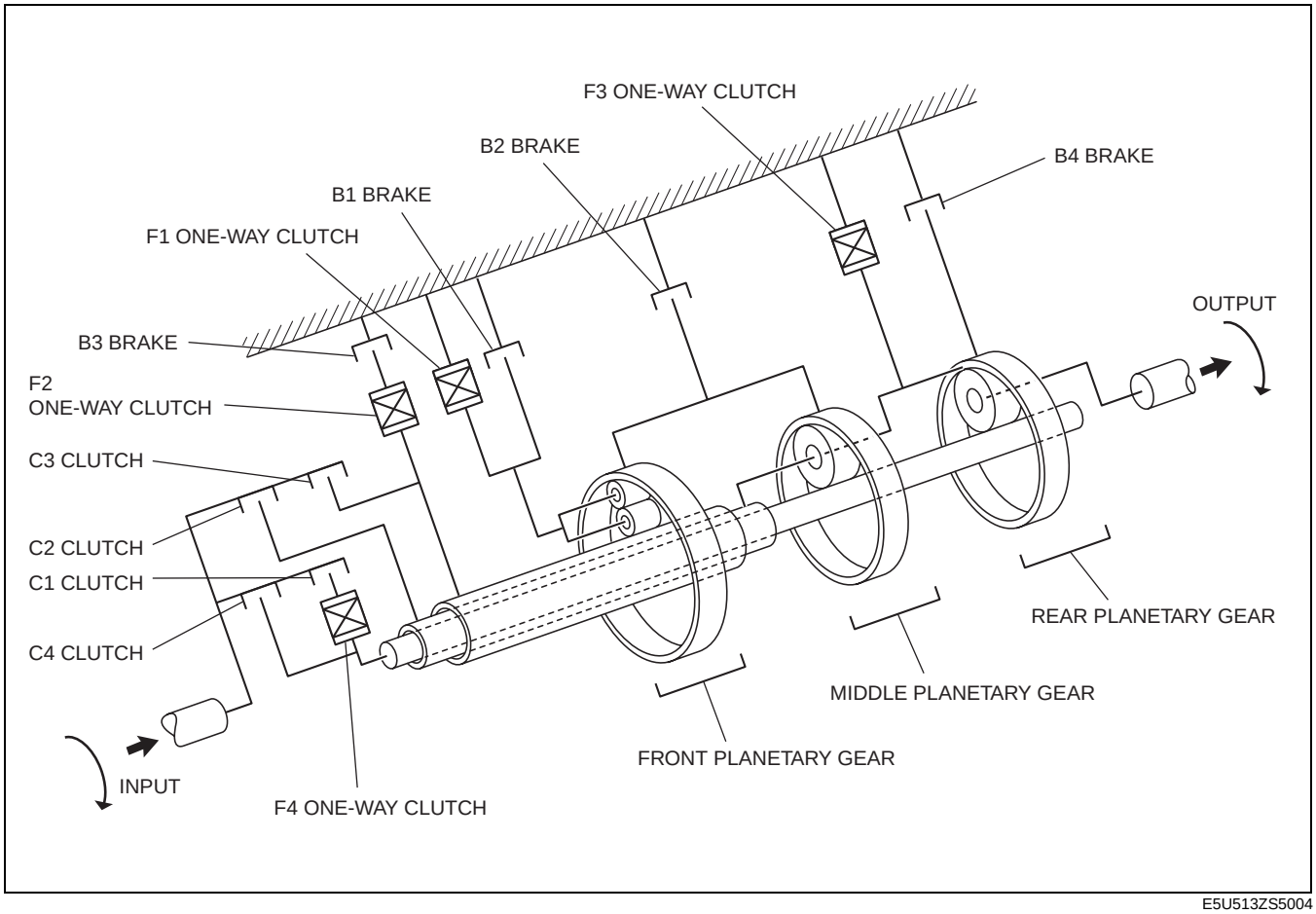
↕ : Automatic shift according to set speed and throttle opening angle
↕ : Manual shift based on selector lever operation
↕ : Consecutive shift by tapping selector lever two times in the down-shift (—) direction or up-shift (+) direction
*1 : Automatically switches between AAS and NORMAL modes according to accelerator pedal depressing speed
*2 : Not operating when engine braking
*3 : AAS mode
○ : Operating
◎ : Operating when engine braking
△ : Operating but not contributing to transmission power

EHU513BS8005

POWERFLOW STRUCTURE [SJ6A-EL]

EHU051300000105

Description of Components



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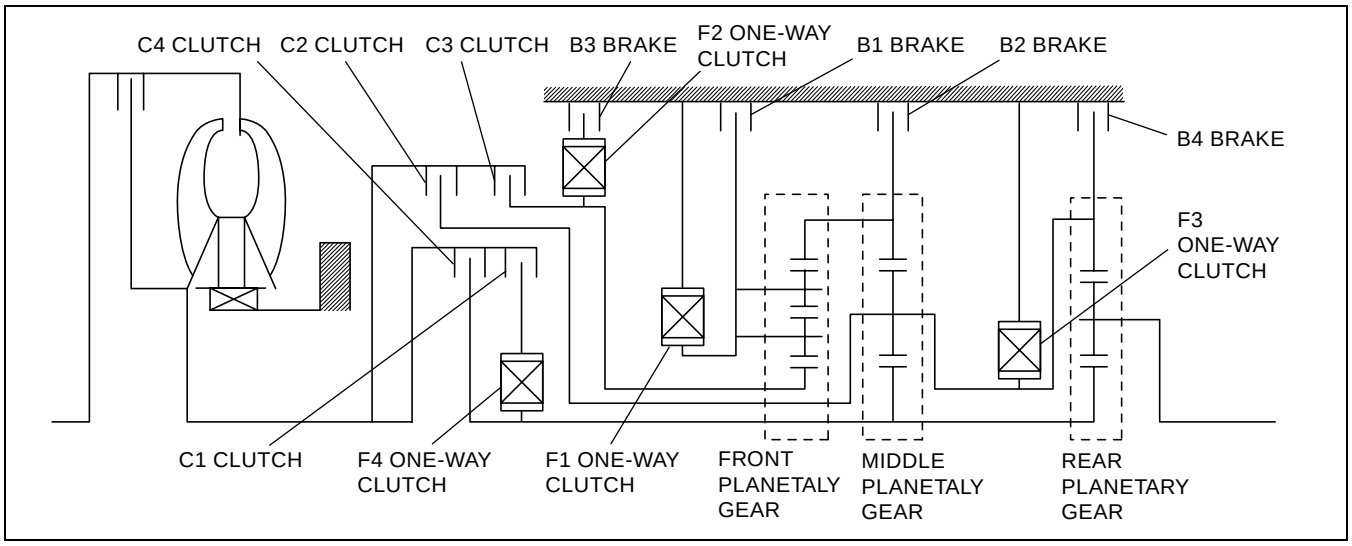

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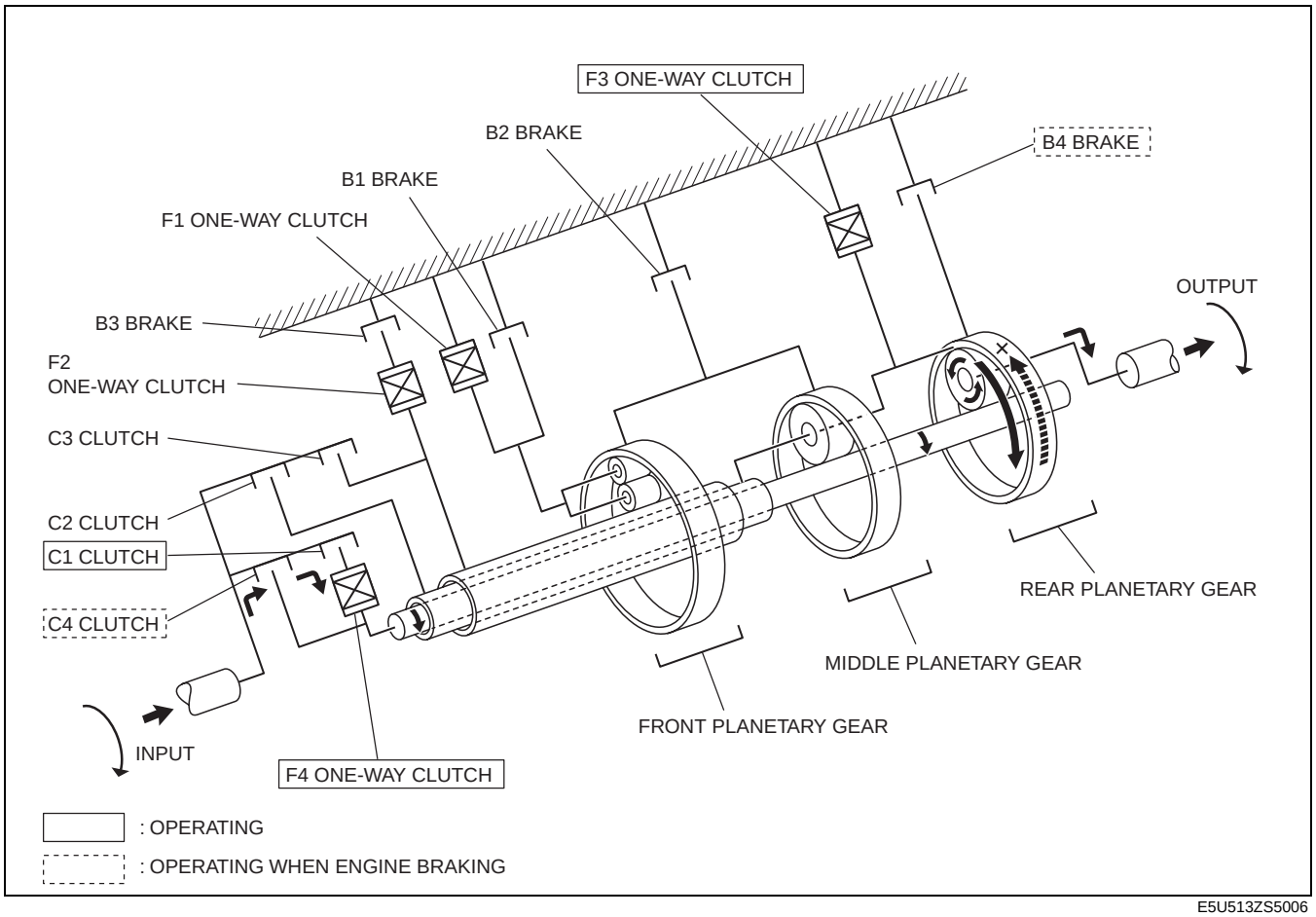
POWERFLOW OPERATION [SJ6A-EL]

EHU051300000106

List of operating components

Clutch / Brake	Operation
C1 clutch	• Engages input shaft and intermediate shaft via F4 one-way clutch.
C2 clutch	• Engages input shaft and middle planetary carrier.
C3 clutch	• Engages input shaft and front sun gear.
C4 clutch	• Engages input shaft and intermediate shaft.
B1 brake	• Locks rotation of front planetary carrier.
B2 brake	• Locks rotation of front and middle ring gear.
B3 brake	• Locks F2 one-way clutch outer race.
B4 brake	• Locks rotation of rear ring gear.
F1 one-way clutch	• Locks counterclockwise rotation of front planetary carrier on transmission case.
F2 one-way clutch	• Locks counterclockwise rotation of front sun gear during B3 brake operation.
F3 one-way clutch	• Locks counterclockwise rotation of rear ring gear. • Locks counterclockwise rotation of middle planetary carrier.
F4 one-way clutch	• Locks counterclockwise rotation of intermediate shaft during C1 clutch operation.

1GR



E5U513ZS5006

① INPUT SHAFT ROTATES CLOCKWISE.

← C1 CLUTCH OPERATES.

② INTERMEDIATE SHAFT ROTATES CLOCKWISE.

③ REAR SUN GEAR ROTATES CLOCKWISE.

④ REAR PLANETARY PINION GEAR ROTATE COUNTERCLOCKWISE.

⑤ REAR RING GEAR TRIES TO ROTATE COUNTERCLOCKWISE.

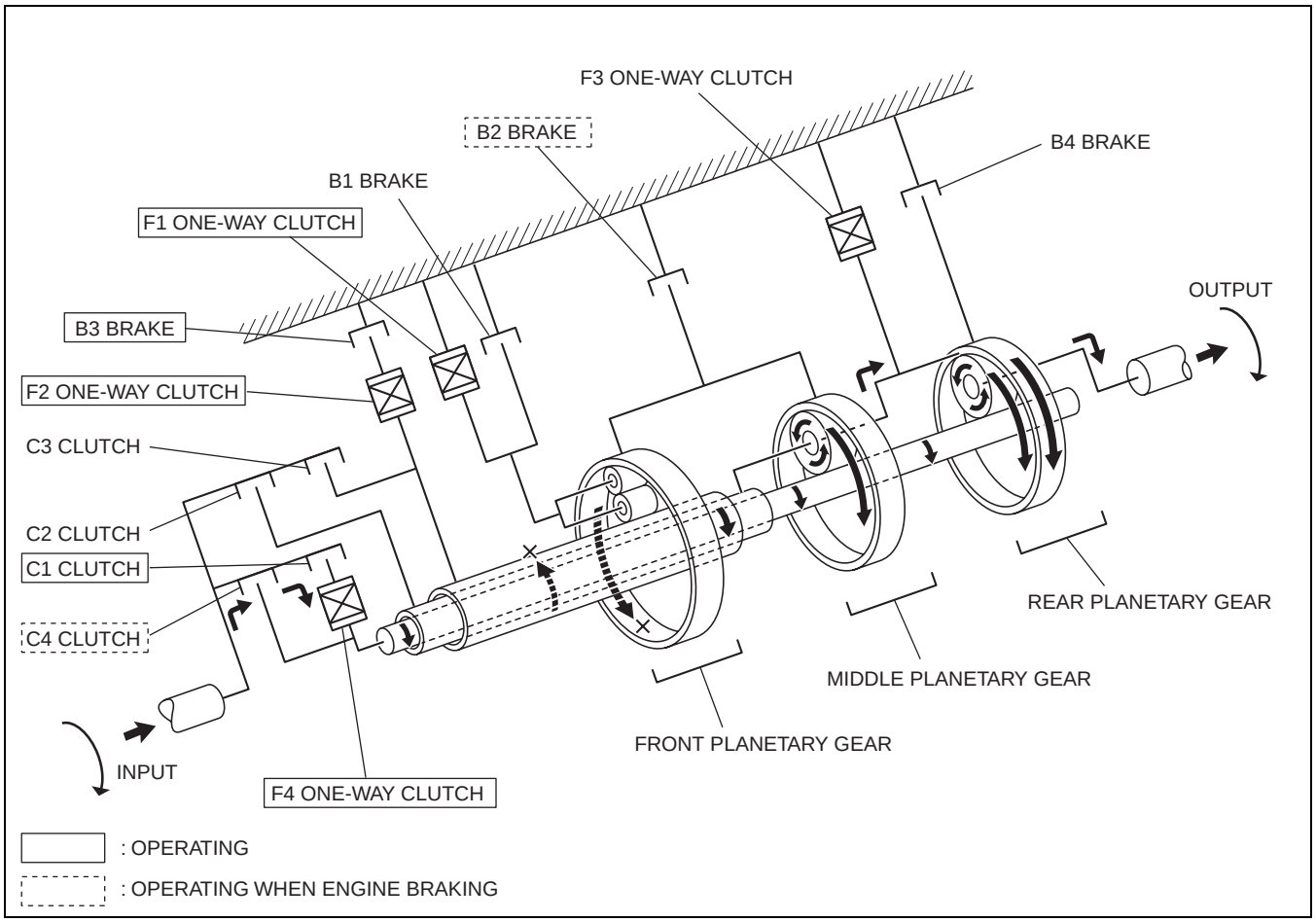
← F3 ONE-WAY CLUTCH OPERATES (LOCKS COUNTERCLOCKWISE ROTATION OF REAR PLANETARY CARRIER).

⑥ REAR PLANETARY CARRIER ROTATES CLOCKWISE DUE TO REACTION FORCE OF REAR PLANETARY PINION GEARS.

⑦ OUTPUT SHAFT ROTATES CLOCKWISE.

E5U513ZS5016

2GR



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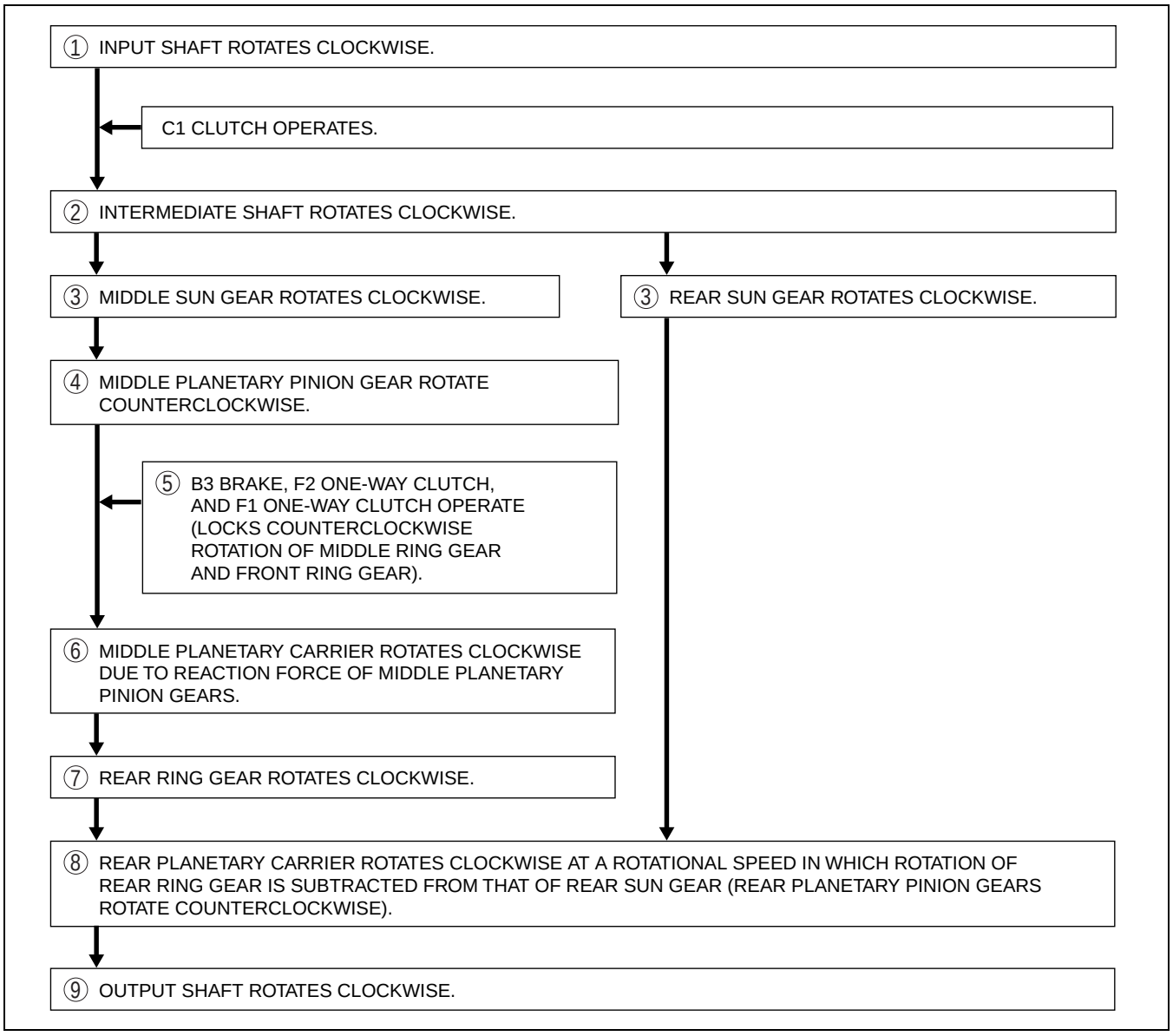

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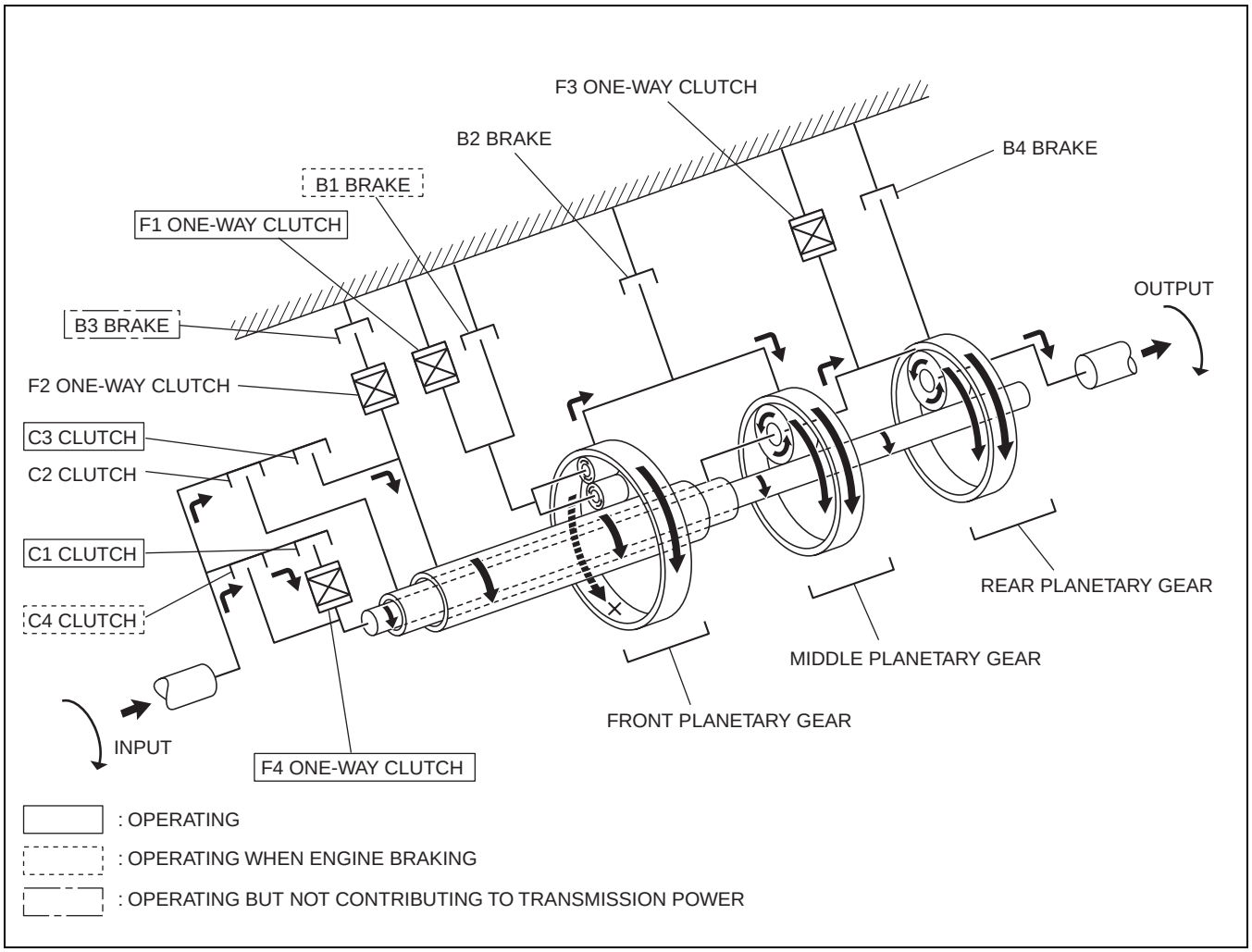
3GR



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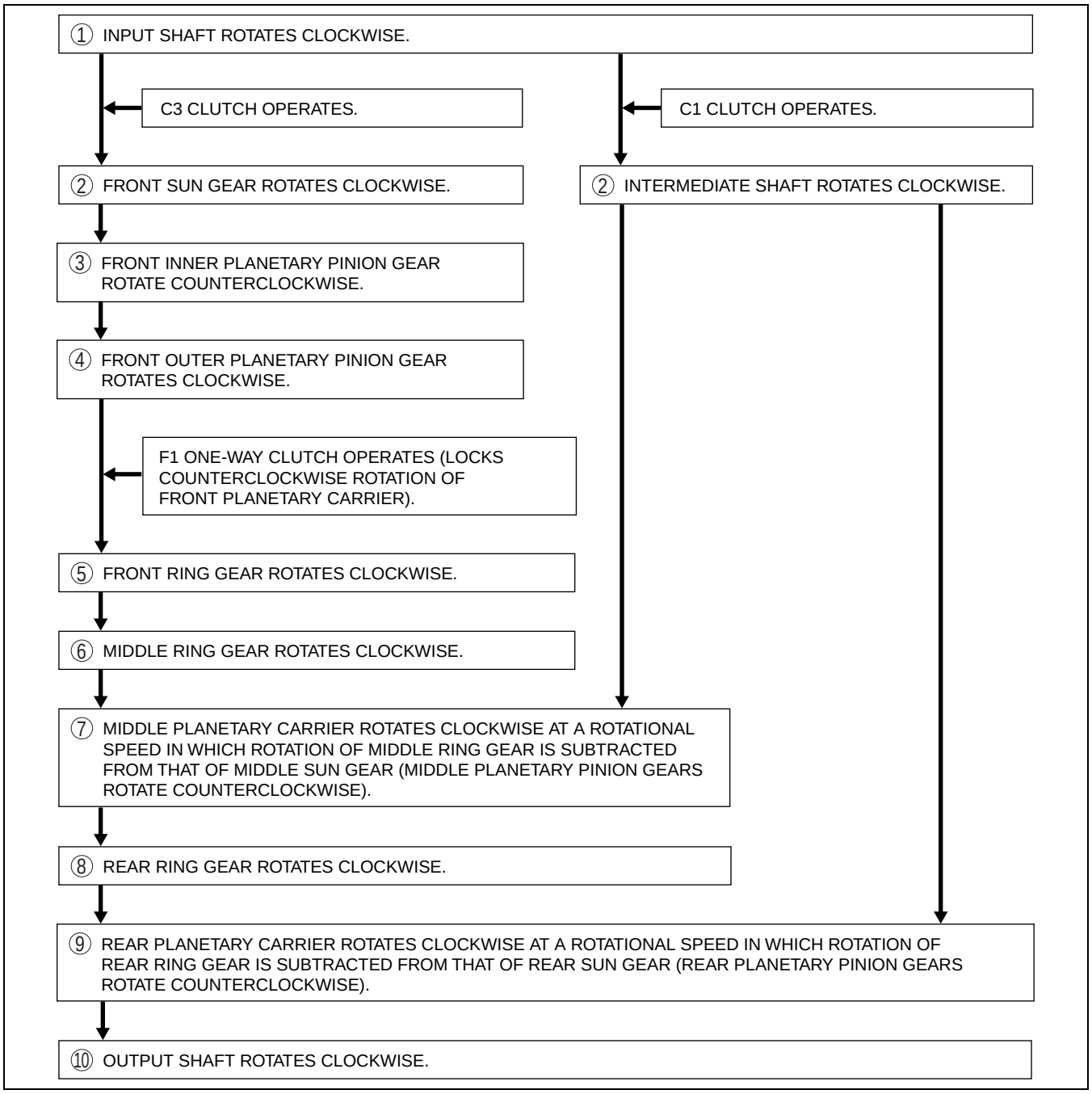

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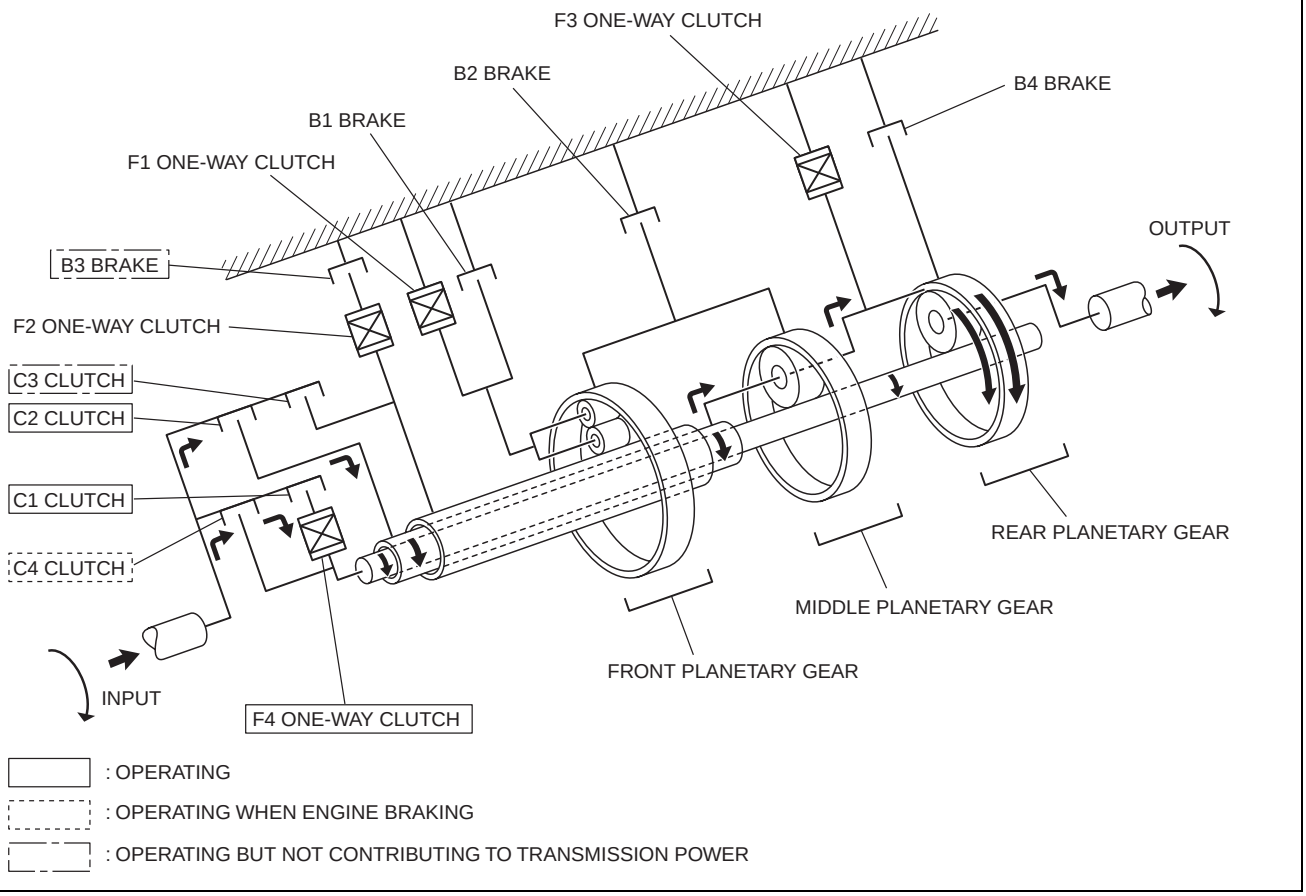
4GR



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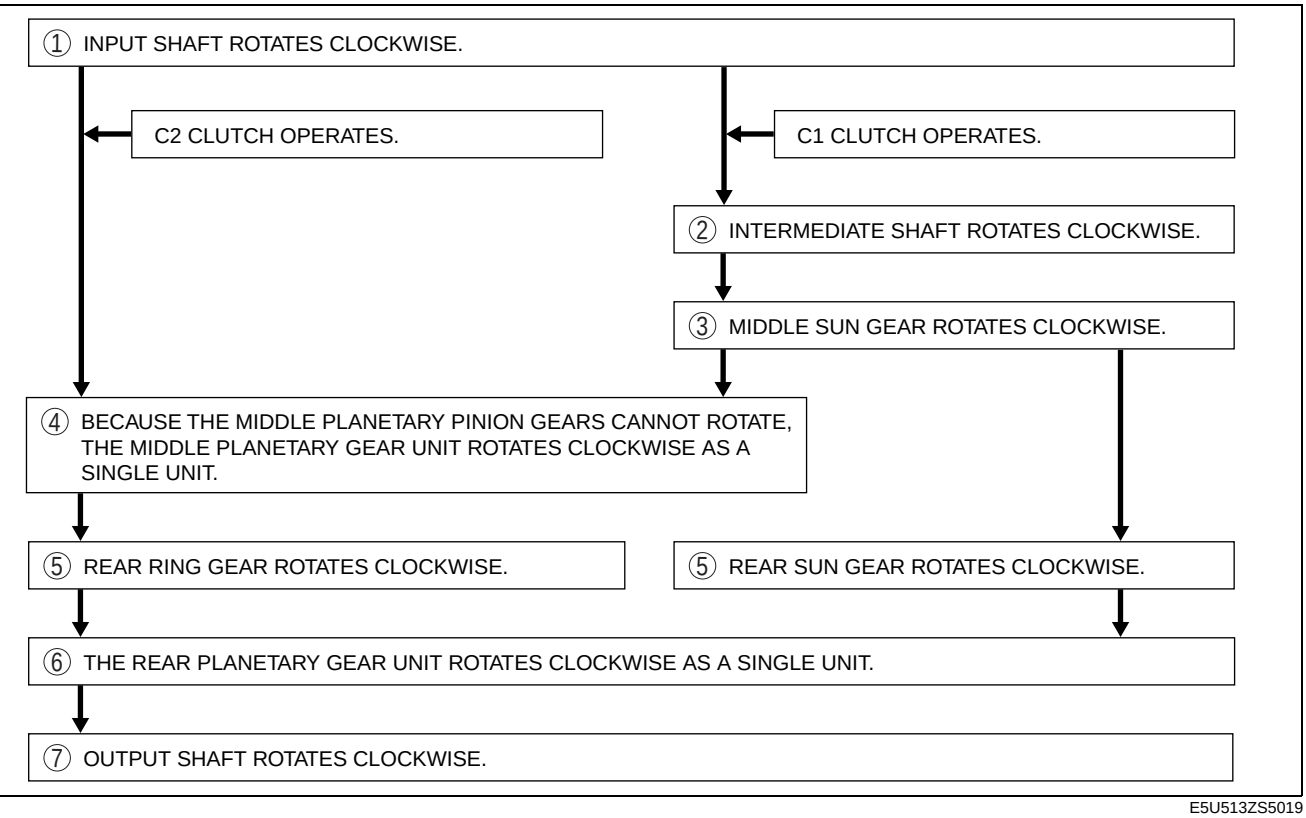

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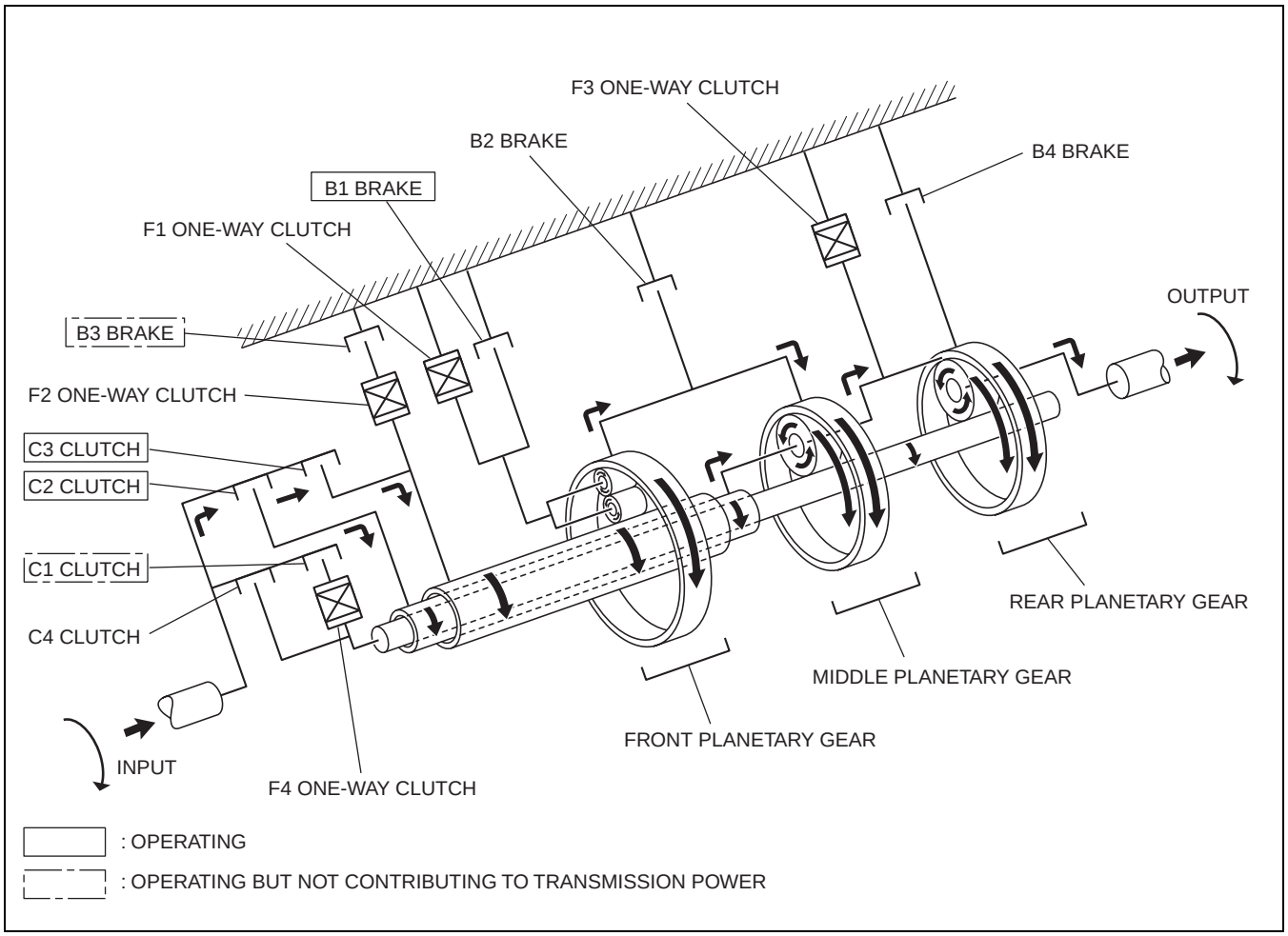
5GR



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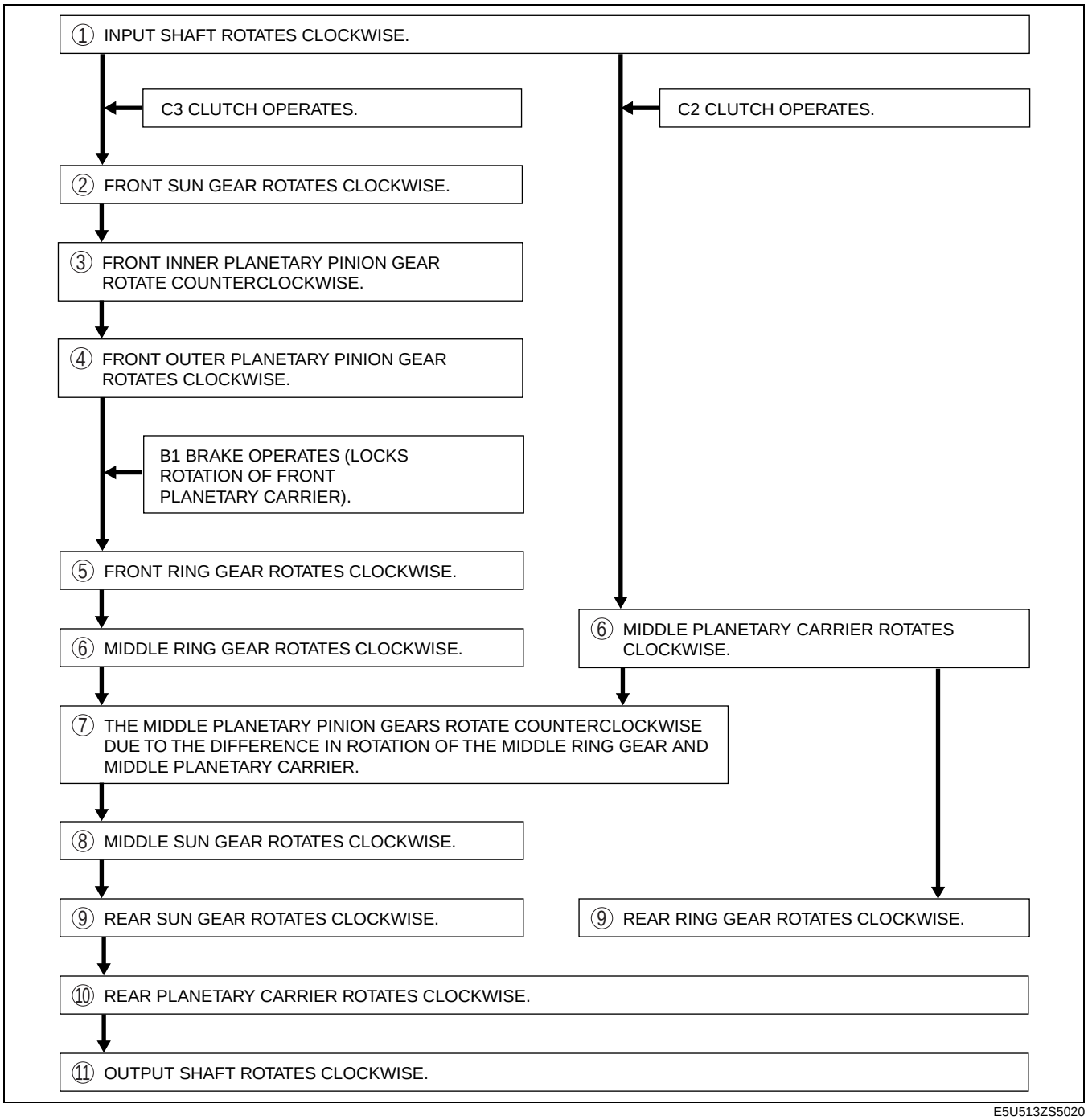
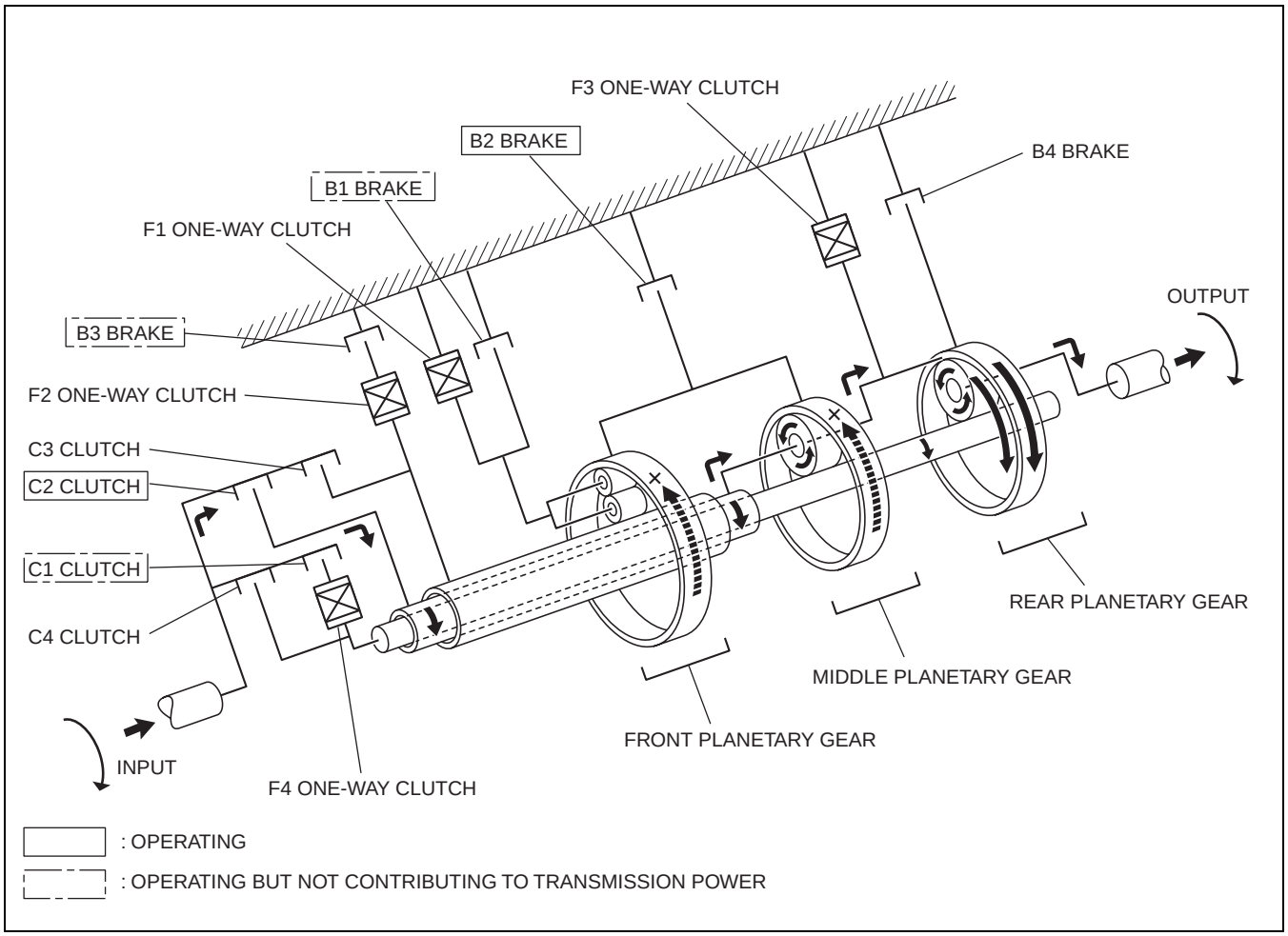


E5U513ZS5020

6GR



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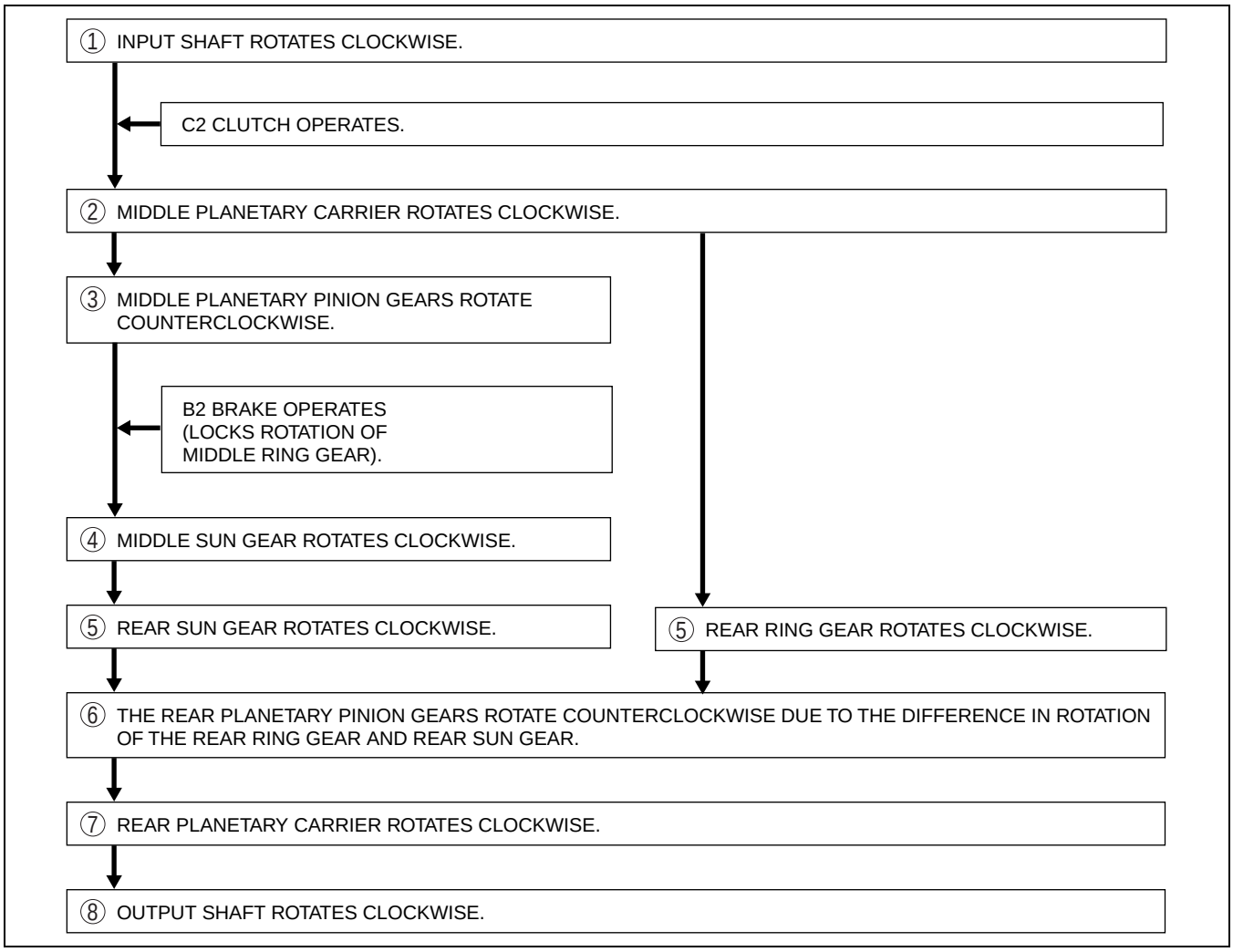
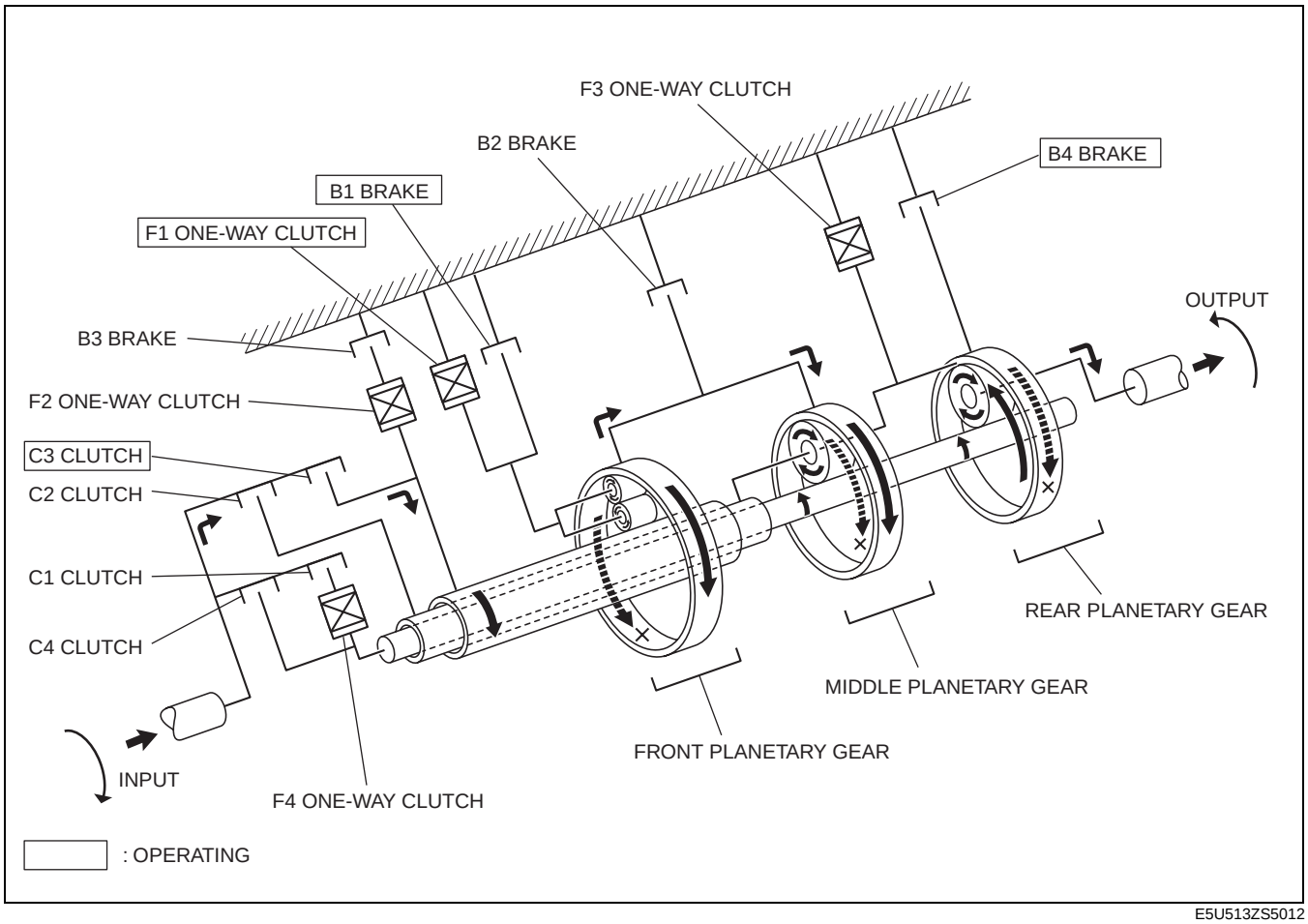


E5U513ZS5021

R position



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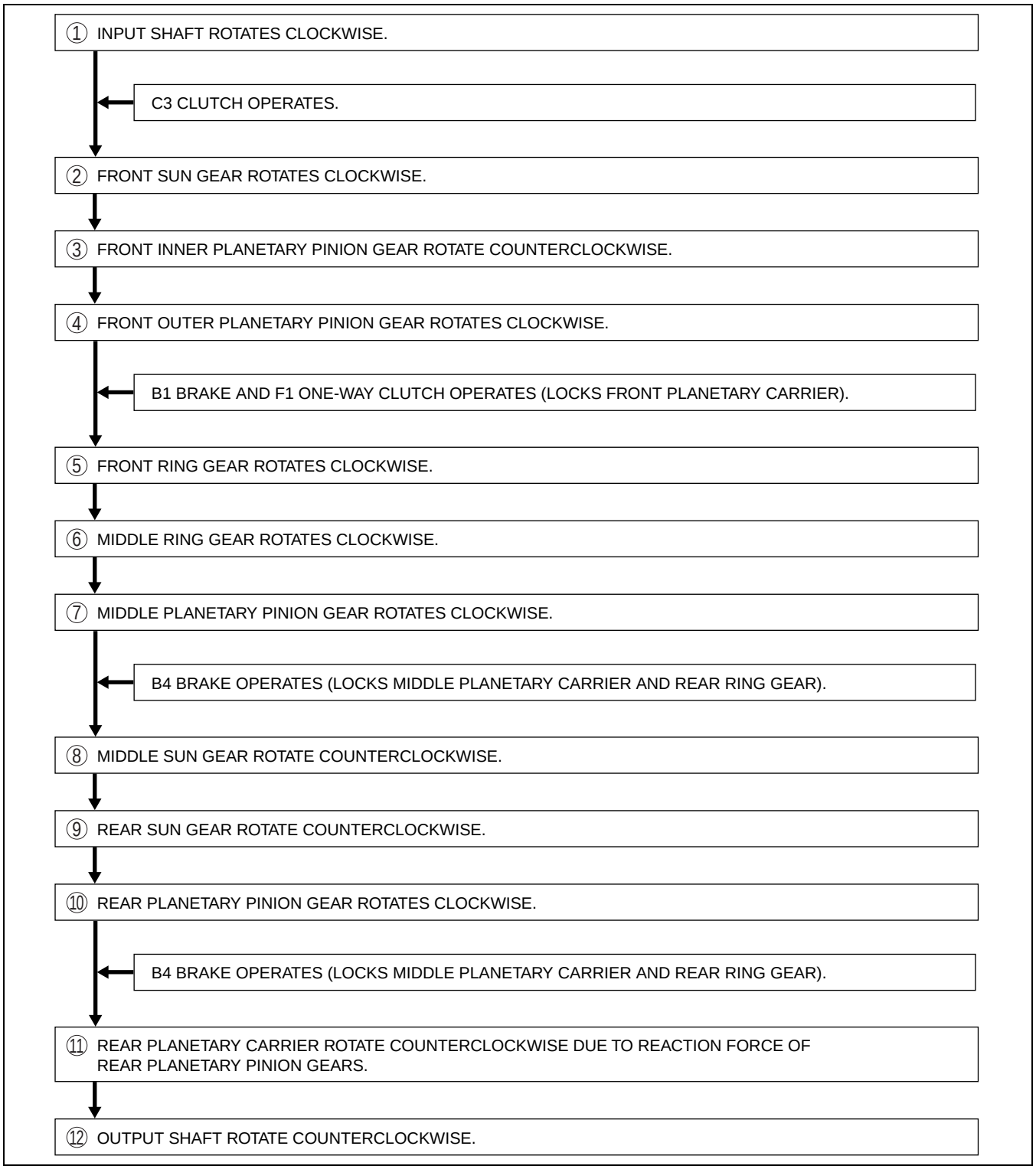
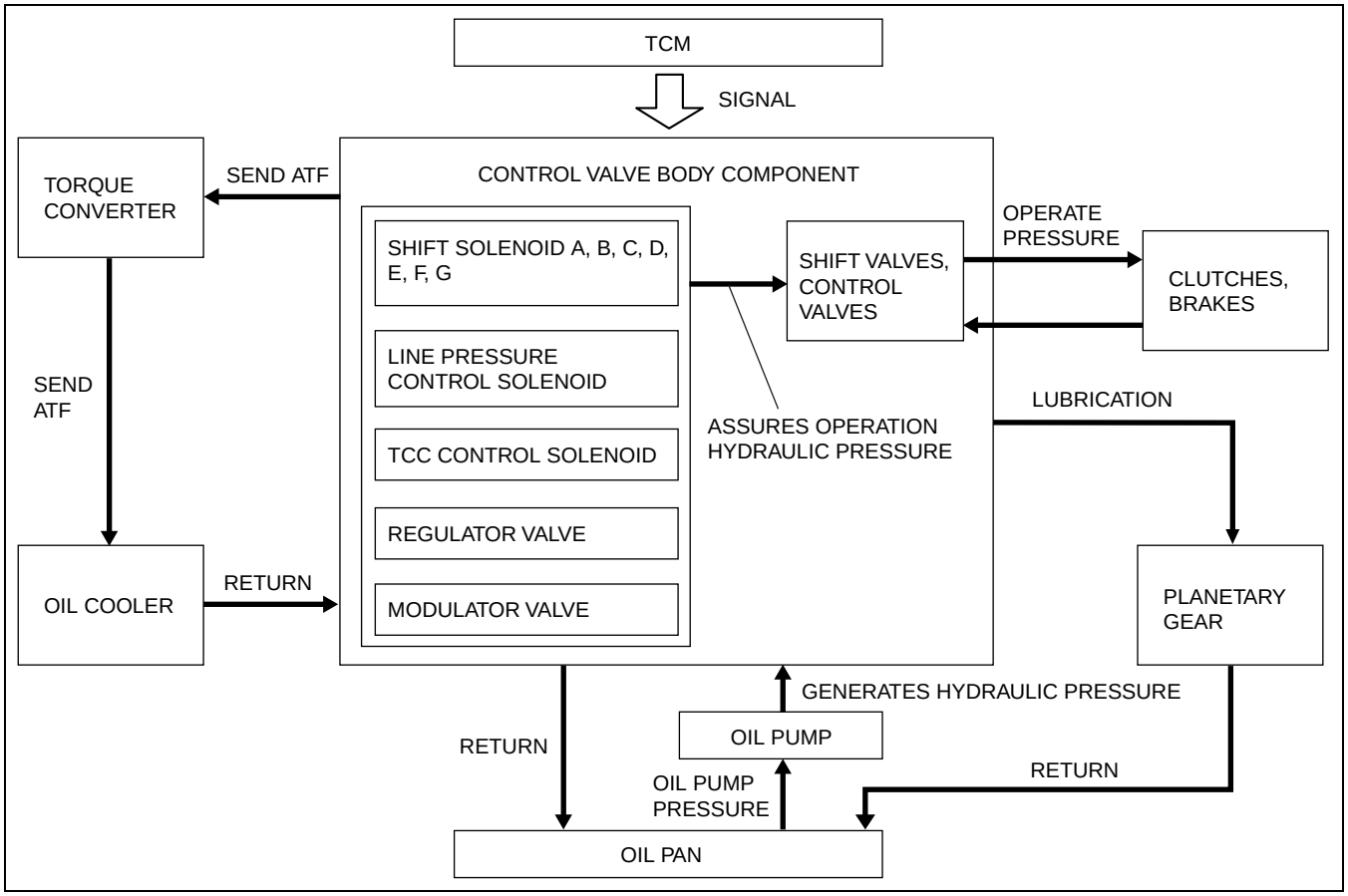


E5U513ZS5022

CONTROL VALVE BODY COMPONENT OUTLINE [SJ6A-EL]

EHU051321100101

- The control valve body supplys oil by switching the oil circuit for the hydraulic pressure generated by the oil pump. Based on the control signal from the TCM, the solenoid valves are activated to control the hydraulic pressure to the clutch and brakes, performing gear shift and TCC. In addition, an appropriate amount of oil is supplied to the torque converter, planetary gears and lubricating parts.



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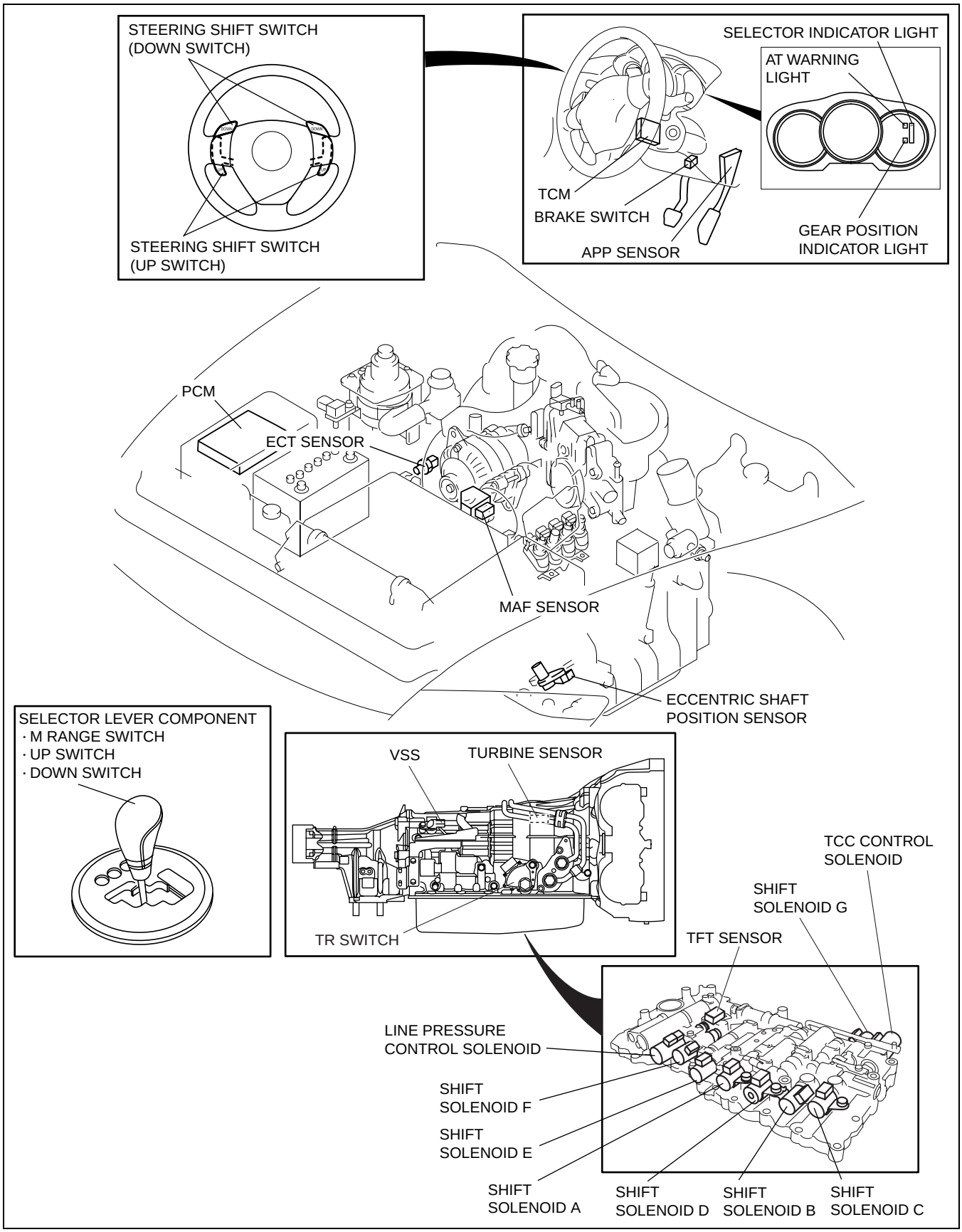
ELECTRONIC CONTROL SYSTEM CONSTRUCTION [SJ6A-EL]

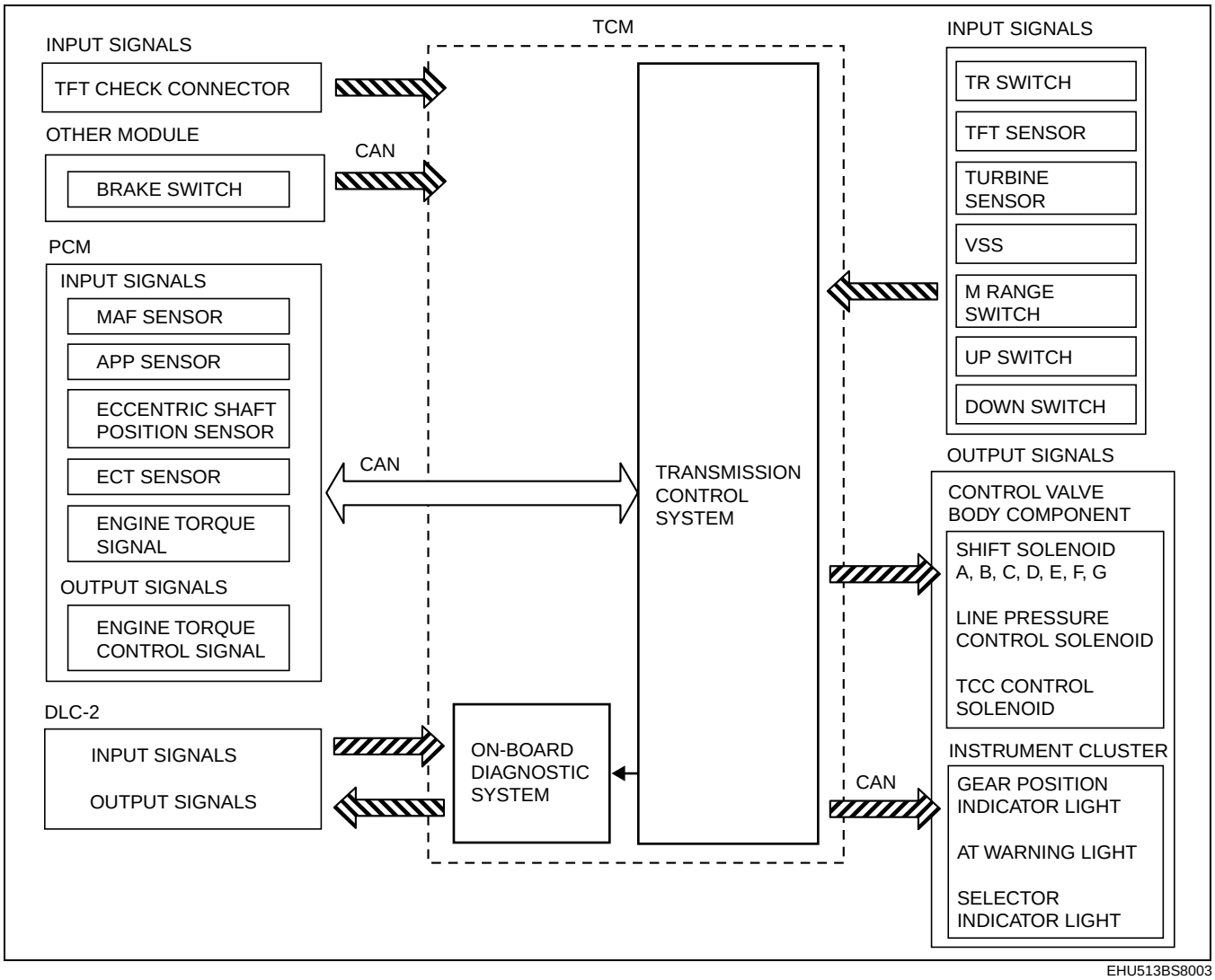
EHU051318901101



EHU513BS8002

ELECTRONIC CONTROL SYSTEM BLOCK DIAGRAM [SJ6A-EL]

EHU051318901102



EHU513BS8003

ELECTRONIC CONTROL ITEMS AND CONTENTS [SJ6A-EL]

EHU051318901103

Item	Content
Shift control	• Detects engine load and vehicle speed, and switches to optimum gear in accordance with preset shift program. • In D range, automatically switches between NORMAL, AAS, DOWN-SLOPE, UP-SLOPE modes according to specific conditions.
Manual mode shift control	• Shifts to selected gear position by manual shifting of the selector lever forward and back. • The up/down operation of the steering shift switch is the same as the manual operation of the selector lever.
TCC control	• According to preset TCC point, performs TCC operation.
Torque reduction control	• Optimally controls engine output torque when shifting.
Shift learning control	• Performs optimal correction for clutch engagement pressure to reduce changes in engine performance and/or elapsed transmission.
On-board diagnostic system	• Detects and/or memorizes failure of input/output part and transmission condition.

COMPONENT DESCRIPTIONS (ELECTRONIC CONTROL) [SJ6A-EL]

EHU051318901104

Part name			Function
Input system	VSS		• Detects parking gear (output) revolution speed.
	Turbine sensor		• Detects direct and reverse disc clutch case (input) revolution speed.
	TR switch		• Detects selector lever ranges/positions.
	M range switch		• Selects driving modes (M range) and changes driving patterns.
	Up switch		• Detects shift up request.
	Down switch		• Detects shift down request.
	TFT sensor		• Detects ATF temperature.
	CAN communication	Brake switch	• Detects the brake pedal depressed.
		Throttle opening signal (APP sensor)	• Input throttle opening angle from PCM.
		Engine speed signal (Eccentric shaft position sensor)	• Input engine speed signal from PCM.
		Engine torque signal (MAF sensor)	• Input engine torque signal from PCM.
		Cruise control signal	• Detects cruise control is in use.
		Engine coolant temperature signal (ECT sensor)	• Input engine coolant temperature signal from PCM.
Output system	ON/OFF type	Shift solenoid A	• Controls the clutch engagement pressure.
		Shift solenoid B	• Controls the clutch engagement pressure.
		Shift solenoid C	• Controls the clutch engagement pressure.
		Shift solenoid D	• Controls the clutch engagement pressure.
		Shift solenoid E	• Controls the clutch engagement pressure.
	Linear type	Line pressure control solenoid	• Adjusts the line pressure.
		TCC control solenoid	• Controls the TCC hydraulic pressure.
		Shift solenoid F	• Controls the clutch engagement pressure.
		Shift solenoid G	• Controls the clutch engagement pressure.
	CAN communication	AT warning light	• Illuminates when failure is detected by diagnosis function.
		Speedometer signal	• Outputs the vehicle speed signal to speedometer.
		Reduce torque signal	• Sends signals to the PCM during shifting.

INPUT/OUTPUT SIGNAL AND RELATED CONTROLS [SJ6A-EL]

EHU051318901105

Component		Control item							
		Shift control	Manual mode shift control	TCC control	5-6 shift inhibit control	Torque reduction control	Line pressure control	Shift learning control	On-board diagnostic function
Input									
VSS		X	X	X			X		X
Turbine sensor		X	X	X		X	X	X	X
TR switch		X	X		X				
M range switch			X				X		
Up switch			X				X		
Down switch			X				X		
TFT sensor		X	X	X			X		
CAN communication	Brake switch			X					
	Throttle opening signal (APP sensor)	X	X			X	X		X
	Engine speed signal (Eccentric shaft position sensor)			X		X	X	X	X
	Engine torque signal (MAF sensor)					X	X	X	X
	Cruise control signal	X							
	Engine coolant temperature signal (ECT sensor)	X		X	X				X
Output									
ON/OFF type	Shift solenoid A	X	X					X	X
	Shift solenoid B	X	X					X	X
	Shift solenoid C	X	X					X	X
	Shift solenoid D	X	X					X	X
	Shift solenoid E	X	X					X	X
Linear type	Line pressure control solenoid	X	X				X	X	X
	TCC control solenoid			X					X
	Shift solenoid F	X	X		X		X	X	X
	Shift solenoid G	X	X		X		X	X	X
CAN communication	AT warning light	X	X						X
	Reduce torque signal					X			
Speedometer signal									

X : Available

TRANSMISSION RANGE (TR) SWITCH FUNCTION [SJ6A-EL]

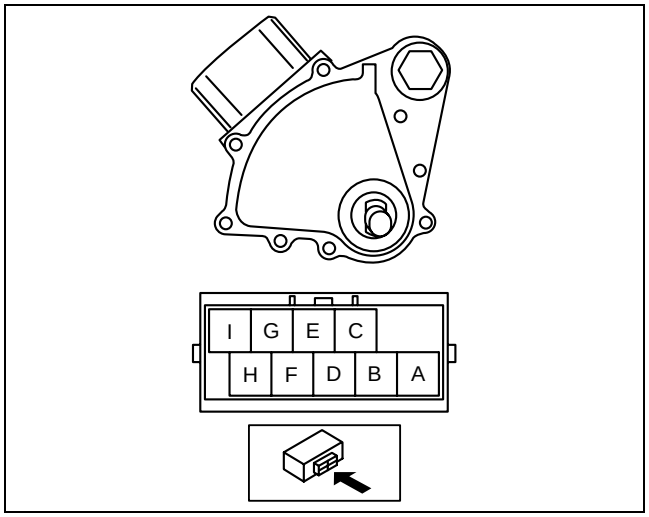
EHU051319200101

- The TR switch sends information on which range is selected in the automatic transmission using a combination of the position circuit terminals, and its functions are as follows:
  1. Enables engine starting only in P or N positions
  2. Used as shifting control signals

○—○ : Continuity

Position/Range	Connector terminal						
	Starter circuit		Position-circuit				
	I	A	E	B	C	H	D
P	○	○	○	○			
R			○		○		
N	○	○	○			○	
D			○				○
Polarity	+	-	+	-	-	-	-

E5U513ZS5024

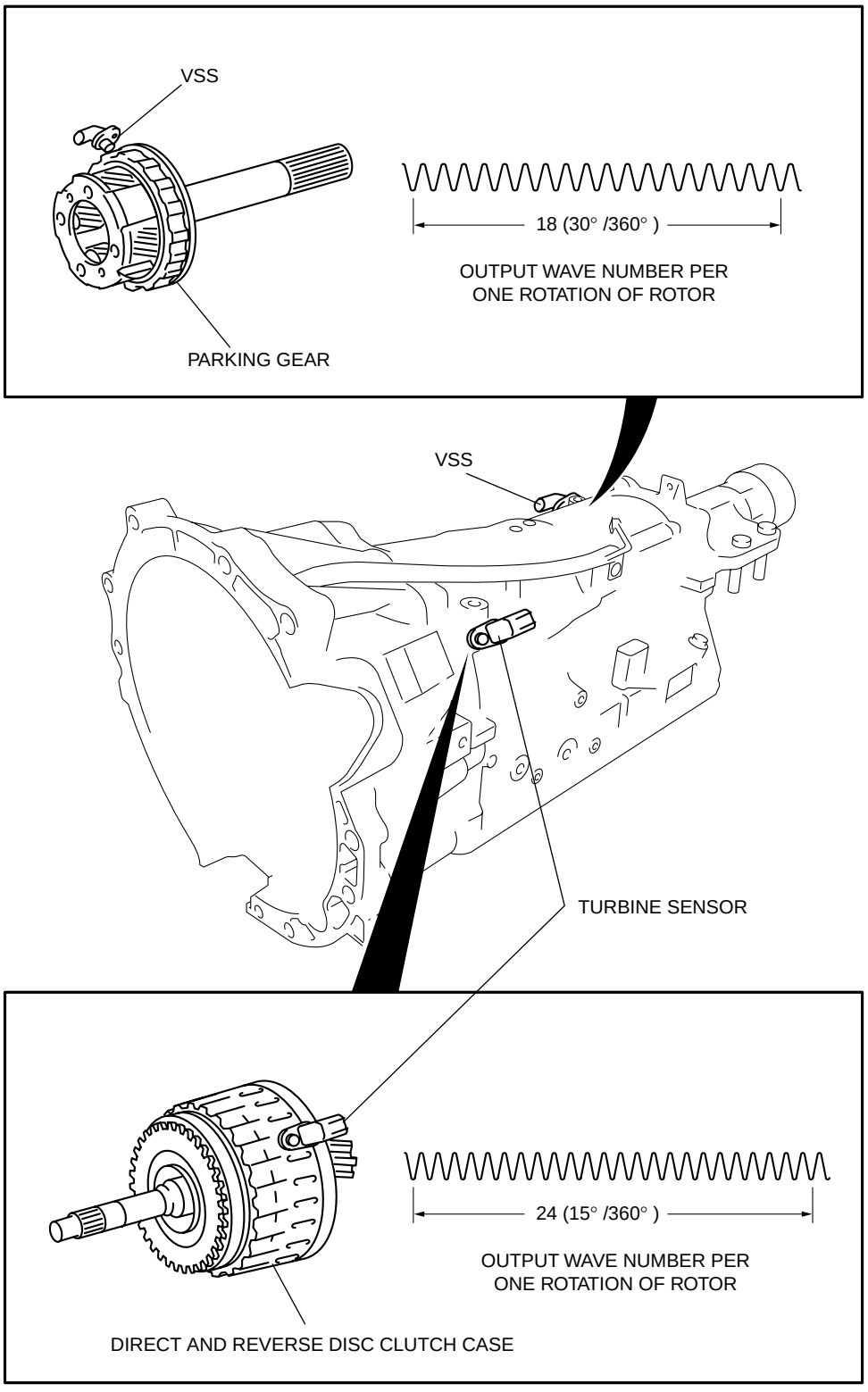


E5U513ZS5023

TURBINE SENSOR, VEHICLE SPEED SENSOR (VSS) CONSTRUCTION/OPERATION [SJ6A-EL]

EHU051319200102

- The turbine sensor detects the rotation speed of the direct and reverse disc clutch case, and sends it to the TCM as a signal.
- The VSS detects the rotation speed of the parking gear and sends it to the TCM as a signal.
- A magnetic pick sensor which has high detection accuracy has been adopted for each sensor. When the rotor rotates, air gap between the sensor and detection projections varies, magnetic flux which passes through the sensor coil increases and decreases, and electromotive force is generated in the coil. This generated voltage is shown as alternative current since the current direction while the projections are approaching the sensor is reversed from that of when the projections are moving away from the sensor.

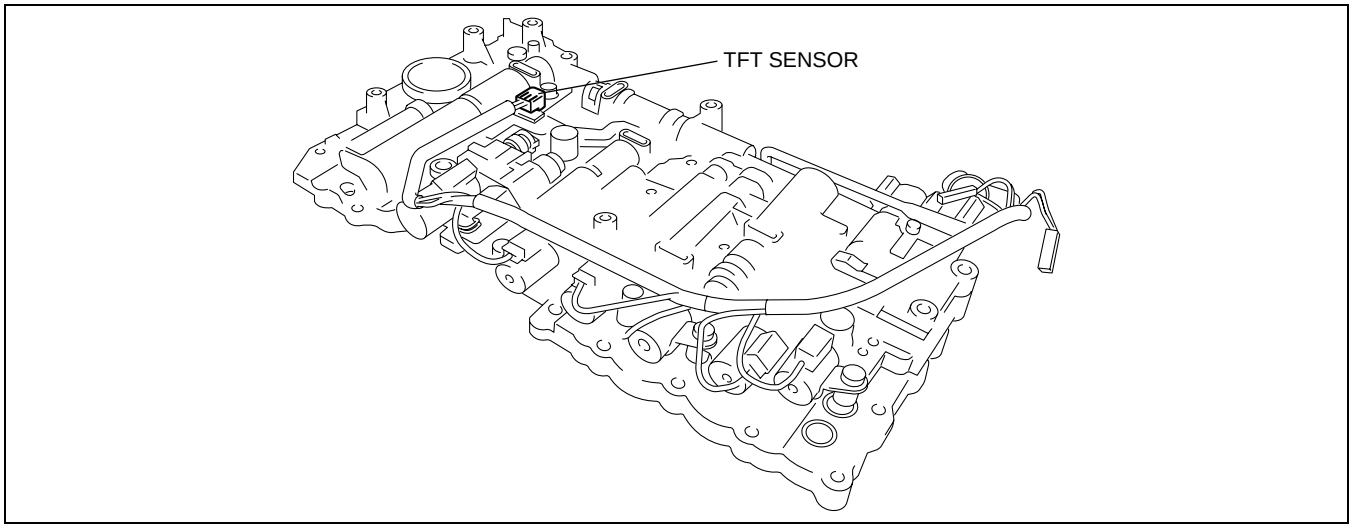


E5U513ZS5025

TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR OUTLINE [SJ6A-EL]

EHU051319200103

- The TFT sensor and the coupler component are equipped to the control valve body component as a single unit.
- A hydraulic pressure sensor for hydraulic control during shifting has been equipped inside the control valve body component.

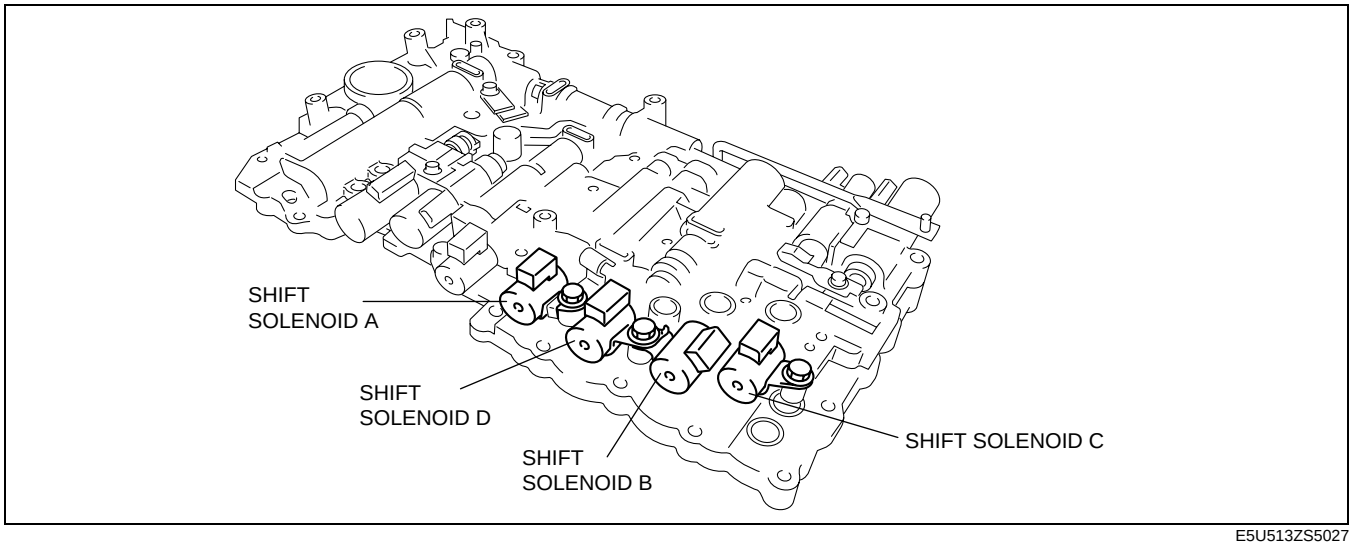


E5U513ZS5026

SHIFT SOLENOID A, B, C AND D OUTLINE [SJ6A-EL]

EHU051321101101

- Shift solenoids A, B, C, and D are directly equipped to the control valve body component.
- Shift solenoids A, B, C, and D turn on and off according to the control signals from the TCM, and change the gear between 1st to 6th using a combination of each shift valve.

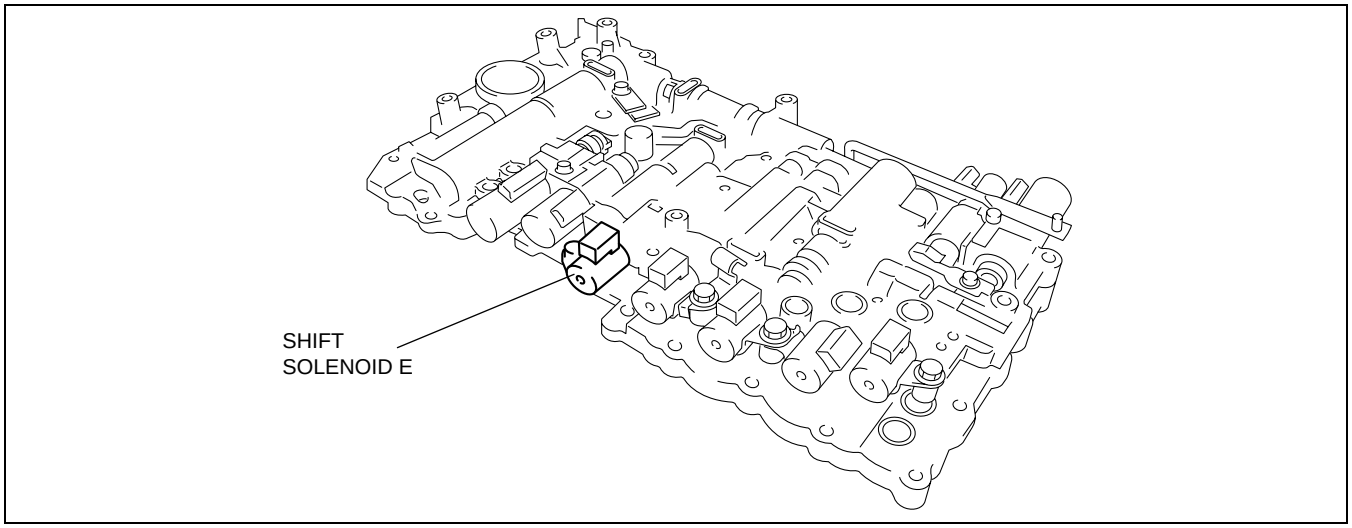


E5U513ZS5027

SHIFT SOLENOID E OUTLINE [SJ6A-EL]

EHU051321101102

- Shift solenoid E is directly equipped to the control valve body component.
- Shift solenoid E turns on and off according to the control signals from the TCM, and switches the C4 clutch and the B1 brake.

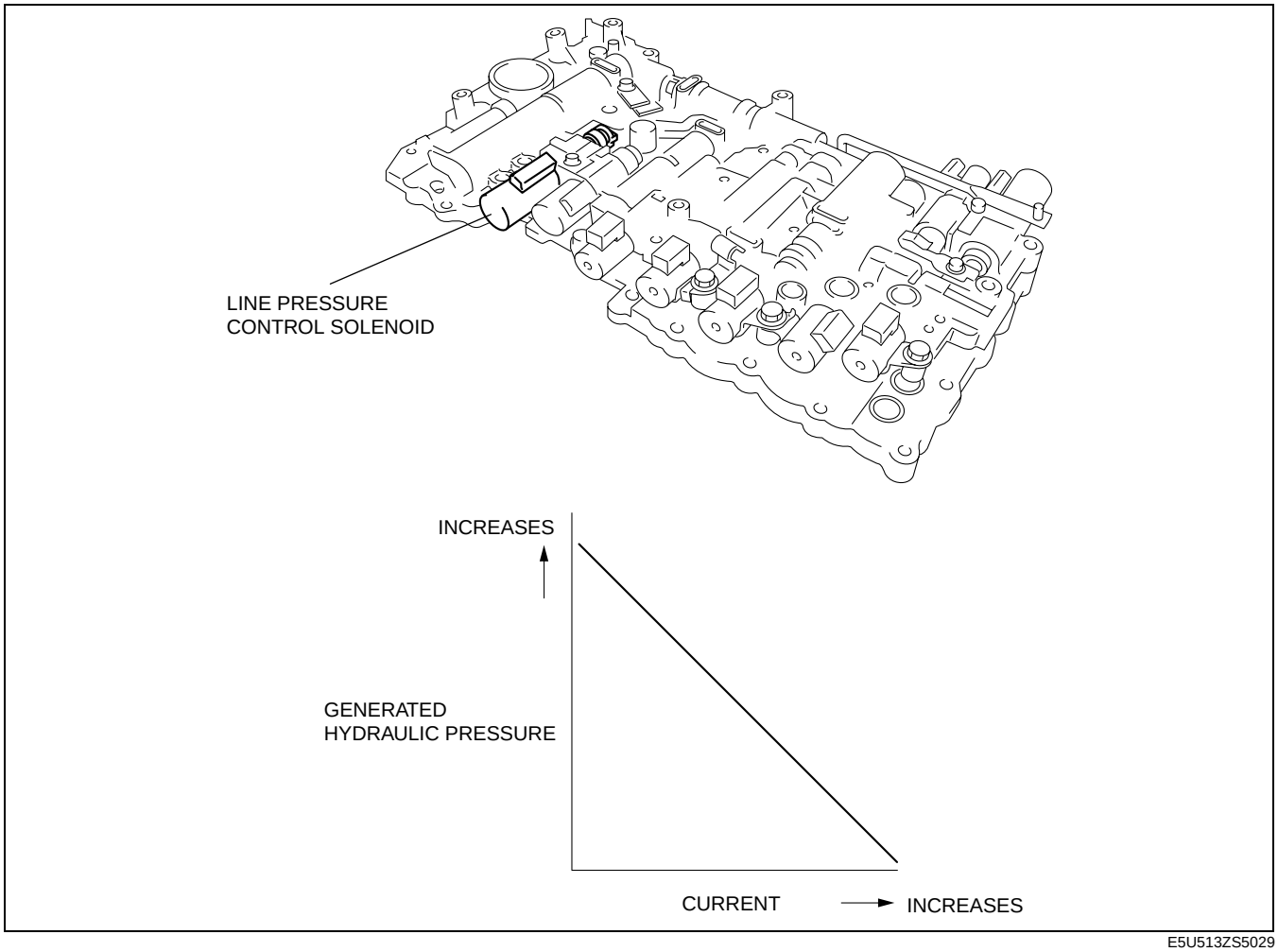


E5U513ZS5028

LINE PRESSURE CONTROL SOLENOID OUTLINE [SJ6A-EL]

EHU051321101103

- Performs linear adjustment of the throttle pressure based on the control signals from the TCM, and controls the pressure which is applied to the clutches and brakes to adjust the line pressure and to reduce shift shock.

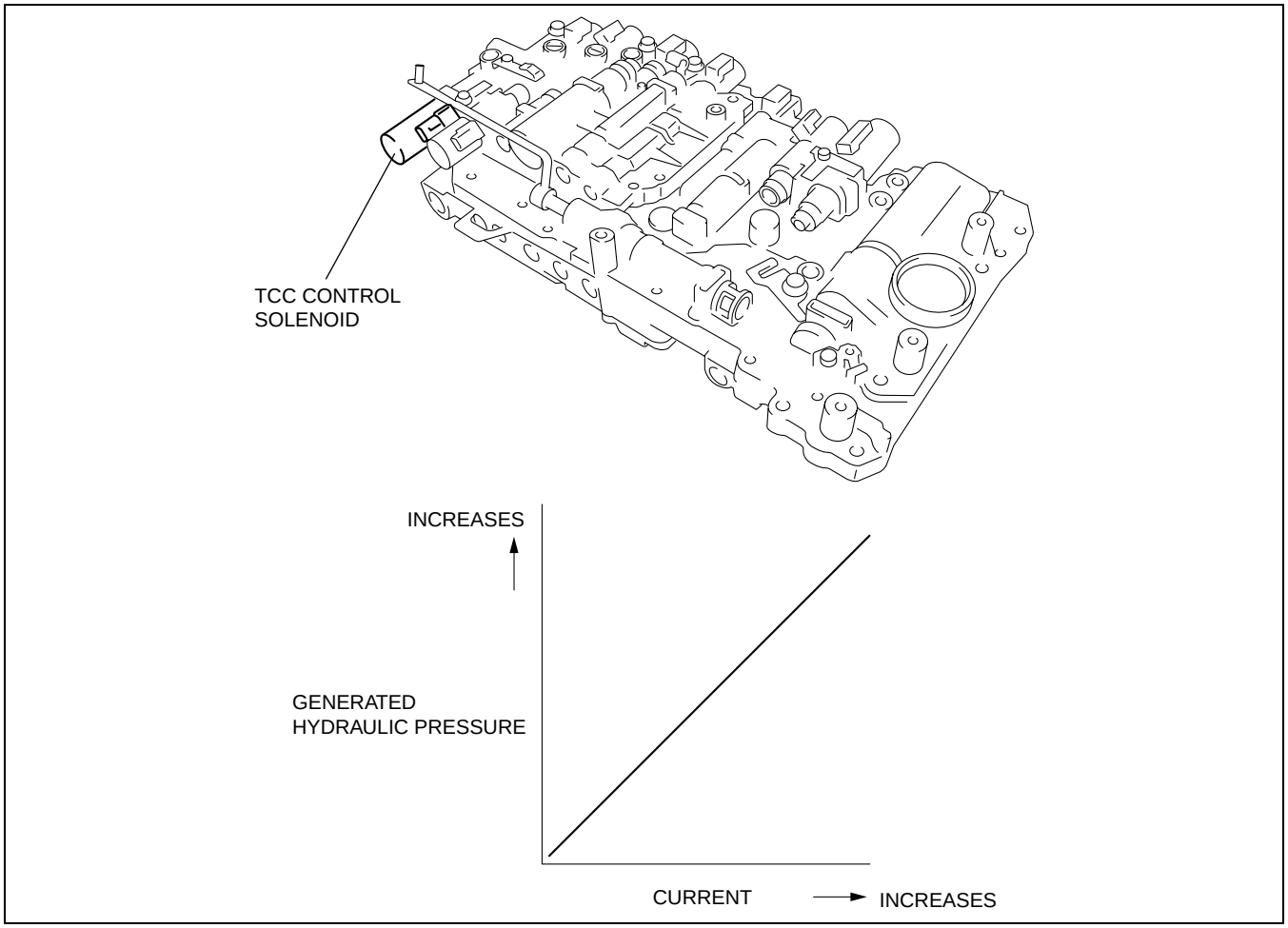


E5U513ZS5029

TORQUE CONVERTER CLUTCH (TCC) CONTROL SOLENOID OUTLINE [SJ6A-EL]

EHU051321101104

- Adjusts the pressure of the TCC in the torque converter based on the control signals from the TCM.

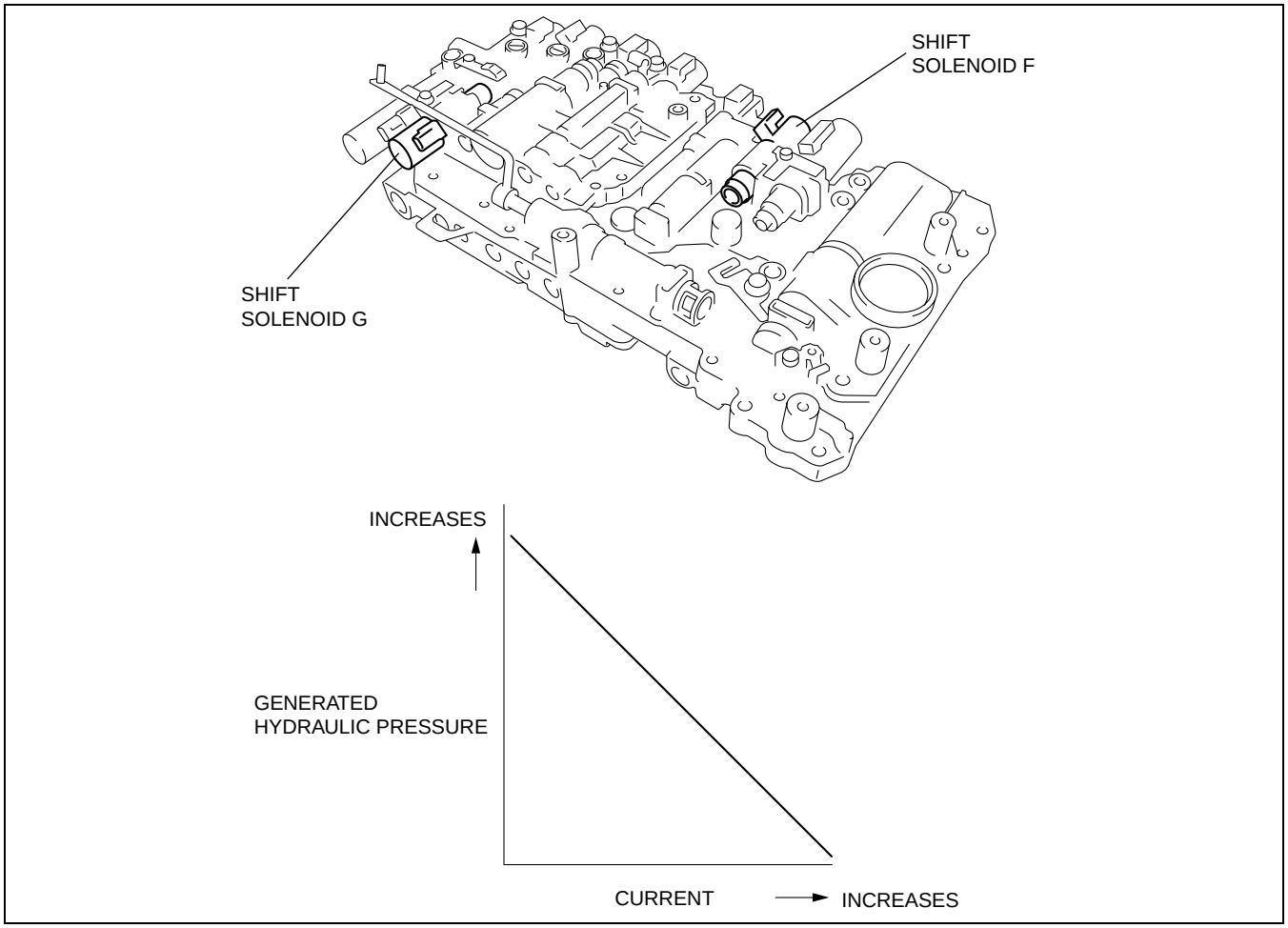


E5U513ZS5030

SHIFT SOLENOID F, G OUTLINE [SJ6A-EL]

EHU051321101105

- By performing linear adjustment of the C3 clutch pressure and the B2 brake pressure based on the control signals from the TCM, the pressure which is applied to the C3 clutch and the B2 brake is directly controlled during shift changes from 5th to 6th gears.

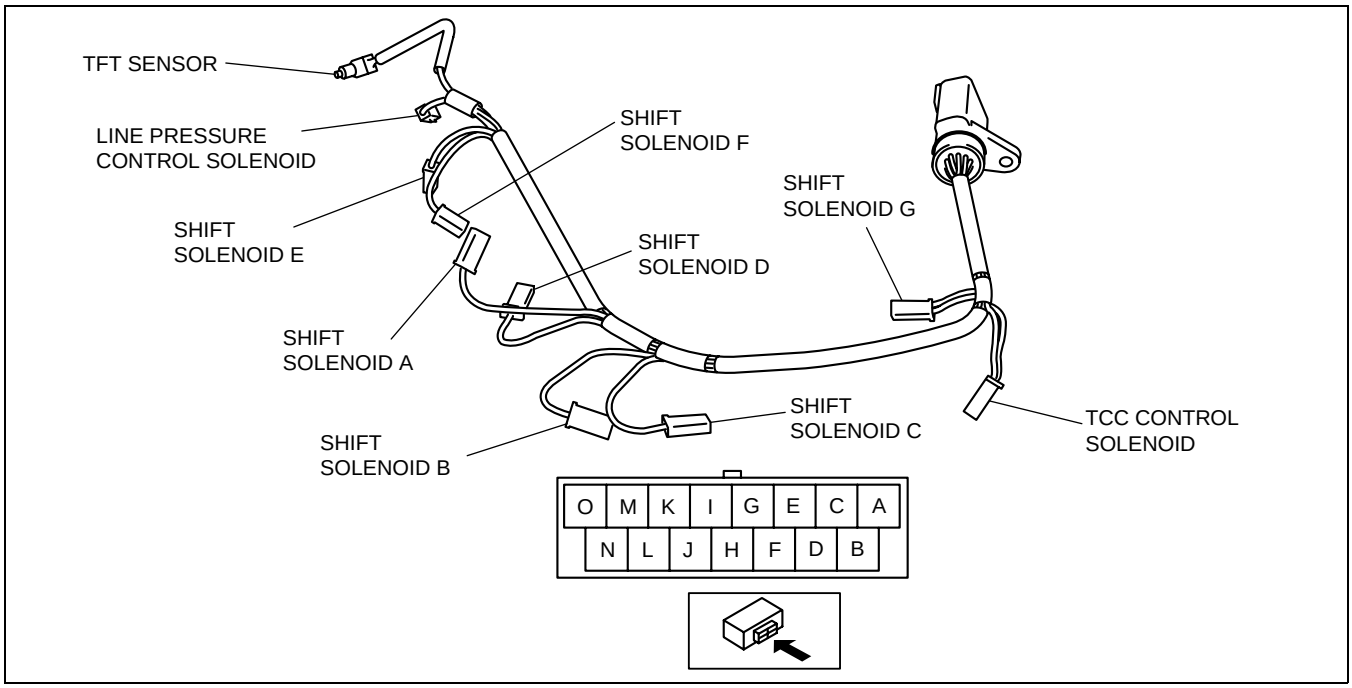


E5U513ZS5031

COUPLER COMPONENT OUTLINE [SJ6A-EL]

EHU051321101106

- The coupler component are installed on the transmission case as the grouped connectors of the TFT sensor and solenoids.



E5U513ZS5032

Terminal No.	Signal
A	TFT sensor (–)
B	TFT sensor (+)
C	Shift solenoid G (–)
D	Shift solenoid G (+)
E	Shift solenoid F (–)
F	Shift solenoid F (+)
G	TCC control solenoid (–)
H	TCC control solenoid (+)

Terminal No.	Signal
I	Line pressure control solenoid (–)
J	Line pressure control solenoid (+)
K	Shift solenoid E
L	Shift solenoid D
M	Shift solenoid C
N	Shift solenoid B
O	Shift solenoid A

SHIFT CONTROL OUTLINE [SJ6A-EL]

EHU051318901106

- Based on the shift diagram, shift solenoids A, B, C, D, E, F, and G are controlled according to the vehicle speed and the throttle opening angle, and the shift control of the transmission is performed.
- When certain conditions are met, the TCM selects a shift mode suitable to the driving conditions and automatically switches to the mode to perform smooth shifting.

Active Adaptive Shift (AAS) Mode

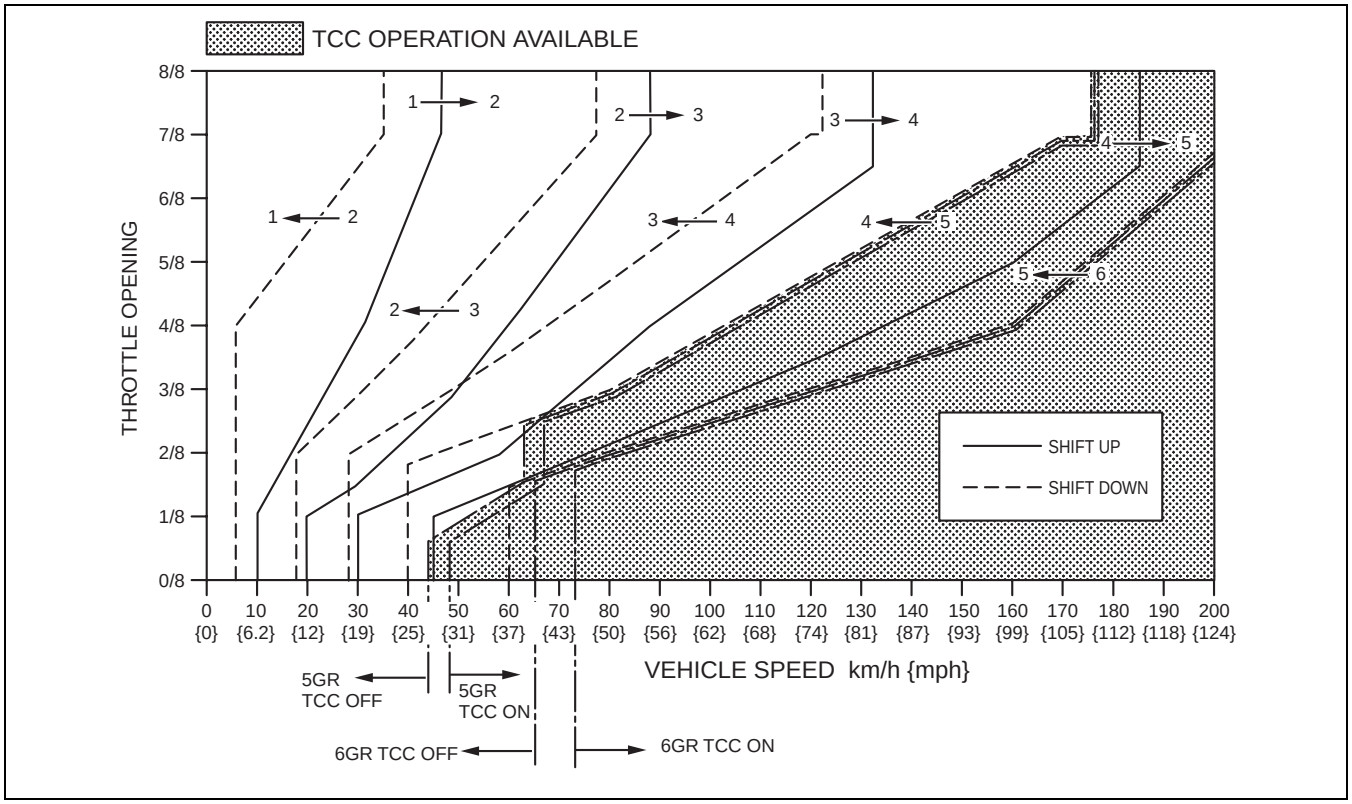
- When certain conditions are met, AAS mode is automatically selected from normal mode. In AAS mode, the shift point is set higher than the normal shift point so that high-engine speed, high-output conditions are available.
- AAS mode is canceled when the vehicle speed remains constant (stable vehicle behavior).

Conditions for switching to active adaptive shift (AAS) mode

- The accelerator pedal is depressed fully to accelerate rapidly while driving in D range.
- Rapid acceleration or deceleration continues for a certain period of time while driving in D range.

Shift control in active adaptive shift (AAS) mode

- Shift control is performed according to the shift pattern in AAS mode.
- When the driver releases the accelerator pedal fully and rapidly, the gear position is maintained at the position before accelerator pedal was released. Due to this, re-acceleration and vehicle control performance have been improved. If the accelerator pedal is released slowly, the gears shift up according to the shift pattern.
- While cornering the vehicle, the gear position is maintained at the position before the vehicle was cornered to facilitate re-acceleration after the corner. The gears do not shift up if the accelerator pedal is depressed fully while cornering the vehicle.



EHU513BS8008

Forced cancellation of active adaptive shift (AAS) mode

- AAS mode is forcibly cancelled under the following conditions:
  - — The vehicle speed in the cruise control system is reset.
  - — The selector lever is shifted to M range while driving in D range.

Down Slope Mode

- While the vehicle is being driven on a down slope, the TCM determines that the vehicle is being driven on a down slope based on the signals and output engine speed from the PCM, and switches the driving mode to the DOWN SLOPE MODE. Due to this, load to the brake is reduced.

Up Slope Mode

- When the vehicle is climbing a slope, the TCM determines that the vehicle is being driven on an up slope based on the signals and output engine speed from the PCM, and switches the driving mode to the UP SLOPE MODE. Due to this, reduction in traction is prevented.

MANUAL MODE SHIFT CONTROL STRUCTURE [SJ6A-EL]

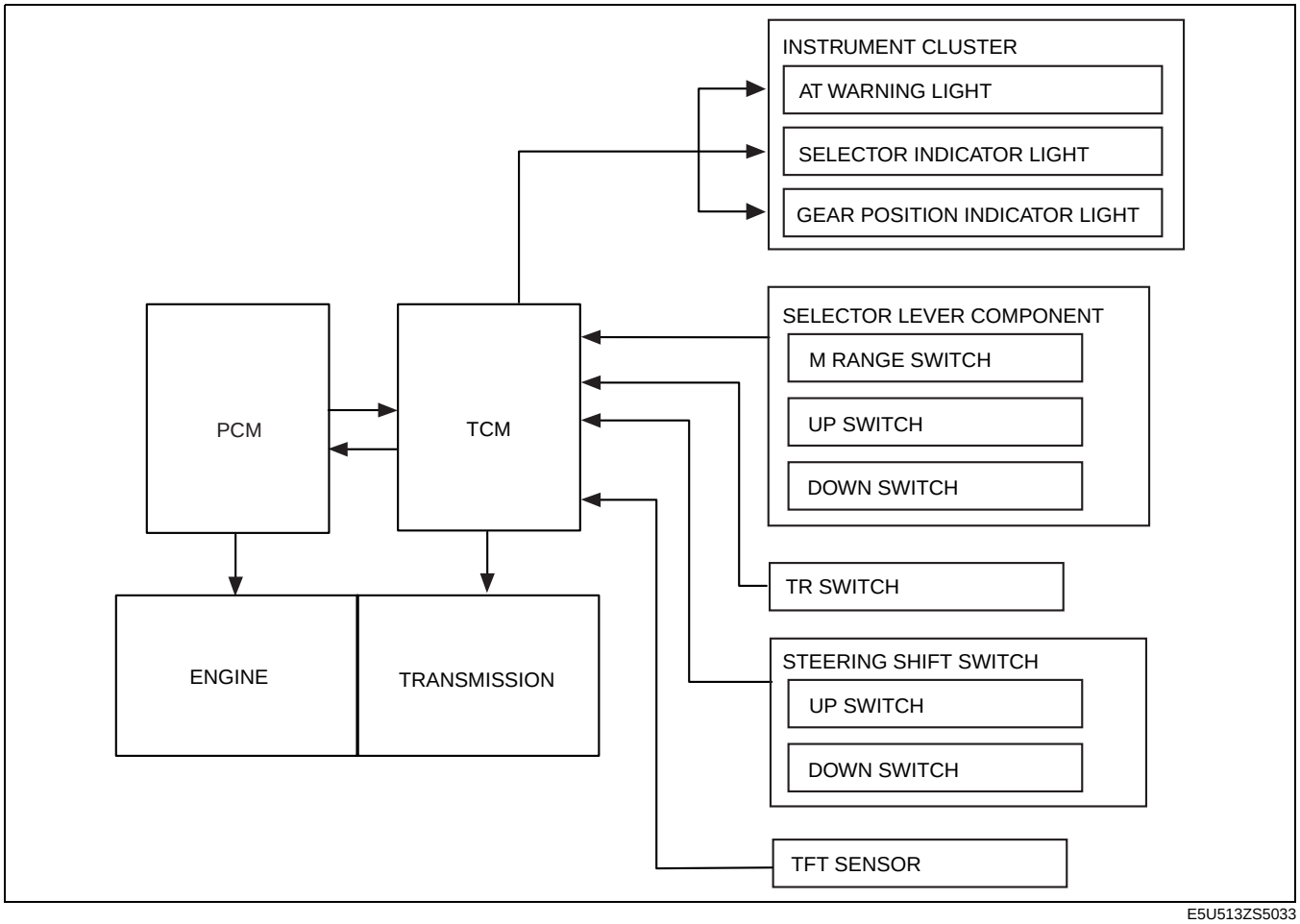
EHU051318901107

Features

- The manual mode shift control is activated by moving the selector lever from the D to M range position (selector lever is shifted over toward driver side).
- Manual mode shift control with a manual shifting system allowing selection of gear positions by manual operation of the selector lever forward (–) and back (+) has been adopted. Moreover, engine braking for all gears in manual mode according to the gear ratio is available.
  - — Shifting between 1GR and 2GR when the vehicle is stopped is possible. Moreover, when shifting from the D to M range while driving, the same gear position is maintained.
  - — Consecutive shifting in the M range has been adopted. When shifting down from M range 6GR or 5GR, one gear can be skipped over by rapidly tapping the selector lever two times in the down-shift (–) direction.
- Specialized manual mode selector lever position and gear position indicator lights, built into the instrument cluster, have been adopted. The gear position indicator light displays the selected gear position while in manual mode.
  - — The selector indicator light includes a selector lever position indicator that displays selector lever positions and, in M range, a gear position indicator light that displays gear positions.

Structure

System diagram



E5U513ZS5033

MANUAL MODE SHIFT CONTROL OPERATION [SJ6A-EL]

EHU051318901108

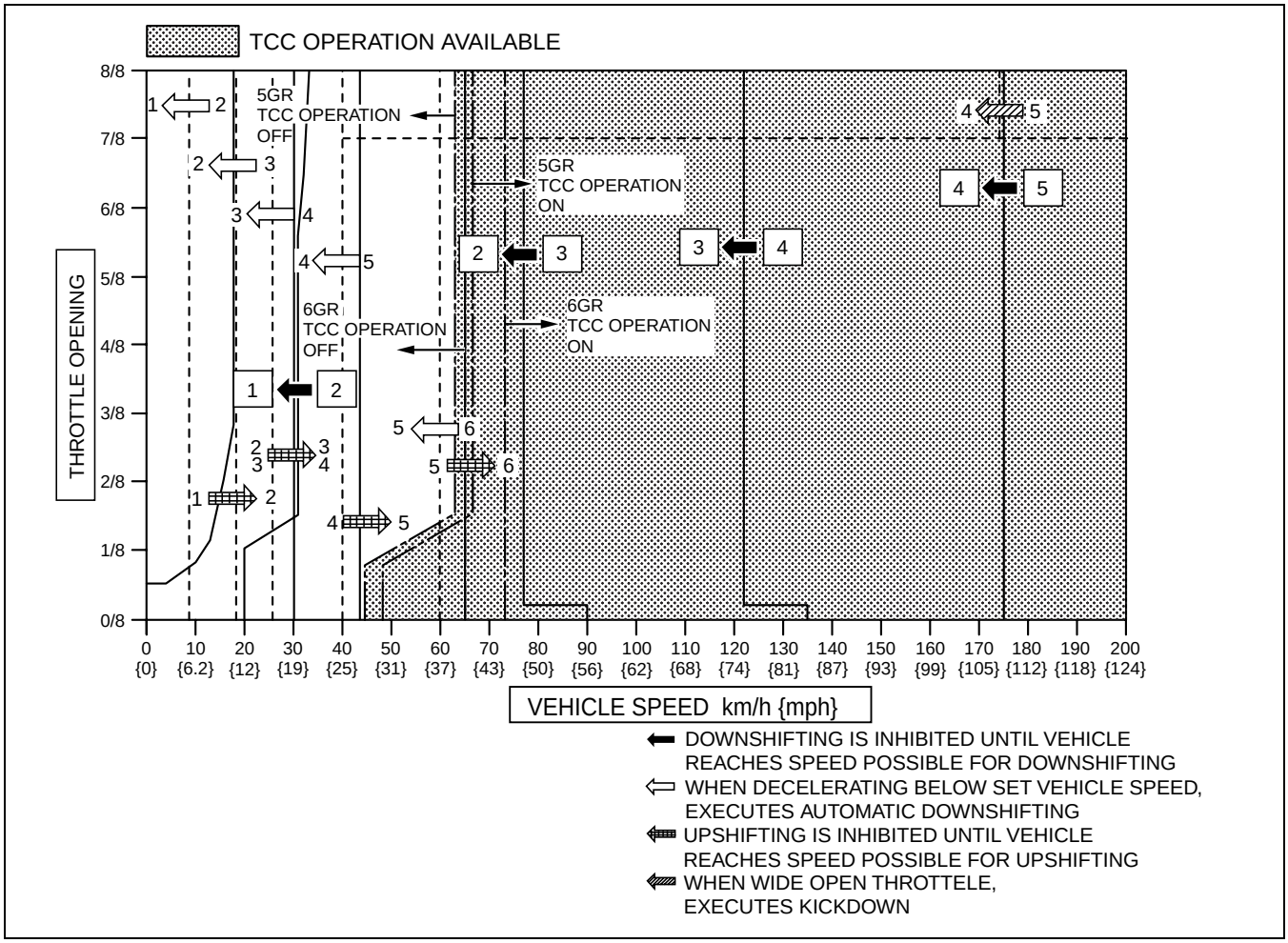
Manual Mode Shift

- When the selector lever is shifted over from the D to M range position, the M range switch in the selector lever component turns on, sending a manual mode command signal to the TCM which activates the manual mode shift control.
- When in manual mode and the selector lever is operated in the back (+) direction, the up switch in the selector lever component is turned on and an up-shift command signal is input to the TCM.
  — The TCM, triggered by the up-shift command signal, carries out shifting by outputting an operation signal to the shift control solenoid.
- Conversely, when the selector lever is operated in the forward (–) direction, the down switch in the selector lever component turns on, and a down-shift command signal is input to the TCM.
  — The TCM, triggered by the down-shift command signal, carries out shifting by outputting an operation signal to the shift control solenoid if the vehicle speed is less than the set speed and the gear position is 2GR or above.
- The up/down operation of the steering shift switch is the same as the manual operation of the selector lever.
- The TCM utilizes a specialized M range automatic shift diagram. Due to this, restriction of manual shift demand and automatic control of downshifting is carried out, reducing load on the AT, preventing engine over-rev and ensuring drive stability.

Condition	Shift control	Note
1GR→2GR up-shift command, at low speed	• To reduce load on the AT, upshifting is inhibited until vehicle reaches speed possible for upshifting	—
2GR→3GR up-shift command, at low speed		
3GR→4GR up-shift command, at low speed		
4GR→5GR up-shift command, at low speed		
5GR→6GR up-shift command, at low speed		
5GR→6GR up-shift command, low ECT	• To rapid engine warming-up, upshifting to 6GR is inhibited	
6GR→5GR down-shift command, above set speed	• To prevent engine over-rev, downshifting is inhibited until vehicle reaches speed possible for downshifting	• Gear position indicator light flash to alert driver
5GR→4GR down-shift command, above set speed		
4GR→3GR down-shift command, above set speed		
3GR→2GR down-shift command, above set speed		
2GR→1GR down-shift command, above set speed		
In 6GR deceleration, speed goes below coast-down set speed (deceleration down-shift)	• To assure drive stability, automatically downshifts from 6GR to 5GR	—
In 5GR deceleration, speed goes below coast-down set speed (deceleration down-shift)	• To assure drive stability, automatically downshifts from 5GR to 4GR	
In 4GR deceleration, speed goes below coast-down set speed (deceleration down-shift)	• To assure drive stability, automatically downshifts from 4GR to 3GR	
In 3GR deceleration, speed goes below coast-down set speed (deceleration down-shift)	• To assure drive stability, automatically downshifts from 3GR to 2GR	
In 2GR deceleration, speed goes below coast-down set speed (deceleration down-shift)	• To assure drive stability, automatically downshifts from 2GR to 1GR	

Condition	Shift control	Note
Wide open throttle at 175—210 km/h {109—130 mph} in 6GR	• To improve acceleration performance, 6GR to 5GR kickdown occurs	—
Wide open throttle at 40—174 km/h {25—108 mph} in 5GR	• To improve acceleration performance, 5GR to 4GR kickdown occurs	

Shift Diagram



EHU513BS8004

AT WARNING LIGHT FUNCTION [SJ6A-EL]

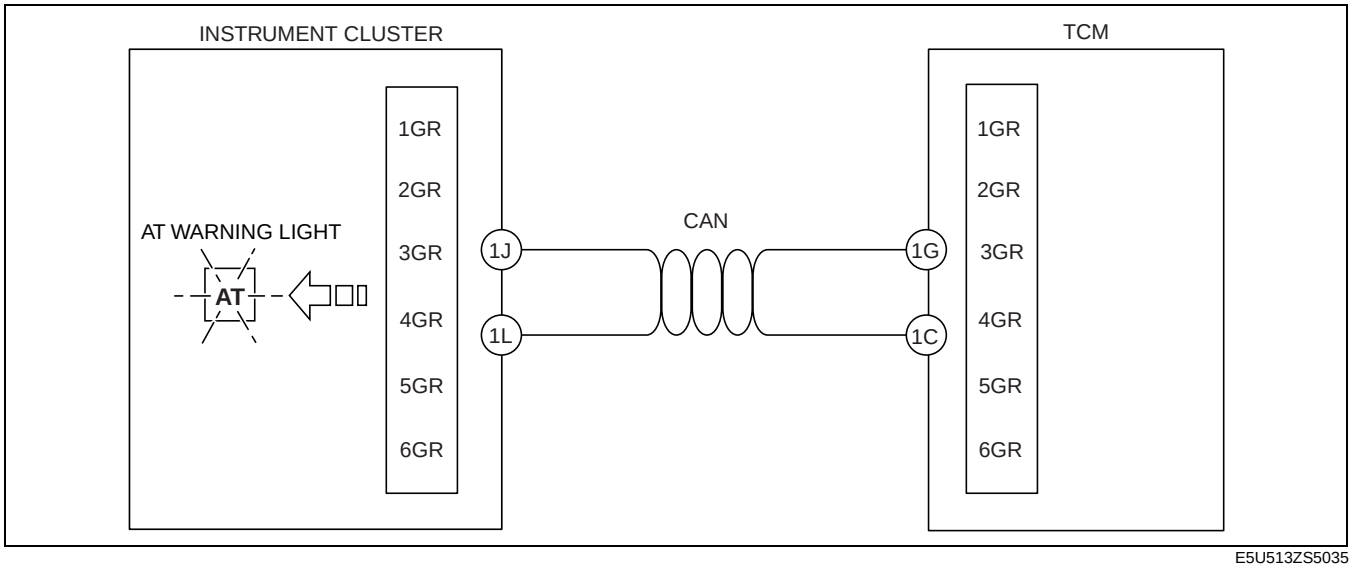
EHU051321101107

- The AT warning light illuminates to alert the driver of a malfunction in the automatic transmission.

AT WARNING LIGHT CONSTRUCTION/OPERATION [SJ6A-EL]

EHU051321101108

- The AT warning light is built into the instrument cluster.
- The AT warning light illuminates when the instrument cluster receives a warning signal from the TCM via CAN communication.
- The TCM sends a warning signal to the instrument cluster via CAN communication when it detects a malfunction.



E5U513ZS5035

SELECTOR INDICATOR LIGHT FUNCTION [SJ6A-EL]

EHU051321101109

- The selector indicator light has a selector lever position light, and a gear position indicator light that indicates gear position.
- When downshifting is cancelled in the M range, the gear position indicator light flashes two times to alert the driver that downshifting is cancelled.

SELECTOR INDICATOR LIGHT CONSTRUCTION/OPERATION [SJ6A-EL]

EHU051321101110

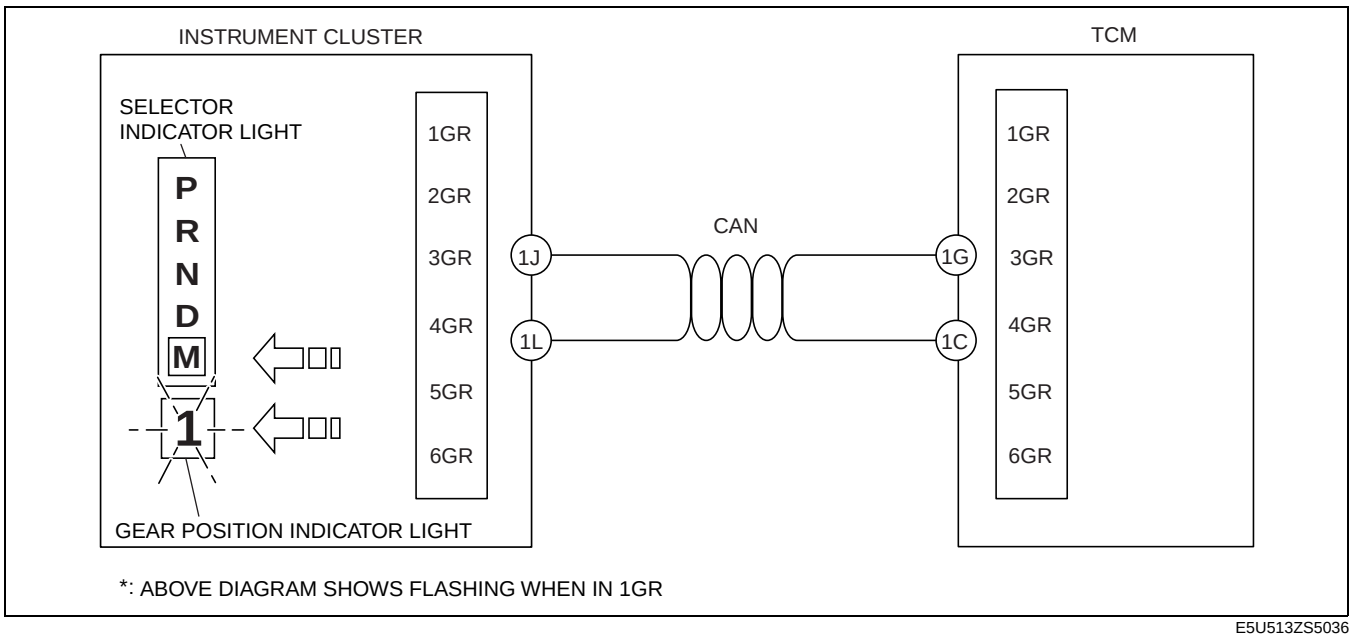
Construction

- The selector indicator light is built into the instrument cluster.
- When in the P, R, N or D range, the TCM detects the selector lever position based on an analog signal from the TR switch. When in the M range, the TCM detects the selector lever position based on a signal from the M range switch inside the selector lever component.
- When the instrument cluster receives a range signal or a gear position signal from the TCM via CAN communication, the selector lever position and the gear position indicator lights illuminate or flash accordingly.

Operation

Gear position indicator light flash

- When the driver's down-shift operation is cancelled, the gear position indicator light flash twice.
  - — When the TCM cancels a shift operation, all of the signals are pulsed ON/OFF and when finally input to the instrument cluster, the on signal (ex. M1 signal when in 1GR) and the remaining three off signals (M2, M3, M4, M5, M6) are reversed to off and on signals respectively.
- Based on a combination of input signals from the TCM, the instrument cluster determines the gear number (1GR displayed as "1"), and flashes the gear position number in the gear position indicator light and the selector indicator "M" light.



E5U513ZS5036

TORQUE CONVERTER CLUTCH (TCC) CONTROL OUTLINE [SJ6A-EL]

EHU051318901109

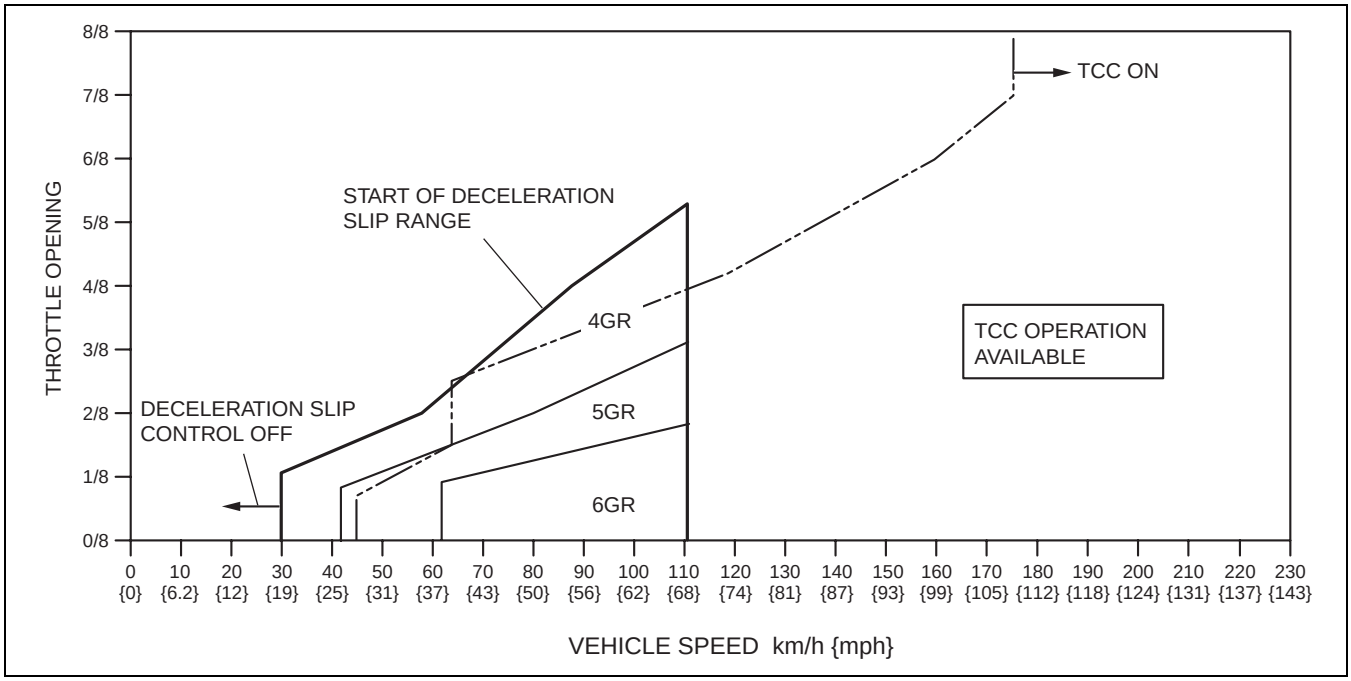
- Based on the TCC diagram, the TCC control solenoid is turned on and off according to the vehicle speed and throttle opening angle, and the TCC point control is performed.
- If any of the following three conditions are met, TCC is cancelled.

TCC Cancel Conditions

- Brake switch is ON
- Accelerator is fully closed (determined being idling)
- Engine coolant temperature is low

Deceleration Slip Control

- The deceleration slip control operates when the accelerator pedal is fully depressed at the start of the deceleration slip range while the vehicle is being driven.
- The deceleration slip control operates even at lower vehicle speeds by sliding the lockup clutch slightly and suppressing engine speed increase. In addition, fuel economy has been improved due to the improved transmission efficiency.



EHU513BS8009

5-6 SHIFT INHIBIT CONTROL OUTLINE [SJ6A-EL]

EHU051318901110

- The TCM inhibits shift change from the 5th to 6th gears when it determines that the engine is cold based on the engine coolant temperature signal from the engine.

TORQUE REDUCTION CONTROL AND LINE PRESSURE CONTROL OUTLINE [SJ6A-EL]

EHU051318901111

- While in a shift change between 1st and 6th gears, a torque reduction request signal is output from the TCM to the PCM to cut engine torque amplification caused by shift changes to realize smooth shift shock.
- In addition, line pressure control in which line pressure is controlled during shift change between 1st and 6th gears has been adopted to improve shift shock.

SELF-DIAGNOSIS FUNCTION OUTLINE [SJ6A-EL]

EHU051318901112

- The TCM monitors the communication status of each sensor, electronic component and PCM including the PCM. If any malfunction should occur, the TCM functions to warn the driver and stores the malfunction as a diagnosis code.

On-board diagnosis	• If any malfunction should occur in the automatic transmission, the TCM will cause warning light to light up in order to inform the driver of the malfunction.
Off-board diagnosis	• The TCM stores the malfunction as a diagnosis code. The diagnosis code and TCM data can be inspected by connecting the WDS or equivalent.

Caution

- **To erase stored DTCs, always perform one of the below procedures. If not performed, a miss-reading of the DTC may occur.**

Stored DTC Erasing Method

- Use the WDS or equivalent.
- Disconnect the negative battery cable and reconnect it after 5 min. or more.

FAIL-SAFE OUTLINE [SJ6A-EL]

EHU051318901113

- With the fail-safe function, if any malfunction should occur in the automatic transmission system, the TCM will output a control signal, and control will be performed to make travelling a minimum distance possible. If shift solenoid malfunction, the TCM will cancel the output of control signals to the solenoid.

SHIFT LEARNING FUNCTION [SJ6A-EL]

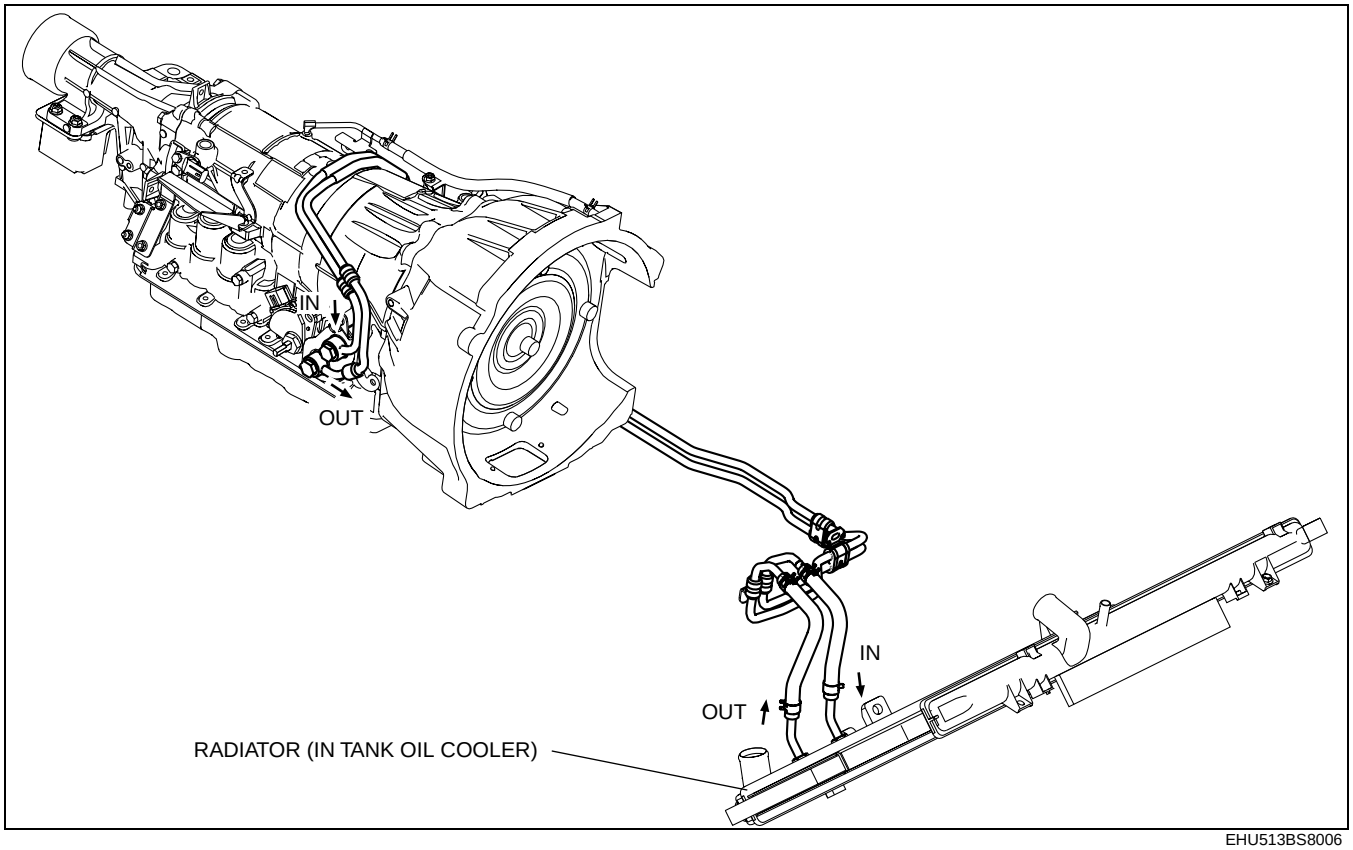
EHU051318901114

- Learns optimum hydraulic pressures for each clutch and brake to reduce shift shock during shift change.

COOLING SYSTEM OUTLINE [SJ6A-EL]

EHU051319900101

- A water-cooling type AT oil cooler is adopted and installed in the radiator. The oil cooler cools the ATF heated in the AT body.



EHU513BS8006

POWER PLANT FRAME (PPF) FUNCTION [SJ6A-EL]

EHU051300000107

- The Power Plant Frame feature has been adopted for all models. For detailed information, refer to the 2005MY RX-8 M15M-D manual transmission description.

05–14 AUTOMATIC TRANSMISSION SHIFT MECHANISM

AUTOMATIC TRANSMISSION SHIFT MECHANISM OUTLINE

EHU051446010101

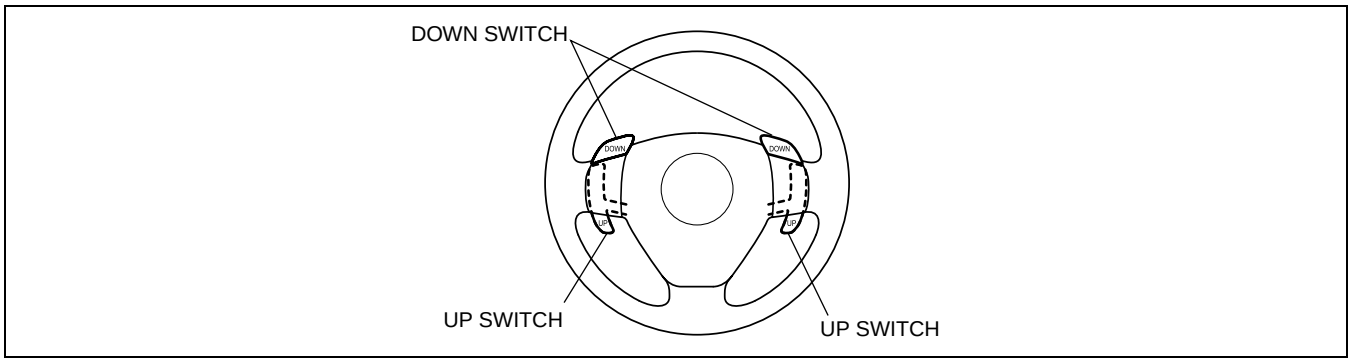
- The construction and operation of the automatic transmission shift mechanism system is essentially carried over from that of the 2005MY RX-8, except for the following.
  — The TCM terminal has been changed for the SJ6A-EL automatic transmission model only.

STEERING SHIFT SWITCH CONSTRUCTION/OPERATION

EHU051446102101

Construction

- There is one pair of up and down switches on both the left and right sides of the steering wheel.
- The circuits of the down switches are built into the audio control switch and cruise control switch. (For vehicles without cruise control, there is only a down switch.)



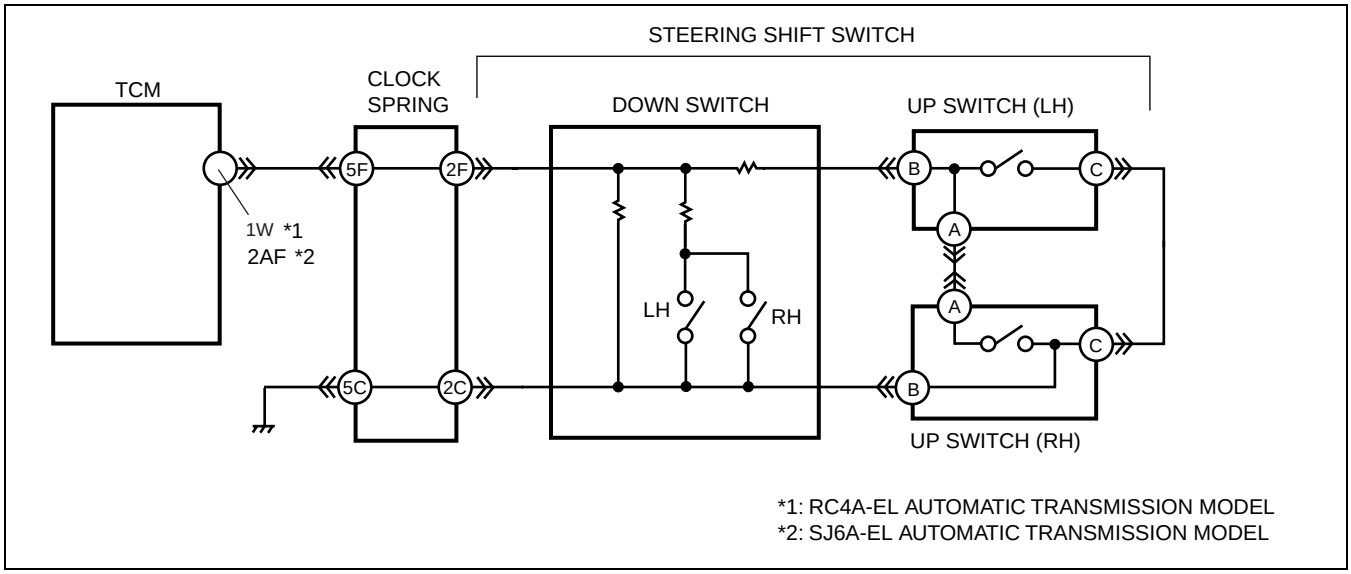
CHU0514S201

Operation

Sending of up/down-shift request signals

- The TCM detects an up/down-shift request signal according to the voltage applied to terminal 1W[*1], 2AF[*2].
- When the up or down switch is operated, the resistor built into the down switch changes the voltage applied to TCM terminal 1W[*1], 2AF[*2].
- The TCM controls upshifting or downshifting based on this change in voltage.

[*1] : RC4A-EL automatic transmission model
[*2] : SJ6A-EL automatic transmission model



EHU514ZS8001

RESTRAINTS

08
SECTION

08–00 OUTLINE

RESTRAINTS ABBREVIATIONS

EHU080000000101

ALR	Automatic Locking Retractor
DLC	Data Link Connector
DTC	Diagnostic Trouble Code
ELR	Emergency Locking Retractor
GND	Ground
IG	Ignition
LED	Light Emitting Diode
LH	Left Hand
PAD	Passenger Air Bag Deactivation
PID	Parameter Identification
RH	Right Hand
SAS	Sophisticated Air bag Sensor
SST	Special Service Tool
WDS	Worldwide Diagnostic System

RESTRAINTS FEATURES

EHU080000000102

Improved safety	• A front passenger sensing system has been added.

08–02 ON-BOARD DIAGNOSTIC

ON-BOARD DIAGNOSTIC FUNCTION OUTLINE

EHU080200000101

- The on-board diagnostic function consists of the following functions: a failure detection function, which detects malfunctions in the air bag system-related parts; a memory function, which stores detected DTCs; a self-diagnostic function, which indicates system malfunctions using DTCs; a PID/data monitoring function, which reads out specific input/output signals.
- Using the WDS or equivalent, DTCs can be read out and deleted, and the PID/data monitoring function can be activated.
- A fail-safe function, prevents the abrupt activation of the air bag module and the pre-tensioner seat belt in case of an air bag system malfunction.

ON-BOARD DIAGNOSTIC FUNCTION FUNCTION

EHU080200000102

Self-diagnostic Function

- Diagnostic DTCs B1013, B1884, B1890 and B2290 have been added due to the adoption of the seat weight sensor.

DTC				System malfunction location
WDS display	Air bag system warning light			
	Flashing pattern		Priority ranking	
B1013	16		18	Seat weight sensor calibration error
B1884	18		21	Passenger air bag deactivation (PAD) indicator open or short to body ground
B1890	18		21	Passenger air bag deactivation (PAD) indicator circuit short to power supply
B2290	16		18	Passenger sensing system malfunction

PID/Data Monitoring Function

- By using the PID/data monitoring function, the monitored item of the input/output signal, as set on the SAS control module, can be freely selected and read out in real-time.
- The WDS or equivalent is used to read out PID/data monitor information.

PID name (definition)	Unit/Condition	Operation Condition (Reference)	Terminal
CCNT_RCM (Number of continuous DTCs)	—	• DTCs detected: 1—255 • No DTCs detected: 0	—
CRSH_ST_D1 (Driver-side side air bag sensor communication state)	OK/ FAULT	• Sensor normal: OK • Sensor communication error: FAULT	2Z, 2AA
CRSH_ST_D2 (Driver-side side air bag sensor circuit state)	OK/ FAULT	• Sensor normal: OK • Sensor internal circuit error: FAULT	2Z, 2AA
CRSH_ST_F1 (Crash zone sensor communication state)	OK/ FAULT	• Sensor normal: OK • Sensor communication error: FAULT	1B, 1C
CRSH_ST_F2 (Crash zone sensor circuit state)	OK/ FAULT	• Sensor normal: OK • Sensor internal circuit error: FAULT	1B, 1C
CRSH_ST_P1 (Passenger-side side air bag sensor communication state)	OK/ FAULT	• Sensor normal: OK • Sensor communication error: FAULT	2B, 2C
CRSH_ST_P2 (Passenger-side side air bag sensor circuit state)	OK/ FAULT	• Sensor normal: OK • Sensor internal circuit error: FAULT	2B, 2C
D_ABAGR2 (Driver-side air bag module (inflator No.2) resistance)	Ohm	Under any condition: 1.5—3.7 ohms	1G, 1J
DABAGR (Driver-side air bag module (inflator No.1) resistance)	Ohm	Under any condition: 1.5—3.7 ohms	1S, 1V
D_PTENSFLT (Driver-side pre-tensioner seat belt circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Pre-tensioner seat belt circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2P, 2S
DR_BUKL (Driver-side buckle switch status)	Buckled/ Unbuckled	• Driver-side buckle switch on: Buckled • Driver-side buckle switch off: Unbuckled	2T
DR_CURTN (Driver-side curtain air bag module resistance)	Ohm	Under any condition: 1.4—3.2 ohms	2V, 2Y
DR_PTENS (Driver-side pre-tensioner seat belt resistance)	Ohm	Under any condition: 1.5—3.1 ohms	2P, 2S
DS_AB (Driver-side side air bag module resistance)	Ohm	Under any condition: 1.4—3.2 ohms	2M, 2O
DS_AB_ST (Driver-side side air bag module circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2M, 2O
DS_CURT_ST (Driver-side curtain air bag module circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2V, 2Y
DS1_STAT (Driver-side air bag module (inflator No.1) circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	1S, 1V

PID name (definition)	Unit/Condition	Operation Condition (Reference)	Terminal
DS2_STAT (Driver-side air bag module (inflator No.2) circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	1G, 1J
DSB_P_ST (Driver-side pre-tensioner seat belt circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Pre-tensioner seat belt circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2P, 2S
DTC_CLR_ST*1 (Seat weight sensor DTC cleared status)	Started/ Normal End/ In Process/ OCS Fault	Fault information cleared at seat weight sensor	1I
IGN_V_2 (IG1 voltage)	V	Ignition switch to ON position: B+	1W
OCS_CAL_ST*2 (Seat weight sensor calibration status)	Starting/ Normal End/ Commanding/ NG (Voltage)/ NG (Weight)/ In Process Timeout/ OCS Fault	• Seat weight sensor calibration start-up: Starting • Seat weight sensor calibration completed normally: Normal End • Seat weight sensor calibration command being sent: Commanding • Voltage malfunction during seat weight sensor calibration: NG (Voltage) • Weight error during seat weight sensor calibration: NG (Weight) • Seat weight sensor calibration time limit passed: Timeout • Seat weight sensor calibration being processed: In Process • Seat weight sensor or Seat weight sensor control module malfunction: OCS Fault	1I
OCS_SYS_ST*1 (Seat weight sensor status)	Empty/ SMALL/ LARGE/ Indeterminate/ Invalid	Occupant classification status determined by seat weight sensor	1I
OCSFLT_CAL (Passenger sensing system calibration status)	OK/ FAULT	• Sensor normal: OK • Seat weight sensor calibration error: FAULT	1I
OCSFLT_COM (Passenger sensing system communication status)	OK/ FAULT	• Sensor normal: OK • Seat weight sensor control module communication error: FAULT	1I
OCSFLT_L (Passenger sensing system (LH) malfunction status)	OK/ FAULT	• Sensor normal: OK • Seat weight sensor (LH) malfunction: FAULT	1I
OCSFLT_MDL (Passenger sensing system control module malfunction status)	OK/ FAULT	• Sensor normal: OK • Seat weight sensor control module malfunction: FAULT	1I
OCSFLT_R (Passenger sensing system (RH) malfunction status)	OK/ FAULT	• Sensor normal: OK • Seat weight sensor (RH) malfunction: FAULT	1I
OD_CRST_D1 (On demand driver-side side air bag sensor communication state)	OK/ FAULT	• Sensor normal: OK • Sensor communication error: FAULT	2Z, 2AA
OD_CRST_D2 (On demand driver-side side air bag sensor circuit state)	OK/ FAULT	• Sensor normal: OK • Sensor internal circuit error: FAULT	2Z, 2AA
OD_CRST_F1 (On demand crash zone sensor communication state)	OK/ FAULT	• Sensor normal: OK • Sensor communication error: FAULT	1B, 1C
OD_CRST_F2 (On demand crash zone sensor circuit state)	OK/ FAULT	• Sensor normal: OK • Sensor internal circuit error: FAULT	1B. 1C

PID name (definition)	Unit/Condition	Operation Condition (Reference)	Terminal
OD_CRST_P1 (On demand passenger-side side air bag sensor communication state)	OK/ FAULT	• Sensor normal: OK • Sensor communication error: FAULT	2B, 2C
OD_CRST_P2 (On demand passenger-side side air bag sensor circuit state)	OK/ FAULT	• Sensor normal: OK • Sensor internal circuit error: FAULT	2B, 2C
OD_D_CURT (Driver-side curtain air bag module circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2V, 2Y
OD_DAB1_ST (Driver-side air bag module (inflator No.1) circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	1S, 1V
OD_DAB2_ST (Driver-side air bag module (inflator No.2) circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	1G, 1J
OD_DSAB_ST (Driver-side side air bag module circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2M, 2O
OD_P_CURT (Passenger-side curtain air bag module circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2A, 2D
OD_PAB1_ST (Passenger-side air bag module (inflator No.1) circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	1M, 1P
OD_PAB2_ST (Passenger-side air bag module (inflator No.2) circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	1A, 1D
OD_PSAB_ST (Passenger-side side air bag module circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2I, 2L
P_ABAGR2 (Passenger-side air bag module (inflator No.2) resistance)	Ohm	Under any condition: 1.4—2.9 ohms	1A, 1D
P_PTENSFLT (Passenger-side pre-tensioner seat belt circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Pre-tensioner seat belt circuit resistance low: SQ_LOWRES • Related wiring harness normal: NORMAL	2G, 2J
PABAGR (Passenger-side air bag module (inflator No.1) resistance)	Ohm	Under any condition: 1.4—2.9 ohms	1M, 1P
PS_AB (Passenger-side side air bag module resistance)	Ohm	Under any condition: 1.4—3.2 ohms	2I, 2L

PID name (definition)	Unit/Condition	Operation Condition (Reference)	Terminal
PS_AB_ST (Passenger-side side air bag sensor circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2I, 2L
PS_BUKL (Passenger-side buckle switch status)	Buckled/ Unbuckled	• Passenger-side buckle switch on: Buckled • Passenger-side buckle switch off: Unbuckled	2H
PS_CURTN (Passenger-side curtain air bag module resistance)	Ohm	Under any condition: 1.4—3.2 ohms	2A, 2D
PS_CURT_ST (Passenger-side curtain air bag module circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2A, 2D
PS_PTENS (Passenger-side pre-tensioner seat belt resistance)	Ohm	Under any condition: 1.5—3.1 ohms	2G, 2J
PS_WEIGHT (Seat weight sensor measured weight of passenger)	kg	Display of load (body weight) on passenger-side seat	1I
PS1_STAT (Passenger-side air bag module (inflator No.1) circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	1M, 1P
PS2_STAT (Passenger-side air bag module (inflator No.2) circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Air bag module circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	1A, 1D
PSAB_DepSt (Passenger-side air bag module deployment status)	Active/ Inactive	• Passenger-side air bag module operation (deployment) enabled status: Active • Passenger-side air bag module non-operation (non-deployment) status: Inactive	1I
PSB_P_ST (Passenger-side pre-tensioner seat belt circuit status)	SHRT_B+/ SHRT_GND/ OPEN/ SQ_LOWRES/ Normal	• Related wiring harness short to power supply: SHRT_B+ • Related wiring harness short to ground: SHRT_GND • Related wiring harness circuit open: OPEN • Pre-tensioner seat belt circuit resistance low: SQ_LOWRES • Related wiring harness normal: Normal	2G, 2J
TRAK_SW (Seat track position sensor state)	Forward/ Rearward	• Front seat front position: Forward • Front seat rear position: Rearward	2W, 2X

*1 : Used during seat weight sensor calibration setting. Not necessary for diagnostic.

*2 : When the calibration error is displayed, the error can be cleared by turning the ignition switch to the LOCK position.

08–10 AIR BAG SYSTEM

AIR BAG SYSTEM OUTLINE

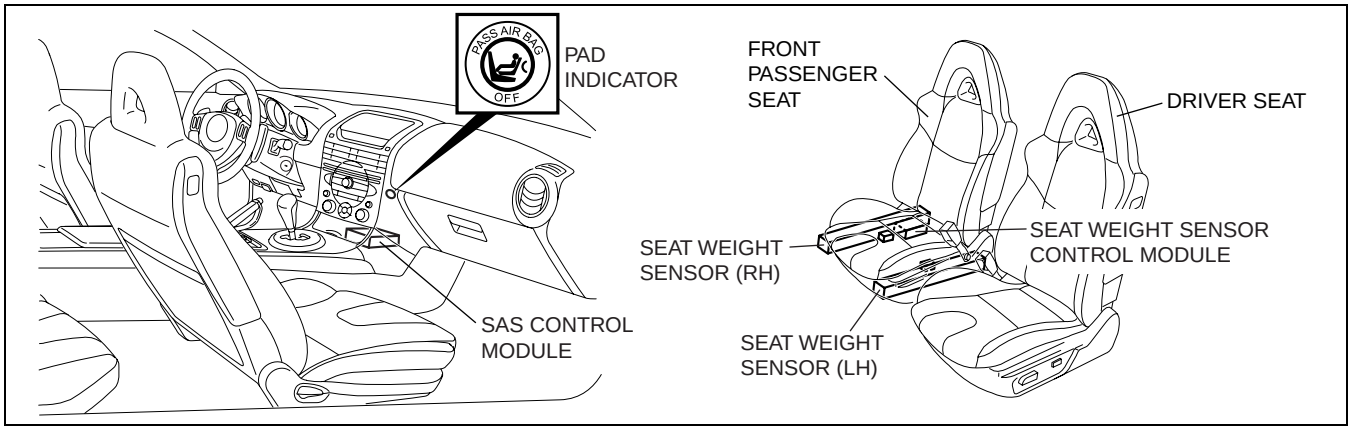
EHU081000000101

- Passenger sensing system has been added.
- In accordance with the system addition, the following components have been added.

Item	Outline
Seat weight sensor	• Measures the compression weight of the load applied to the passenger-side seat by the distortion amount using two seat weight sensor and sends an electrical signal corresponding to the distortion amount to the seat weight sensor control module.
Seat weight sensor control module	• Based on the electrical signal sent from the seat weight sensor corresponding to the distortion amount, calculates the total seated weight to determine the passenger, and sends the determination result to the SAS control module.
PAD indicator	• PAD indicator has been adopted to inform driver and front passenger of the deployment standby status of the passenger-side air bag module, passenger-side side air bag module and passenger-side pre-tensioner seat belt.

AIR BAG SYSTEM STRUCTURAL VIEW

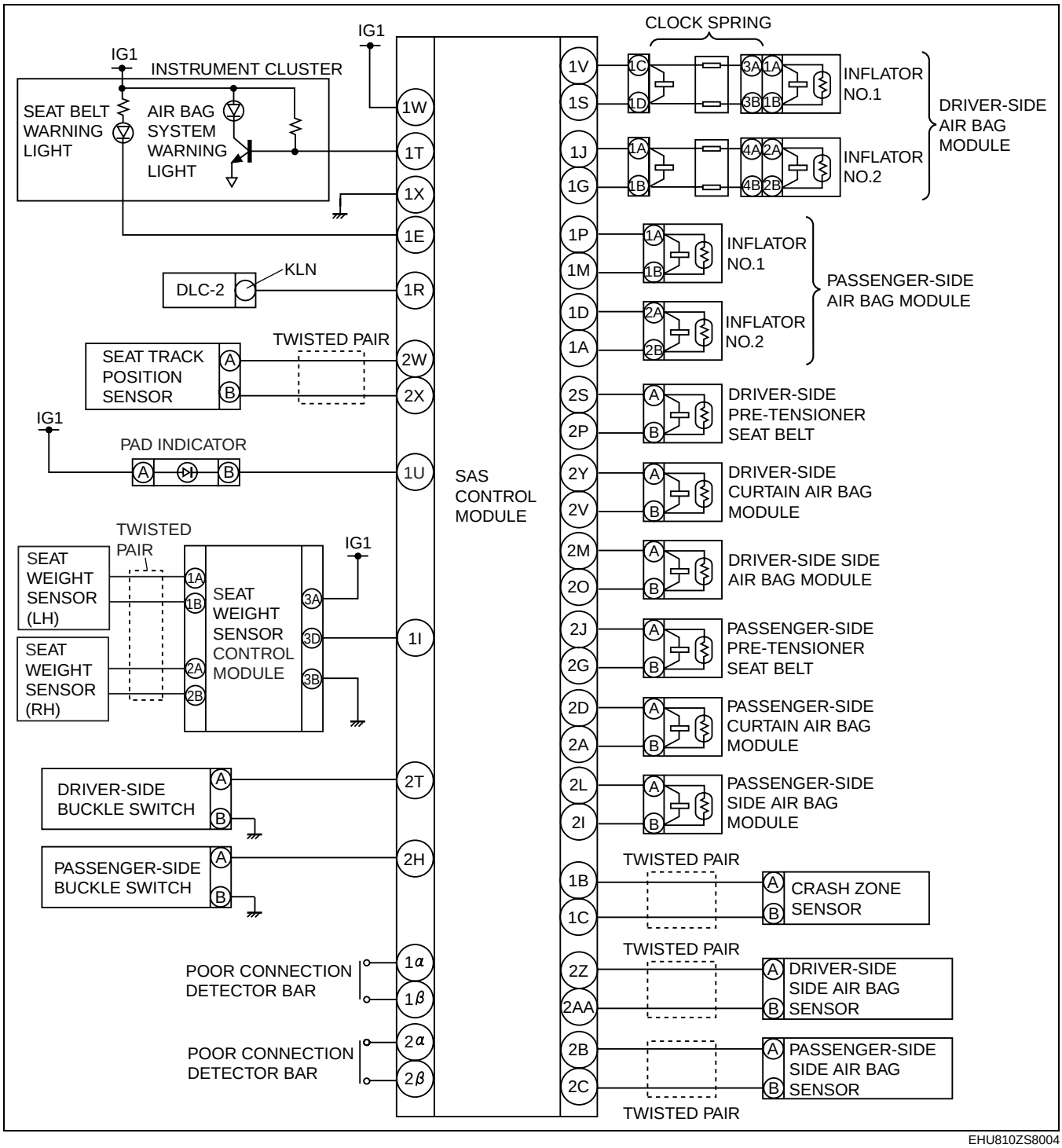
EHU081000000102



EHU810ZS8001

AIR BAG SYSTEM WIRING DIAGRAM

EHU081000000103



EHU810ZS8004

PASSENGER SENSING SYSTEM OUTLINE

EHU081057031101

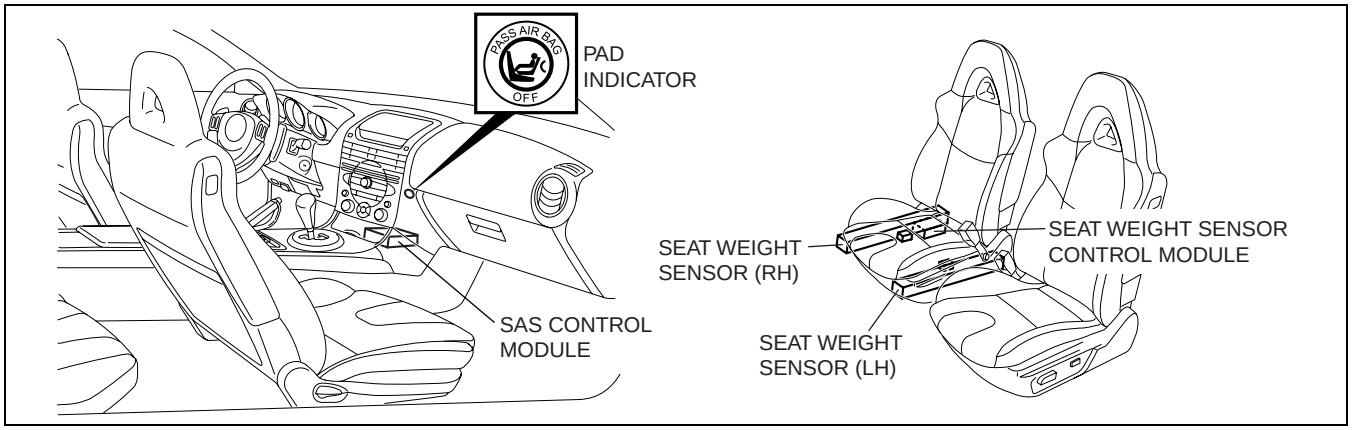
Outline

- Measures the total seated weight on the passenger-side seat, determines whether there is an adult or child (including a child-restraint seat), or that it is empty, and then controls operation (deployment) or non-operation (non-deployment) of the passenger-side air bag module and pre-tensioner seat belt.

PASSENGER SENSING SYSTEM CONSTRUCTION

EHU081057031102

- Consists of the seat weight sensors installed on the underside of the front passenger slide adjuster, the seat weight sensor control module installed to the underside of the seat weight sensor on the right, the PAD indicator, and the SAS control module installed on the console.



EHU810ZS8002

PASSENGER SENSING SYSTEM OPERATION

EHU081057031103

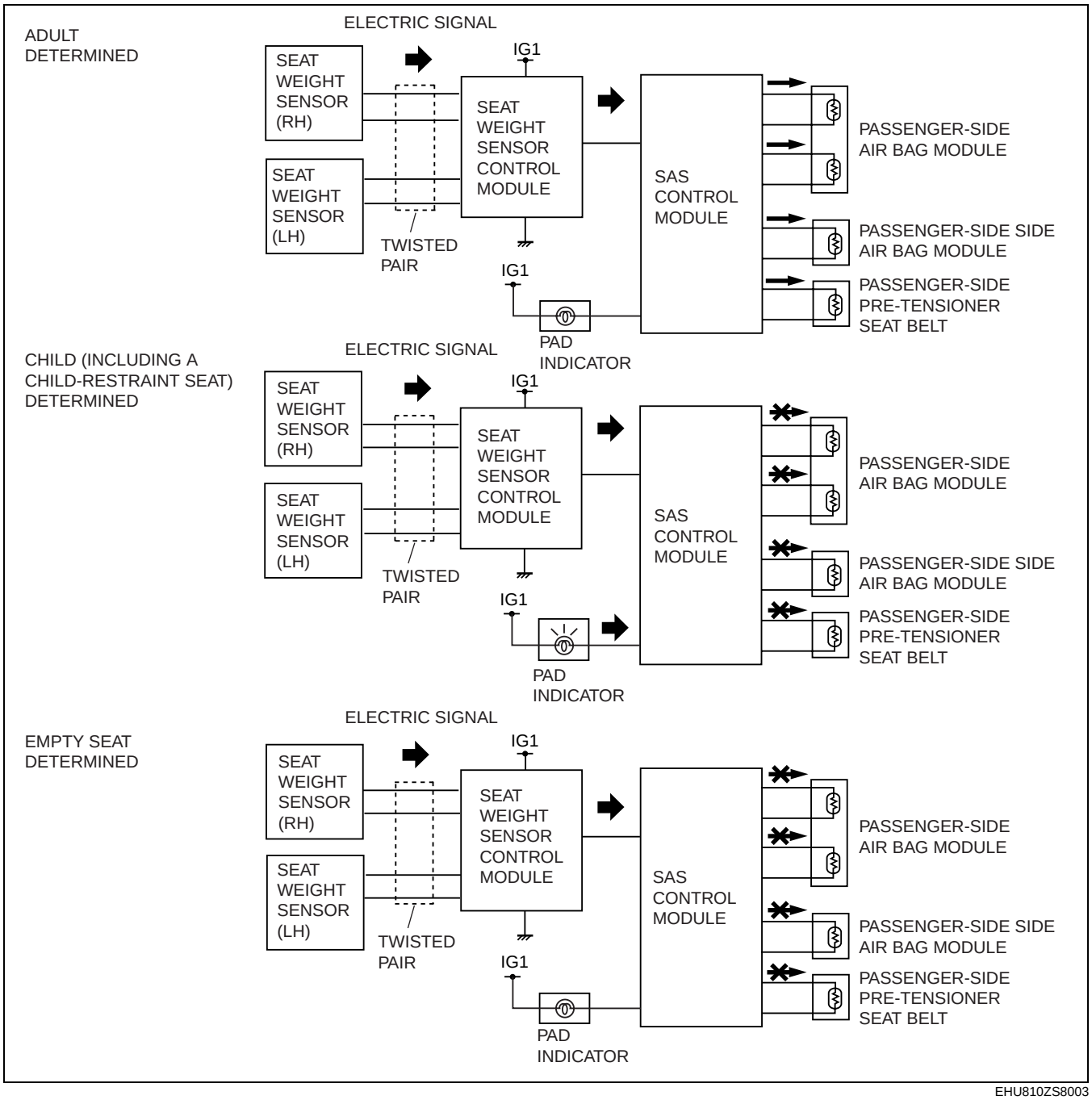
1. The load on the passenger-side seat is converted into an electric signal by the strain gauge built into the seat weight sensor, and this signal is sent to the seat weight sensor control module.
2. The electronic signals from the two seat weight sensor are used for calculation by the seat weight sensor control module, which divides the result and then determines whether there is an adult or child (including a child-restraint seat) in the passenger-side seat, or that it is empty. The determined result is sent to the SAS control module.
3. The SAS control module performs control based on this determined result as shown in the following table when the module detects a level of impact requiring operation (deployment).

×: Possible
-: Not possible

Determined result	Determined weight	Passenger-side air bag module operation (deployment)	Passenger-side side air bag module operation (deployment)	Passenger-side pre-tensioner seat belt operation (deployment)	PAD indicator
Adult	Approx. 42 kg {93 lb} or more	×	×	×	Not illuminated
Child (including child-restraint seat)	Approx. 30 kg {66 lb} or less	-	-	-	Illuminated
Empty	Approx. 0 kg {0 lb}	-	-	-	Not illuminated

Note

- The passenger-side air bag module, the passenger-side side air bag module and the passenger-side pre-tensioner seat belt system will be turned off as the total seated weight drops toward 30kg {66 lb} and they will be turned on again before the weight exceeds 42kg {93 lb}.



EHU810ZS8003

Caution

- **If any of the following work is performed, perform the seat weight sensor calibration using the WDS or equivalent.**
  - **— Replacement with a new seat weight sensor**
  - **— Replacement with a new seat weight sensor control module**
  - **— Replacement with new passenger-side seat parts**
  - **— Disassembly of the passenger-side seat**
- **If any of the following work is performed, perform the seat weight sensor inspection using the WDS or equivalent.**
  - **— Removal of the passenger-side seat**
  - **— Loosening and retightening of passenger's seat fixing bolts**
  - **— Or, the vehicle is involved in a collision**

BODY & ACCESSORIES

09
SECTION

09–00 OUTLINE

BODY AND ACCESSORIES ABBREVIATIONS

EHU090000000101

A/C	Air Conditioner
ACC	Accessories
AT	Automatic Transmission
CAN	Controller Area Network
CM	Control Module
CPU	Central Processing Unit
CTR	Center
DLC	Data Link Connector
DTC	Diagnostic Trouble Code
GND	Ground
HI	High
IG	Ignition
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left Hand
LO	Low
M	Motor
MT	Manual Transmission
OFF	Switch Off
ON	Switch On
PCM	Powertrain Control Module
PID	Parameter Identification
P/W CM	Power Window Control Module
RH	Right Hand
SW	Switch
TNS	Tail Number Side Lights
WDS	Worldwide Diagnostic System

BODY AND ACCESSORIES NEW FEATURES

EHU090000000102

Improved marketability	• Advanced keyless entry and start system adopted • Car-navigation unit modified

09–14A SECURITY AND LOCKS [ADVANCED KEYLESS SYSTEM]

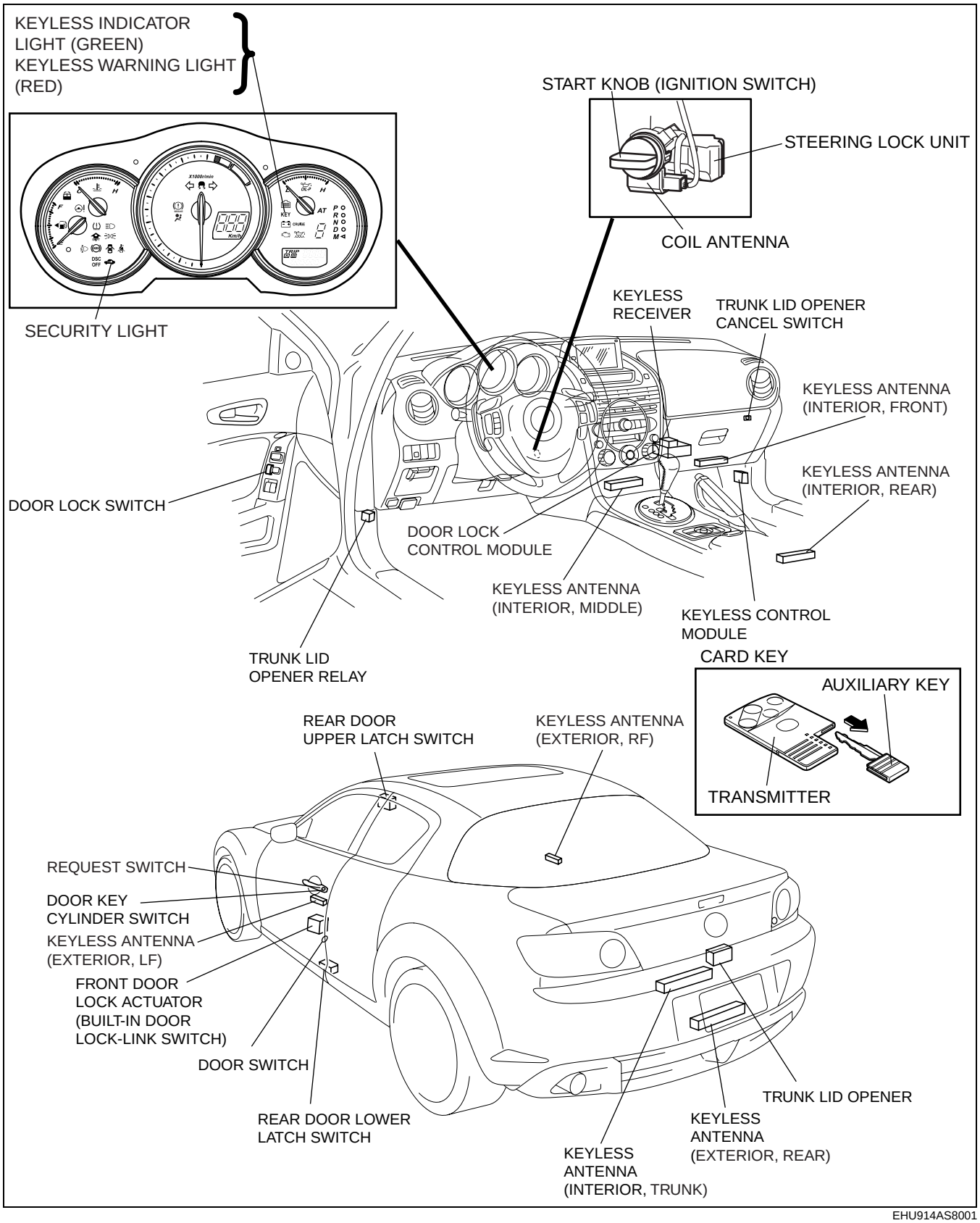
SECURITY AND LOCKS OUTLINE

EHU091400001101

Improved marketability	• Power door lock system adopted • Advanced keyless entry and start system adopted

SECURITY AND LOCKS STRUCTURAL VIEW

EHU091400001102



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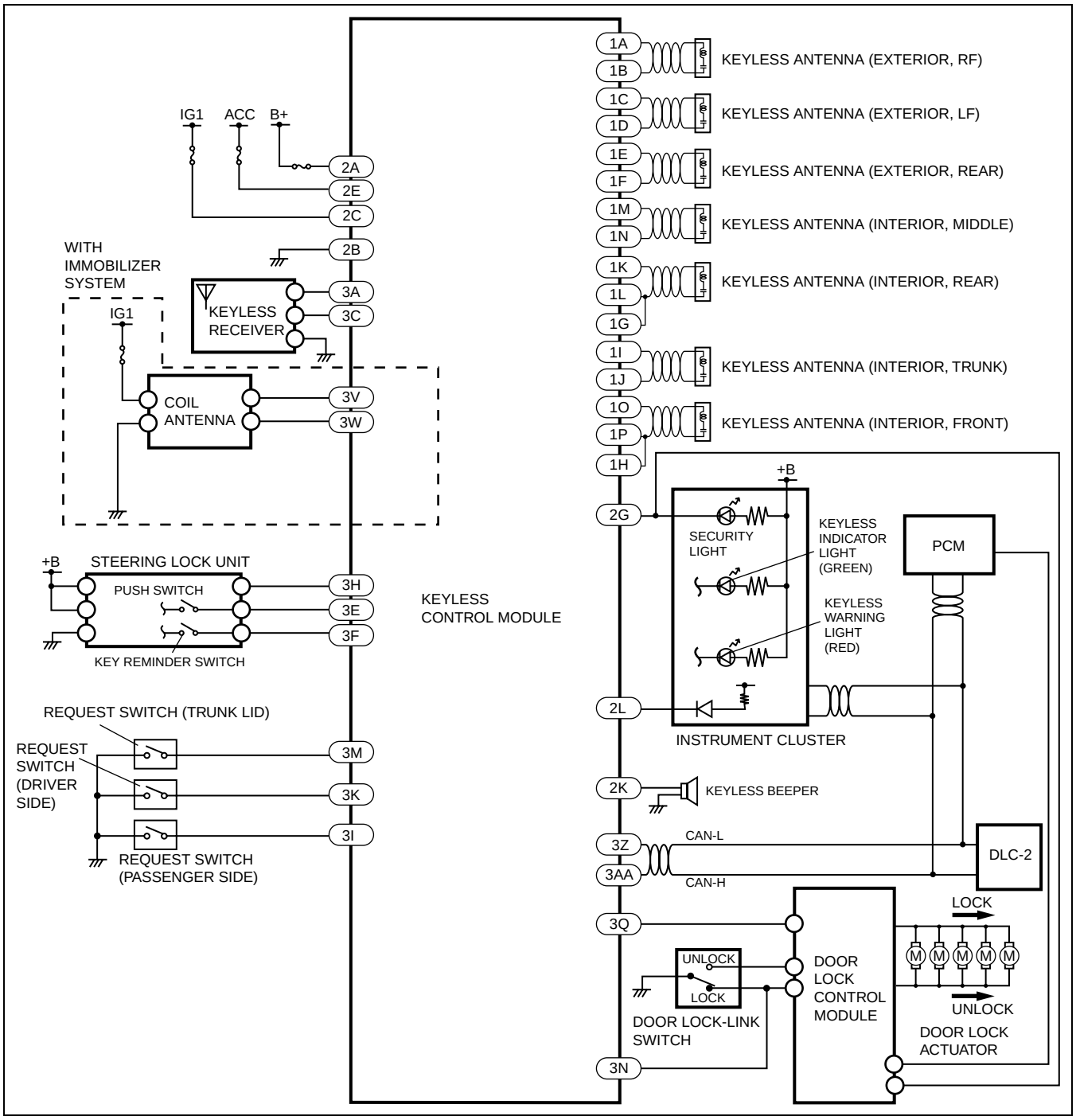
SECURITY AND LOCKS SYSTEM WIRING DIAGRAM

EHU091400001103



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POWER DOOR LOCK SYSTEM OUTLINE

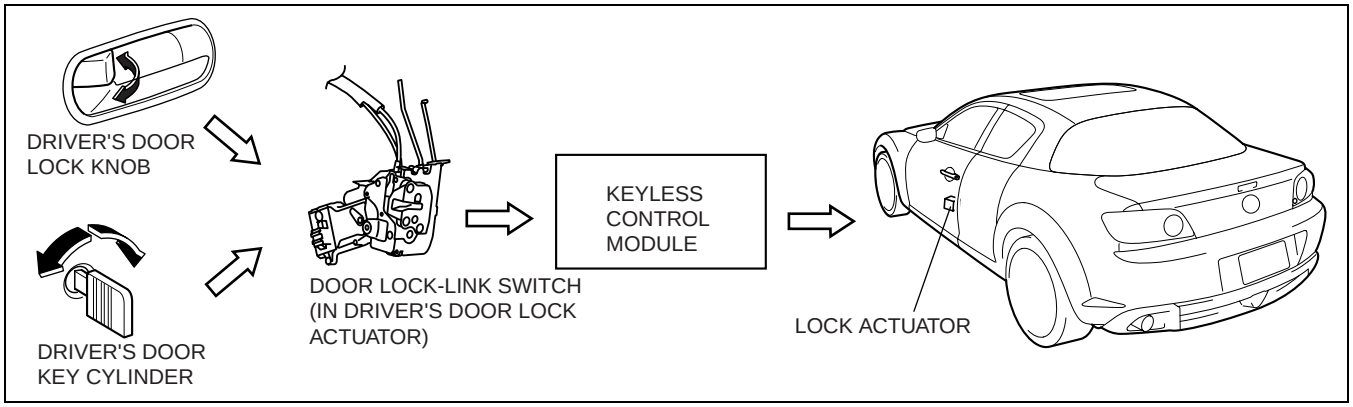
EHU091466000101

- A door lock knob interlock function has been adopted where all doors are locked/unlocked when the driver's door is locked/unlocked with the driver's door lock knob.
- A door key interlock function has been adopted where all doors are locked/unlocked when the driver's door is locked/unlocked with the driver's door key cylinder.

POWER DOOR LOCK SYSTEM OPERATION

EHU091466000102

- When the driver's door is locked/unlocked with the driver's door lock knob or key cylinder, the door lock-link switch in the door lock actuator is locked/unlocked via the rod.
- The keyless control module activates each lock actuator to lock/unlock according to the lock/unlock signal from the door lock-link switch.



EHU914AS8002

KEYLESS ENTRY SYSTEM OUTLINE

EHU091469000101

- An advanced keyless system has been adopted that enables the driver to start the engine or lock/unlock the doors without operating the key or transmitter (card key) by carrying the card key that has been programmed to the vehicle.
- The doors also can be locked/unlocked by operating the key (auxiliary key) or transmitter (card key).
- The answer-back function has been adopted where the hazard warning light flashes and a beeping sound confirms that the doors are locked/unlocked. Also, the advanced keyless entry system indicates activation by a buzzer sound.
- A warning and guidance function has been adopted that promotes correction if the system is operated improperly, and uses the indicator light in the instrument cluster, a buzzer sound, and the keyless beeper from behind passenger compartment.
- A customize function that switches the activation/deactivation of each function has been adopted.
- A rolling code type transmitter (card key) has been adopted to prevent theft by radiowave interception.
- To prevent improper operation while the vehicle is moving, the doors cannot be locked/unlocked by operating the transmitter (card key) or request switch when the start knob is in any position except LOCK.

KEYLESS ENTRY SYSTEM OPERATION

EHU091469000102

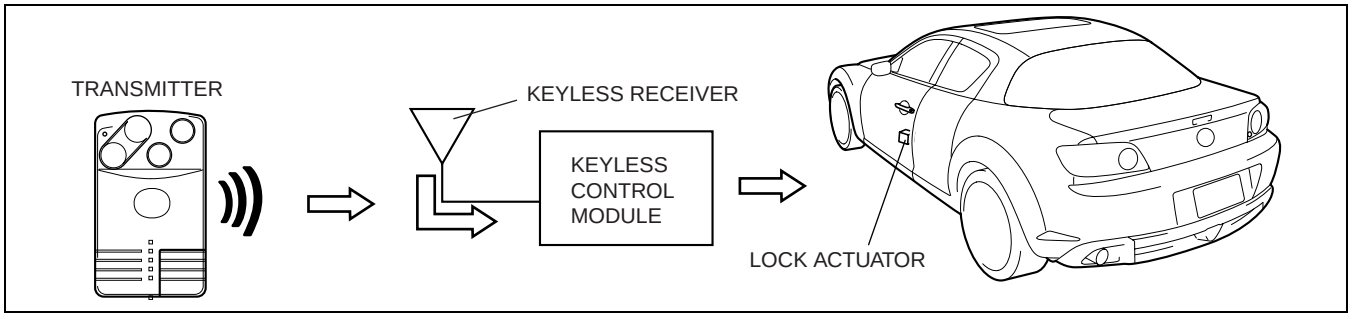
Normal Keyless Entry Function
Lock/unlock

Note

- If any of the following conditions are met, the doors cannot be locked by operating the transmitter (card key).
  - — The auxiliary key is inserted in the ignition key cylinder.
  - — The start knob is not in the LOCK position.
  - — The start knob is being pressed.
  - — Any door is open.
- If any of the following conditions are met, the doors cannot be unlocked by operating the transmitter (card key).
  - — The auxiliary key is inserted in the ignition key cylinder.
  - — The start knob is not in the LOCK position.
  - — The start knob is being pressed.

1. When the transmitter (card key) is operated, the card key sends ID data and rolling code. They are received by the keyless receiver and sent to the keyless control module.
2. When the keyless control module receives a lock/unlock signal from the transmitter (card key) and verifies the ID, the signal is sent to the all lock actuators activate to lock/unlock.

3. The keyless control module operates the hazard warning lights flash to flash according to lock/unlock signal from the transmitter (card key).
   — When the LOCK button is pressed, the hazard warning lights flash once.
   — When the UNLOCK button is operated, the hazard warning lights flash twice.



EHU914AS8003

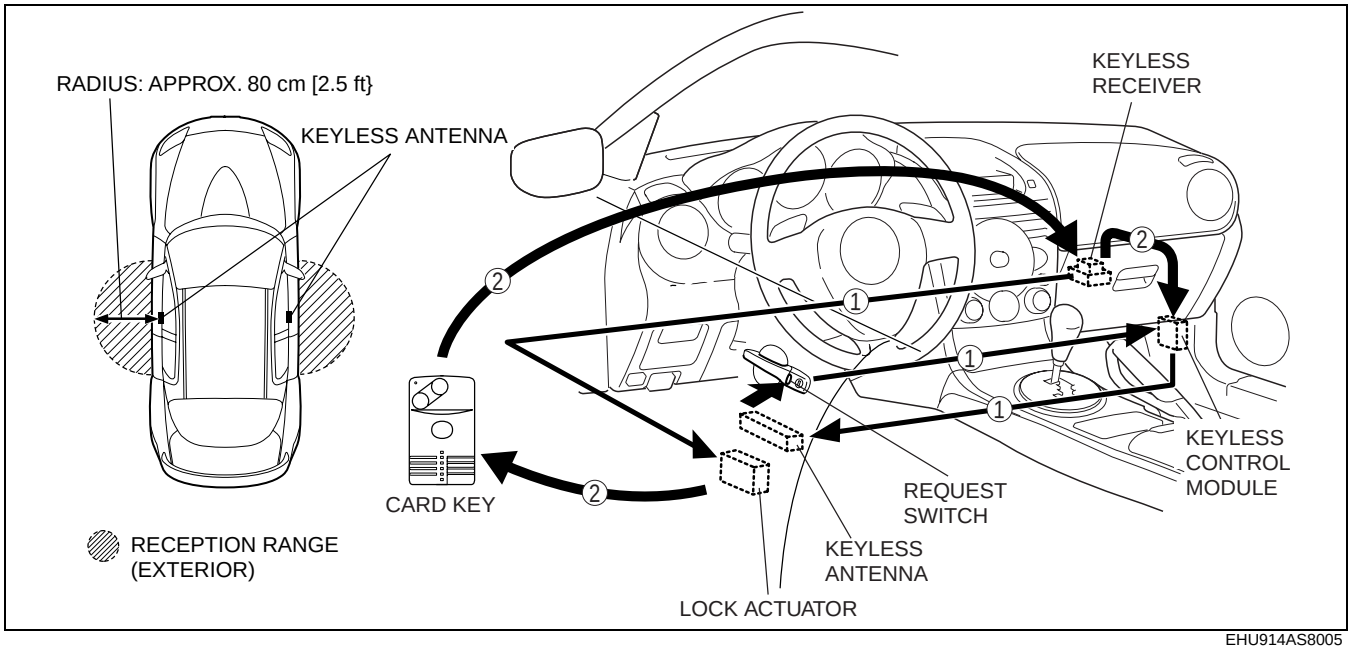
Advanced Keyless Entry Function
Door lock/unlock

Note

- If any of the following conditions are not met, the doors cannot be locked by operating the request switch.
  — The card key is not inside the vehicle.
  — All doors and trunk lid are closed.
  — The auxiliary key is not inserted in the ignition key cylinder.
  — The start knob is in the LOCK position and not being pressed.
  — The card key is within the reception range outside the vehicle.
- If any of the following conditions are not met, the doors cannot be unlocked by operating the request switch.
  — The auxiliary key is not inserted in the ignition key cylinder.
  — The start knob is in the LOCK position and not being pressed.
  — The card key is within the reception range outside the vehicle.

09–14A

1. When a request switch is pressed, the keyless control module sends a request signal from the keyless antenna. The request signal is sent to the area around the door that the request switch is pressed, and the signal is sent to the cabin area.
2. When the card key receives a request signal, the card key sends back ID data.
3. The ID data is received at the keyless receiver, and sent to the keyless control module.
4. When the ID data is verified by the keyless control module and the card key is determined to be outside the vehicle, a signal is sent to the lock actuators are activated to lock/unlock.
5. The keyless control module commands the hazard warning lights to flash.
   — When the doors are locked, the hazard warning lights flash once.
   — When the doors are unlocked, the hazard warning lights flash twice.

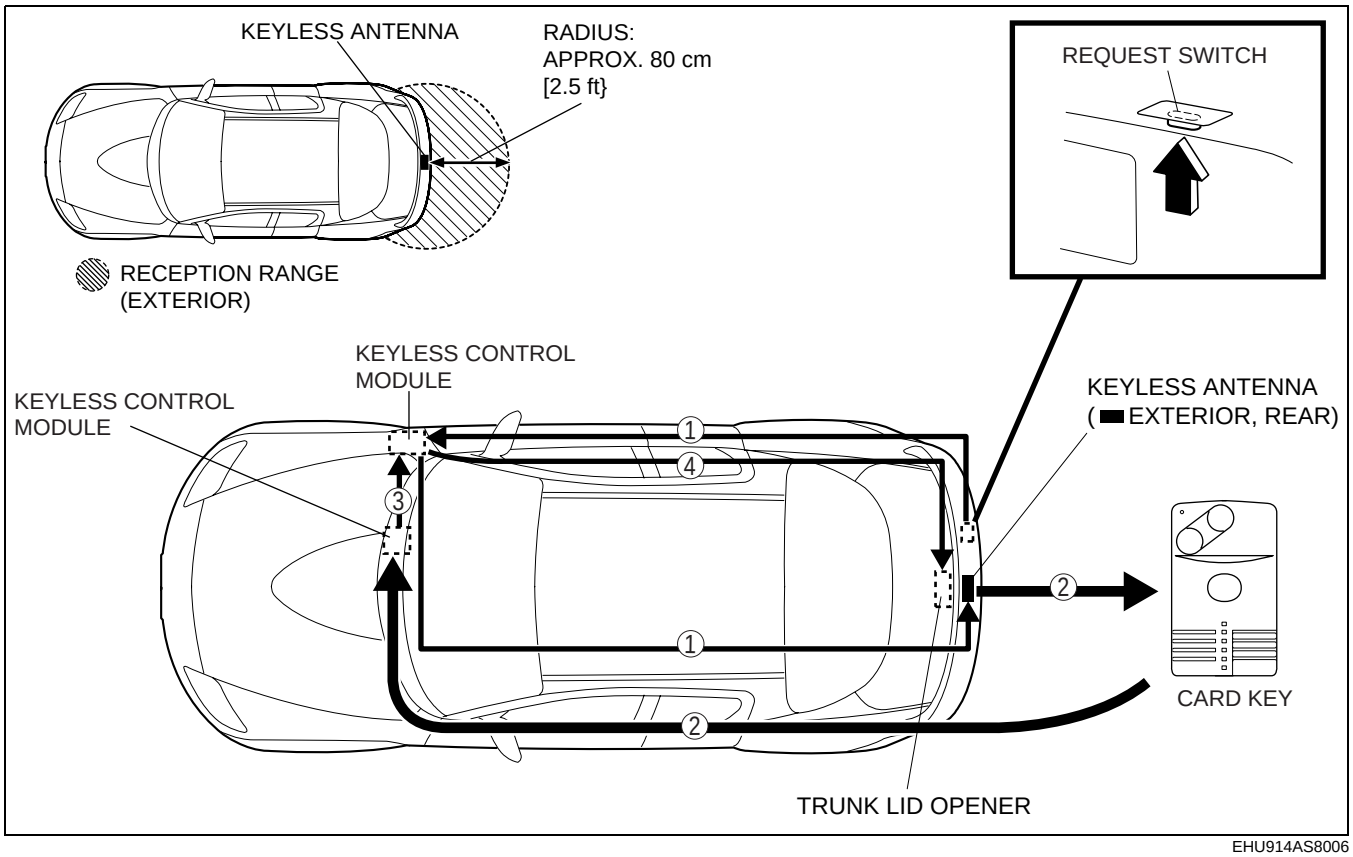


EHU914AS8005

Trunk lid opening

Note
- If any of the following conditions are not met, the trunk lid cannot be opened by operating the request switch.
  — The auxiliary key is not inserted in the ignition key cylinder.
  — The start knob is in the LOCK position and not being pressed.
  — The card key is within the reception range outside the vehicle.
  — The trunk lid opener cancel switch is in the ON position.

1. When the trunk lid request switch is pressed and held for 1 s or more, the keyless control module sends a request signal from the keyless antenna. The request signal is sent to the area around the trunk lid, and the signal is sent to the rear area.
2. When the card key receives a request signal, the card key sends back ID data.
3. The ID data is received at the keyless receiver (rear), and sent to the keyless control module.
4. When the ID data is verified by the keyless control module and the card key is determined to be outside the vehicle, a signal is sent to the trunk lid opener to open the trunk lid.
5. The keyless control module commands the hazard warning lights to flash.
   — When the trunk lid is unlocked, the hazard warning lights flash twice.



EHU914AS8006

Auto re-lock function
- The auto re-lock function automatically locks the doors if any of the following operations are performed within approx. 30 s after the UNLOCK button of the card key is pressed, or after the request switch is pressed to unlock the doors.
  — A door or the trunk lid is opened.
  — The auxiliary key is inserted in the ignition key cylinder.
  — The start knob is pressed.
  — The transmitter (card key) is operated. (If the UNLOCK button is pressed, the timer is reset.)
  — A request switch is operated.

Out-of-area (reception area) autolock function

- When all doors are closed and the driver is out of the reception area carrying the card key, the doors are automatically locked. (Initial setting is OFF.)

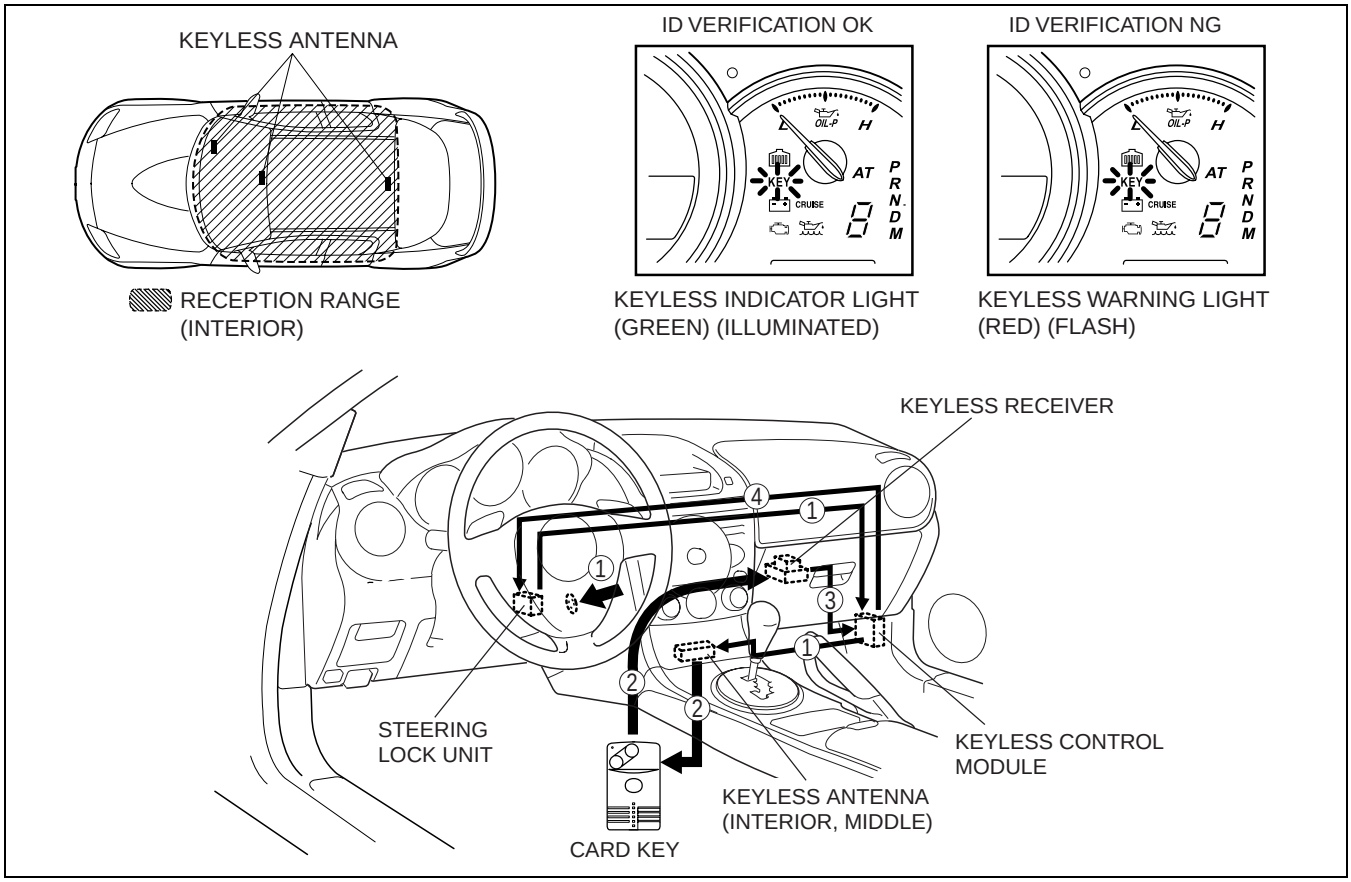
1. When all the following conditions are met and all doors are closed after any door or the trunk lid is open, the keyless beeper sound is heard and the function starts operation. (The doors are not locked at this time.)
   — The card key is not inside the vehicle.
   — The card key is within the reception area outside the vehicle.
   — The auxiliary key is not inserted in the ignition key cylinder.
   — The start knob is in the LOCK position, and not being pressed.
2. After the operation has started, the card key is monitored within the reception area by the keyless antenna. After about 2 s from where the card key has been determined to be out of the reception area, all lock actuators activate to lock. If approx. 30 s have passed since the operation started, the doors also locks regardless of whether the card key is within or out of the reception area.
3. The hazard warning light flashes once and keyless beep spund will be heard once at the same time the door locks.

ADVANCED KEYLESS START FUNCTION OPERATION

EHU091469000103

- The advanced start function activates to start the engine by operating the start knob, and not by inserting the key but by the driver carrying the card key while in the vehicle.

1. When the start knob is pressed, the keyless control module sends a request signal from the keyless antennas (interior).
2. The card key receives the request signal, and sends back ID data.
3. The ID data is received by the keyless receiver, and sent to the keyless control module.
4. When the ID data is verified by the keyless control module and the card key is determined to be inside the vehicle, the start knob of the steering lock unit is released. The keyless indicator light (green) in the instrument cluster illuminates at the same time to indicate that the start knob is operable.
   — If the ID verification is not acceptable (for reasons such as an unprogrammed card key, or card key battery depletion or transmitter interference), the start knob is not released and the keyless warning light (red) illuminates to indicate that the start knob is inoperable.
   — For vehicles with the immobilizer system, ID verification is performed when the start knob is turned to the ON position, and if the verification is acceptable, permission is given to start the engine.
5. Turn the start knob to the START position to start the engine.



EHU914AS8007

WARNING/GUIDANCE FUNCTION OPERATION

EHU091469000104

- If the system is operated improperly, it warns the driver using the indicator light in the instrument cluster, buzzer sound, and keyless beeper in the trunk compartment.
- The operation condition of the advanced keyless system is indicated by the indicator light and beeper sound to guide user's operation.

Item		Operation condition	Keyless buzzer (outside the vehicle)	Instrument cluster		
				Buzzer (Interior)	Keyless warning light (red)	Keyless indicator light (green)
Warning	Start knob not in LOCK warning	Driver's door is open with start knob in ACC position	–	Continuous	Flashes	–
	Card key out of vehicle warning*1	Card key cannot be detected inside vehicle with driver's door open and start knob not in LOCK position	–	Continuous	Flashes*2	–
		Card key cannot be detected inside vehicle with all doors closed and start knob not in LOCK position	Sounds 6 times	—	Flashes*3	–
		Card key cannot be detected inside vehicle with start knob not in LOCK position and under any condition other than above	–	—	Flashes*2	–
	Card key left in vehicle warning	Door/trunk lid is open with proper card key inside vehicle and another card key carried	Continuous for 10 s	–	–	–
	Door lock inoperable warning	Request switch is pressed with card key carried and a door open or start knob not in LOCK position	Sounds 6 times	–	–	–
	Battery voltage low indication	Card key battery voltage depleted	–	–	–	Flashes (Approx. 30 s after IG OFF)
Guidance	Start knob operable guidance	Start knob is operable (lock released) when it is pressed	–	–	–	On (Max. 3 s)
	Start knob inoperable guidance	Start knob is inoperable (locked) when it is pressed	–	–	Flashes	–
	Lock/unlock answer back	Doors are locked/unlocked with normal/advanced keyless entry function	Locked: Once Unlocked: Twice	–	–	–

*1 : If the start knob is turned to the LOCK position with the card key out of the vehicle, the start knob is inoperable (the engine cannot be restarted). For vehicles with the immobilizer system, the engine cannot be restarted by turning the start knob from the ACC position to the START position even though the start knob has not been turned to the LOCK position.
*2 : Stops flashing and goes out if the card key is detected inside the vehicle.
*3 : Stops flashing and goes out if the card key is detected inside the vehicle and door is opened.

CUSTOMIZE FUNCTION OUTLINE

EHU091469000105

- The settings of the following functions, and warning and guidance functions for the advanced keyless entry system can be turned ON/OFF optionally.
- The WDS or equivalent is necessary for settings. Refer to the Workshop Manual for the detailed setting procedure.

Function name	WDS or equivalent display	Initial setting
Auto lock function (Out-of-area type)	Auto Lock	OFF
Keyless buzzer answer back	Answer Back Buzzer	OFF
Battery voltage low indication	Low Battery Warning	ON

ON-BOARD DIAGNOSYS SYSTEM OUTLINE (KEYLESS ENTRY SYSTEM)

EHU091469000106

Special Features

- The keyless entry system has an on-board diagnostic function to facilitate system diagnosis.
- The on-board diagnostic function consists of the following functions: a malfunction detection function, which detects overall malfunctions in the keyless entry system-related parts; a memory function, which stores detected DTCs; a display function, which indicates system malfunctions by DTC display; and a PID/data monitoring function, which reads out specific input/output signals.
- Using the WDS or equivalent, DTCs can be read out and cleared, and the PID/data monitoring function can be activated.

ON-BOARD DIAGNOSYS SYSTEM PID DATA/MONITOR FUNCTION OPERATION (KEYLESS ENTRY SYSTEM)

EHU091469000107

On-board Diagnostic Function

Malfunction detection function

- Detects overall malfunctions in the keyless entry system-related parts.

Display function

- If any malfunction is detected, the keyless warning light (red) in the instrument cluster illuminates to inform the driver of a system malfunction.

Memory function

- Stores malfunctions in the keyless entry system-related parts detected by the malfunction detection function, and the stored malfunction contents are not cleared even if the ignition switch is turned to the LOCK position or the negative battery cable is disconnected.

DTC table

DTC WDS or equivalent display	System malfunction location
B1342	Keyless control module internal malfunction
B1134	Unprogrammed card key
B2477	Configuration error
B1317	Keyless control module power supply voltage increases.
B1318	Keyless control module power supply voltage decreases
B2170	Push switch (Steering lock unit)
B1126	Steering lock unit internal malfunction
U0236	Steering lock unit communication system
B1093	Steering lock unit communication error
U0214	Keyless receiver
B1133	Keyless antenna (exterior, RF)
B1132	Keyless antenna (exterior, LF)
B1127	Keyless antenna (Interior, trunk)
B1128	Keyless antenna (Interior, rear)
B1131	Keyless antenna (exterior, rear)
B1129	Keyless antenna (Interior, middle)
B112A	Keyless antenna (Interior, front)
U0323	Communication error to instrument cluster
U0100	Communication error to PCM
U0073	Control module communication error
U2023	Error signal from CAN related module
B1681*	No detected communication with the coil antenna.
B2103*	Coil malfunction
B1213*	Only one key ID number is programmed.

* : With immobilizer system

PID/data monitor function

- The PID/data monitor function is used for optionally selecting input/output signal monitor items preset in the keyless control module and reading them out in real-time.
- Use the WDS or equivalent to read the PID/data monitor.

PID/data monitor table

PID name (definition)	Data contents	Unit/ Operation	Terminal
DTC_CNT	Number of continuous DTCs	–	–
RPM	Engine speed	RPM	3Z, 3AA
VSS	Vehicle speed	KPH	3Z, 3AA
VPWR	Supply voltage	V	2A
NUMCARD	Number of programmed card keys	–	–
NUMKEY*	Number of programmed key ID numbers	–	–
DRSW_D	Door switch (driver's door)	CLOSE/ OPEN	3Q
DRSW_ALL	Door switch (except driver's door)	CLOSE/ OPEN	3Q
REQ_SW_R	Request switch (right side door)	On/Off	3I
REQ_SW_L	Request switch (left side door)	On/Off	3K
REQ_SW_BK	Request switch (trunk lid)	On/Off	3M
LOCK_SW_D	Door lock-link switch (driver's side)	On/Off	3N
IMMOBI	Immobilizer system equipped or not	On*/Off	–
TR/LG_SW	Trunk compartment light switch	CLOSE/ OPEN	
IG_KEY_IN	Key reminder switch	Key-In/Key-Out	3F
IG_SW_ST	Ignition switch (Push switch)	Pushed/Not Pushed	3E
BUZZER	Keyless beeper	On/Off	2K
SECURITY	Security light	On/Off	2G
PWR_IG1	Power supply (IG1)	On/Off	2C
PWR_ACC	Power supply (ACC)	On/Off	2E

* : Vehicles with immobilizer system

Simulation Function

- The simulation function is used for optionally selecting simulation items of output parts preset in the keyless control module, and to operate them regardless of control.

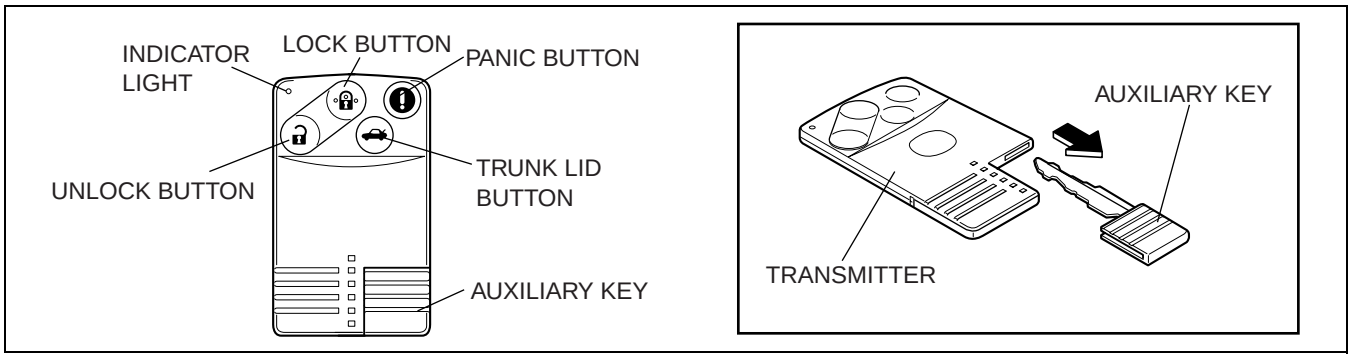
ACTIVE COMMAND MODE TABLE

Command name	Output part name	Unit/ Operation	Terminal
BZR_OUT	Keyless beeper	On/Off	2K
BZR_INN	Interior buzzer (Instrument cluster)	On/Off	3Z, 3AA
LNP_RED	Keyless warning light (red)	On/Off	3Z, 3AA
LNP_GREEN	Keyless indicator light (green)	On/Off	3Z, 3AA
DR_LOCK	All doors lock	Off/Lock	3Q
DR_UNLOCK	All doors unlock	Off/Unlock	3Q

CARD KEY (TRANSMITTER) CONSTRUCTION/OPERATION

EHU091469000108

- A card-type transmitter that is thin and convenient to carry has been adopted.
- A maximum of six transmitters can be programmed for one vehicle.
- A built-in operation indicator light illuminates according to LOCK/UNLOCK button operation and request signal from the vehicle.
- In case the transmitter is inoperable due to battery depletion, the doors can be locked/unlocked and the engine can be started using the auxiliary key.
- A transponder is built into the auxiliary key for vehicles with the immobilizer system.



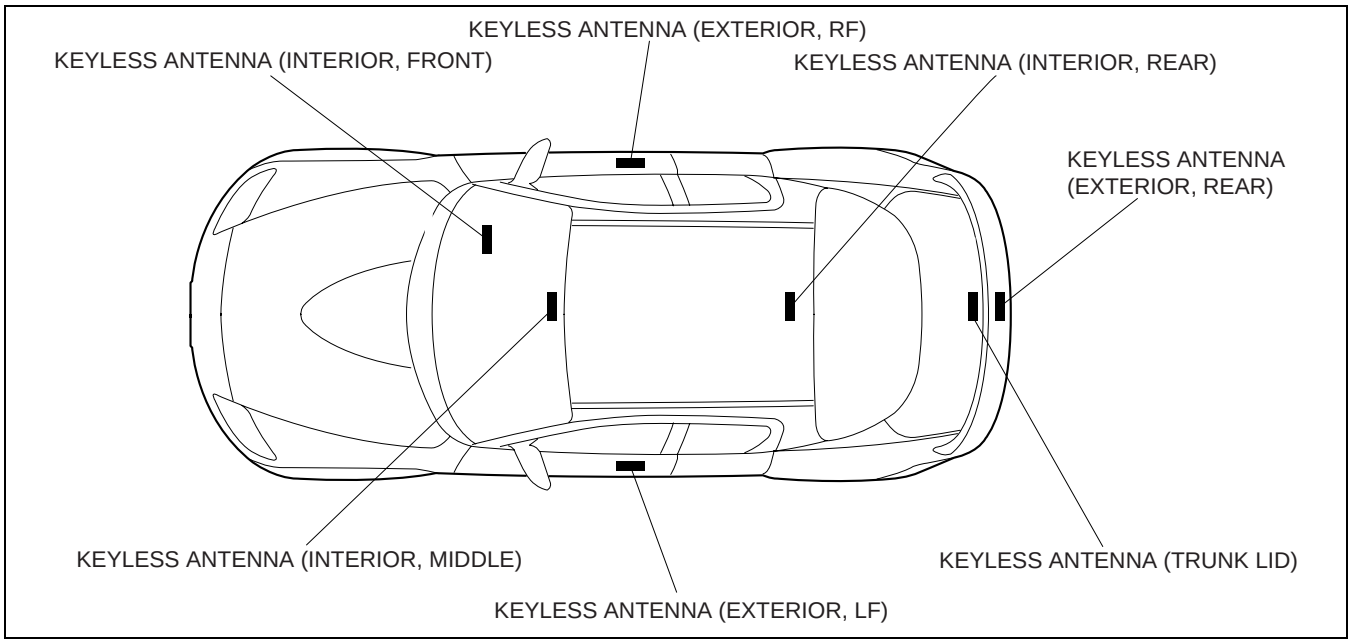
E5U914AS1008

KEYLESS ANTENNA CONSTRUCTION/OPERATION

EHU091469000109

- Consists of the antennas for request signal output (7 locations).
- Operated by the keyless control module, the keyless antennas send request signals to produce the reception areas inside and outside the vehicle.
- The keyless antennas built-into the front doors can output signals to both inside or outside the vehicle, and change the level of the radiowave (output to inside or outside the vehicle) according to operation conditions.
- The keyless control module locates the card key by determining the antenna which is receiving the signal the strongest.

09–14A

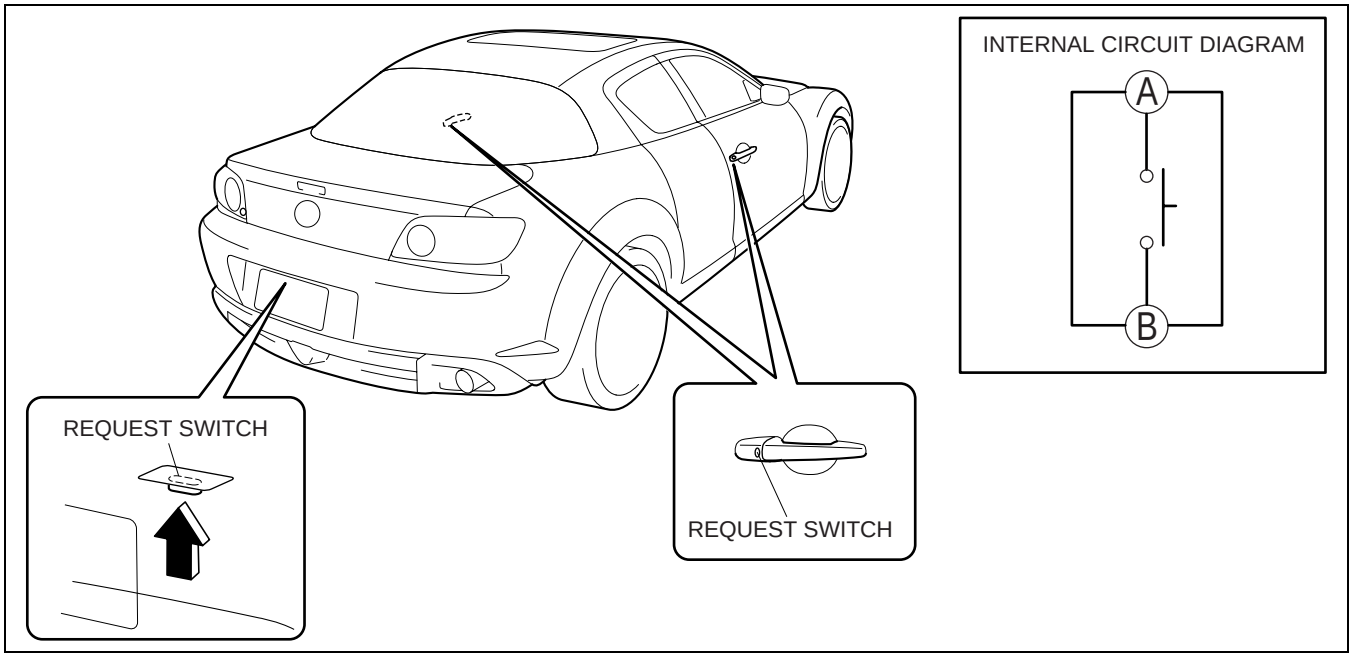


EHU914AS8008

REQUEST SWITCH CONSTRUCTION

EHU091469000110

- Installed on both doors and trunk lid.



EHU914AS8009

09–14B SECURITY AND LOCKS [KEYLESS ENTRY SYSTEM]

SECURITY AND LOCKS OUTLINE

EHU091400001104

Features

Improved marketability	• Keyless entry system modified
Improved theft-deterrence	

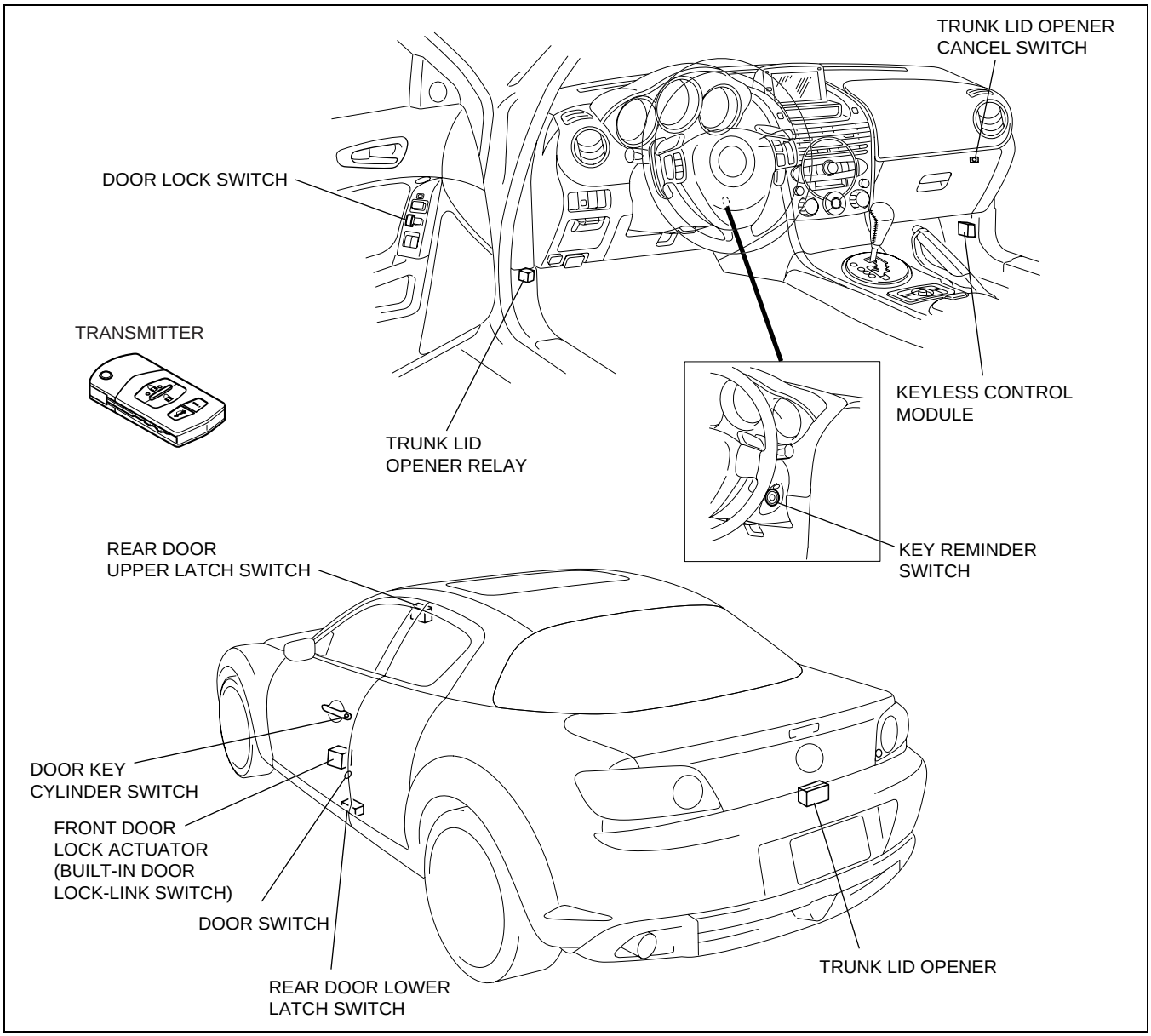
KEYLESS ENTRY SYSTEM OUTLINE

EHU091466000107

- The following operations can be performed using the transmitter when away from the vehicle (approx. 2.5 m {8.2 ft}):
  - — Lock all doors (by pressing the LOCK button).
  - — Unlock the driver-side door (by pressing the UNLOCK button one time).
  - — Unlock the driver and passenger-side doors (by pressing the UNLOCK button two times within 5 s).
  - — Unlock the trunk lid (by pressing the TRUNK LID button). (When the trunk lid opener cancel switch is at the ON position, the trunk lid does not unlock even when the TRUNK LID button is pressed.)
  - — Alarm (by pressing the PANIC button). (Cancelled by pressing any transmitter button, inserting the key into the steering lock, or after 5 min.)
- When the transmitter LOCK button is pressed two times within 5 s, the horn sounds once to indicate that all doors are locked.
- An auto-locking device has been adopted that automatically locks the doors if any of the following operations are not performed within 30 s of pressing the transmitter UNLOCK button:
  - — Any door is opened.
  - — The door is lock/unlock using the door key cylinder.
  - — The door is lock/unlock using the door lock switch.
  - — The key is inserted the steering lock.
- In order to prevent accidental operation when driving, pushing any transmitter button will have no affect when the key is inserted into the steering lock.

KEYLESS ENTRY SYSTEM STRUCTURAL VIEW

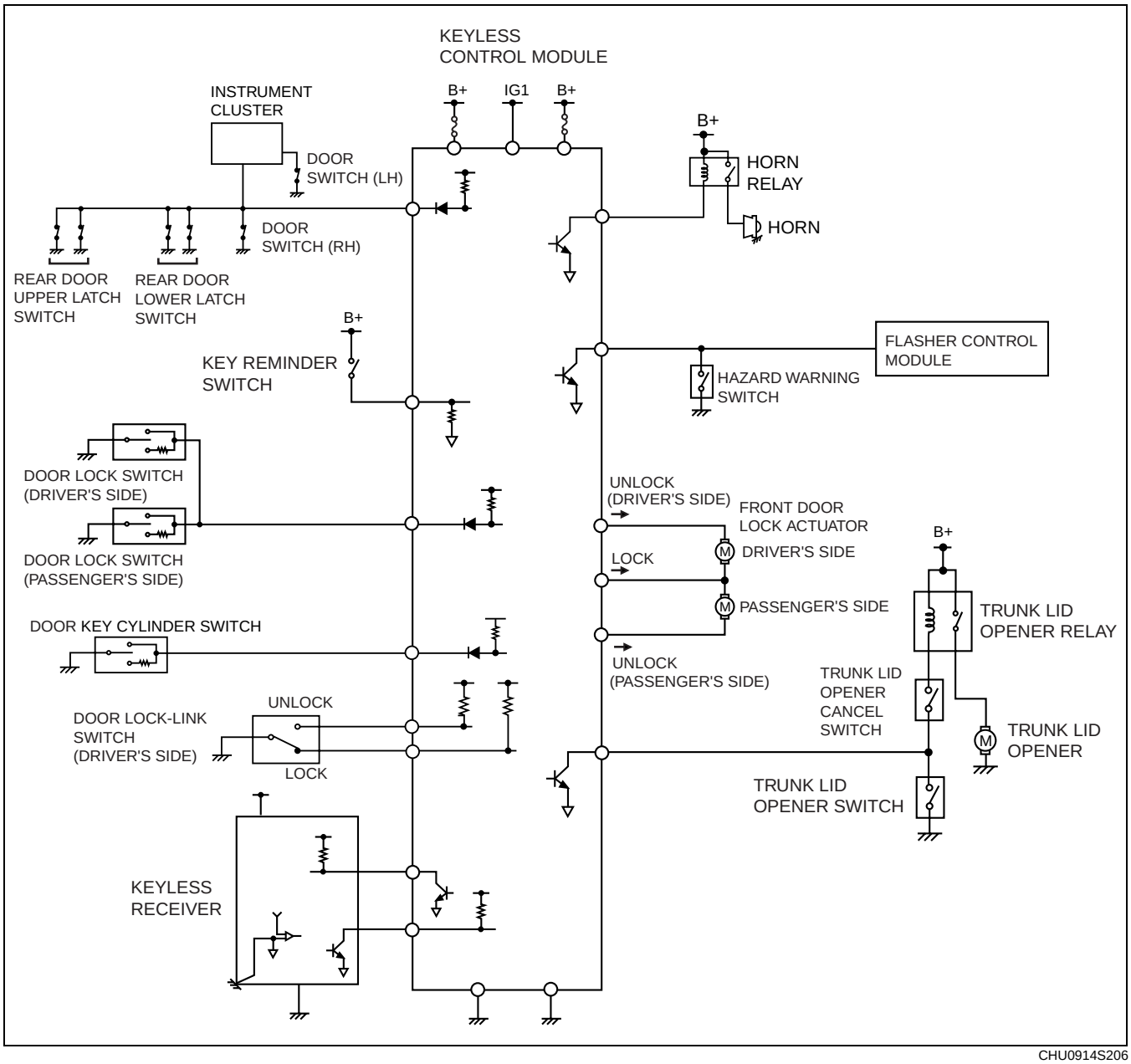
EHU091466000108



EHU914BS8001

KEYLESS ENTRY SYSTEM WIRING DIAGRAM

EHU091466000109



CHU0914S206

09–20 ENTERTAINMENT

CAR-NAVIGATION SYSTEM OUTLINE

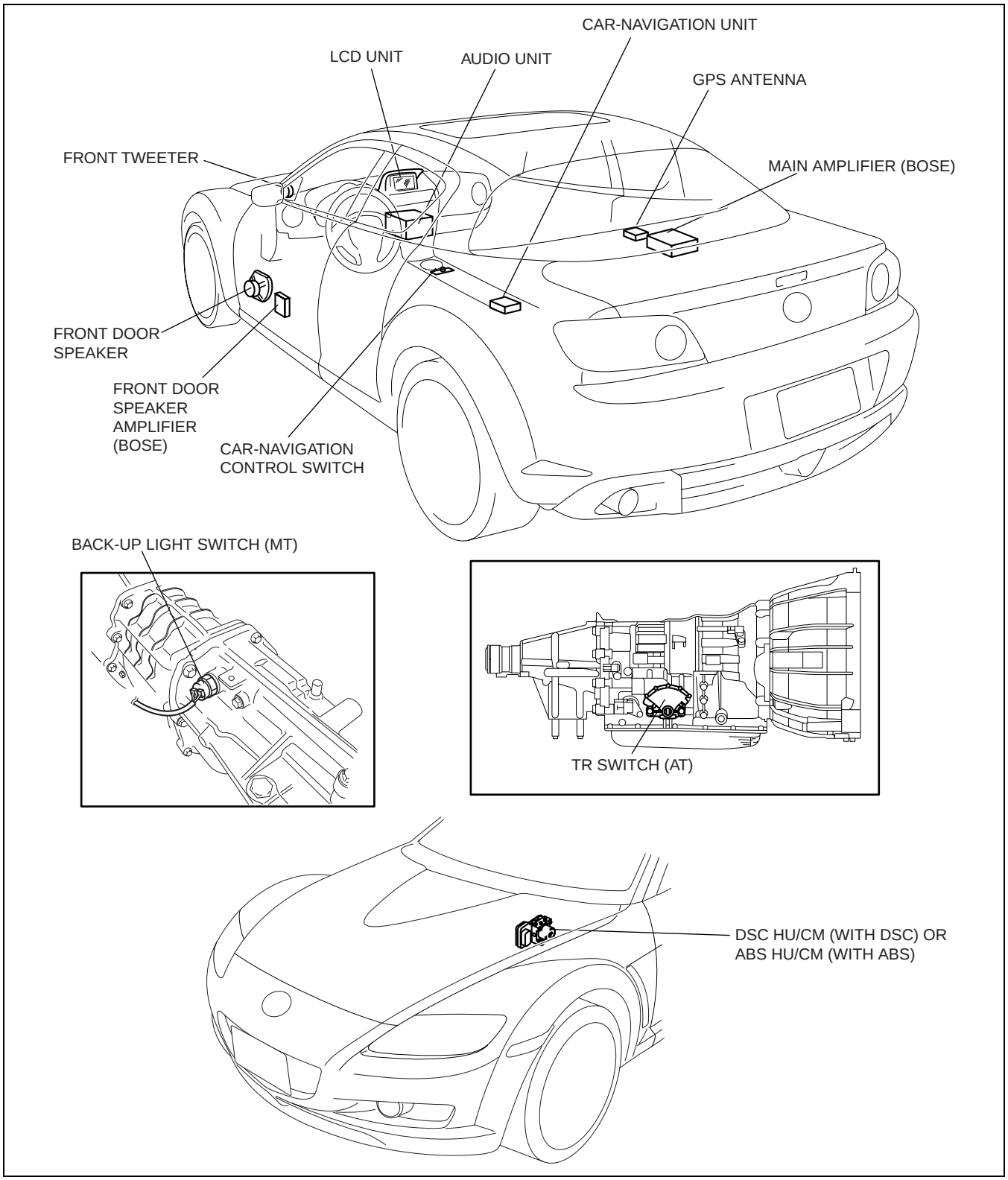
EHU092066000101

- A 7 inch wide, pop-up LCD (*TFT) has been adopted to improve marketability.
- A hybrid in car-navigation system and map-matching function has been adopted to improve accuracy of detection of the vehicle's position.
- A remote control with an infrared transmitter has been adopted to improve operational ability.
- The languages and voices available for use with the car-navigation unit include English and French. However, the language used in this manual is in **English only**.

*TFT: Thin Film Transistor

CAR-NAVIGATION SYSTEM STRUCTURAL VIEW

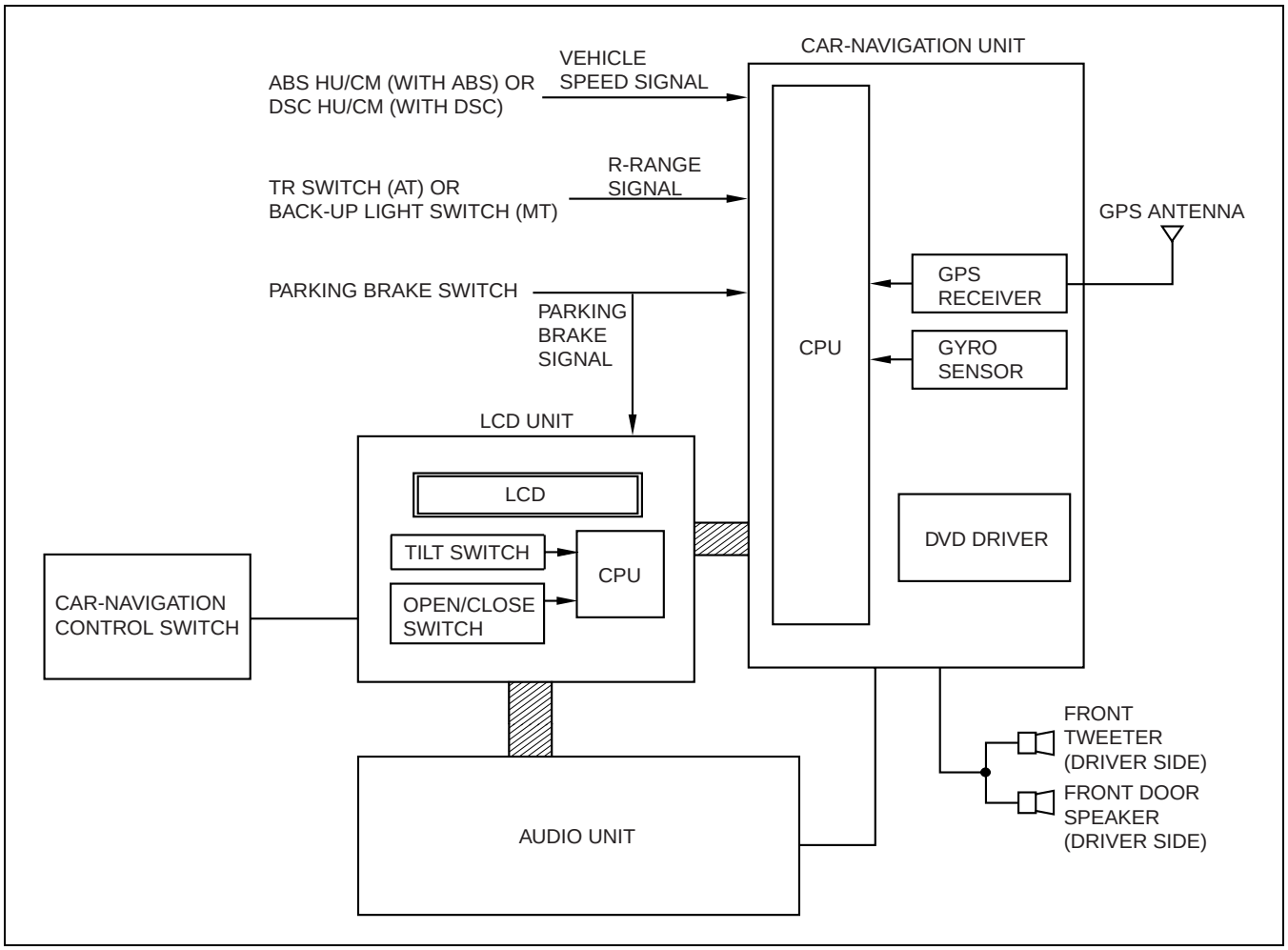
EHU092066000102



CHU0920S100

CAR-NAVIGATION SYSTEM BLOCK DIAGRAM

EHU092066000103



CHU0920S101

CAR-NAVIGATION SYSTEM SPECIFICATIONS

EHU092066000104

Car-navigation Unit

Item		Specification
Unit type		Stand alone
Rated voltage	(V)	12
ROM type		DVD-ROM
Voice guidance output power	(W)	5

LCD Unit

Item			Specification
Unit type			Pop-up
Rated voltage		(V)	12
Display (for car-navigation system)	Size	(inch)	7 (wide)
	Type		TFT (Thin Film Transistor); Full-color
Display (for audio, and A/C)	Type		LCD; Amber-color

CAR-NAVIGATION UNIT OUTLINE

EHU092066902101

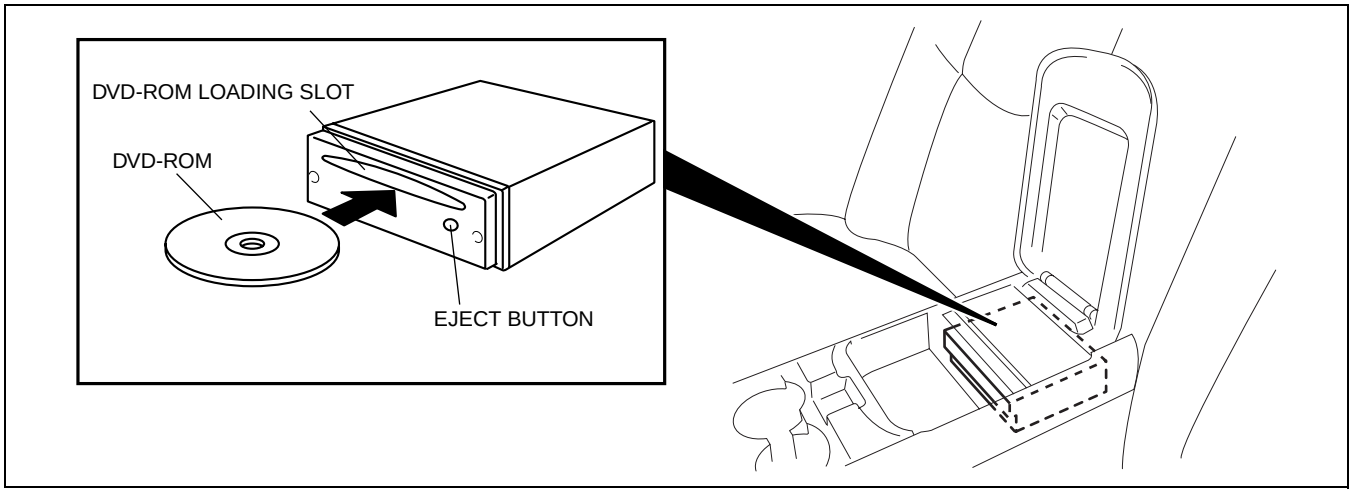
- Using exterior signal input and DVD-ROM information, this unit detects vehicle position, provides destination route guidance, and displays color maps.

CAR-NAVIGATION UNIT CONSTRUCTION

EHU092066902102

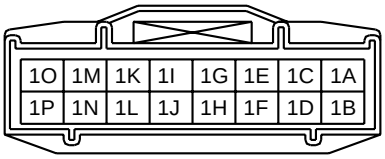
Structure

- The car-navigation unit is located in the console.
- An Eject button, to eject the DVD-ROM from the loading slot, is included in the unit.
- A gyro sensor which detects vehicle cornering angle is built into the unit.



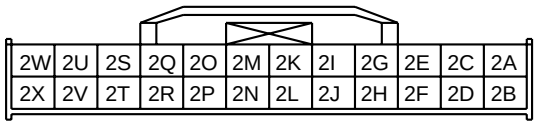
EHU920ZS8001

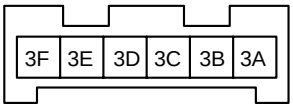
Terminal Layout and Signals

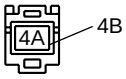
Terminal		Signals
		16-pin connector
	1A	GND
	1B	B+
	1C	–
	1D	ACC
	1E	Front speaker input (-)*1
	1F	–
	1G	Front speaker input (+)*1
	1H	Vehicle speed
	1I	Front speaker output (-)*1
	1J	–
	1K	Front speaker output (+)*1
	1L	R-range
	1M	Front speaker output (-)*2
	1N	Front speaker output (+)*2
	1O	Front speaker input (-)*2
	1P	Front speaker input (+)*2

*1 : Vehicles with BOSE

*2 : Vehicles without BOSE

Terminal		Signals 24-pin connector
	2A	–
	2B	–
	2C	–
	2D	–
	2E	–
	2F	–
	2G	–
	2H	–
	2I	–
	2J	–
	2K	–
	2L	–
	2M	–
	2N	Monitor serial input
	2O	Shield GND
	2P	Monitor serial output
	2Q	Shield GND
	2R	Video (composit sync)
	2S	–
	2T	Video (B)
	2U	Video GND
	2V	Video (G)
	2W	–
	2X	Video (R)

Terminal		Signals 6-pin connector
	3A	Mic (+)
	3B	Mic (-)
	3C	Mic power
	3D	GND
	3E	Mic sense
	3F	–

Terminal		Signal 1-pin connector
	4A	GPS antenna input
	4B	GND

NAVIGATION FUNCTION

EHU092066000106

Outline

- A vehicle's position is measured by a hybrid method of autonomous navigation (using yaw-rate signals from the gyro sensor and vehicle speed signals from BCM) and GPS navigation (using signals from GPS satellites). Accurate detection of the vehicle's position is possible based on the adoption of a map-matching function which specifies the vehicle's position as compared with the map data read from the DVD-ROM and the vehicle's position measured from autonomous navigation and GPS navigation.
- Guidance to destination is provided via display of the recommended route on the map screen, as well as voice messaging guidance at intersections and points of divergence.
- Based on inputted signals and information on the DVD-ROM, the following features are available:
  - — Destination can be selected based on address, POI (Point of Interest), emergency, and memory point, home, preset destination, intersection, free way on/off ramp, coordinates, map or previous destination.
  - — Route information is available in map, turn list, turn arrow, enlarged junction diagram, and freeway information mode.
  - — Voice guidance and menus are available in three languages.
  - — A map screen that displays maps in thirteen steps with scales from 50 m to 256 km {1/32 mile to 128mile}.
  - — A map screen that displays routes according to Search condition and route preferences.

    Search condition

    Quick: The route with the quickest time will be used.

    Altern.: The alternative route will be used.

    Short: The route with the shortest distance.

    Route preferences

    Allow Major roads

    Allow toll road

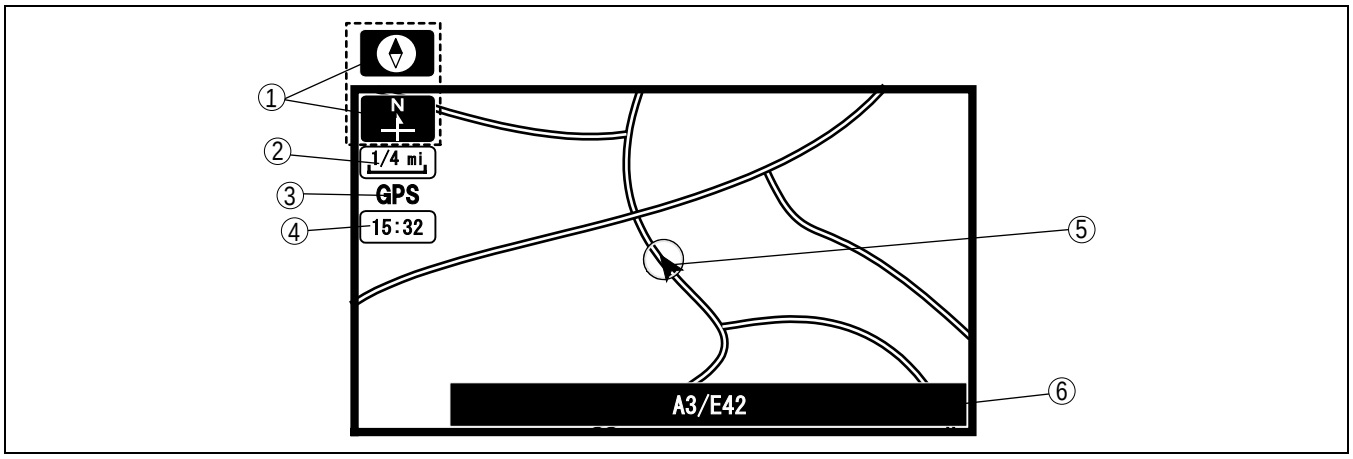
    Allow time restricted road

    Allow ferry

Map Screen Selection

Current position map

- The location of the vehicle and surrounding area are shown.

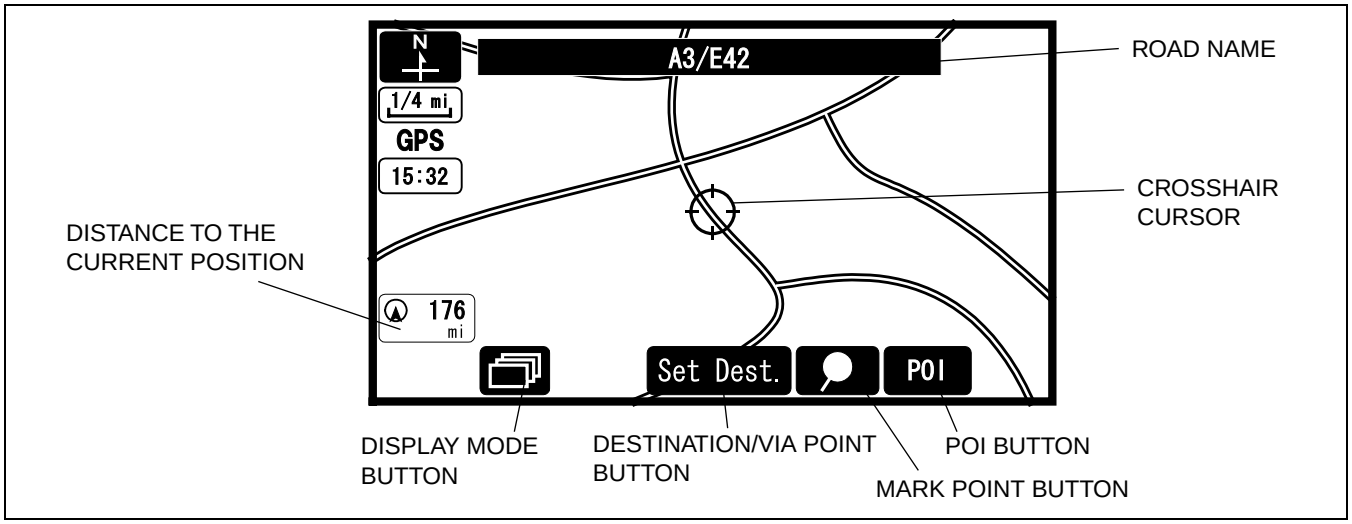


EPU920ZS2016

No.	Contents	Description
1	Map orientation	**North up** • Geographic north is up. **Head up** • The direction you are heading is up.
2	Map scale	The map can be displayed in 13 steps with scale from 50 m to 256 km {1/32 mile to 128 mile}
3	GPS reception indicator	Illuminates when receiving signals from 3 or more satellites.
4	Clock	Clock will be displayed when you set up clock on navigation set up on.
5	Vehicle position	Shows the current position and direction of the vehicle.
6	Road name	Shows the name of the road you are currently driving on.

Scroll map mode

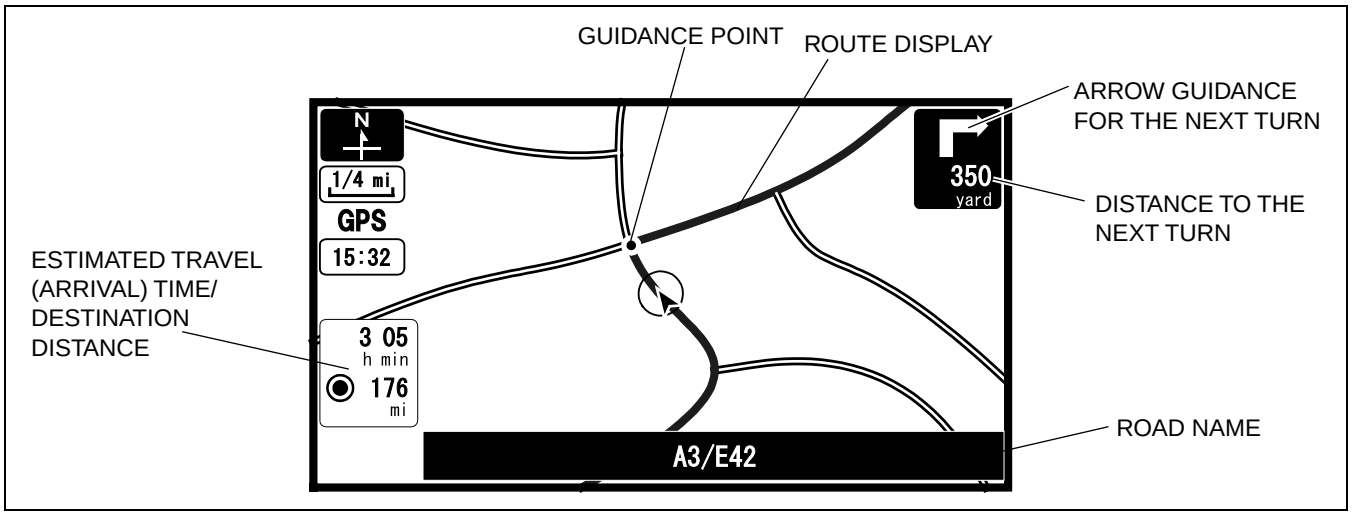
- The scroll map is displayed when operating the joystick on the current position map.
- This map can be scrolled with the crosshair cursor.



EPU920ZS2017

Guide mode

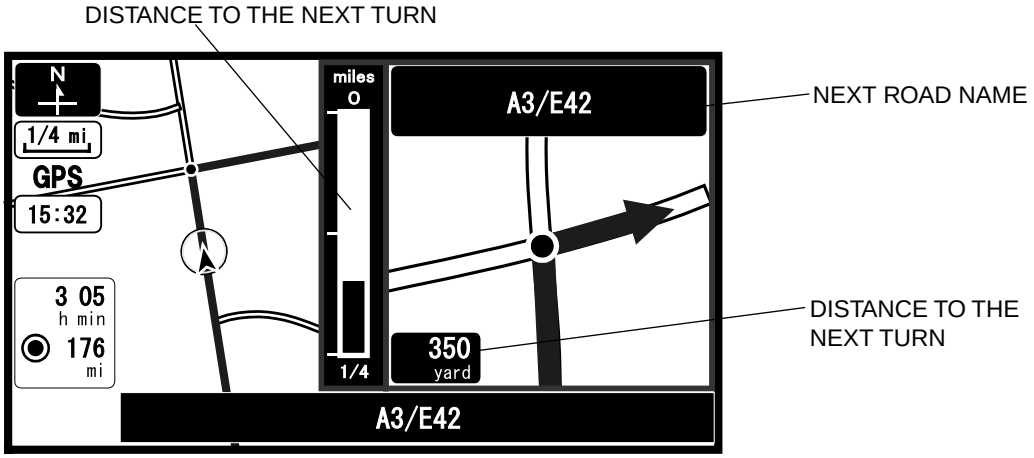
- Displays an arrow guidance to indicate destination, and also displays route and destination guidance information. (While in route guidance.)



E6U920ZS5305

Intersection zoom map

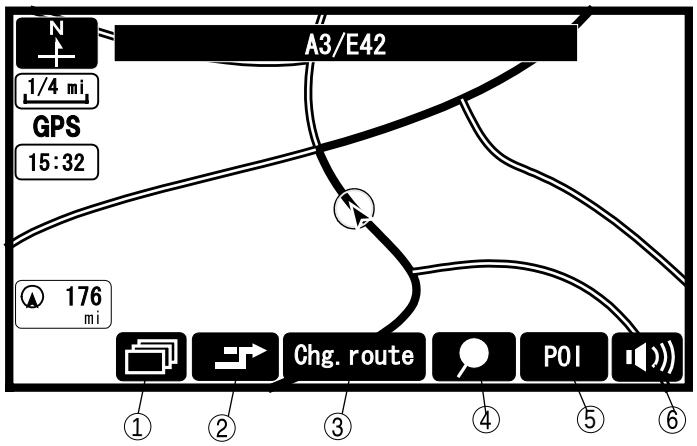
- An enlarged map is displayed when approaching an intersection. (While in route guidance.) Activated by selecting Guidance Screen (On) in setup mode.



EPU920ZS2019

Pop Up Menu

- Pop up menu appears when pressing the [ENTER] button.
- The following items are displayed on the pop up menu. The actual displayed items vary according to whether the destination has been set or not.



EPU920ZS2020

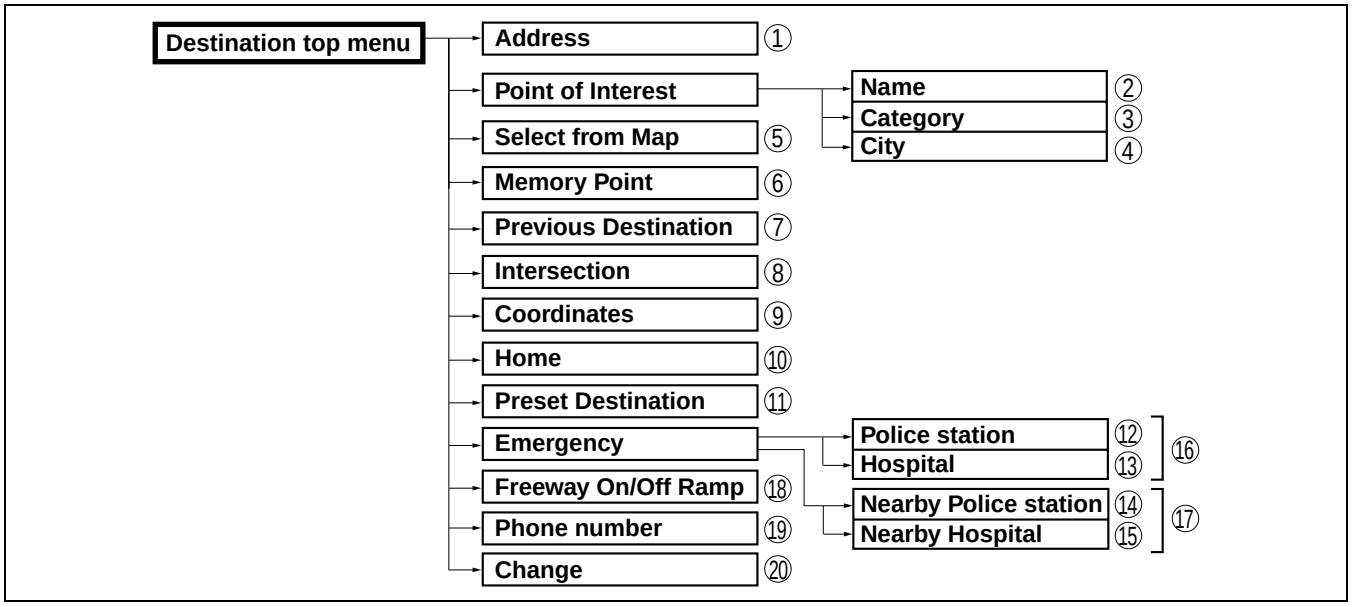
No.	Contents	Description
1	Display configuration	The following items can be selected. • single or dual map • Turn list • Turn arrow • Enlarged junction diagram • Free way information
2	Detour	Searches for detour.
3	Change route	Changes route search settings.
4	Store memory point	Stores markers on the map.
5	POI (Point of Interest) display	Displays POI on the map.
6	Volume	Adjusts volume of voice guidance.

Destination Setting Function
Outline

- The following instructions explain how destinations can be chosen and set.

Note

- A destination can be set to where the crosshair cursor indicates by selecting the Destination option of the scroll map mode pop-menu.



E6U920ZS5199

No.	Contents
1	Sets destination by inputting address.
2	Sets destination by inputting POI name.
3	Sets destination by selecting POI category, inputting target name and selecting POI.
4	Sets destination by inputting city name and selecting POI.
5	Sets destination by moving the crosshair cursor to the destination when in scroll map mode.
6	Sets destination from a list of points stored by the user.
7	Sets destination from a list of recent destinations.
8	Sets destination by selecting intersection name.
9	Sets destination by inputting coordinates.
10	Sets destination to home.
11	Sets destination to preset destination point.
12	Sets destination to police station.
13	Sets destination to hospital.
14	Sets destination to nearby police station.
15	Sets destination to nearby hospital.
16	Vehicle is stopped.
17	Vehicle is running.
18	Sets destination by selecting Freeway On Ramp/Off Ramp
19	Sets destination by inputting phone number.
20	Changes search area.

09–22 INSTRUMENTATION/DRIVER INFO.

INSTRUMENT CLUSTER OUTLINE

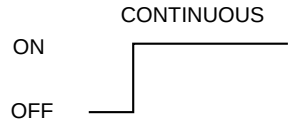
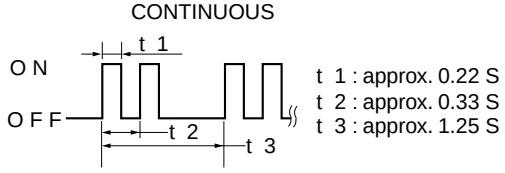
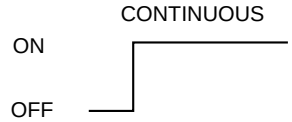
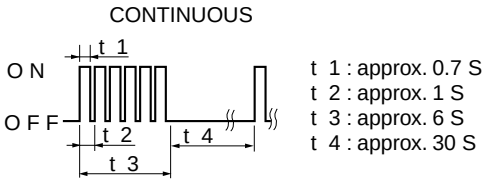
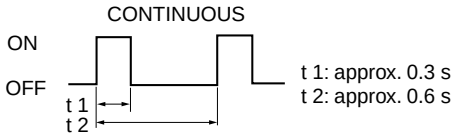
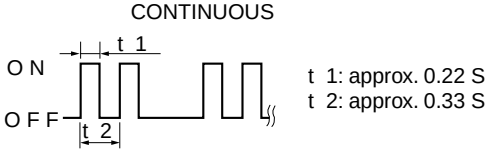
EHU092255430101

- Following indicator lights have been added.
  - — Keyless indicator light (with advanced keyless system)
  - — Keyless warning lightt (with advanced keyless system)
- Following alarm have been modified.
  - — Advanced keyless system warning alarm (with advanced keyless system)
  - — Key reminder warning alarm
  - — Seat belt warning alarm

INSTRUMENT CLUSTER SPECIFICATIONS

EHU092255430102

Item		Specification
Speedometer	Meter type	LCD
	Indication range (mph {km/h})	0—186 {0—299}
	Input signal communication system	CAN system
	Input signal source	ABS HU/CM (with ABS) DSC HU/CM (with DSC)
	Rated voltage (V)	DC 12
Tachometer	Meter type	Stepping motor type
	Indication range (rpm)	0—9,000 (13B-MSP (Standard Power)) 0—10,000 (13B-MSP (High Power))
	Red zone (rpm)	7,500—9,000 (13B-MSP (Standard Power)) 9,000—10,000 (13B-MSP (High Power))
	Input signal communication system	CAN system
	Input signal source	PCM
	Rated voltage (V)	DC 12
Fuel gauge	Meter type	Stepping motor type (Reset-to-zero type)
	Input signal communication system	Conventional communication system
	Input signal source	Fuel gauge sender unit
	Rated voltage (V)	DC 12
Water temperature gauge	Meter type	Stepping motor type (Medium range stabilized type)
	Input signal communication system	CAN system
	Input signal source	PCM
	Rated voltage (V)	DC 12
Odometer/ Tripmeter	Display	LCD
	Indication digits	Odometer: 6 digits, Tripmeter: 4 digits
	Input signal communication system	CAN system
	Input signal source	PCM
	Rated voltage (V)	DC 12
Clock accuracy (Reference value)* (s/day)		-1.5—1.5

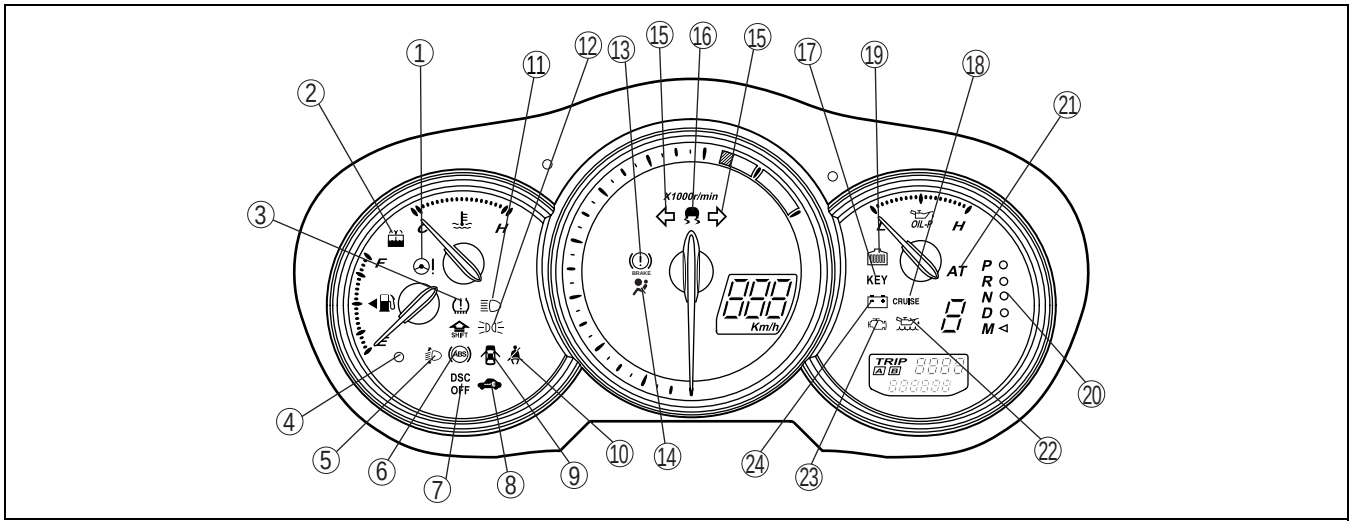
Item				Specification
WARNING ALARMS	Sound frequency		(Hz)	800—1,500
	Output sound pressure level		(dB)	75.0 (over-revolution warning alarm) 67.5 (except over-revolution warning alarm)
	Lights-on reminder warning alarm	Sound frequency	(Hz)	1,000
		Sound cycle		
	Key reminder warning alarm	Sound frequency	(Hz)	800
		Sound cycle		
	Over-revolution warning alarm	Sound frequency	(Hz)	1,500
		Sound cycle		
	Seat belt warning alarm	Sound frequency	(Hz)	800
		Sound cycle		
	Tire pressure warning alarm	Sound frequency	(Hz)	1,500
		Sound cycle		
	Advanced keyless system warning alarm	Sound frequency	(Hz)	1,800
		Sound cycle		

* : If the clock accuracy varies largely from the reference value, battery deterioration or an audio unit (base unit) malfunction may have occurred.

INSTRUMENT CLUSTER STRUCTURAL VIEW

EHU092255430103

Warning And Indicator Light



EHU922ZS8001

×: Applicable

No.	Warning and indicator light	Input signal source	CAN system	Note
1	EPS warning light	EPS control module	X	—
2	Washer fluid-level warning light	Washer fluid-level sensor	—	With washer fluid-level warning system
3	Tire pressure warning light	TPMS control module	X	—
4	Fuel-level warning light	Fuel gauge sender unit	—	—
5	Headlight auto leveling warning light	Auto leveling control module	—	With discharge headlight
6	ABS warning light	ABS HU/CM	X	With ABS
7	DSC OFF light	DSC HU/CM	X	With DSC
8	Security light	Keyless control module	—	—
9	Door ajar warning light	Door switch	—	—
10	Seat belt warning light	Buckle switch	—	—
11	High-beam indicator light	Headlight switch	—	—
12	TNS indicator light	TNS relay	—	—
13	Brake system warning light	• Parking brake switch • Brake fluid level sensor	—	—
		ABS HU/CM (EBD)	X	—
14	Air bag system warning light	SAS control module	—	—
15	Turn indicator light	Turn switch	—	—
16	DSC indicator light	DSC HU/CM	X	With DSC
17	Keyless indicator light Keyless warning light	Keyless control module	X	With advanced keyless system
18	Cruise indicator light	PCM	X	With cruise control system
19	Coolant level warning light	PCM	X	—
20	Selector indicator light	TCM	X	AT
21	AT warning light	TCM	X	AT
22	Oil level warning light	PCM	X	—
23	MIL	PCM	X	—
24	Generator warning light	PCM	X	—