Component Procedures: Computers and Control Systems

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Component Procedures: Computers and Control Systems

Parts and Labor (itype_189)

Parts

Qualifier	Part #	Name	Price	Note
Boost Sensor	L30118211B	Map Sensor	97.23	

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Replace	Boost Sensor	B	0.3	0.2
Diagnose/Test	Diagnostic Circuit, Inspect	B	0.5	0.0
Diagnose/Test	Diagnostic Circuit, Inspect > NOTE > To RE-Te?	B	0.3	0.0
Diagnose/Test	System Performance, Test	B	1.3	0.0

Intake Air System (Article 1444825)

INTAKE AIR SYSTEM DIAGRAM[LF, L3]

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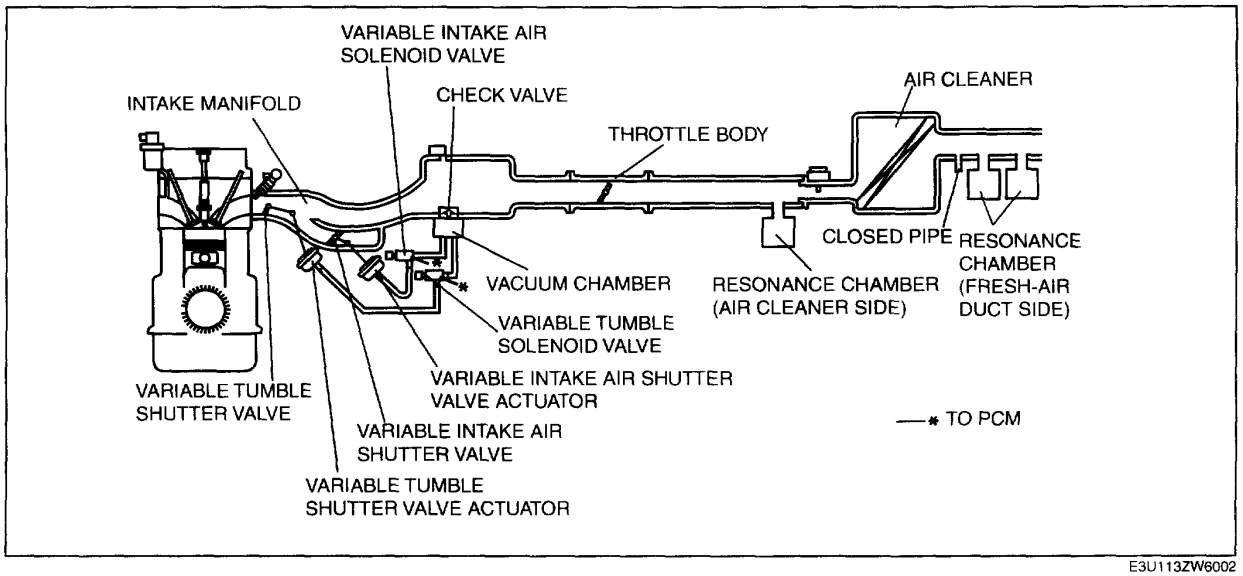

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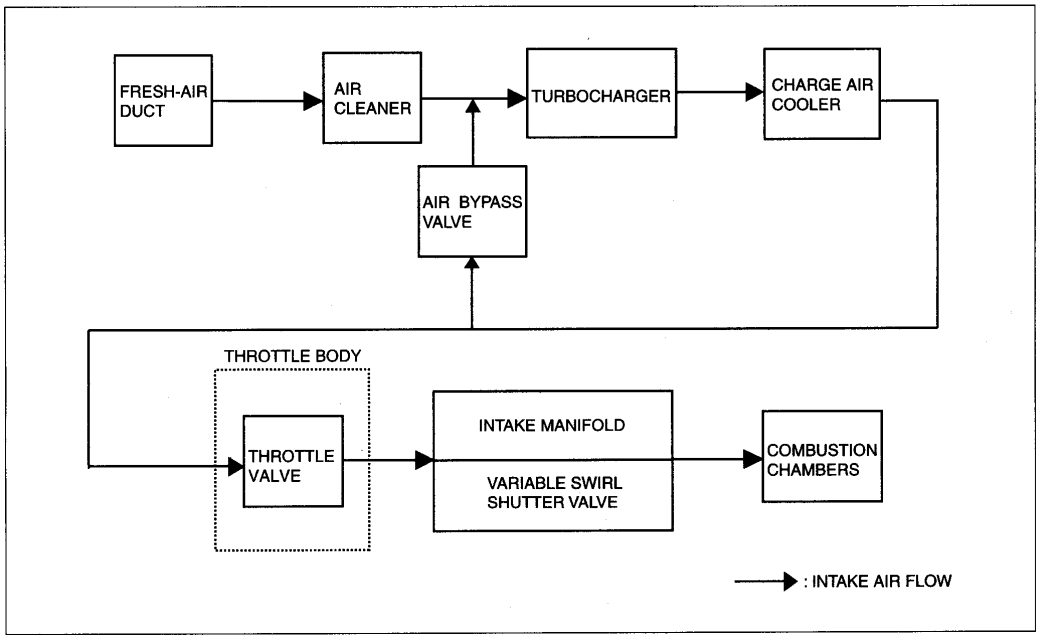

Control System Device and Control Relationship Chart (Article 1444923)

MONITORING SYSTEM AND CONTROL SYSTEM DEVICE RELATIONSHIP CHART [LF, L3]

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California Emission Regulation Applicable Model

x: Applicable

Component	Oxygen sensor monitor	Oxygen sensor heater monitor	Catalyst monitor	Misfire monitor	Fuel system monitor	Evaporative emission system monitor	EGR system monitor	Thermostat monitor
Input								
Battery		x		x		x		
Ignition switch	x	x				x		
A/C switch, refrigerant pressure switch (high, low pressure)							x	x
TP sensor	x		x	x	x	x	x	
ECT sensor	x	x	x	x	x	x	x	x
IAT sensor	x	x	x		x	x	x	x
MAF sensor	x	x	x	x	x		x	x
HO2S (front)	x	x	x		x			
HO2S (middle)	x	x	x		x			
HO2S (rear)	x	x			x			
Fuel gauge sender unit						x		
BARO sensor	x	x	x		x	x		
MAP sensor							x	
CMP sensor				x				
CKP sensor	x	x	x	x	x	x	x	x
VSS							x	x
Output								
Fuel injector					x			
HO2S heater (front)		x						
HO2S heater (middle)		x						
HO2S heater (rear)		x						
EGR valve							x	
Purge solenoid valve	x		x		x	x		
EVAP system leak detection pump						x		
MIL	x	x	x	x	x	x	x	x
DLC-2	x	x	x	x	x	x	x	x

Except for California Emission Regulation Applicable Model

x: Applicable

Component	Oxygen sensor monitor	Oxygen sensor heater monitor	Catalyst monitor	Misfire monitor	Fuel system monitor	Evaporative emission system monitor	EGR system monitor	Thermostat monitor
Input								
Battery		x		x		x		
Ignition switch	x	x				x		
A/C switch, refrigerant pressure switch (high, low pressure)							x	x
TP sensor	x		x	x	x	x	x	
ECT sensor	x	x	x	x	x	x	x	x
IAT sensor	x		x		x	x	x	x
MAF sensor	x	x	x	x	x		x	x
HO2S (front)	x	x	x		x			
HO2S (rear)	x	x			x			
Fuel gauge sender unit						x		
BARO sensor	x					x		
MAP sensor							x	
CMP sensor				x				
CKP sensor	x	x	x	x	x	x	x	x
VSS	x					x	x	x
Output								
Fuel injector					x			
HO2S heater (front)		x						
HO2S heater (rear)		x						
EGR valve							x	
Purge solenoid valve	x		x		x	x		
EVAP system leak detection pump						x		
MIL	x	x	x	x	x	x	x	x
DLC-2	x	x	x	x	x	x	x	x

Electrical (OE) (itype_21)

For information regarding diagrams for this system, please refer to
Powertrain Management
diagrams.
See: Powertrain Management > Electrical > Wiring Diagram Index

All Technical Service Bulletins (itype_100)

Tsbs

- A/T - Range Switch Removal/Installation Caution (0501107, 2007/12/07)
- Fuel System - MIL ON/DTC's P0442/P0455/P0456 (0102010, 2010/03/26)
- Engine - VVT Noise At Engine Start Up (0101011, 2011/12/21)
- Computers/Controls KAM Memory Clearing After VVT R & R (MTIP-09-01-3, 2009/01/01)
- Computers/Controls - Module Reprogramming Precautions (0103008, 2008/06/23)
- Engine Controls - Oxygen Sensor Removal Precautions (0100315, 2015/02/27)
- Engine Controls/Cooling System - MIL ON/DTC P0128 Set (0100711, 2011/02/07)

- Engine Controls - MIL ON/DTC's P0131/P2251 (0101510, 2010/02/15)
- Engine/Fuel - MIL ON/DTC P2006 Stored (0100611, 2011/02/09)
- Engine Controls - MIL ON/DTC P0401 Set (0100408, 2008/02/07)
- Emissions - MIL ON/DTC P0441 Set (0100309, 2009/01/23)
- Engine Controls - Revised DTC P0441 Diagnostics (0102908, 2008/04/28)
- 01-002/18 - MULTI-MODEL - DETERMINING EVAPORATIVE SYSTEM LEAK LOCATION FOR DTCs P0441 / P0442 / P0455 / P0456 (01-002/18, 2018/01/30)
- Engine - MIL ON/DTC P2004 Set (0101209, 2009/04/09)

Customer Interest Bulletins (itype_109)

Tsbs
- Engine Controls/Cooling System - MIL ON/DTC P0128 Set (0100711, 2011/02/07)
- Engine Controls - MIL ON/DTC's P0131/P2251 (0101510, 2010/02/15)
- Engine/Fuel - MIL ON/DTC P2006 Stored (0100611, 2011/02/09)
- Fuel System - MIL ON/DTC's P0442/P0455/P0456 (0102010, 2010/03/26)
- Engine Controls - MIL ON/DTC P0401 Set (0100408, 2008/02/07)
- Emissions - MIL ON/DTC P0441 Set (0100309, 2009/01/23)
- Engine - VVT Noise At Engine Start Up (0101011, 2011/12/21)
- Engine - MIL ON/DTC P2004 Set (0101209, 2009/04/09)

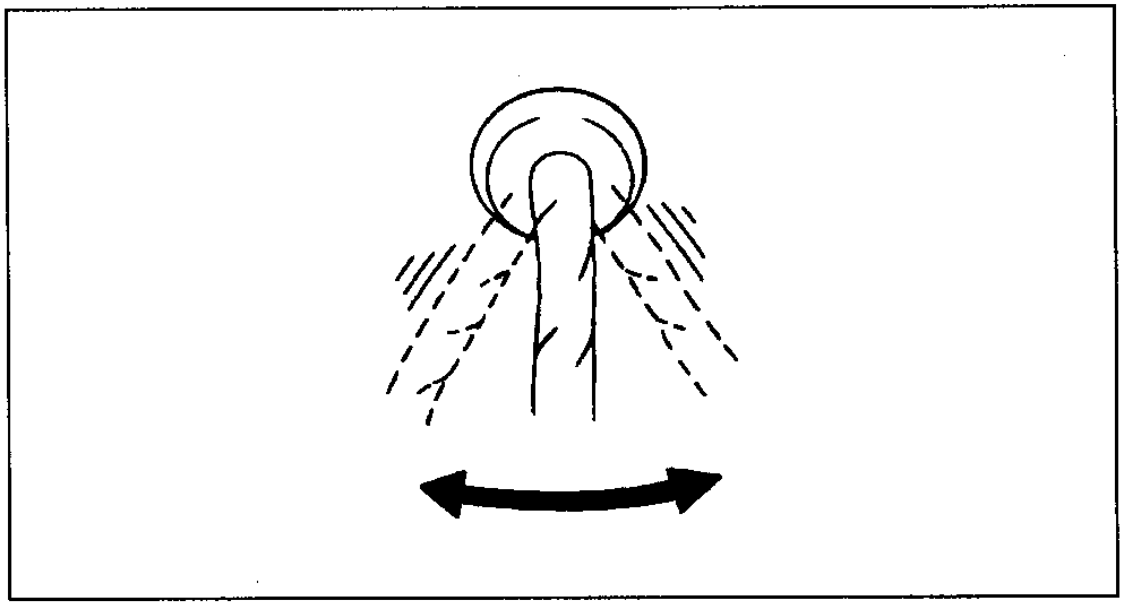
Repair Tips (itype_110)

Tsbs
- Computers/Controls - Module Reprogramming Precautions (0103008, 2008/06/23)
- Engine Controls - Oxygen Sensor Removal Precautions (0100315, 2015/02/27)
- A/T - Range Switch Removal/Installation Caution (0501107, 2007/12/07)
- Computers/Controls KAM Memory Clearing After VVT R & R (MTIP-09-01-3, 2009/01/01)

Engine Control System Operation Inspection (Article 1367616)

Non Standards
- Part 1 (1431187)
- Part 2 (1415842)

Intermittent Concern Troubleshooting (Article 1413299)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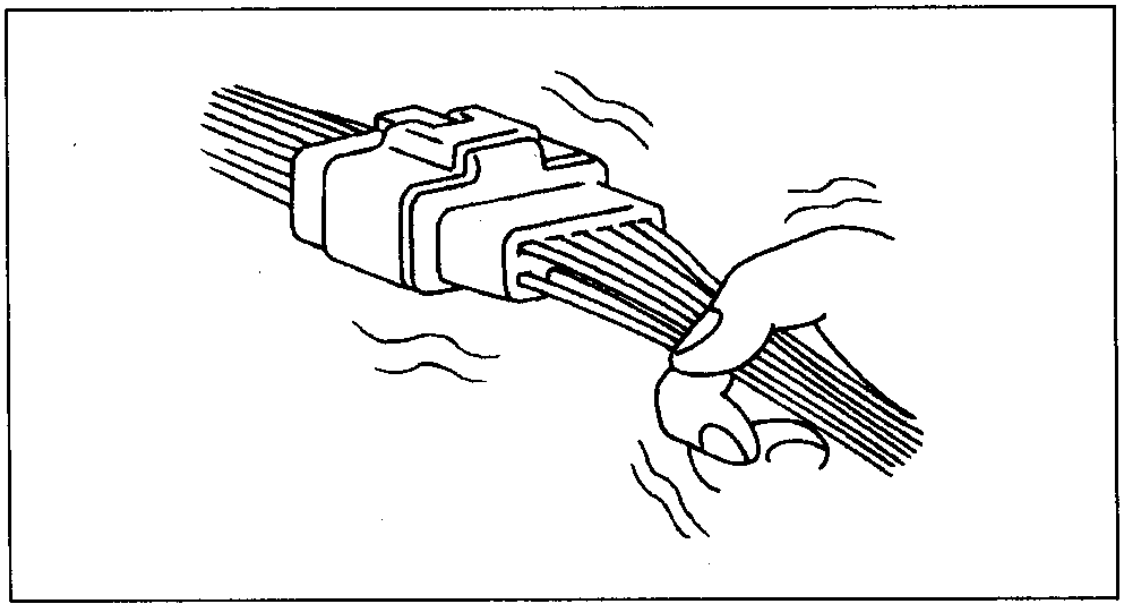

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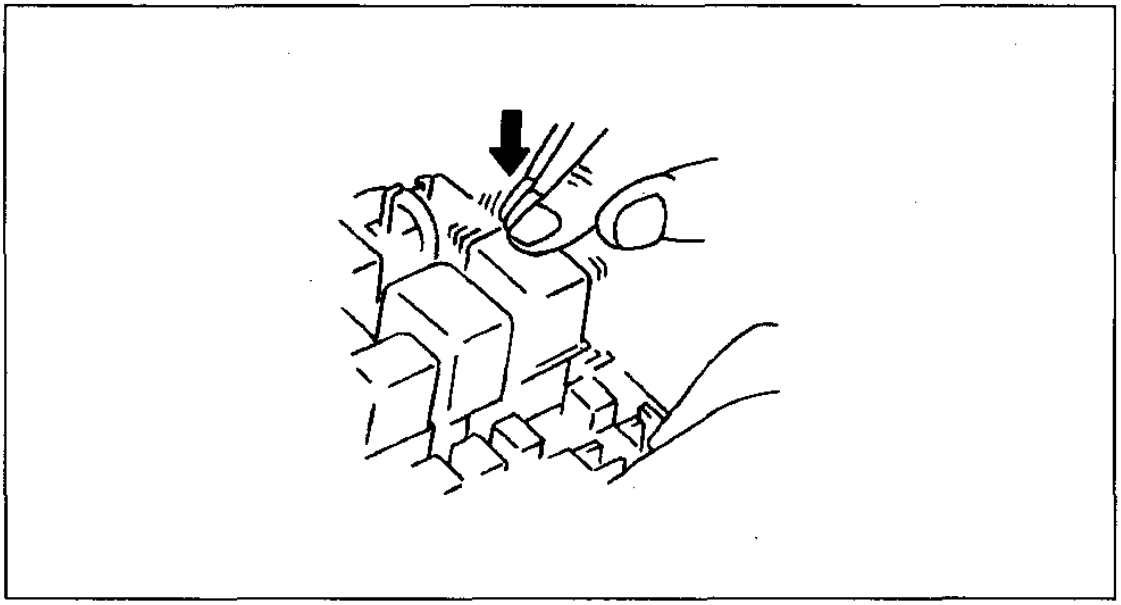

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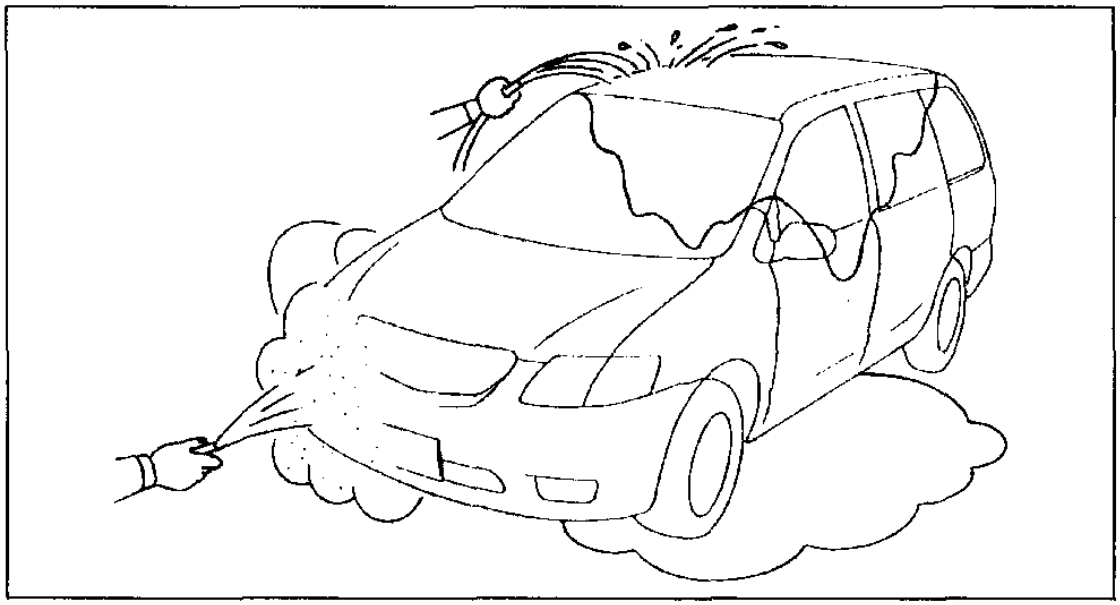

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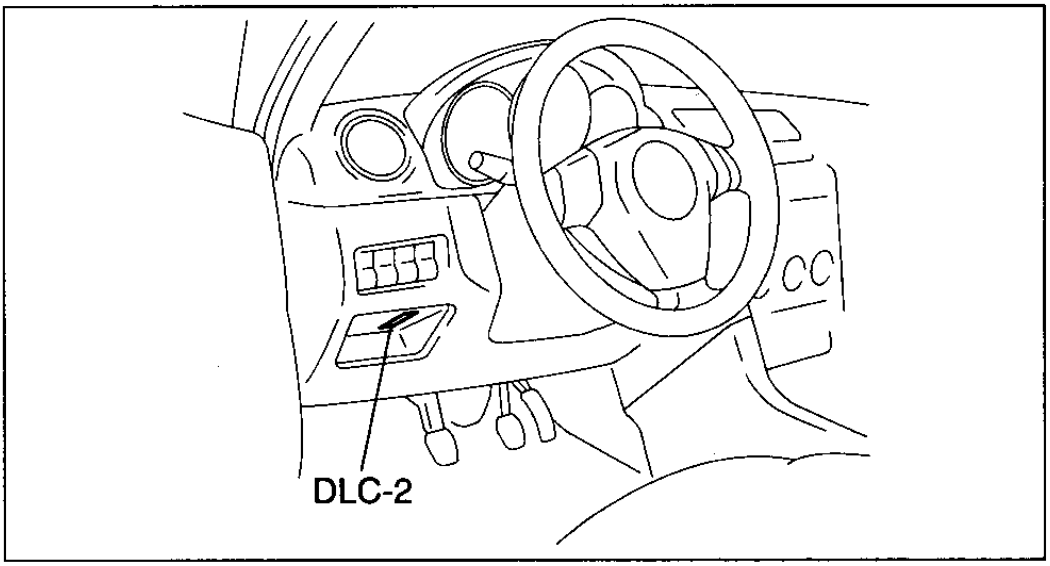
After Repair Procedure (Article 1365271)



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OBD Pending Trouble Code (Article 1444505)

OBD PENDING TROUBLE CODE [LF, L3]
- These appear when a problem is detected in a monitored system. The code for a failed system is stored in the PCM
memory in the first drive cycle. This code is called the pending code. If the PCM judges that the system returned to normal or the problem was mistakenly detected, and deletes the pending code. If the problem is found in a second drive cycle too, the PCM judges that the system has failed, and the DTC is stored.

OBD Freeze Frame Data (Article 1444513)

OBD FREEZE FRAME DATA [LF, L3]
- This is the technical data which indicates the engine condition at the time of the first malfunction. This data will remain in the memory even if another emission-related OTC is stored, with the exception of Fuel system
or Misfire DTCs. Once freeze frame data for Fuel system or Misfire OTC is stored, it will overwrite any previous data and the freeze frame will not be overwritten again.

OBD On-Board System Readiness Test (Article 1444506)

OBD ON-BOARD SYSTEM READINESS TEST [LF, L3]
- This shows the OBD systems operating status. If any monitor function is incomplete, M-MDS. will identify which monitor function has not been completed. The
Fuel system
, Misfire and
CCM
are continuous monitoring-type functions. The
HO2S
,
EGR system
and
Catalyst
will be monitored under drive cycles. The OBD diagnostic system is initialized by performing the OTC cancellation procedure or disconnecting the negative battery cable.

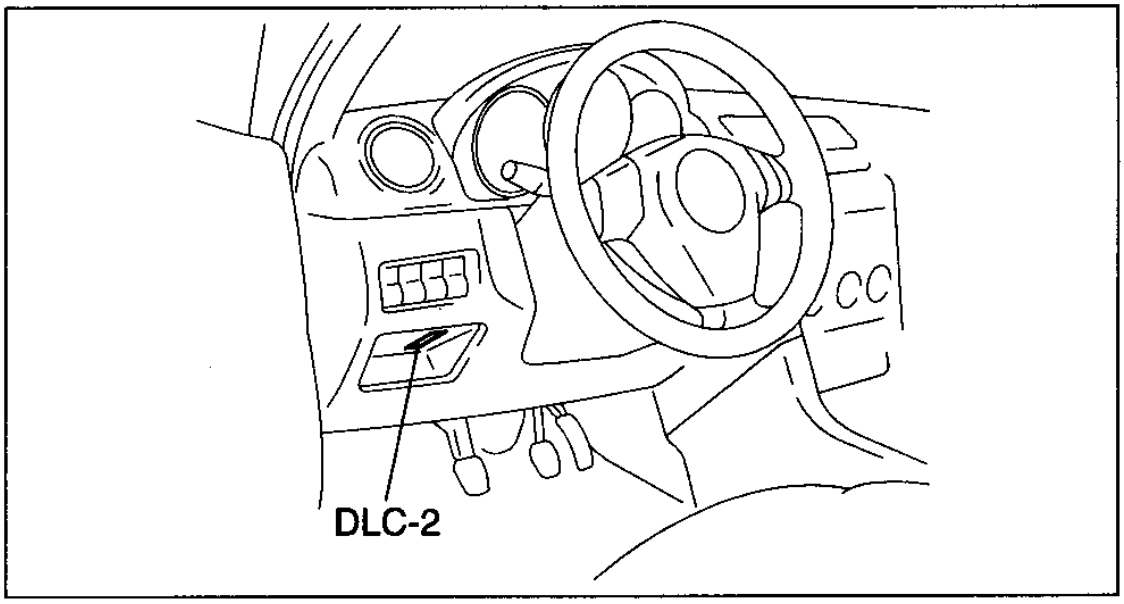
OBD Read/Clear Diagnostic Test Results (Article 1444514)

OBD READ/CLEAR DIAGNOSTIC TEST RESULTS [LF, L3]
- This retrieves all stored DTCs in the
PCM
and clears the on-board readiness test results, freeze frame data, DTC and pending trouble code.

OBD Parameter Identification (PID) Access (Article 1444507)

OBD PARAMETER IDENTIFICATION (PID) ACCESS [LF, L3]
- The PID mode allows access to certain data values, analog and digital inputs and outputs, calculated values and system status information. Since the PID values for output devices are the
PCM
internal data values, inspect each device to identify which output devices are malfunctioning.

Diagnostic Monitoring Test Results Access Procedure (Article 1444228)



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Diagnostic Monitoring Test Results (Article 1371171)

DIAGNOSTIC MONITORING TEST RESULTS [LF, L3]

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- The purpose of this test mode is to confirm the result of OBD-II monitor diagnostic test results. The result values stored when particular monitor is completed are displayed. If the monitor is not completed, initial value is displayed.

OBD Monitor ID	Test ID	Description	Related system	Scaling ID	Unit
01	80	HO2S (Front) lean-to-rich slow response (calculated)	HO2S	20	Ratio
01	81	HO2S (Front) rich-to-lean slow response (calculated)		20	Ratio
01	82	HO2S (Front) lean-to-rich delayed response (calculated)		20	Ratio
01	83	HO2S (Front) rich-to-lean delayed response (calculated)		20	Ratio
02	03*2	Low HO2S (Rear) voltage for switch time calculation (constant)		0A	Voltage
02	04*2	High HO2S (Rear) voltage for switch time calculation (constant)		0A	Voltage
02	05*2	HO2S (Rear) rich-to-lean response time (calculated)		10	Time
02	85*1	HO2S (Rear) rich-to-lean response time (calculated)		26	Voltage per time
21	80	HO2S (Front) and HO2S (Rear) switching time ratio	Catalyst	20	Ratio
31	83	EGR pressure variation	EGR	17	Pressure
3A	80	EVAP system leak detection pump gross leak check	EVAP	0D	Current
3B	80	EVAP system leak detection pump small leak check		0D	Current
3C	80*1	EVAP system leak detection pump very small leak check		05	Raw value
3D	80	Purge flow monitor		0D	Current
A2	0B	Cylinder No.1 average misfire counts for last 10 DC	Misfire	24	Counts
A2	0C	Cylinder No.1 misfire counts for last/current DC		24	Counts
A3	0B	Cylinder No.2 average misfire counts for last 10 DC		24	Counts
A3	0C	Cylinder No.2 misfire counts for last/current DC		24	Counts
A4	0B	Cylinder No.3 average misfire counts for last 10 DC		24	Counts
A4	0C	Cylinder No.3 misfire counts for last/current DC		24	Counts
A5	0B	Cylinder No.4 average misfire counts for last 10 DC		24	Counts
A5	0C	Cylinder No.4 misfire counts for last/current DC		24	Counts

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model

Monitoring System and Control System Device Relationship Chart (Article 1447795)

MONITORING SYSTEM AND CONTROL SYSTEM DEVICE RELATIONSHIP CHART [LF, L3]

California Emission Regulation Applicable Model

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x: Applicable

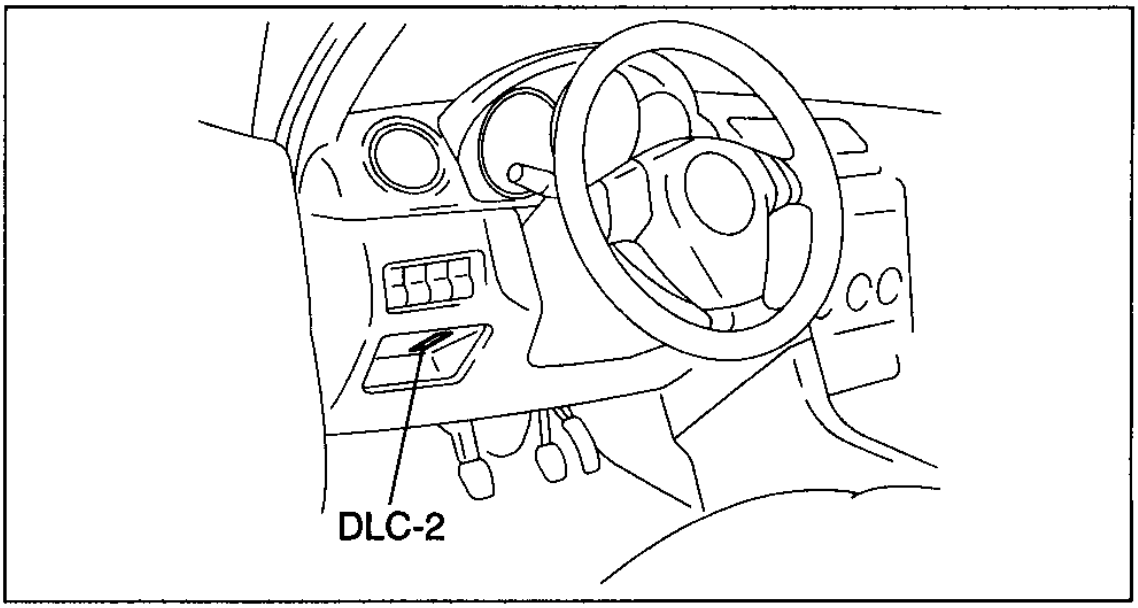
Component	Oxygen sensor monitor	Oxygen sensor heater monitor	Catalyst monitor	Misfire monitor	Fuel system monitor	Evaporative emission system monitor	EGR system monitor	Thermostat monitor
Input								
Battery		x		x		x		
Ignition switch	x	x				x		
A/C switch, refrigerant pressure switch (high, low pressure)							x	x
TP sensor	x		x	x	x	x	x	
ECT sensor	x	x	x	x	x	x	x	x
IAT sensor	x	x	x		x	x	x	x
MAF sensor	x	x	x	x	x		x	x
HO2S (front)	x	x	x		x			
HO2S (middle)	x	x	x		x			
HO2S (rear)	x	x			x			
Fuel gauge sender unit						x		
BARO sensor	x	x	x		x	x		
MAP sensor							x	
CMP sensor				x				
CKP sensor	x	x	x	x	x	x	x	x
VSS							x	x
Output								
Fuel injector					x			
HO2S heater (front)		x						
HO2S heater (middle)		x						
HO2S heater (rear)		x						
EGR valve							x	
Purge solenoid valve	x		x		x	x		
EVAP system leak detection pump						x		
MIL	x	x	x	x	x	x	x	x
DLC-2	x	x	x	x	x	x	x	x

Except for California Emission Regulation Applicable Model

x: Applicable

Component	Oxygen sensor monitor	Oxygen sensor heater monitor	Catalyst monitor	Misfire monitor	Fuel system monitor	Evaporative emission system monitor	EGR system monitor	Thermostat monitor
Input								
Battery		x		x		x		
Ignition switch	x	x				x		
A/C switch, refrigerant pressure switch (high, low pressure)							x	x
TP sensor	x		x	x	x	x	x	
ECT sensor	x	x	x	x	x	x	x	x
IAT sensor	x		x		x	x	x	x
MAF sensor	x	x	x	x	x		x	x
HO2S (front)	x	x	x		x			
HO2S (rear)	x	x			x			
Fuel gauge sender unit						x		
BARO sensor	x					x		
MAP sensor							x	
CMP sensor				x				
CKP sensor	x	x	x	x	x	x	x	x
VSS	x					x	x	x
Output								
Fuel injector					x			
HO2S heater (front)		x						
HO2S heater (rear)		x						
EGR valve							x	
Purge solenoid valve	x		x		x	x		
EVAP system leak detection pump						x		
MIL	x	x	x	x	x	x	x	x
DLC-2	x	x	x	x	x	x	x	x

On-Board System Readiness Tests Access Procedure (Article 1447796)



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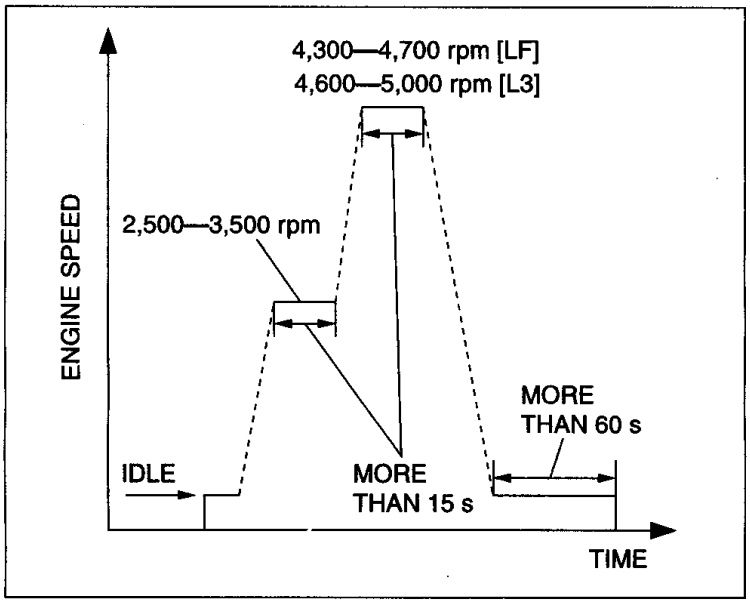
OBD-II Drive Mode (Article 1386031)



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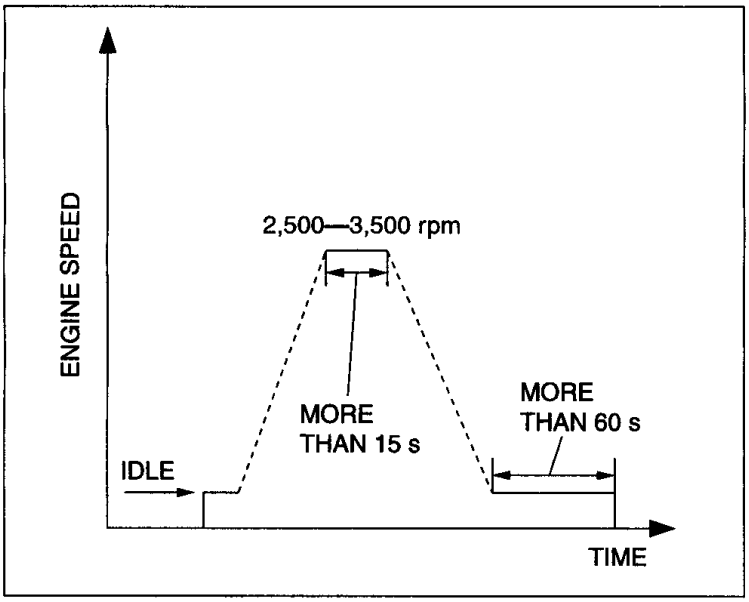

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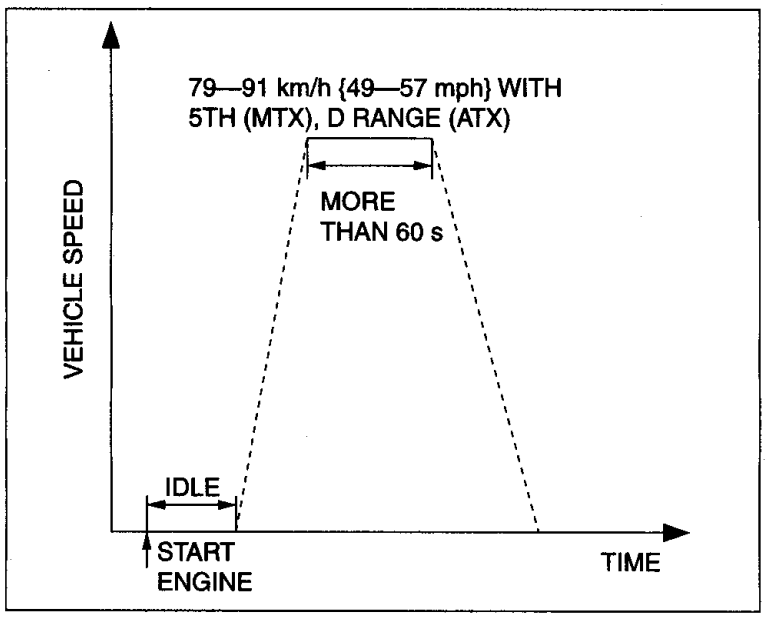

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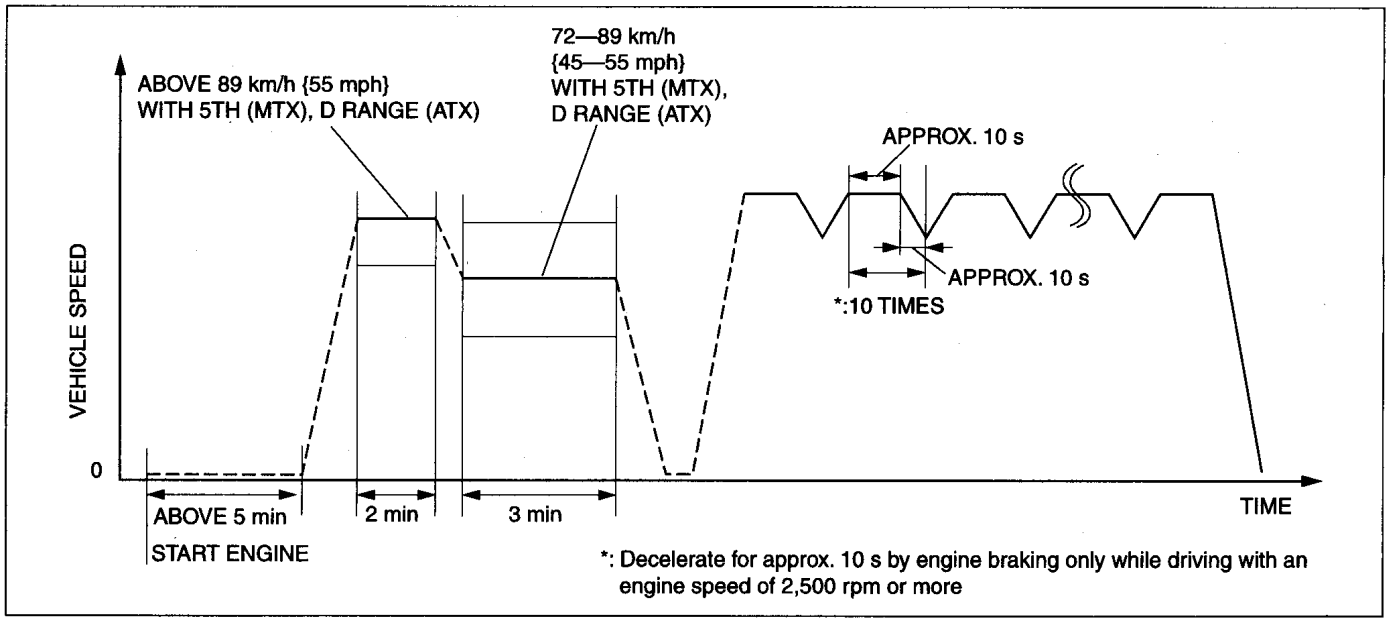

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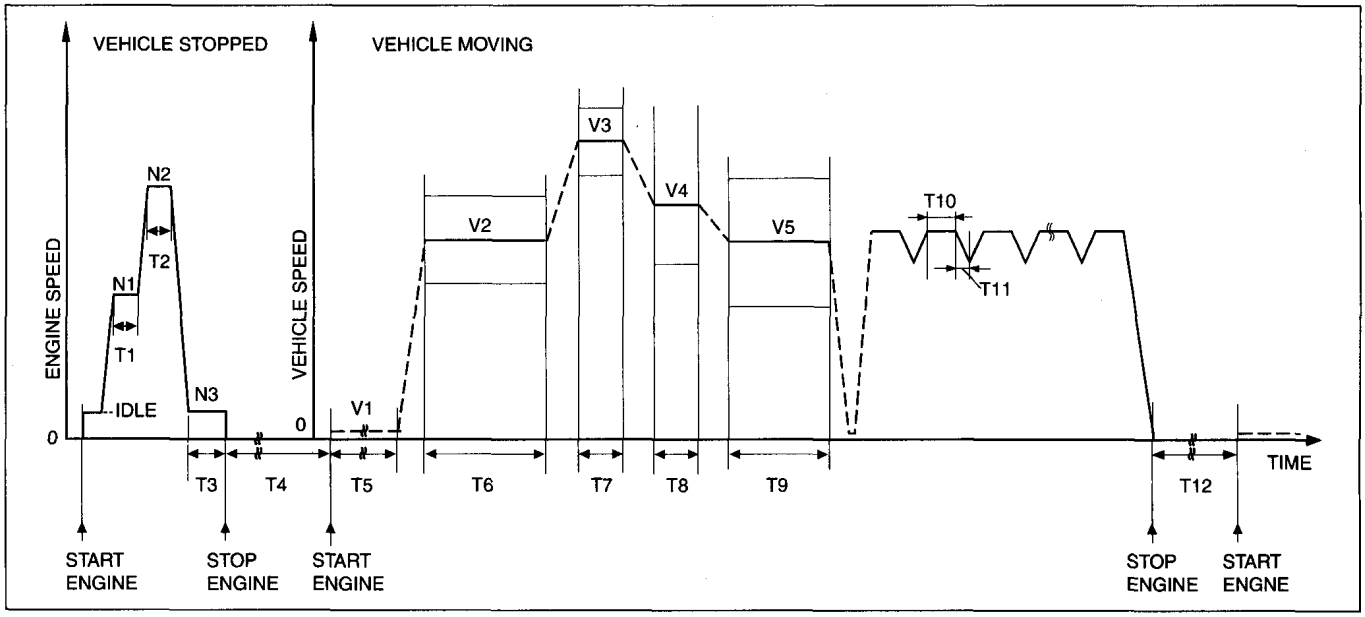

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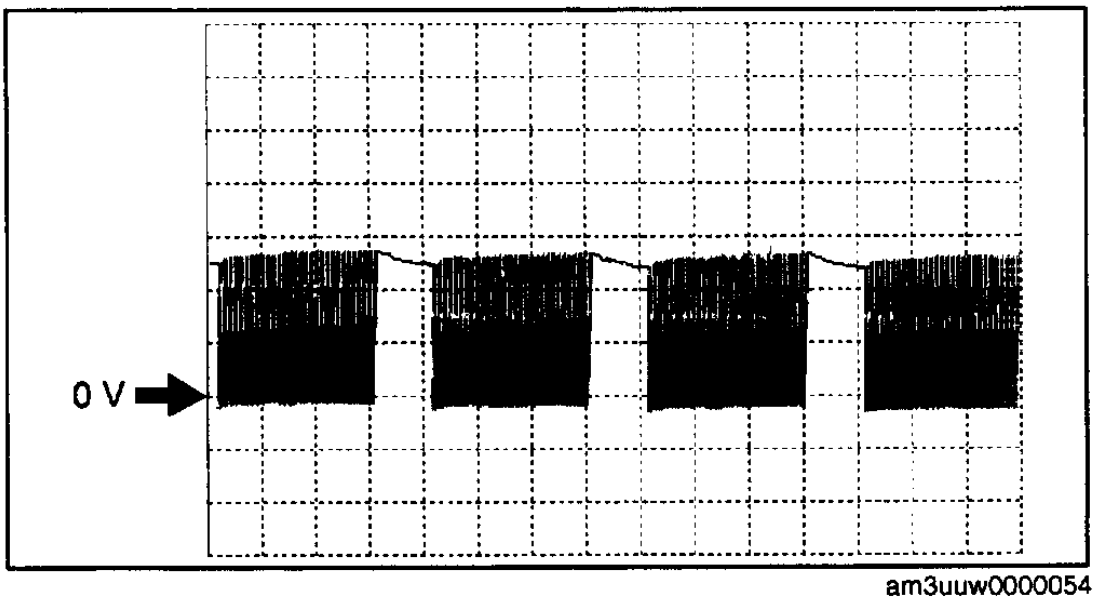
Step	Time	Engine speed (rpm)	Vehicle speed (km/h {mph})	Vehicle condition
1	T1: More than 15 s	N1: 2,500—3,500	0 {0}	—
2*	T2: More than 15 s	N2: 4,300—4,700 [LF] 4,600—5,000 [L3]	0 {0}	—
3	T3: More than 60 s	N3: Idle	0 {0}	Idle the engine after the cooling fan has stopped
4	T4: More than 5 h	0	0 {0}	Keep the ignition switch off
5	T5: More than 15 min	Idle	V1: 0 {0}	—
6	T6: 5 min	—	V2: 65—80 {40—50}	MTX: 5TH ATX: D range
7	T7: 1 min	—	V3: 79—91 {49—57}	MTX: 5TH ATX: D range
8	T8: 2 min	—	V4: Above 89 {55}	MTX: 5TH ATX: D range
9	T9: 3 min	—	V5: 72—89 {45—55}	MTX: 5TH ATX: D range
10	T10: Approx. 10 s	Above 2,500	—	—
11	T11: Approx. 10 s	—	—	Decelerate by engine braking only (10 times)
12	T12: More than 10 min	0	0 {0}	Keep the ignition switch off

* : California emission regulation applicable model is not applicable.

Oscilloscope Patterns and Waveforms (itype_48)



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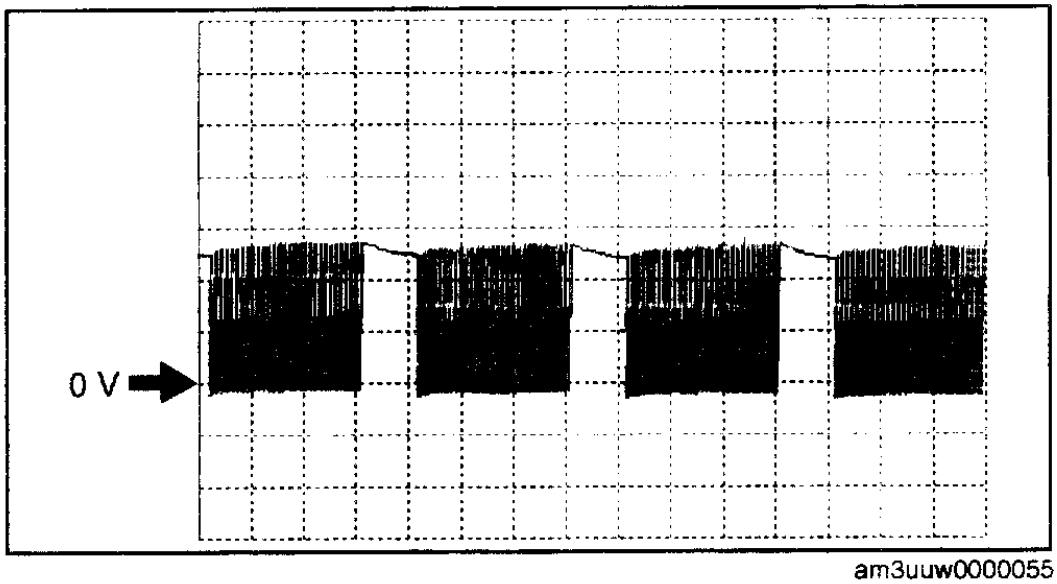

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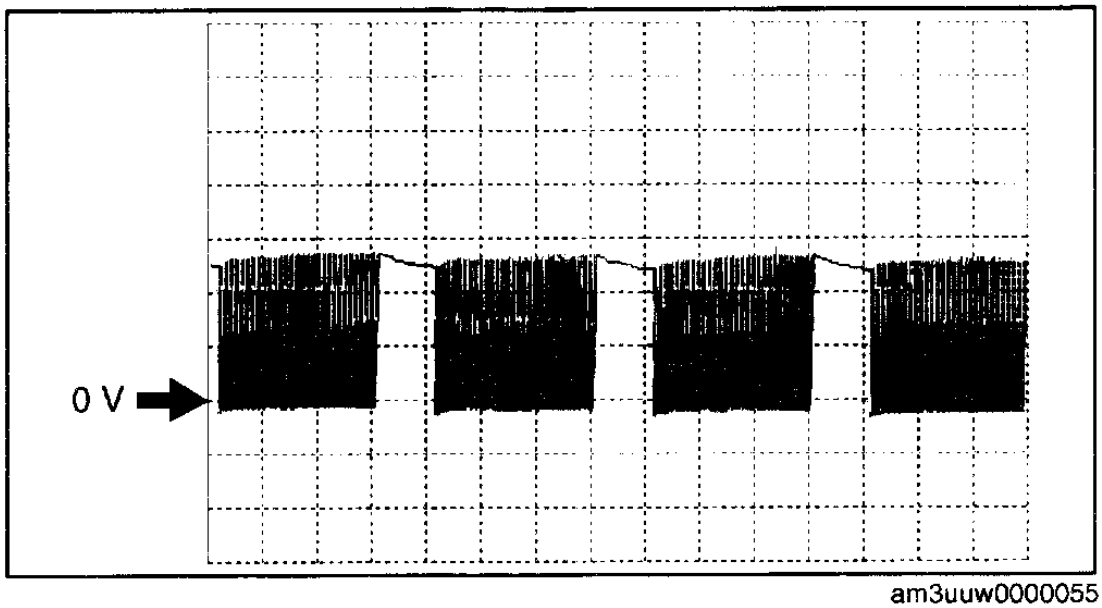

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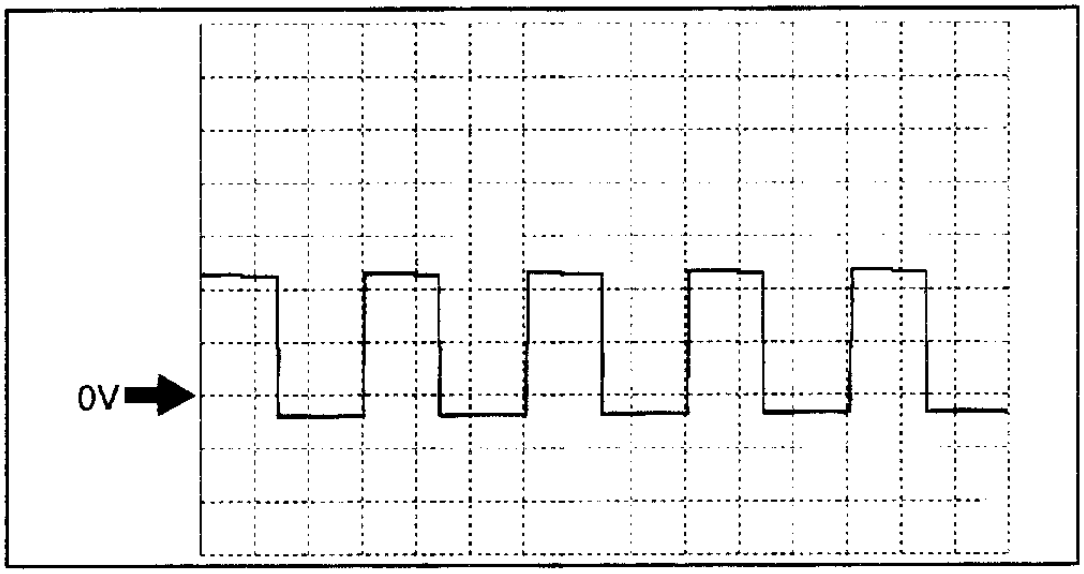

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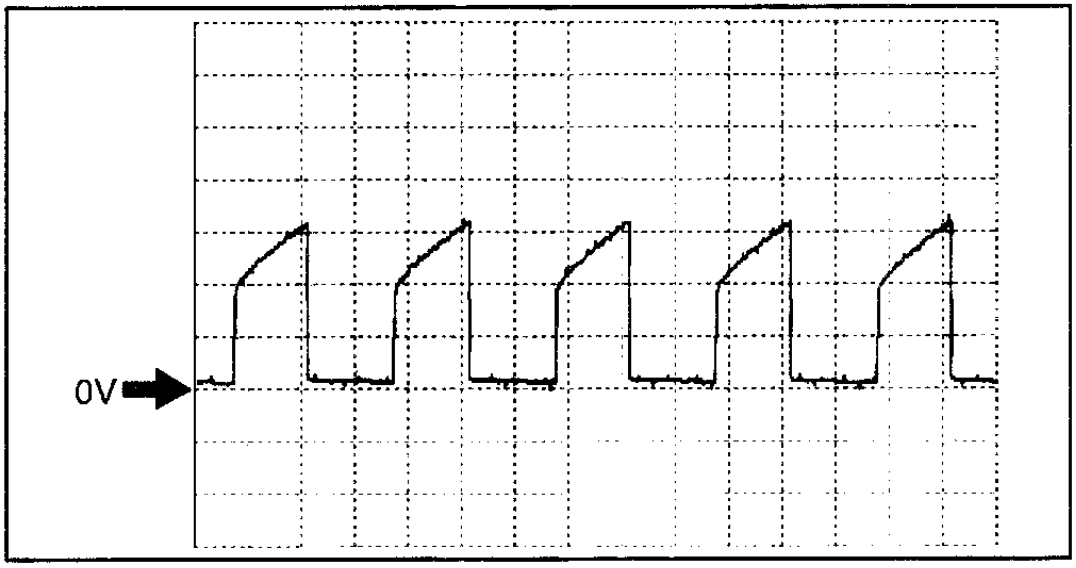

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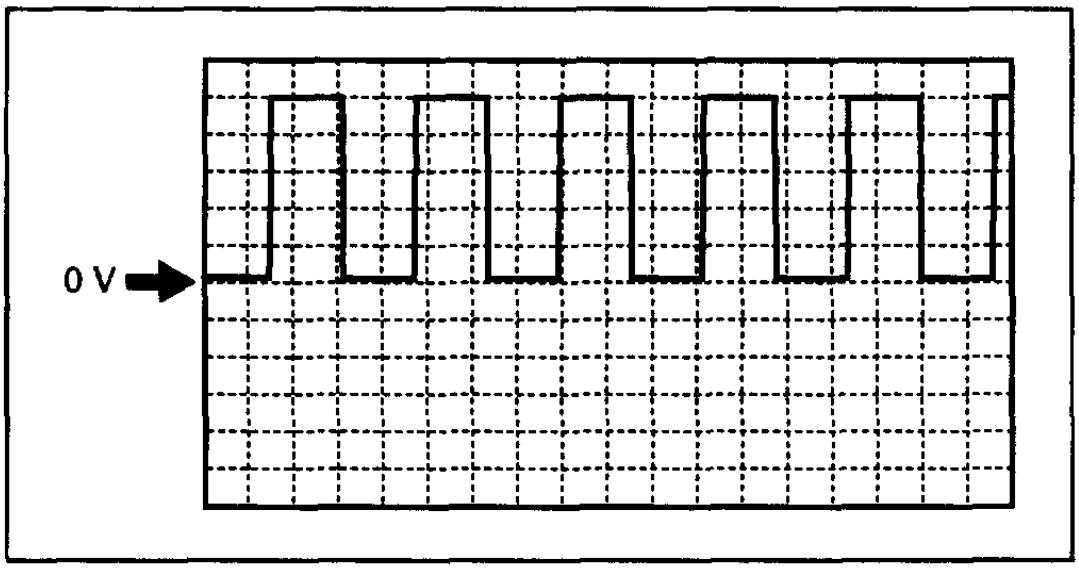

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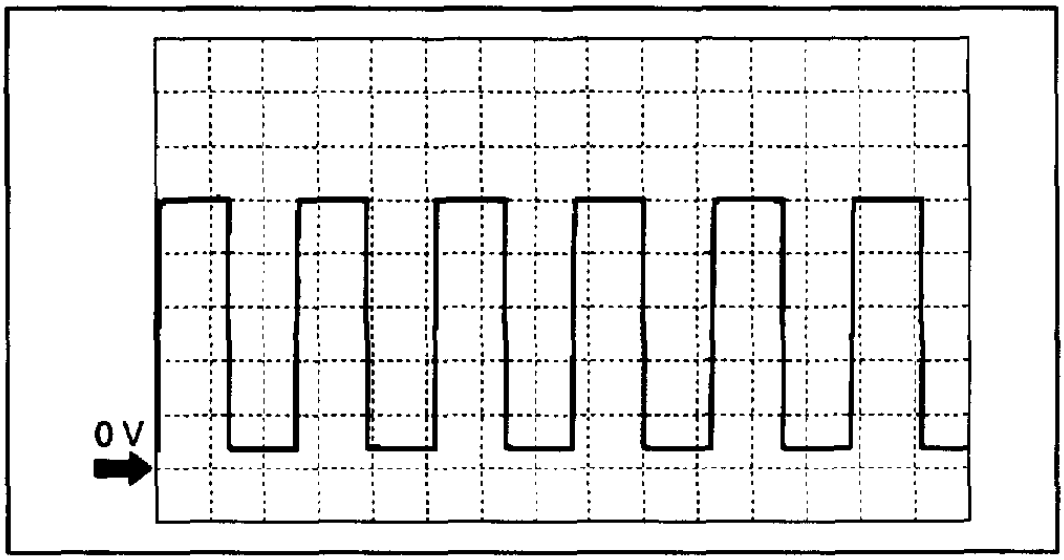

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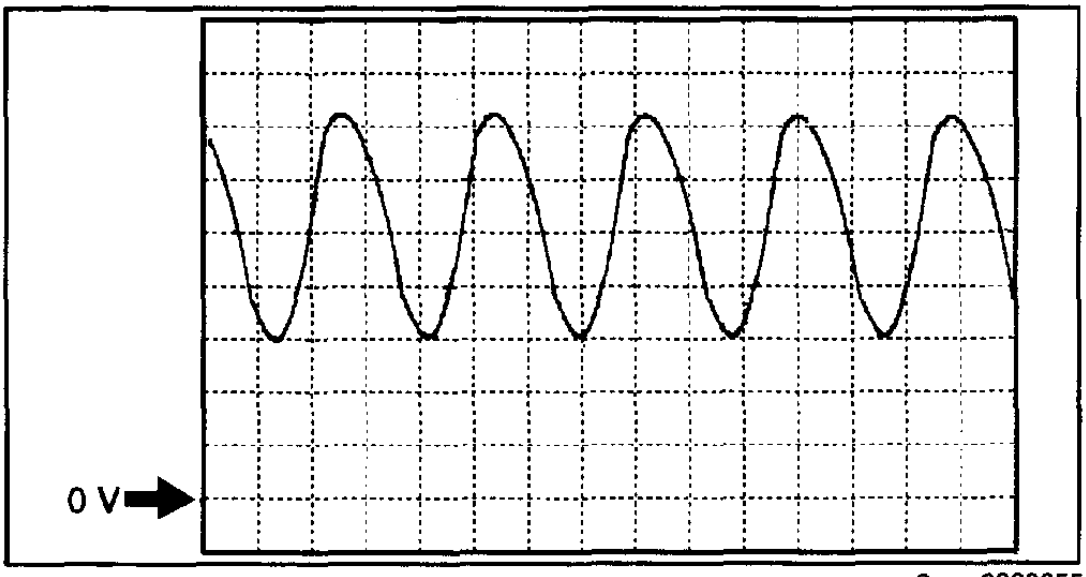

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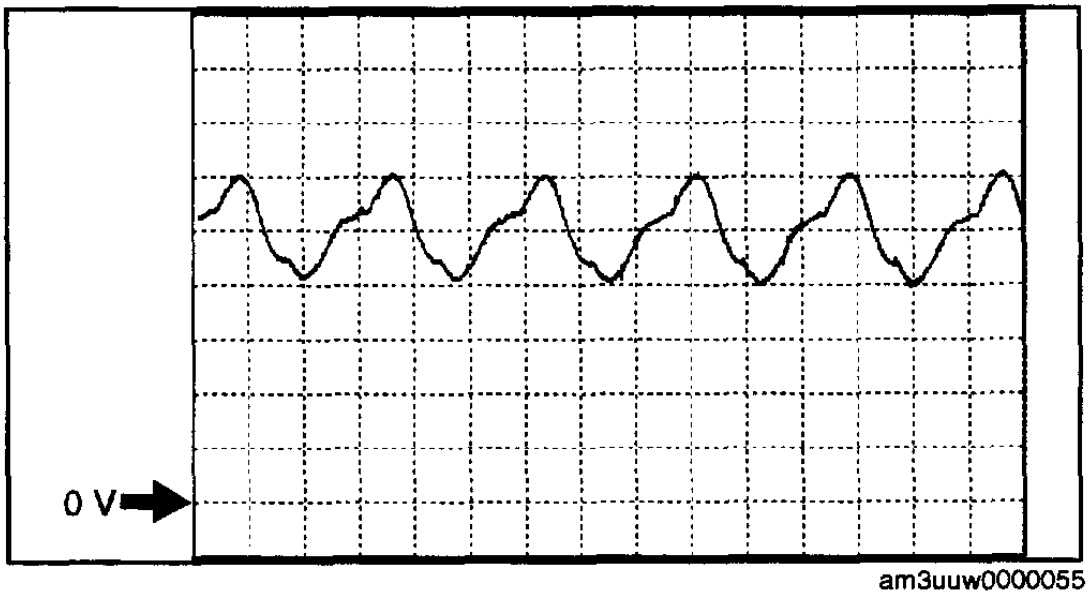

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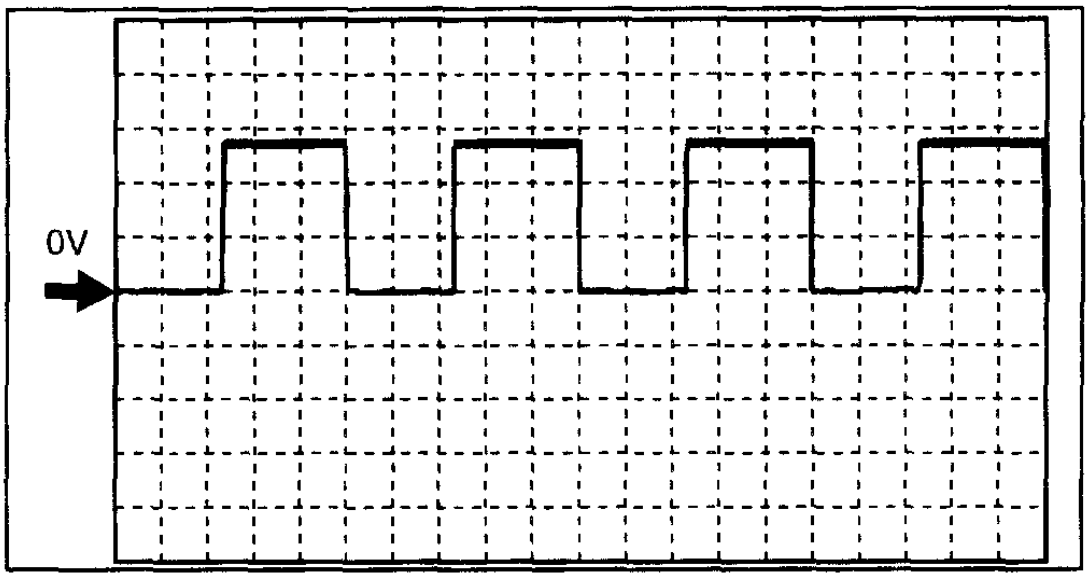

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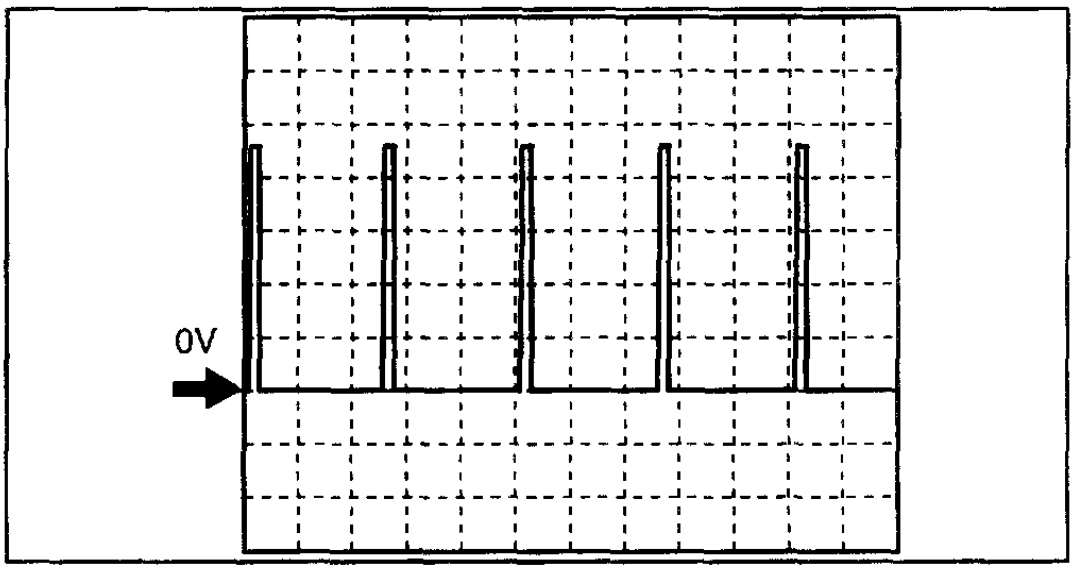

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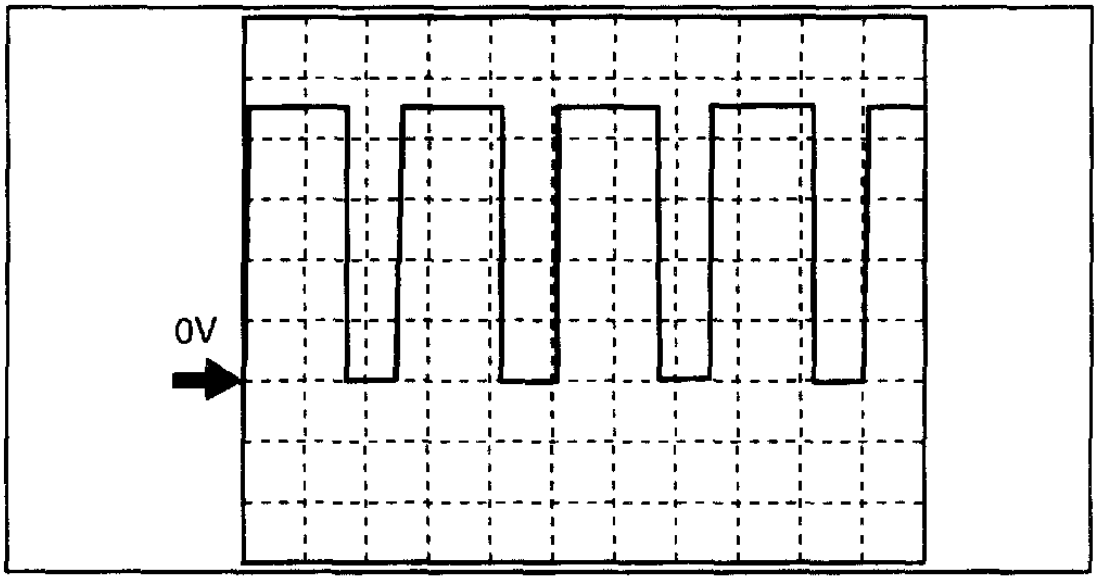

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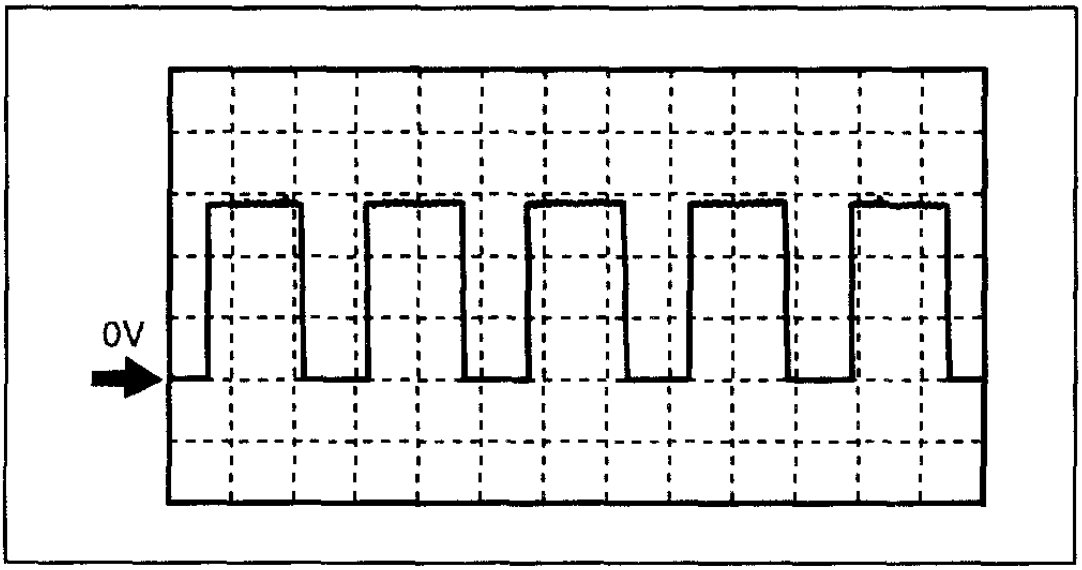

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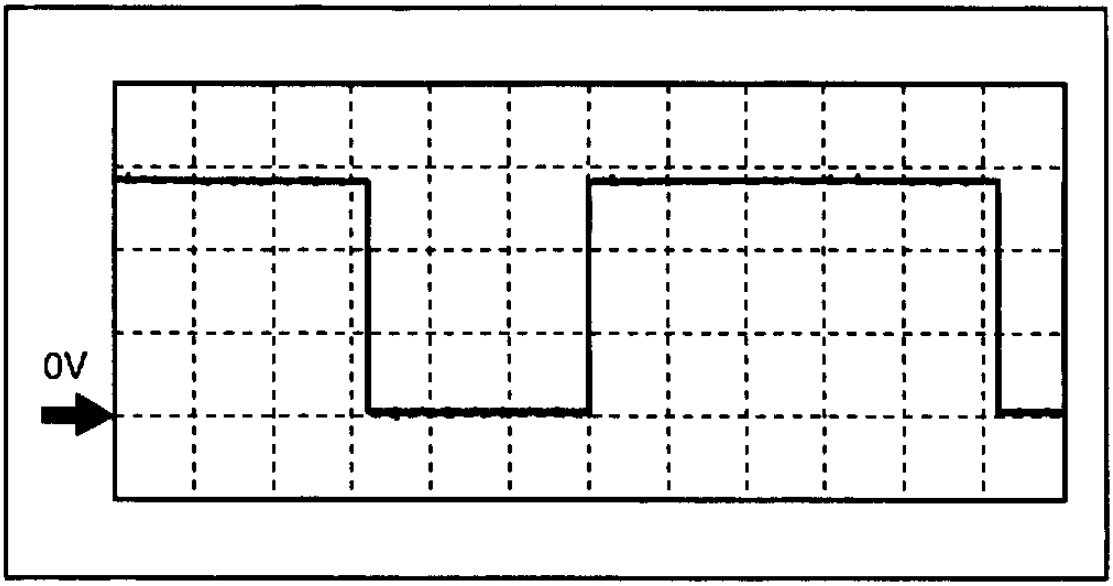

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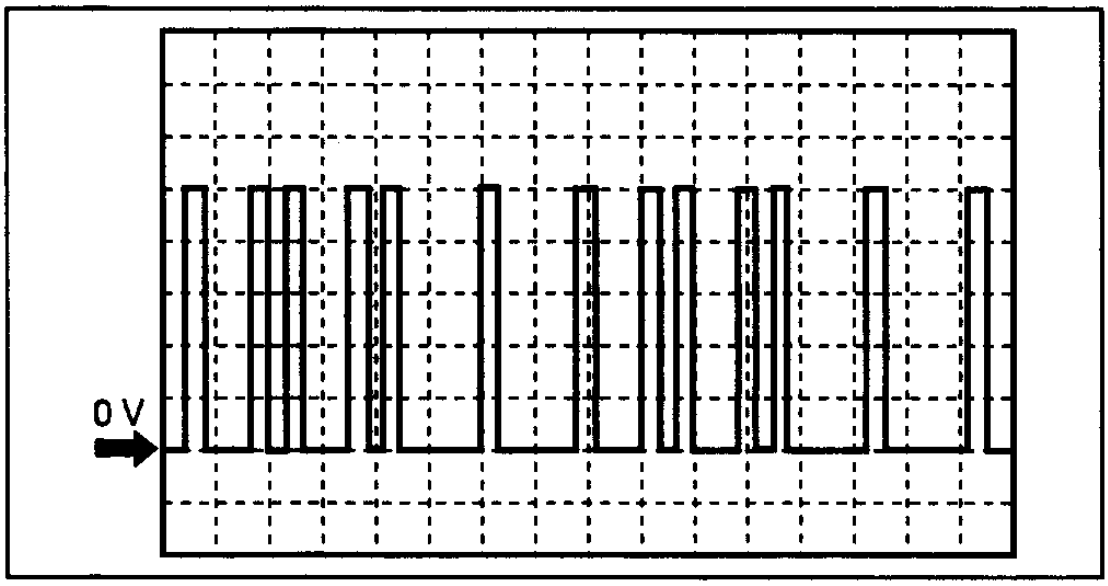

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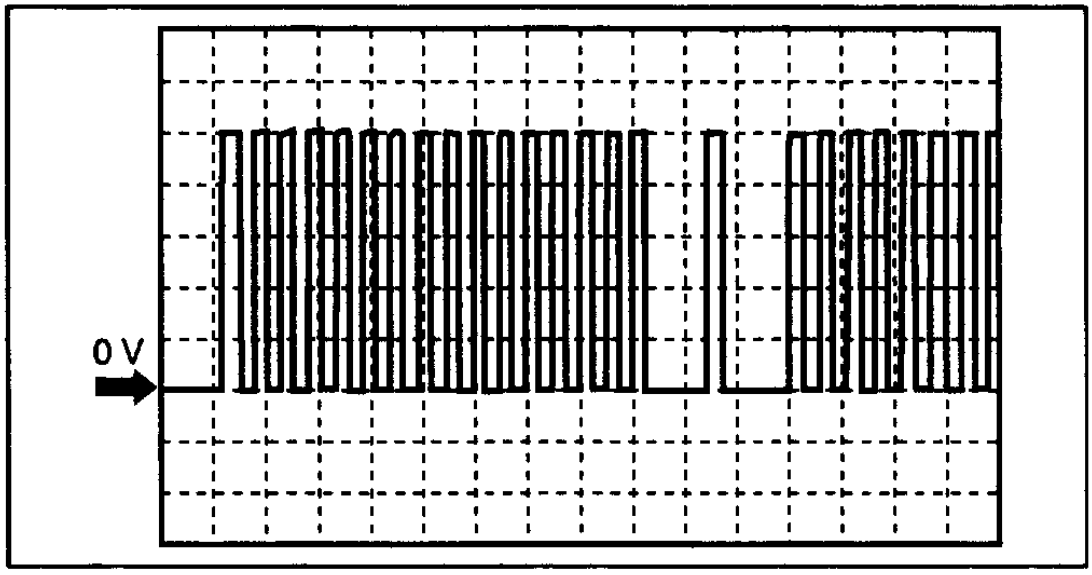

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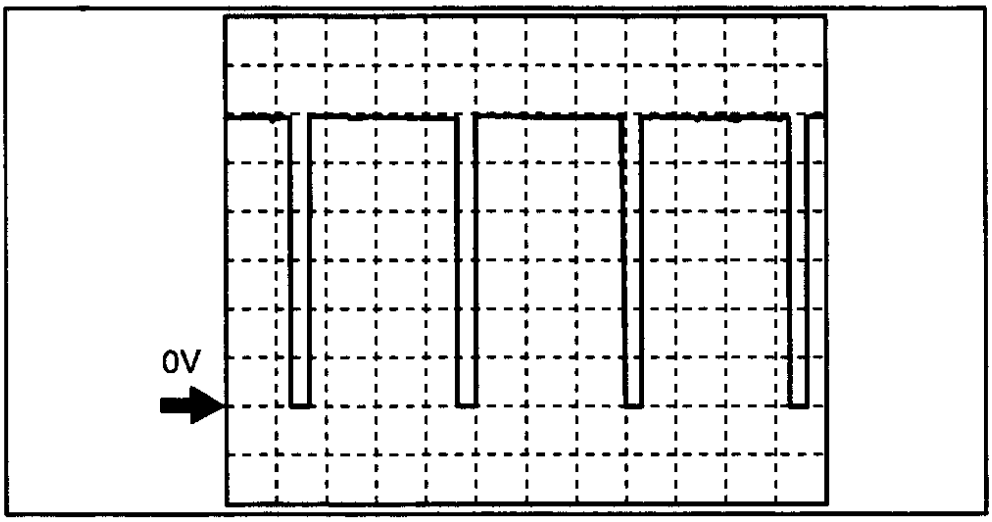

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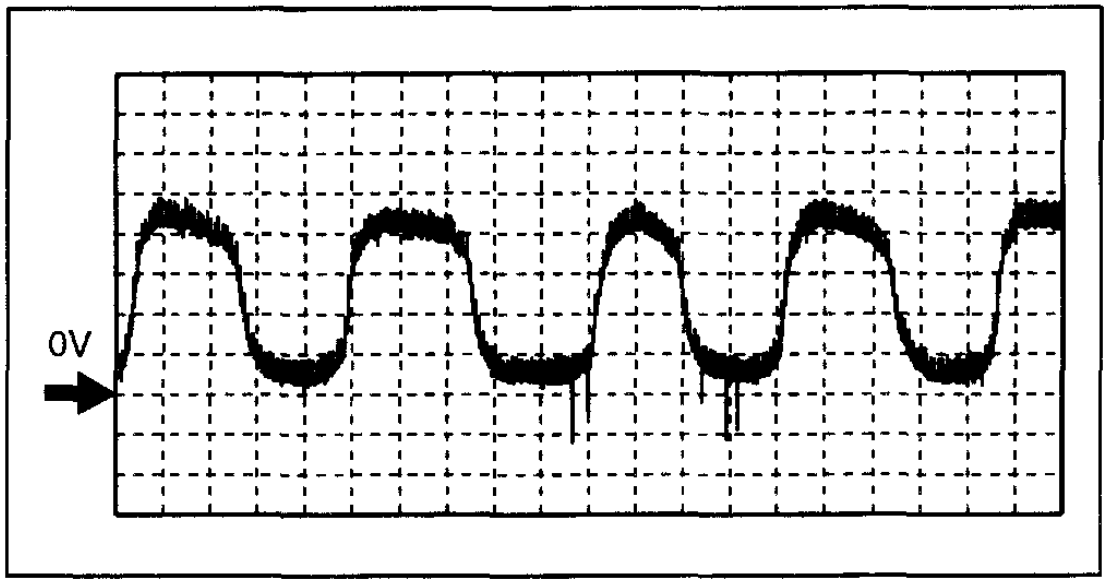

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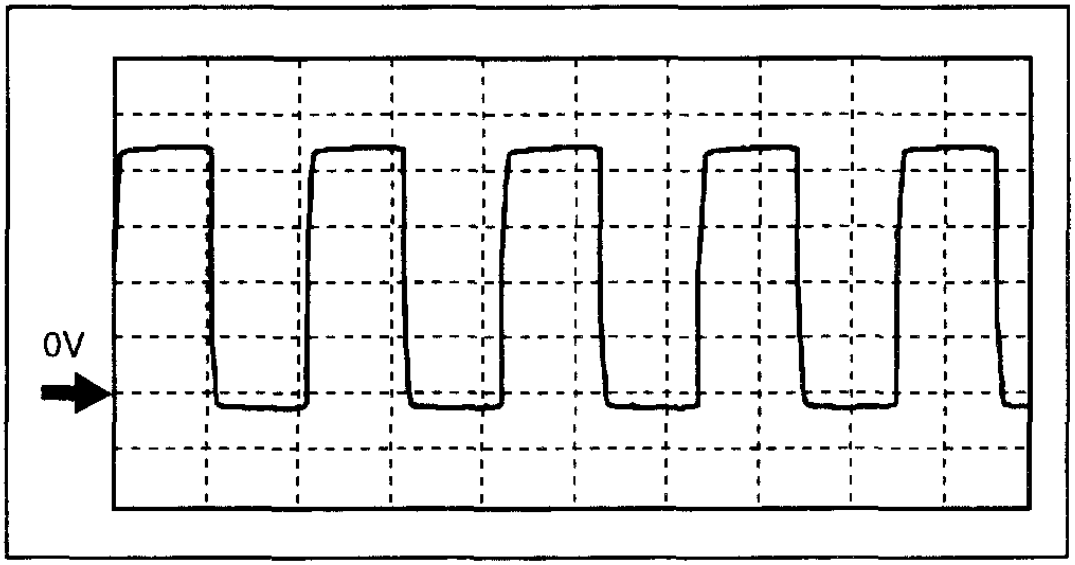

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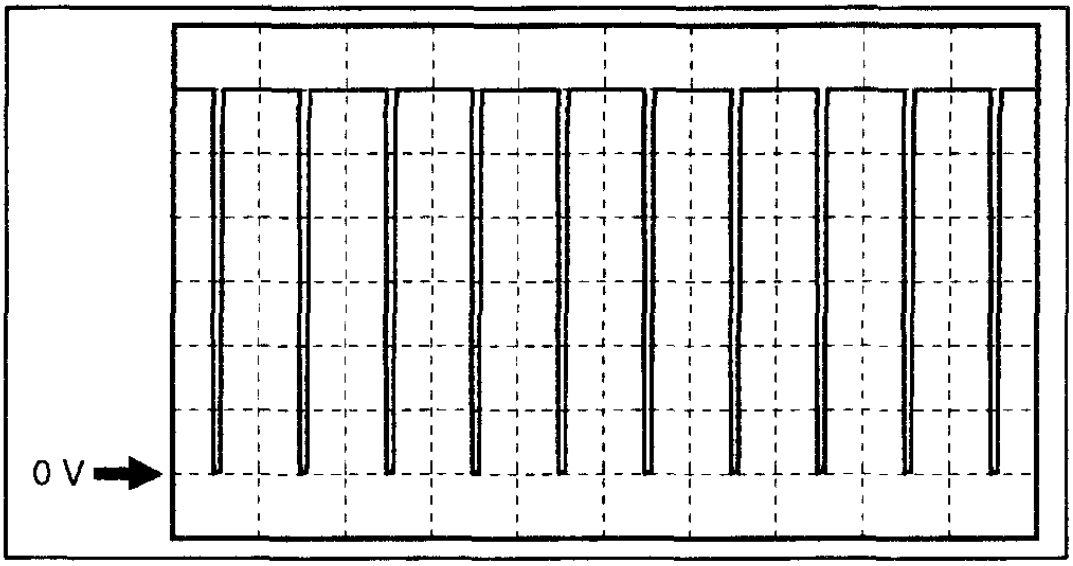

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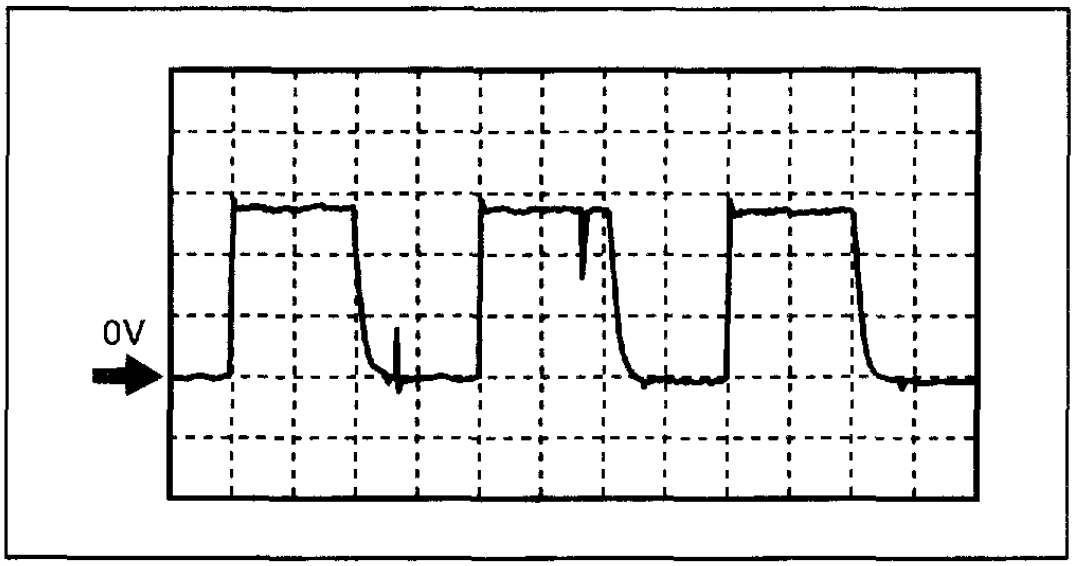

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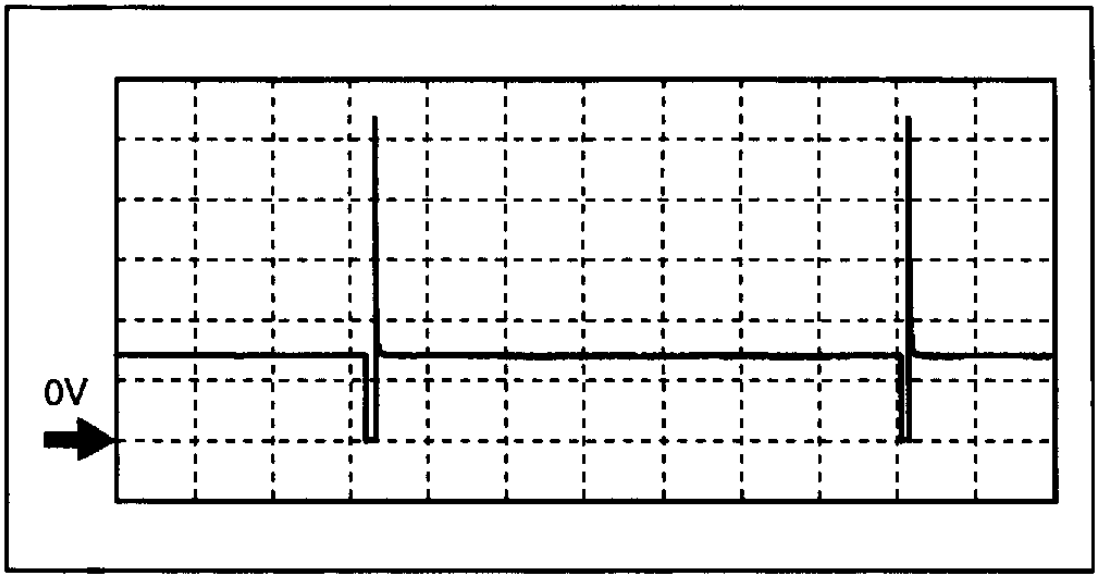

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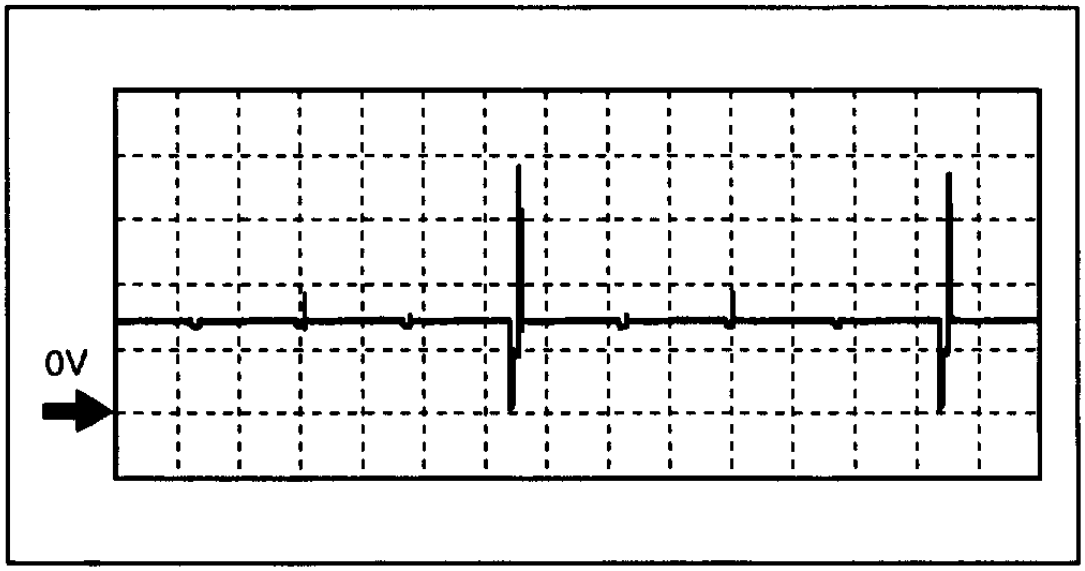

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Pinout Values and Diagnostic Parameters (itype_385)

PCM
WIRING HARNESS-SIDE CONNECTOR

2BE	2BA	2AW	2AS	2AO	2AK	2AG	2AC	2Y	2U	2Q	2M	2I	2E	2A
2BF	2BB	2AX	2AT	2AP	2AL	2AH	2AD	2Z	2V	2R	2N	2J	2F	2B
2BG	2BC	2AY	2AU	2AQ	2AM	2AI	2AE	2AA	2W	2S	2O	2K	2G	2C
2BH	2BD	2AZ	2AV	2AR	2AN	2AJ	2AF	2AB	2X	2T	2P	2L	2H	2D

1BE	1BA	1AW	1AS	1AO	1AK	1AG	1AC	1Y	1U	1Q	1M	1I	1E	1A
1BF	1BB	1AX	1AT	1AP	1AL	1AH	1AD	1Z	1V	1R	1N	1J	1F	1B
1BG	1BC	1AY	1AU	1AQ	1AM	1AI	1AE	1AA	1W	1S	1O	1K	1G	1C
1BH	1BD	1AZ	1AV	1AR	1AN	1AJ	1AF	1AB	1X	1T	1P	1L	1H	1D

Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
1A	Shift solenoid A*1	Shift solenoid A	• (See Inspection Using An Oscilloscope (Reference).)		• Shift solenoid A • Related wiring harness
	—*2	—	—	—	—
					• Starter relay

1B	Starter relay control	Starter relay	Under any condition		Below 1.0	• Related wiring harness
1C	—	—	—		—	—
1D	—*1	—	—		—	—
	Clutch operation*2	CPP switch	Clutch pedal depressed		Below 1.0	• CPP switch • Related wiring harness
			Clutch pedal released		B+	
1E	Shift solenoid B*1	Shift solenoid B	• (See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid B • Related wiring harness
	—*2	—	—		—	—
1F	Shift solenoid C*1	Shift solenoid C	• (See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid C • Related wiring harness
	—*2	—	—		—	—
1G	—	—	—		—	—
1H	Fuel pump control	Fuel pump relay	Ignition switch to the ON position		B+	• Fuel pump relay • Related wiring harness
			Cranking		Below 1.0	
			Idle		Below 1.0	
1I	A/C	A/C relay	Idle	A/C operating	Below 1.0	• A/C relay • Related wiring harness
				A/C not operating	B+	
1J	Refrigerant pressure switch (medium)	Refrigerant pressure switch (medium)	A/C ON	Refrigerant pressure is above 1.52 MPa {15.5 kgf/cm^2, 220 psi}	Below 1.0	• Refrigerant pressure switch • Related wiring harness
				Refrigerant pressure is below 1.23 MPa {12.5 kgf/cm^2, 178 psi}	B+	
1K	—	—	—		—	—
1L	—	—	—		—	—

1M	Pressure control solenoid (+)*1	Pressure control solenoid	• (See Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
	—*2	—	—		—	—
1N	Pressure control solenoid (–)*1	Pressure control solenoid	• (See Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
	—*2	—	—		—	—
1O	—	—	—		—	—
1P	—	—	—		—	—
1Q	Main relay control	Main relay	Ignition switch off after 15 min		B+	• Main relay • Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1R	—	—	—		—	—
1S	GND (shield)	Input/turbine speed sensor harness, GND	Under any condition		Below 1.0	• Related wiring harness
1T	—	—	—		—	—
1U	EVAP leak detection pump (pump)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1V	EVAP leak detection pump (solenoid)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1W	—	—	—		—	—
1X	—*1	—	—		—	—
	Neutral position*2	Neutral switch	Ignition switch is turned to the ON position	Shift lever is at neutral position	Below 1.0	• Neutral switch • Related wiring harness
				Shift lever is not at neutral position	B+	

1Y	Cooling fan control	Fan control module	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Fan control module • Related wiring harness
1Z	Shift solenoid E*1	Shift solenoid E	• (See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid E • Related wiring harness
	—*2	—	—		—	—
1AA	—	—	—		—	—
1AB	Brake	Brake switch	Brake pedal depressed		B+	• Brake switch • Related wiring harness
			Brake pedal released		Below 1.0	
1AC	APP sensor 2	APP sensor	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• APP sensor • Related wiring harness
1AD	Shift solenoid D*1	Shift solenoid D	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid D • Related wiring harness
	—*2	—	—		—	—
1AE	—	—	—		—	—
1AF	Manual down*1	Down switch	Ignition switch is turned to the ON position.	Detects down-shift operation of selector lever in M range	1.0 or less	• Selector lever • Related wiring harness
				Others	B+	
	—*2	—	—		—	—
1AG	Input/turbine speed sensor (–)*1	Input/turbine speed sensor	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Input/turbine speed sensor • Related wiring harness
	—*2	—	—		—	—
1AH	Selector lever position*1	TR switch	Ignition switch is turned to the ON position	P position	Approx. 4.6	• TR switch • Related wiring harness
				R position	Approx. 3.9	
				N position	Approx. 3.2	
				D range	Approx. 2.5	
				M range	Approx. 2.5	
	—*2	—	—		—	—
1AI	CAN (L)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AJ	Manual up*1	Up switch	Ignition switch is turned to the ON position.	Detects up-shift operation of selector lever in M range	1.0 or less	• Selector lever • Related wiring harness
				Others	B+	
	—*2	—	—		—	—
1AK	MAF	MAF sensor	Ignition switch to the ON position		Approx. 0.7	• MAF sensor • Related wiring harness
			Idle (after warm up)		Approx. 1.5	
1AL	Constant voltage (Vref)	APP sensor	Ignition switch to the ON position		Approx. 5.0	• Related wiring harness
1AM	CAN (H)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AN	M range switch*1	M range switch	Ignition switch is turned to the ON position.	M range	1.0 or less	• Selector lever • Related wiring harness
				Except above	B+	
	—*2	—	—		—	—
	Input/turbine		• Inspect using the wave profile.			• Input/turbine speed sensor

1AO	speed sensor (−)*1	Input/turbine speed sensor	(See Inspection Using An Oscilloscope (Reference).)			• Related wiring harness
	_*2	—	—		—	—
1AP	APP sensor 1	APP sensor	Ignition switch to the ON position	When the accelerator pedal is depressed	Approx. 3.0	• APP sensor • Related wiring harness
				When the accelerator pedal is released	Approx. 0.4	
1AQ	Cruise control switch	Cruise control switch	Ignition switch to the ON position	ON/OFF switch pressed in	Approx. 0	• Cruise control switch • Related wiring harnesses
				CANCEL switch pressed in	Approx. 1.1	
				SET/COAST switch pressed in	Approx. 3.1	
				RES/ACCEL switch pressed in	Approx. 4.2	
				Except above	Approx. 5	
1AR	Sensor GND	MAF sensor	Under any condition		Below 1.0	• Related wiring harness
1AS	Sensor GND	TFT sensor*1, TR switch*1, IAT sensor, APP sensor	Under any condition		Below 1.0	• Related wiring harness
1AT	IAT	MAF/IAT sensor	Ignition switch to the ON position	IAT 0 °C {32 °F}	Approx. 3.43	• IAT sensor • Related wiring harness
				IAT 20 °C {68 °F}	Approx. 2.38	
				IAT 40 °C {104 °F}	Approx. 1.49	
				IAT 60 °C {140 °F}	Approx. 0.89	
				IAT 80 °C {176 °F}	Approx. 0.53	
				IAT 100 °C {212 °F}	Approx. 0.33	
1AU	A/C on signal	Refrigerant pressure switch (high and low)	Idle	A/C switch and fan switch on	Below 1.0	• Refrigerant pressure switch • Related wiring harness
1AV	—	—	—		—	—
1AW	Vehicle speed*1	VSS	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• VSS • Related wiring harness
	_*2	—	—		—	—
1AX	Drive-by-wire relay control	Drive-by-wire relay	Ignition switch off		B+→ Below 1.0	• Drive-by-wire relay • Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1AY	Ignition switch	Ignition switch	Ignition switch off		Below 1.0	• Related wiring harness
			Ignition switch to the ON position		B+	
1AZ	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BA	Back-up power supply	Battery (positive terminal)	Under any condition		B+	• Battery • Related wiring harness
1BB	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BC	—	—	—		—	—
1BD	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BE	B+	Main relay	Ignition switch off after 15 min		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	
1BF	B+	Drive-by-wire relay	Ignition switch off		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	

1BG	B+*1	Main relay	Ignition switch off after 15 min	Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position	B+	
	—*2	—	—	—	—
1BH	GND	GND	Under any condition	Below 1.0	• Related wiring harness
2A	Throttle actuator control (+)	Throttle actuator	Ignition switch to the ON position	B+	• Throttle actuator • Related wiring harness
2B	Throttle actuator control (−)	Throttle actuator	Idle (after warm up)	Approx. 3.5—5.5	• Throttle actuator • Related wiring harness
2C	Purge control	Purge solenoid valve	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Purge solenoid valve • Related wiring harness
2D	—	—	—	—	—
2E	OCV control	OCV	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• OCV valve • Related wiring harness
2F	—	—	—	—	—
2G	EGR valve #2 coil control	EGR valve (terminal A)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2H	EGR valve #4 coil control	EGR valve (terminal F)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
	Variable tumble control	Variable tumble solenoid valve	ECT above 62 °C {143 °F} while idling.	B+	• Variable tumble solenoid valve • Related wiring harness
2I			ECT below 63 °C {145 °F} and engine speed below 3,750 rpm	Below 1.0	
2J	Variable intake air control	Variable intake air solenoid valve	Ignition switch to the ON position	Below 1.0	• Variable intake air solenoid valve • Related wiring harness
			Engine speed: below 4,750 rpm [LF]/4,600 rpm [L3]	Below 1.0	
			Engine speed: above 4,750 rpm [LF]/4,600 rpm [L3]	B+	
2K	EGR valve #1 coil control	EGR valve (terminal E)	Ignition switch to the ON position	Below 1.0	• EGR valve • Related wiring harness
			Idle	Below 1.0	
2L	EGR valve #3 coil control	EGR valve (terminal B)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2M	—	—	—	—	—
2N	—	—	—	—	—
2O	—	—	—	—	—
2P	—	—	—	—	—
2Q	Rear HO2S	HO2S (rear)	Ignition switch to the ON position	Approx. 0	• HO2S (rear) • Related wiring harness
			Idle (after warm up)	Alternates between 0 and 1.0	
2R	Middle HO2S	HO2S (Middle)	Ignition switch to the ON position	Approx. 0	• HO2S (Middle) • Related wiring harness
			Idle (after warm up)	Alternates between 0 and 1.0	
2S	CMP	CMP sensor	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• CMP sensor • Related wiring harness
2T	—	—	—	—	—
2U	Knocking (+)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using	Approx. 4.3	• KS • Related wiring harness

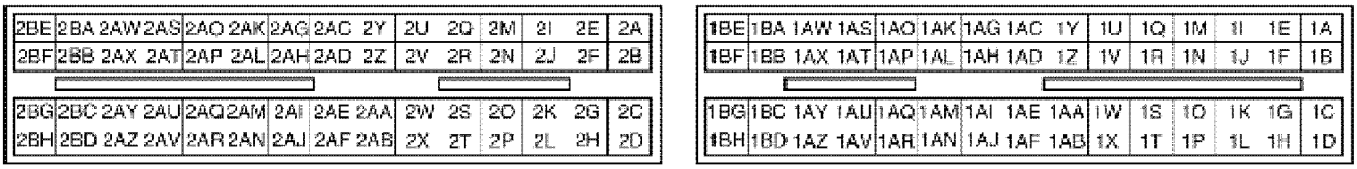
			analog type voltmeter)			
2V	Knocking (−)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Below 1.0	• KS • Related wiring harness
2W	CKP	CKP sensor	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• CKP sensor • Related wiring harness
2X	GND (shield)	KS harness, HO2S (front, middle, rear) harness, GND	Under any condition		Below 1.0	• Related wiring harness
2Y	—	—	—		—	—
2Z	Sensor GND	HO2S (front)	Under any condition		Below 1.0	• Related wiring harness
2AA	—	—	—		—	—
2AB	—	—	—		—	—
2AC	ATF temperature	TFT sensor	Ignition switch is turned to the ON position.	TFT is 20 °C {68 °F}	Approx. 3.3	• TFT sensor • Related wiring harness
				TFT is 40 °C {104 °F}	Approx. 2.4	
				TFT is 60 °C {140 °F}	Approx. 1.5	
2AD	Front HO2S	HO2S (front)	Idle (after warm up): Approx. 0 mA		—	• HO2S (front) • Related wiring harness
2AE	Variable tumble shutter valve monitor	Variable tumble shutter valve switch	ECT above 63 °C {145 °F} while idling.		B+	• Variable tumble shutter valve switch • Related wiring harness
			ECT below 63 °C {145 °F} and engine speed below 3,750 rpm		Below 1.0	
2AF	—	—	—		—	—
2AG	Manifold absolute pressure	MAP sensor	Ignition switch to the ON position (at sea level)		Approx. 4.1	• MAP sensor • Related wiring harness
			Idle		Approx. 1.4	
2AH	ECT	ECT sensor	Ignition switch to the ON position	IAT 20 °C {68 °F}	3.04—3.14	• ECT sensor • Related wiring harness
				IAT 40 °C {104 °F}	2.09—2.21	
				IAT 60 °C {140 °F}	1.29—1.39	
				IAT 80 °C {176 °F}	0.76—0.83	
				IAT 100 °C {212 °F}	0.45—0.49	
2AI	Generator field coil control	Generator (terminal D)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Following PIDs: IAT, ECT, RPM, VPWR, ALTT V • Generator • Related wiring harness
2AJ	Generator output voltage	Generator (terminal P)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Generator • Related wiring harness
2AK	TP (No. 1)	TP sensor No. 1	Ignition switch to the ON position	APP closed	0.53—1.00	• TP sensor • Related wiring harness
				APP open	4.25—4.75	
2AL	TP (No. 2)	TP sensor No. 2	Ignition switch to the ON position	APP closed	4.00—4.47	• TP sensor • Related wiring harness
				APP open	0.25—0.75	
2AM	Constant voltage (Vref)	CMP sensor	Ignition switch to the ON position		B+	• CMP sensor • Related wiring harness
2AN	—	—	—		—	—
2AO	Constant voltage	TP sensor	Ignition switch to the ON		Approx.	• TP sensor • Related

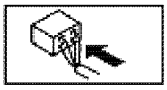
	(Vref)		position	5.0	wiring harness
2AP	Sensor GND	TP sensor	Under any condition	Below 1.0	• TP sensor • Related wiring harness
2AQ	Constant voltage (Vref)	CKP sensor	Ignition switch to the ON position	B+	• CKP sensor • Related wiring harness
2AR	—	—	—	—	—
2AS	—	—	—	—	—
2AT	IGT4	Ignition coil (No.4 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Ignition coil • Related wiring harness
2AU	Constant voltage (Vref)	MAP sensor, variable tumble shutter valve switch	Ignition switch to the ON position	Approx. 5.0	• MAP sensor • Variable tumble shutter valve switch • Related wiring harness
2AV	—	—	—	—	—
2AW	IGT2	Ignition coil (No.2 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Ignition coil • Related wiring harness
2AX	IGT3	Ignition coil (No.3 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Ignition coil • Related wiring harness
		Variable			• Variable tumble shutter valve switch

2AY	Sensor GND	tumble shutter valve switch, ECT sensor, MAP sensor, HO2S (middle, rear)	Under any condition	Below 1.0	• ECT sensor • MAP sensor • HO2S (middle, rear) • Related wiring harness
2AZ	Fuel injection (#4)	Fuel injector No.4	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.4 • Related wiring harness
2BA	IGT1	Ignition coil (No.1 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Ignition coil • Related wiring harness
2BB	Fuel injection (#1)	Fuel injector No.1	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.1 • Related wiring harness
2BC	Fuel injection (#2)	Fuel injector No.2	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.2 • Related wiring harness
2BD	Fuel injection (#3)	Fuel injector No.3	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.3 • Related wiring harness
2BE	Rear HO2S heater control	HO2S (Rear) heater	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• HO2S (Rear) heater • Related wiring harness

2BF	Middle HO2S heater control	HO2S (Middle) heater	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• HO2S (Middle) heater • Related wiring harness
2BG	Front HO2S heater control	HO2S (Front) heater	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• HO2S (Front) heater • Related wiring harness
2BH	GND	GND	Under any condition	Below 1.0	• Related wiring harness

PCM
WIRING HARNESS-SIDE CONNECTOR





1B	Shift solenoid A	Shift solenoid A	• (See Inspection Using An Oscilloscope (Reference).)		• Shift solenoid A • Related wiring harness
1C	Shift solenoid B	Shift solenoid B	• (See Inspection Using An Oscilloscope (Reference).)		• Shift solenoid B • Related wiring harness
1D	Shift solenoid C	Shift solenoid C	• (See Inspection Using An Oscilloscope (Reference).)		• Shift solenoid C • Related wiring harness
1E	Shift solenoid D	Shift solenoid D	During TCC operation	B+	• Shift solenoid D • Related wiring harness
			Except above	1.0 or less	
1F	Shift solenoid E	Shift solenoid E	During TCC operation	B+	• Shift solenoid E • Related wiring harness
			Except above	1.0 or less	
1G	Pressure control solenoid (+)	Pressure control solenoid	• (See Inspection Using An Oscilloscope (Reference).)		• Pressure control solenoid • Related wiring harness
1H	Pressure control solenoid (−)	Pressure control solenoid	• (See Inspection Using An Oscilloscope (Reference).)		• Pressure control solenoid • Related wiring harness
1I	—	—	—	—	—
1J	Vehicle speed	VSS	• (See Inspection Using An Oscilloscope (Reference).)		• VSS • Related wiring harness
			Ignition	Detects up-	• Selector lever

1K	Manual up	Up switch	switch is turned to the ON position.	shift operation of selector lever in M range	1.0 or less	• Related wiring harness
				Others	B+	
1L	—	—	—	—	—	—
1M	Input/turbine speed sensor (+)	Input/turbine speed sensor	• (See Inspection Using An Oscilloscope (Reference).)			• Input/turbine speed sensor • Related wiring harness
1N	—	—	—	—	—	—
1O	M range switch	M range switch	Ignition switch is turned to the ON position.	M range	1.0 or less	• Selector lever • Related wiring harness
				Except above	B+	
1P	Manual down	Down switch	Ignition switch is turned to the ON position.	Detects down-shift operation of selector lever in M range	1.0 or less	• Selector lever • Related wiring harness
				Others	B+	
1Q	Input/turbine speed sensor (−)	Input/turbine speed sensor	• (See Inspection Using An Oscilloscope (Reference).)			• Input/turbine speed sensor • Related wiring harness
1R	Refrigerant pressure switch (medium)	Refrigerant pressure switch (medium)	A/C ON	Refrigerant pressure is above 1.52 MPa {15.5 kgf/cm^2, 220 psi}	Below 1.0	• Refrigerant pressure switch • Related wiring harness
				Refrigerant pressure is below 1.23 MPa {12.5 kgf/cm^2, 178 psi}	B+	
1S	Selector lever position	TR switch	Ignition switch is turned to the ON position	P position	Approx. 4.6	• TR switch • Related wiring harness
				R position	Approx. 3.9	
				N position	Approx. 3.2	
				D range	Approx. 2.5	
				M range	Approx. 2.5	
1T	—	—	—	—	—	—
1U	ATF temperature	TFT sensor	Ignition switch is turned to the ON position.	TFT is 20 °C {68 °F}	Approx. 3.3	• TFT sensor • Related wiring harness
				TFT is 40 °C {104 °F}	Approx. 2.4	
				TFT is 60 °C {140 °F}	Approx. 1.5	
1V	—	—	—	—	—	—
1W	Cooling fan control	Fan control module	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Fan control module. • Related wiring harness
1X	—	—	—	—	—	—
1Y	APP sensor 1	APP sensor	Ignition switch to the ON position	When the accelerator pedal is depressed	Approx. 3.0	• APP sensor • Related wiring harness
				When the accelerator pedal is released	Approx. 0.4	
1Z	—	—	—	—	—	—
1AA	Sensor GND	TR sensor, TFT sensor, IAT sensor, APP sensor	Under any condition		Below 1.0	• Related wiring harness
1AB	Starter relay control	Starter relay	Under any condition		Below 1.0	• Starter relay • Related wiring harness
1AC	MAF	MAF sensor	Ignition switch to the ON position		Approx. 0.7	• MAF sensor • Related wiring harness
			Idle (after warm up)		Approx. 1.3	
1AD	Cruise control switch	Cruise control switch	Ignition switch to the ON position	ON/OFF switch pressed in	Approx. 0	• Cruise control switch • Related wiring harnesses
				CANCEL switch pressed in	Approx. 1.1	
				SET/COAST switch pressed in	Approx. 3.1	
				RES/ACCEL switch pressed	Approx.	

				in	4.2	
				Except above	Approx. 5	
1AE	Sensor GND	MAF sensor	Under any condition		Below 1.0	• Related wiring harness
1AF	EVAP leak detection pump (pump)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1AG	Atmospheric pressure	BARO sensor	Ignition switch to the ON position (at sea level)		Approx. 4.0	• BARO sensor • Related wiring harness
1AH	IAT	MAF/IAT sensor	Ignition switch to the ON position	IAT 0 °C {32 °F}	Approx. 3.43	• IAT sensor • Related wiring harness
				IAT 20 °C {68 °F}	Approx. 2.38	
				IAT 40 °C {104 °F}	Approx. 1.49	
				IAT 60 °C {140 °F}	Approx. 0.89	
				IAT 80 °C {176 °F}	Approx. 0.53	
				IAT 100 °C {212 °F}	Approx. 0.33	
1AI	CAN (L)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AJ	EVAP leak detection pump (solenoid)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1AK	—	—	—		—	—
1AL	APP sensor 2	APP sensor	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• APP sensor • Related wiring harness
1AM	CAN (H)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AN	A/C	A/C relay	Idle	A/C operating	Below 1.0	• A/C relay • Related wiring harness
				A/C not operating	B+	
1AO	—	—	—		—	—
1AP	A/C on signal	Refrigerant pressure switch (high and low)	Idle	A/C switch and fan switch on	Below 1.0	• Refrigerant pressure switch • Related wiring harness
1AQ	—	—	—		—	—
1AR	Fuel pump control	Fuel pump relay	Ignition switch to the ON position after 1 s		B+	• Fuel pump relay • Related wiring harness
			Cranking		Below 1.0	
			Idle		Below 1.0	
1AS	—	—	—		—	—
1AT	Main relay control	Main relay	Ignition switch off after 5 min		B+	• Main relay • Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1AU	Brake	Brake switch	Brake pedal depressed		B+	• Brake switch • Related wiring harness
			Brake pedal released		Below 1.0	
1AV	GND (shield)	Input/turbine speed sensor harness, GND	Under any condition		Below 1.0	• Related wiring harness
1AW	Constant voltage (Vref)	APP sensor	Ignition switch to the ON position		Approx. 5.0	• Related wiring harness
			Ignition switch off		Below 1.0	• Related

1AX	Ignition switch	Ignition switch	Ignition switch to the ON position		B+	wiring harness
1AY	Drive-by-wire relay	Drive-by-wire relay	Ignition switch off		B+	• Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1AZ	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BA	Back-up power supply	Battery (positive terminal)	Under any condition		B+	• Battery • Related wiring harness
1BB	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BC	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BD	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BE	B+	Main relay	Ignition switch off after 5 min		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	
1BF	Throttle actuator power supply	Drive-by-wire relay	Ignition switch off after 10 s		Below 1.0	• Related wiring harness
			Ignition switch to the ON position		B+	
1BG	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BH	GND	GND	Under any condition		Below 1.0	• Related wiring harness
2A	Throttle actuator control (+)	Throttle actuator	Ignition switch to the ON position		B+	• Throttle actuator • Related wiring harness
2B	Throttle actuator control (-)	Throttle actuator	Idle (after warm up)		Approx. 3.5—5.5	• Throttle actuator • Related wiring harness
			Idle (after warm up)		Below 1.0	• HO2S (Rear) heater
2C	Rear HO2S heater control	HO2S (Rear) heater	Engine speed above 4,000 rpm		B+	• Related wiring harness
2D	—	—	—		—	—
2E	—	—	—		—	—
2F	—	—	—		—	—
2G	Front HO2S heater control	HO2S (Front) heater	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• HO2S (Front) heater • Related wiring harness
2H	—	—	—		—	—
2I	TP (No. 2)	TP sensor No. 2	Ignition switch to the ON position	APP closed	4.00—4.47	• TP sensor • Related wiring harness
				APP open	0.25—0.75	
2J	—	—	—		—	—
2K	Constant voltage (Vref)	TP sensor	Ignition switch to the ON position		Approx. 5.0	• TP sensor • Related wiring harness
2L	—	—	—		—	—
2M	TP (No. 1)	TP sensor No. 1	Ignition switch to the ON position	APP closed	0.53—1.00	• TP sensor • Related wiring harness
				APP open	4.25—4.75	
2N	—	—	—		—	—
2O	TP sensor GND	TP sensor	Under any condition		Below 1.0	• TP sensor • Related wiring harness
2P	GND (shield)	KS harness, HO2S (front, rear), GND	Under any condition		Below 1.0	• Related wiring harness
2Q	Knocking (+)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Approx. 4.3	• KS • Related wiring harness
			Ignition switch to the ON position (Use digital type voltmeter, because			• KS

2R	Knocking (−)	KS	measurement voltage will be detected less than true voltage when using analog type voltmeter)	Below 1.0	• Related wiring harness
2S	—	—	—	—	—
2T	Constant voltage (Vref)	CKP sensor	Ignition switch to the ON position	B+	• CKP sensor • Related wiring harness
2U	CKP	CKP sensor	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• CKP sensor • Related wiring harness
2V	CMP	CMP sensor	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• CMP sensor • Related wiring harness
2W	Constant voltage (Vref)	MAP sensor, variable tumble shutter valve switch	Ignition switch to the ON position	Approx. 5.0	• Related wiring harness
2X	Constant voltage (Vref)	CMP sensor	Ignition switch to the ON position	B+	• CKP sensor • Related wiring harness
2Y	—	—	—	—	—
2Z	HO2S (front) power supply	HO2S (front)	Idle (after warm up)	Approx. 4.1	• HO2S (front) • Related wiring harness
2AA	Sensor GND	HO2S (rear), ECT sensor, MAP sensor, variable tumble shutter valve switch	Under any condition	Below 1.0	• Related wiring harness
2AB	—	—	—	—	—
2AC	HO2S (front) VSIP	HO2S (front)	Idle (after warm up)	Approx. 4.0	• HO2S (front) • Related wiring harness
2AD	HO2S (front) IP+	HO2S (front)	When the engine speed is increased, the voltage increased.		• HO2S (front) • Related wiring harness
2AE	Variable tumble shutter valve monitor	Variable tumble shutter valve switch	ECT above 63 °C {145 °F} while idling.	B+	• Variable tumble shutter valve switch • Related wiring harness
			ECT below 63 °C {145 °F} and engine speed below 3,750 rpm	Below 1.0	
2AF	OCV control	OCV	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• OCV valve • Related wiring harness
2AG	Front HO2S	HO2S (front)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• HO2S (front) • Related wiring harness
2AH	Rear HO2S	HO2S (rear)	Ignition switch to the ON position	Approx. 0	• HO2S (rear) • Related wiring harness
			Idle (after warm up)	Alternates between 0 and 1.0	
2AI	Variable tumble control	Variable tumble solenoid valve	ECT above 62 °C {143 °F} while idling.	B+	• Variable tumble solenoid valve • Related wiring harness
			ECT below 63 °C {145 °F} and engine speed below 3,750 rpm	Below 1.0	
2AJ	Variable intake air control	Variable intake air solenoid valve	Ignition switch to the ON position	Below 1.0	• Variable intake air solenoid valve • Related wiring harness
			Engine speed: below 4,750 rpm	Below 1.0	
			Engine speed: above 4,750 rpm	B+	
			IAT 20 °C {68 °F}	3.04—3.14	

2AK	ECT	ECT sensor	Ignition switch to the ON position	IAT 40 °C {104 °F}	2.09—2.21	• ECT sensor • Related wiring harness
				IAT 60 °C {140 °F}	1.29—1.39	
				IAT 80 °C {176 °F}	0.76—0.83	
				IAT 100 °C {212 °F}	0.45—0.49	
2AL	Manifold absolute pressure	MAP sensor	Ignition switch to the ON position (at sea level)		Approx. 4.1	• MAP sensor • Related wiring harness
			Idle		Approx. 1.2	
2AM	Generator output voltage	Generator (terminal P)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Generator • Related wiring harness
2AN	Purge control	Purge solenoid valve	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Purge solenoid valve • Related wiring harness
2AO	—	—	—		—	—
2AP	—	—	—		—	—
2AQ	Generator field coil control	Generator (terminal D)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Following PIDs: IAT, ECT, RPM, VPWR, ALTT V. • Generator • Related wiring harness
2AR	EGR valve #2 coil control	EGR valve (terminal A)	Ignition switch to the ON position		B+	• EGR valve • Related wiring harness
			Idle		B+	
2AS	—	—	—		—	—
2AT	—	—	—		—	—

2AU	EGR valve #1 coil control	EGR valve (terminal E)	Ignition switch to the ON position	Below 1.0	• EGR valve • Related wiring harness
			Idle	Below 1.0	
2AV	EGR valve #4 coil control	EGR valve (terminal F)	Ignition switch to the ON position	Below 1.0	• EGR valve • Related wiring harness
			Idle	Below 1.0	
2AW	—	—	—	—	—
2AX	—	—	—	—	—
2AY	EGR valve #3 coil control	EGR valve (terminal B)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2AZ	Fuel injection (#4)	Fuel injector No.4	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.4 • Related wiring harness
2BA	—	—	—	—	—
2BB	Fuel injection (#1)	Fuel injector No.1	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.1 • Related wiring harness
2BC	Fuel injection (#2)	Fuel injector No.2	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.2 • Related wiring harness
2BD	Fuel injection (#3)	Fuel injector No.3	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.3 • Related wiring harness
2BE	IGT1	Ignition coil (No.1 cylinders)	• Inspect using the wave profile. (See Inspection Using An		• Ignition coil • Related wiring

			Oscilloscope (Reference).)	harness
2BF	IGT2	Ignition coil (No.2 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)	• Ignition coil • Related wiring harness
2BG	IGT3	Ignition coil (No.3 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)	• Ignition coil • Related wiring harness
2BH	IGT4	Ignition coil (No.4 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)	• Ignition coil • Related wiring harness

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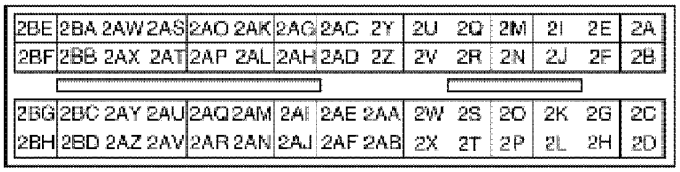
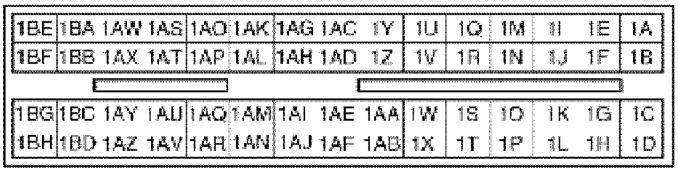




Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
1A	—	—	—	—	—
1B	Starter relay	Starter relay	Under any condition	Below 1.0	• Starter relay • Related

	control					wiring harness
1C	—	—	—		—	—
1D	—*1	—	—		—	—
	Clutch operation*2	CPP switch	Clutch pedal depressed		Below 1.0	• CPP switch • Related wiring harness
			Clutch pedal released		B+	
1E	—	—	—		—	—
1F	—	—	—		—	—
1G	—	—	—		—	—
1H	Fuel pump control	Fuel pump relay	Ignition switch to the ON position		B+	• Fuel pump relay • Related wiring harness
			Cranking		Below 1.0	
			Idle		Below 1.0	
1I	A/C	A/C relay	Idle	A/C operating	Below 1.0	• A/C relay • Related wiring harness
				A/C not operating	B+	
1J	Refrigerant pressure switch (medium)	Refrigerant pressure switch (medium)	A/C ON	Refrigerant pressure is above 1.52 MPa {15.5 kgf/cm^2, 220 psi}	Below 1.0	• Refrigerant pressure switch • Related wiring harness
				Refrigerant pressure is below 1.23 MPa {12.5 kgf/cm^2, 178 psi}	B+	
1K	—	—	—		—	—
1L	—	—	—		—	—
1M	—	—	—		—	—
1N	—	—	—		—	—
1O	—	—	—		—	—
1P	—	—	—		—	—
1Q	Main relay control	Main relay	Ignition switch off after 15 min		B+	• Main relay • Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1R	Cooling fan control	Fan control module	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Fan control module • Related wiring harness
1S	—	—	—		—	—
1T	—	—	—		—	—
1U	EVAP leak detection pump (pump)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1V	EVAP leak detection pump (solenoid)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1W	—	—	—		—	—
1X	—*1	—	—		—	—
	Neutral position*2	Neutral switch	Ignition switch is turned to the ON position	Shift lever is at neutral position	Below 1.0	• Neutral switch • Related wiring harness
				Shift lever is not at neutral position	B+	
1Y	—	—	—		—	—
1Z	—	—	—		—	—
1AA	—	—	—		—	—
1AB	Brake	Brake switch	Brake pedal depressed		B+	• Brake switch • Related wiring harness
			Brake pedal released		Below 1.0	
1AC	—	—	—		—	—
1AD	—	—	—		—	—
1AE	—	—	—		—	—
1AF	—	—	—		—	—
1AG	—	—	—		—	—
1AH	—	—	—		—	—
1AI	CAN (L)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AJ	—	—	—		—	—
			Ignition switch to the ON position		Approx. 0.7	• MAF sensor

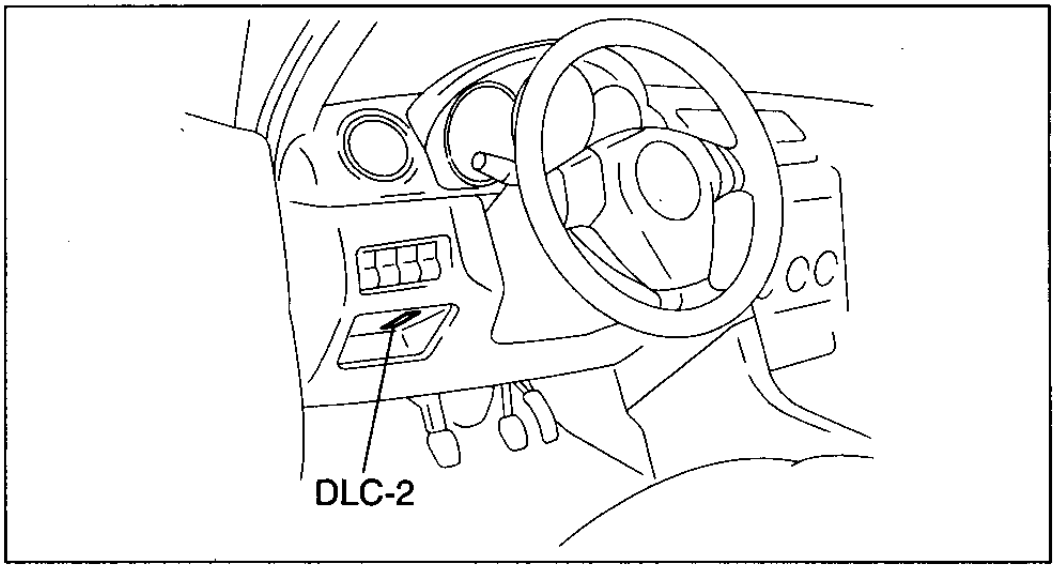
1AK	MAF	MAF sensor	Idle (after warm up)		Approx. 1.5	• Related wiring harness
1AL	Constant voltage (Vref)	APP sensor	Ignition switch to the ON position		Approx. 5.0	• Related wiring harness
1AM	CAN (H)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AN	—	—	—		—	—
1AO	APP sensor 2	APP sensor	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• APP sensor • Related wiring harness
1AP	APP sensor 1	APP sensor	Ignition switch to the ON position	When the accelerator pedal is depressed	Approx. 3.0	• APP sensor • Related wiring harness
				When the accelerator pedal is released	Approx. 0.4	
1AQ	Cruise control switch	Cruise control switch	Ignition switch to the ON position	ON/OFF switch pressed in	Approx. 0	• Cruise control switch • Related wiring harnesses
				CANCEL switch pressed in	Approx. 1.1	
				SET/COAST switch pressed in	Approx. 3.1	
				RES/ACCEL switch pressed in	Approx. 4.2	
				Except above	Approx. 5	
1AR	Sensor GND	MAF sensor	Under any condition		Below 1.0	• Related wiring harness
1AS	—	—	—		—	—
1AT	IAT	MAF/IAT sensor	Ignition switch to the ON position	IAT 0 °C {32 °F}	Approx. 3.43	• IAT sensor • Related wiring harness
				IAT 20 °C {68 °F}	Approx. 2.38	
				IAT 40 °C {104 °F}	Approx. 1.49	
				IAT 60 °C {140 °F}	Approx. 0.89	
				IAT 80 °C {176 °F}	Approx. 0.53	
				IAT 100 °C {212 °F}	Approx. 0.33	
1AU	A/C on signal	Refrigerant pressure switch (high and low)	Idle	A/C switch and fan switch on	Below 1.0	• Refrigerant pressure switch • Related wiring harness
1AV	Sensor GND	IAT sensor, APP sensor	Under any condition		Below 1.0	• Related wiring harness
1AW	—	—	—		—	—
1AX	Drive-by-wire relay control	Drive-by-wire relay	Ignition switch off		B+→ Below 1.0	• Drive-by-wire relay • Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1AY	Ignition switch	Ignition switch	Ignition switch off		Below 1.0	• Related wiring harness
			Ignition switch to the ON position		B+	
1AZ	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BA	Back-up power supply	Battery (positive terminal)	Under any condition		B+	• Battery • Related wiring harness
1BB	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BC	—	—	—		—	—
1BD	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BE	B+	Main relay	Ignition switch off after 15 min		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	
						• Battery

1BF	B+	Drive-by-wire relay	Ignition switch off	Below 1.0	• Related wiring harness
			Ignition switch to the ON position	B+	
1BG	—	—	—	—	—
1BH	GND	GND	Under any condition	Below 1.0	• Related wiring harness
2A	Throttle actuator control (+)	Throttle actuator	Ignition switch to the ON position	B+	• Throttle actuator • Related wiring harness
2B	Throttle actuator control (−)	Throttle actuator	Idle (after warm up)	Approx. 3.5—5.5	• Throttle actuator • Related wiring harness
2C	Purge control	Purge solenoid valve	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• Purge solenoid valve • Related wiring harness
2D	—	—	—	—	—
2E	OCV control	OCV	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)		• OCV valve • Related wiring harness
2F	—	—	—	—	
2G	EGR valve #2 coil control	EGR valve (terminal A)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2H	EGR valve #4 coil control	EGR valve (terminal F)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2I	Variable tumble control	Variable tumble solenoid valve	ECT above 62 °C {143 °F} while idling.	B+	• Variable tumble solenoid valve
			ECT below 63 °C {145 °F} and engine speed below 3,750 rpm	Below 1.0	• Related wiring harness
2J	Variable intake air control	Variable intake air solenoid valve	Ignition switch to the ON position	Below 1.0	• Variable intake air solenoid valve • Related wiring harness
			Engine speed: below 4,750 rpm [LF]/4,600 rpm [L3]	Below 1.0	
			Engine speed: above 4,750 rpm [LF]/4,600 rpm [L3]	B+	
2K	EGR valve #1 coil control	EGR valve (terminal E)	Ignition switch to the ON position	Below 1.0	• EGR valve • Related wiring harness
			Idle	Below 1.0	
2L	EGR valve #3 coil control	EGR valve (terminal B)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2M	—	—	—	—	—
2N	—	—	—	—	—
2O	—	—	—	—	—
2P	Sensor GND	Variable tumble shutter valve switch, ECT sensor, MAP sensor, HO2S (middle, rear)	Under any condition	Below 1.0	• Variable tumble shutter valve switch • ECT sensor • MAP sensor • HO2S (middle, rear) • Related wiring harness
2Q	Rear HO2S	HO2S (rear)	Ignition switch to the ON position	Approx. 0	• HO2S (rear) • Related wiring harness
			Idle (after warm up)	Alternates between 0 and 1.0	
2R	—	—	—	—	—
2S	CMP	CMP sensor	• Inspect using the wave profile. (See Inspection Using An		• CMP sensor • Related wiring

			Oscilloscope (Reference).)			harness
2T	—	—	—		—	—
2U	Knocking (+)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Approx. 4.3	• KS • Related wiring harness
2V	Knocking (−)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Below 1.0	• KS • Related wiring harness
2W	CKP	CKP sensor	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• CKP sensor • Related wiring harness
2X	GND (shield)	KS harness, HO2S (front, middle, rear) harness, GND	Under any condition		Below 1.0	• Related wiring harness
2Y	—	—	—		—	—
2Z	HO2S (front) power supply	HO2S (front)	Idle (after warm up)		Approx. 4.1	• HO2S (front) • Related wiring harness
2AA	—	—	—		—	—
2AB	—	—	—		—	—
2AC	HO2S (front) VSIP	HO2S (front)	Idle (after warm up)		Approx. 4.0	• HO2S (front) • Related wiring harness
2AD	HO2S (front) IP+	HO2S (front)	When the engine speed is increased, the voltage increased.			• HO2S (front) • Related wiring harness
	Variable		ECT above 63 °C {145 °F} while idling.		B+	• Variable tumble
2AE	tumble shutter valve monitor	Variable tumble shutter valve switch	ECT below 63 °C {145 °F} and engine speed below 3,750 rpm		Below 1.0	shutter valve switch • Related wiring harness
2AF	—	—	—		—	—
2AG	Manifold absolute pressure	MAP sensor	Ignition switch to the ON position (at sea level)		Approx. 4.1	• MAP sensor • Related wiring harness
			Idle		Approx. 1.4	
2AH	ECT	ECT sensor	Ignition switch to the ON position	IAT 20 °C {68 °F}	3.04—3.14	• ECT sensor • Related wiring harness
				IAT 40 °C {104 °F}	2.09—2.21	
				IAT 60 °C {140 °F}	1.29—1.39	
				IAT 80 °C {176 °F}	0.76—0.83	
				IAT 100 °C {212 °F}	0.45—0.49	
2AI	Generator field coil control	Generator (terminal D)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Following PIDs: IAT, ECT, RPM, VPWR, ALTT V • Generator • Related wiring harness
2AJ	Generator output voltage	Generator (terminal P)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Generator • Related wiring harness
2AK	TP (No. 1)	TP sensor No. 1	Ignition switch to the ON position	APP closed	0.53—1.00	• TP sensor • Related wiring harness
				APP open	4.25—4.75	
					4.00—	• TP sensor

2AL	TP (No. 2)	TP sensor No. 2	Ignition switch to the ON position	APP closed	4.47	• Related wiring harness
				APP open	0.25—0.75	
2AM	Constant voltage (Vref)	CMP sensor	Ignition switch to the ON position		B+	• CMP sensor • Related wiring harness
2AN	—	—	—		—	—
2AO	Constant voltage (Vref)	TP sensor	Ignition switch to the ON position		Approx. 5.0	• TP sensor • Related wiring harness
2AP	Sensor GND	TP sensor	Under any condition		Below 1.0	• TP sensor • Related wiring harness
2AQ	Constant voltage (Vref)	CKP sensor	Ignition switch to the ON position		B+	• CKP sensor • Related wiring harness
2AR	Constant voltage (Vref)	MAP sensor, variable tumble shutter valve switch	Ignition switch to the ON position		Approx. 5.0	• MAP sensor • Variable tumble shutter valve switch • Related wiring harness
2AS	—	—	—		—	—
2AT	IGT4	Ignition coil (No.4 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Ignition coil • Related wiring harness
2AU	—	—	—		—	—
2AV	—	—	—		—	—
2AW	IGT2	Ignition coil (No.2 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Ignition coil • Related wiring harness
2AX	IGT3	Ignition coil (No.3 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Ignition coil • Related wiring harness
2AY	—	—	—		—	—
2AZ	Fuel injection (#4)	Fuel injector No.4	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Fuel injector No.4 • Related wiring harness
2BA	IGT1	Ignition coil (No.1 cylinders)	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Ignition coil • Related wiring harness
2BB	Fuel injection (#1)	Fuel injector No.1	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Fuel injector No.1 • Related wiring harness
2BC	Fuel injection (#2)	Fuel injector No.2	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Fuel injector No.2 • Related wiring harness
2BD	Fuel injection (#3)	Fuel injector No.3	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Fuel injector No.3 • Related wiring harness
2BE	Rear HO2S heater control	HO2S (Rear) heater	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• HO2S (Rear) heater • Related wiring harness
2BF	—	—	—	—	—	—
2BG	Front HO2S heater control	HO2S (Front) heater	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• HO2S (Front) heater • Related wiring harness
2BH	—	—	—	—	—	—

Reading Diagnostic Trouble Codes (Article 1387552)



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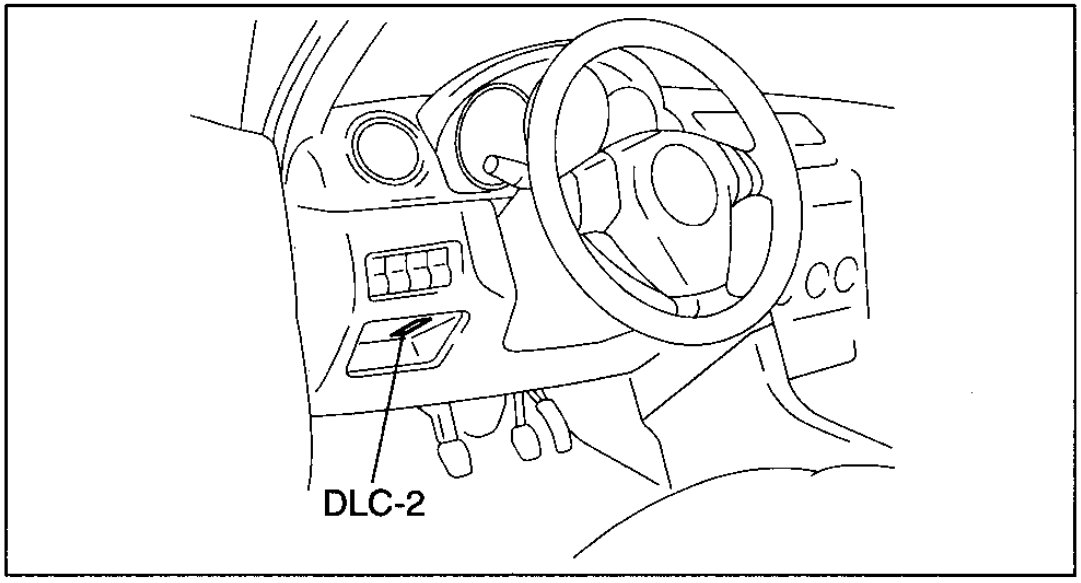

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PID/DATA Monitor Table (Reference) (Article 1409178)

PID/DATA monitor table (reference)

Monitor item (Definition)	Unit/ Condition		Condition/Specification (Reference)	Inspection Item(s)	PCM terminal
AAT (Ambient air temperature)	°C	°F	Ignition switch at ON position: Indicate the ambient air temperature	• IAT sensor	—
AC_REQ (Refrigerant pressure switch (high, low))	On/Off		Refrigerant pressure is more than the specification or less than the specification. (Refrigerant pressure switch (high, low) is off): Off Except above: On	• Refrigerant pressure switch (high, low)	1AU*8 1AP*9
ACCS (A/C relay)	On/Off		Ignition switch ON: Off A/C switch ON and fan switch ON at idle: On	• Following PIDs: RPM, TP, ECT, TR • A/C relay	1I*8 1AN*9
AFR (Air fuel ratio)	—		Ignition switch at ON position: Indicate the air fuel ratio*4	• Following PIDs: O2S11, O2S12, O2S13*1 • Fuel injector	—
AFR_ACT (Actual air fuel ratio)	—		Ignition switch at ON position: Indicate the actual air fuel ratio	• Following PIDs: O2S11, O2S12, O2S13*1 • Fuel injector	—
ALTF (Generator field coil control duty value)	%		Ignition switch ON: 0% Idle: 0—100% Just after A/C switch ON and fan switch ON at idle: Duty value rises	• Following PIDs: IAT, ECT, RPM, VPWR, ALTT V • Generator	2AI*8 2AQ*9
ALTT V (Generator output voltage)	V		Ignition switch ON: 0 V Idle: Approx. 14.9 V (E/L not operating)	• Generator	2AJ*8 2AM*9
APP (Accelerator pedal position)	%		APP released: 0% APP open: 100%	• Following PIDs: APP1, APP2 • APP sensor	1AC*1 1AP*1 1Y*9 1AL*9 1AO*10 1AP*10
APP1 (APP sensor 1)	%		APP released: 31.0—32.4% APP open: 69.8—81.8%	• APP sensor	1AP*8 1Y*9
	V		APP released: 1.55—1.62 V APP depressed: 3.49—4.09 V		
APP2 (APP sensor 2)	%		APP released: 20.2—21.4% APP depressed: 58.8—70.8%	• APP sensor	1AC*1 1AL*9 1AO*10
	V		APP released: 1.01—1.07 V APP depressed: 2.94—3.54 V		
ARPMDES (Target engine speed)	RPM		No load: 700 rpm E/L operating: 700 rpm P/S operating: 700 rpm A/C ON: 750 rpm	• Following PIDs: IAT, RPM, MAP, ECT, MAF, TP, INGEAR, TR, PSP, ALTT V • IAC valve • CKP sensor	—
BARO (Barometric pressure)	Pa		Ignition switch ON: Indicate the atmospheric pressure	• BARO sensor	—
	V		Ignition switch ON (at sea level): Approx. 4.0 V		
BOO (Brake switch)	On/Off		Brake pedal depressed: On Brake pedal released: Off	• Brake switch	1AB*8 1AU*9
BPA (Brake pressure applied switch)	On/Off		Brake pedal depressed: On Brake pedal released: Off	• Brake switch	—
CATT11_DSD (Desired catalyst temperature bank one, sensor one)	°C		Indicate the estimated catalytic converter temperature	• Perform applicable DTC troubleshooting.	—
CHRGLP (Generator warning light)	On/Off		Ignition switch ON: On Idle: Off	• Perform applicable DTC troubleshooting.	—

Monitor Item (Definition)	Unit/ Condition		Condition/Specification (Reference)	Inspection Item(s)	PCM terminal
COLP (Refrigerant pressure switch (middle))	ON/OFF		Refrigerant pressure switch (middle) ON*5 at idle: ON Refrigerant pressure switch (middle) OFF*6 at idle: OFF	• Refrigerant pressure switch	1J*8 1R*9
CPP*3 (Clutch pedal position)	On/Off		Clutch pedal depressed: On Clutch pedal released: Off	• CPP switch	1D
CPP/PNP*3 (Shift lever position)	Drive/ Neutral		Neutral position: Neutral Others: Drive	• Neutral switch	1X
DTCCNT (Number of DTC detected)	—		—	• Perform applicable DTC troubleshooting.	—
DWN SW*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)				
ECT (Engine coolant temperature)	°C	°F	ECT 20 °C (68 °F): 20 °C (68 °F) ECT 60 °C (140 °F): 60 °C (140 °F)	• ECT sensor	2AH*8 2AK*9
	V		ECT 20 °C (68 °F): 3.04—3.14 V ECT 60 °C (140 °F): 1.29—1.39 V		
EQ_RAT11 (Equivalence ratio (lambda))	—		Idling after warm-up: Approx. 1	• Perform applicable DTC troubleshooting.	2Z*1,*7 2AC*7 2AD*1,*7
EQ_RAT11_DSD (Desired equivalence ratio (lambda))	—		Idling after warm-up: Approx. 1	• Perform applicable DTC troubleshooting.	2Z*1,*7 2AC*7 2AD*1,*7
ETC_ACT (Electronic throttle control actual)	°		Indicate the desired TP by angle	• Perform applicable DTC troubleshooting.	2AL*8 2AK*8 2I*9 2M*9
ETC_DSD (Electronic throttle control desired)	%		Indicate the desired TP by percent	• Following PIDs:APP1, APP2, ETC_ACT. • TP sensor	—
	°		Indicate the desired TP by angle		
EVAPCP (Purge solenoid valve duty value)	%		Ignition switch ON: 0% Idle: 0%	• Following PIDs: IAT, RPM, ECT, MAF, O2S11, INGEAR, TR, VPWR.	2C*8 2AN*9
FAN_DUTY (Cooling fan control)	%		ECT 108 C (226 F) or more: 90% ECT less than 100 °C (212 °F): 0%	• Following PIDs: RPM, TP, ECT, COLP, TEST. • Fan control module	1Y*1 1W*9 1R*10
FLI (Fuel level)	%		Fuel gauge level F: Approx. 100% Fuel gauge level E: Approx. 0%	• Perform applicable DTC troubleshooting.	—
FP (Fuel pump relay)	On/Off		Ignition switch ON: Off Idle: On Cranking: On	• Following PIDs: RPM • Fuel pump relay	1H*8 1AR*9
FUELPW (Fuel injector duration)	sec		Ignition switch ON: 0 ms Idle (after warm up): approx. 2.5 ms	• Following PIDs: IAT, MAF, TP, MAP, ECT, RPM, O2S11, O2S12, INGEAR, TR, PSP, VPWR, ALTT V • Fuel injector	2AZ 2BB 2BC 2BD
FUELSYS (Fuel system status)	OL/CL/OL-Drive/OL-Fault/CL-Fault		Ignition switch ON: OL Idle (after warm up): CL	• Following PIDs: IAT, MAF, TP, MAP, ECT, RPM, O2S11, O2S12, INGEAR, TR, PSP, VPWR, ALTT V • Fuel injector	—
GEAR*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)				
GENVDSD (Generator voltage desired)	V		Ignition switch ON: 0 V Idle: Approx. 14.9 V (E/L not operating)	• Perform applicable DTC troubleshooting	—
HTM_CNT*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)				
HTM_DIS*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)				

Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Inspection item(s)	PCM terminal
HTR11 (HO2S heater (front))	On/Off	Idle (after warm up): On⇨Off	• Following PIDs: IAT, MAF, TP, ECT, RPM	2BQ*9 2G*9
HTR12 (HO2S heater (middle*1, rear*7))	On/Off	Ignition switch ON: Off (HO2S heater not operating) Idle: On (HO2S heater operating)	• Following PIDs: IAT, MAF, ECT, RPM	2BF*1 2C*9 2BE*10
HTR13*1 (HO2S heater (rear))	On/Off	Ignition switch ON: Off (HO2S heater not operating) Idle: On (HO2S heater operating)	• Following PIDs: IAT, MAF, ECT, RPM	2BE
IAT (Intake air temperature)	°C | °F	Indicate the IAT.	• IAT sensor	1AT*8 1AH*9
	V	IAT 0 °C (32 °F): Approx. 3.43 V IAT 20 °C (68 °F): Approx. 2.38 V IAT 40 °C (104 °F): Approx. 1.49 V		
IMRC (Variable tumble solenoid valve)	On/Off	Engine speed is less than approx. 3,750 rpm: On Others: Off	• Following PIDs: TP, ECT, RPM • Variable tumble solenoid valve	2I*8 2AI*9
IMTV (Variable intake air control solenoid valve)	On/Off	Engine speed is less than approx. 4,500 rpm: On Others: Off	• Following PIDs: RP • Variable intake air solenoid valve	2J*8 2AJ*9
INGEAR (Load/no load condition)	On/Off	**MTX** CPP or CPP/PNP is ON: Off Others: On **ATX** P, N position: Off Others: On	• Perform applicable DTC troubleshooting.	1D*3 1X*3 1S*9 1AH*11
IVS (CTP condition)	Idle/Off Idle	CTP: Idle Others: Off Idle	• Perform applicable DTC troubleshooting.	—
KNOCKR (Knocking retard)	°	Ignition switch ON: 0° Idle: 0°	• Knock sensor	2U*8 2V*8 2Q*9 2R*9
LDP_EVAPCP (EVAP system leak detection pump detect incorrect purge flow)	A	Indicate the EVAP control system incorrect purge flow detection value	• Perform applicable DTC troubleshooting.	—
LDP_IDL (EVAP system leak detection pump idle current)	A	Indicate the EVAP system leak detection pump idle current	• Perform applicable DTC troubleshooting.	—
LDP_MON (EVAP system leak detection pump monitoring current)	A	Indicate the EVAP system leak detection pump monitoring current	• Perform applicable DTC troubleshooting.	—
LDP_REF (EVAP system leak detection pump reference current)	A	Indicate the EVAP system leak detection pump reference current	• Perform applicable DTC troubleshooting.	—
LDP_SLDV (EVAP system small leak detection value)	A	Indicate the EVAP control system small leak detection value	• Perform applicable DTC troubleshooting.	—
LDP_VSL_FV*1 (EVAP system small leak detection value)	mA/sec	Indicate the EVAP control system vary small leak-fail value	• Perform applicable DTC troubleshooting.	—
LDP_VSL_SV*1 (EVAP system small leak detection value)	mA/sec	Indicate the EVAP control system vary small leak-safe value	• Perform applicable DTC troubleshooting.	—
LDP_VSLDV*1 (EVAP system small leak detection value)	mA/sec	Indicate the EVAP control system vary small leak detection value	• Perform applicable DTC troubleshooting.	—
LINEDES*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			

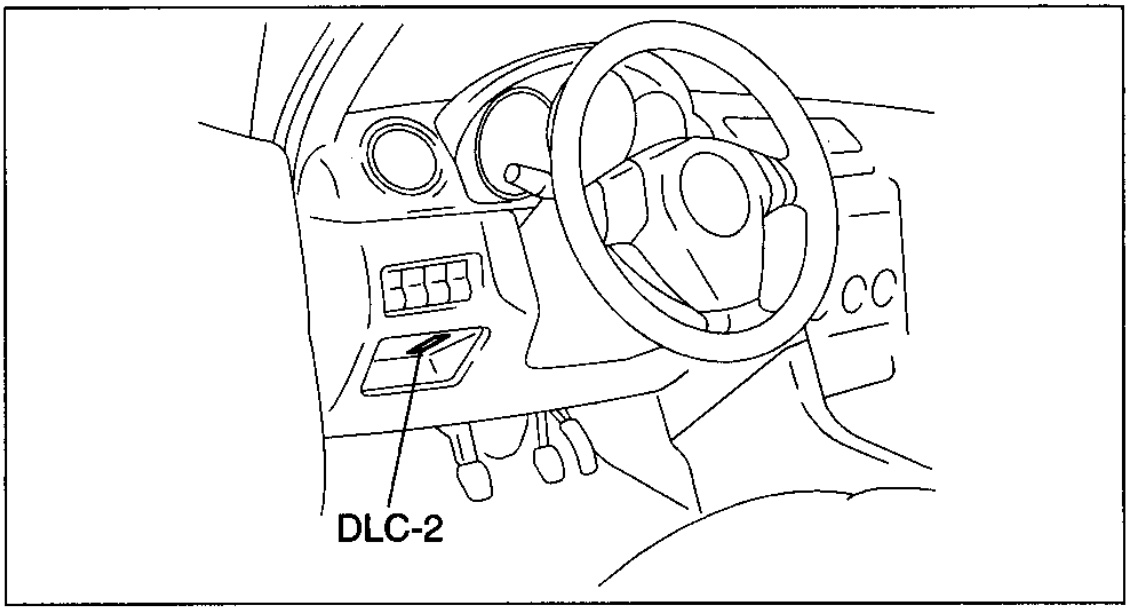
Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Inspection item(s)	PCM terminal
LOAD (Engine load)	%	Ignition switch ON: 0% Idle (after warm up): approx.19%	• MAF sensor	—
LONGFT1 (long term fuel trim)	%	Idle (after warm up): approx. –14—14%	• Perform applicable DTC troubleshooting	—
LPS*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
MAF (Mass airflow)	g/sec	Ignition switch ON: approx. 0 g/s Idle (after warm up): approx. 1.5 g/s	• MAF sensor	1AK*8 1AC*9
	V	Ignition switch ON: approx. 0.7 V Idle (after warm up): approx. 1.3 V		
MAP (Manifold absolute pressure)	Pa	Ignition switch ON (at sea level): approx. 101 kPa (29.8 inHg)	• MAP sensor	2AG*8 2AL*9
	V	Ignition switch ON (at sea level): approx. 4.1 V		
MIL (Malfunction indicator lamp)	On/Off	Ignition switch ON: On Idle: Off	• Perform applicable DTC troubleshooting.	—
MIL_DIS (Travelled distance since the MIL illuminated)	km, mile	No DTC: 0 km (0 mile) DTC detected: Not 0 km (0 mile)	• Perform applicable DTC troubleshooting.	—
MNL SW*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
O2S11 (Front oxygen sensor)	A	Idle (After warm up): approx. 0 mA	• HO2S (front).	2Z*1,7 2AC*7 2AD*1,7
O2S12 (Middle*2, rear*7 oxygen sensor)	V	Idle (After warm up): approx. 0.6 V	• HO2S (Middle*1, rear*7).	2R*1 2AH*9 2Q*10
O2S13*1 (Rear oxygen sensor)	V	Idle (After warm up): approx. 0.6 V	• HO2S (Rear).	2Q
OSS*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
RFCFLAG (Readiness function code)	Not Learnt/ Learnt	Before running PCM adaptive memory procedure drive mode: Not Learnt After running PCM adaptive memory procedure drive mode: Learnt	• Run PCM adaptive memory procedure drive mode	—
RO2FT1 (rear oxygen sensor fuel trim)	—	Idle (after warm up): approx. –0.03—0.03	• Perform applicable DTC troubleshooting.	—
RPM (Engine speed)	RPM	Indicate the engine speed	• CKP sensoR	2W*8 2U*9
SCCS (Speed control command switch)	V	Press ON/OFF: Approx. 0 V Press CANCEL: Approx. 1.2 V Press SET/COAST: Approx. 3.2 V Press RES/ACCEL: Approx. 4.2 V Others: Approx. 5.0 V	• Cruise control switch	—
SEGRP (EGR valve (stepping motor) position)	—	Ignition switch ON: 0 step Idle: 0 step Cranking: 0—60 steps	• Following PIDs: MAF, TP, ECT, RPM, VSS • EGR valve	2G*8 2H*8 2K*8 2L*8 2AR*9 2AU*9 2AV*9 2AY*9

Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Inspection item(s)	PCM terminal
SEGRP DSD (Desired SEGRP valve position)	%	Idle: 0%	• Following PIDs: MAF, TP, ECT, RPM, VSS	2G*8 2H*8 2K*8 2L*8 2AR*9 2AU*9 2AV*9 2AY*9
SHRTFT1 (Short term fuel trim)	%	Idle (after warm up): approx.–30—25%	• Perform applicable DTC troubleshooting.	—
SHRTFT12 (Short term fuel trim bank 1 sensor 2)	%	Idle (after warm up): Approx.–30—25%	• Perform applicable DTC troubleshooting	—
SHRTFT13*1 (Short term fuel trim bank 1 sensor 3)	%	Idle (after warm up): Approx.–30—25%	• Perform applicable DTC troubleshooting	—
SOL 12S*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
SOL 23S*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
SPARKADV (Ignition timing)	°	Ignition switch ON: BTDC 0° Idle: BTDC approx. 10°	• Following PIDs: MAF, TP, ECT, RPM, INGEAR, TR, PSP, VPWR • Ignition timing	2AT*8 2AW*8 2AX*8 2BA*8 2BE*9 2BF*9 2BG*9 2BH*9
SSA/SS1*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
SSB/SS2*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
SSC/SS3*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
test (Test mode)	On/Off	—	—	—
TFT*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
TFTV*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
THOP*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
TIRESIZE (Tire Size (rev / mile))	rev/mile	Indicate the tire circumference length	—	—
TP REL (Relative throttle position)	%	APP released: Approx. 10% APP depressed: Approx. 93%	• TP sensor	—
TP1 (TP)	%	APP released: 8—12% APP depressed: 88—94%	• TP sensor	2AK*8 2M*9
	V	APP released: 0.4—0.6 V APP depressed: 4.4—4.7 V		
TP2 (TP)	%	APP released: 88—92% APP depressed: 6—12%	• TP sensor	2AL*8 2I*9
	V	APP released: 4.4—4.6 V APP depressed: 0.3—0.6 V		
TPCT (TP sensor voltage at CTP)	V	Approx. 0.5 V	• TP sensor	2AK*8 2AL*8 2M*9 2I*9
TR*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
TR_SENS*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
TSS*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			

Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Inspection item(s)	PCM terminal
UP SW*2	(See PID/DATA MONITOR INSPECTION[FN4A-EL].)			
VPWR (Module supply voltage)	V	Indicate the Module supply voltage.	• Battery	—
Vref*7 (Battery voltage)	V	Indicate the Module supply voltage.	• Battery	—
VSS (Vehicle speed)	KPH, MPH	Vehicle speed 20 kph {12 mph}: 20 kph {12 mph} Vehicle speed 40 kph {25 mph}: 20 kph {12 mph}	• Perform applicable DTC troubleshooting	—
VT ACT1 (Actual valve timing)	°	Idle: Approx. 0°	• Following PIDs: TP, ECT, RPM • OCV	2E*8 2AF*9
VT DIFF1 (Difference between target and actual valve timing)	°	Idle: Approx. 0°	• Following PIDs: TP, ECT, RPM • OCV	2E*8 2AF*9
VT DUTY1 (Oil control valve duty value)	%	Idle: Approx. 11.5%	• Following PIDs: TP, ECT, RPM • OCV	2E*8 2AF*9
VTC (Variable tumble shutter valve control)	On/Off	Indicate the condition of the variable tumble shutter valve switch	• Following PIDs: IMRC • Variable tumble shutter valve switch	2AE

*1 : California emission regulation applicable model
*2 : LF ATX
*3 : MTX
*4 : Calculated value; differs from terminal voltage
*5 : Refrigerant pressure switch (middle) turns off when the refrigerant pressure is 1.26—1.49 MPa {12.9—15.1 kgf/cm6, 184—214 psi}
*6 : Refrigerant pressure switch (middle) turns on when the refrigerant pressure is 1.69—1.84 MPa {17.3—18.7 kgf/cm^2, 247—265 psi}
*7 : Except for California emission regulation applicable model
*8 : LF MTX, L3, and California emission regulation applicable model with LF ATX
*9 : Except for California emission regulation applicable model with LF ATX
*10: Except for California emission regulation applicable model with LF MTX, L3
*11: California emission regulation applicable model with LF ATX

Active Command Modes Procedure (Article 1447507)



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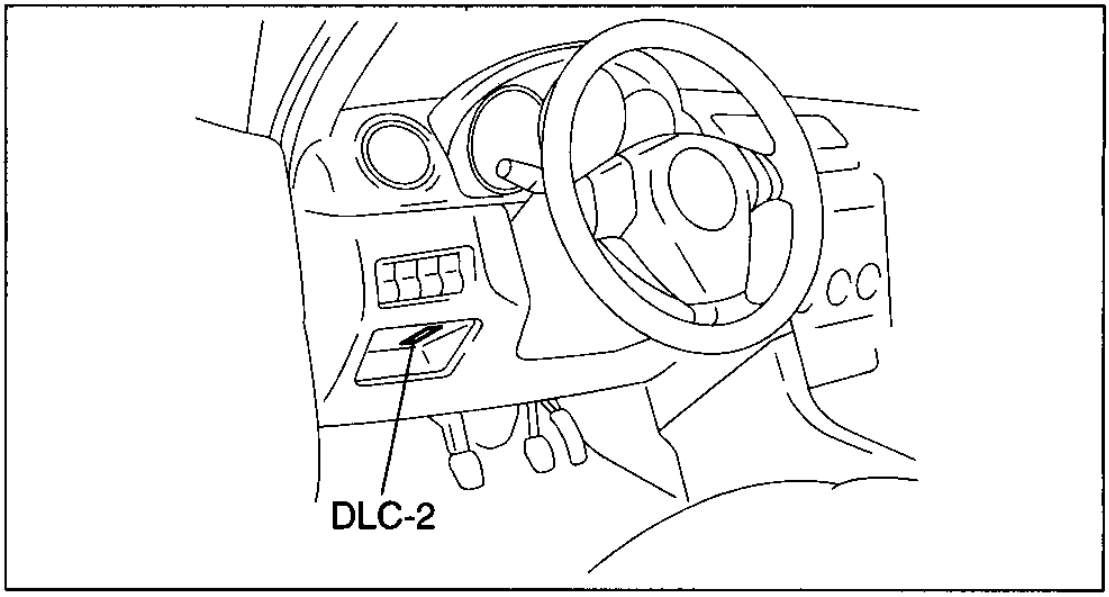
Freeze Frame PID Data Access Procedure (Article 1447451)



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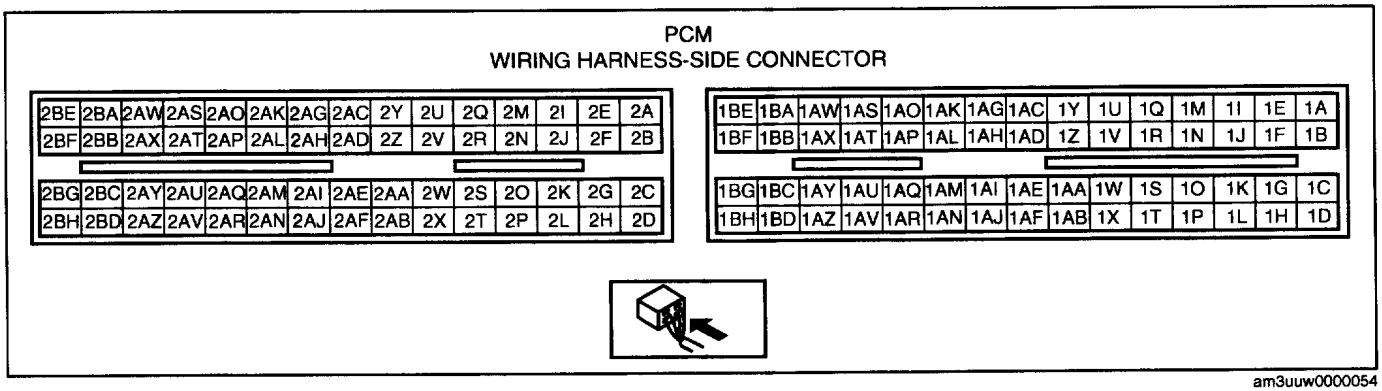
PCM Inspection (Article 1366338)



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Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
1A	Shift solenoid A*1	Shift solenoid A	(See Inspection Using An Oscilloscope (Reference).)		• Shift solenoid A • Related wiring harness
	—*2	—	—	—	—
1B	Starter relay control	Starter relay	Under any condition	Below 1.0	• Starter relay • Related wiring harness

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1C	—	—	—		—	—
1D	—*1	—	—		—	—
	Clutch operation*2	CPP switch	Clutch pedal depressed		Below 1.0	• CPP switch • Related wiring harness
			Clutch pedal released		B+	
1E	Shift solenoid B*1	Shift solenoid B	(See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid B • Related wiring harness
	—*2	—	—		—	—
1F	Shift solenoid C*1	Shift solenoid C	(See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid C • Related wiring harness
	—*2	—	—		—	—
1G	—	—	—		—	—
1H	Fuel pump control	Fuel pump relay	Ignition switch to the ON position		B+	• Fuel pump relay • Related wiring harness
			Cranking		Below 1.0	
			Idle		Below 1.0	
1I	A/C	A/C relay	Idle	A/C operating	Below 1.0	• A/C relay • Related wiring harness
				A/C not operating	B+	
1J	Refrigerant pressure switch (medium)	Refrigerant pressure switch (medium)	A/C ON	Refrigerant pressure is above 1.52 MPa (15.5 kgf/cm², 220 psi)	Below 1.0	• Refrigerant pressure switch • Related wiring harness
				Refrigerant pressure is below 1.23 MPa (12.5 kgf/cm², 178 psi)	B+	
1K	—	—	—		—	—
1L	—	—	—		—	—
1M	Pressure control solenoid (+)*1	Pressure control solenoid	(See Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
	—*2	—	—		—	—
1N	Pressure control solenoid (–)*1	Pressure control solenoid	(See Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
	—*2	—	—		—	—
1O	—	—	—		—	—
1P	—	—	—		—	—
1Q	Main relay control	Main relay	Ignition switch off after 15 min		B+	• Main relay • Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1R	—	—	—		—	—
1S	GND (shield)	Input/turbine speed sensor harness, GND	Under any condition		Below 1.0	• Related wiring harness
1T	—	—	—		—	—
1U	EVAP leak detection pump (pump)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1V	EVAP leak detection pump (solenoid)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1W	—	—	—		—	—
1X	—*1	—	—		—	—
	Neutral position*2	Neutral switch	Ignition switch is turned to the ON position	Shift lever is at neutral position	Below 1.0	• Neutral switch • Related wiring harness
				Shift lever is not at neutral position	B+	
1Y	Cooling fan control	Fan control module	• Inspect using the wave profile.			• Fan control module • Related wiring harness
1Z	Shift solenoid E*1	Shift solenoid E	(See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid E • Related wiring harness
	—*2	—	—		—	—
1AA	—	—	—		—	—
1AB	Brake	Brake switch	Brake pedal depressed		B+	• Brake switch • Related wiring harness
			Brake pedal released		Below 1.0	
1AC	APP sensor 2	APP sensor	• Inspect using the wave profile.			• APP sensor • Related wiring harness
1AD	Shift solenoid D*1	Shift solenoid D	• Inspect using the wave profile.			• Shift solenoid D • Related wiring harness
	—*2	—	—		—	—
1AE	—	—	—		—	—
1AF	Manual down*1	Down switch	Ignition switch is turned to the ON position.	Detects down-shift operation of selector lever in M range	1.0 or less	• Selector lever • Related wiring harness
				Others	B+	
	—*2	—	—		—	—
1AG	Input/turbine speed sensor (–)*1	Input/turbine speed sensor	• Inspect using the wave profile.			• Input/turbine speed sensor • Related wiring harness
	—*2	—	—		—	—
1AH	Selector lever position*1	TR switch	Ignition switch is turned to the ON position	P position	Approx. 4.6	• TR switch • Related wiring harness
				R position	Approx. 3.9	
				N position	Approx. 3.2	
				D range	Approx. 2.5	
				M range	Approx. 2.5	
	—*2	—	—		—	—
1AI	CAN (L)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1AJ	Manual up*1	Up switch	Ignition switch is turned to the ON position.	Detects up-shift operation of selector lever in M range	1.0 or less	• Selector lever • Related wiring harness
				Others	B+	
	—*2	—	—		—	—
1AK	MAF	MAF sensor	Ignition switch to the ON position		Approx. 0.7	• MAF sensor • Related wiring harness
			Idle (after warm up)		Approx. 1.5	
1AL	Constant voltage (Vref)	APP sensor	Ignition switch to the ON position		Approx. 5.0	• Related wiring harness
1AM	CAN (H)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AN	M range switch*1	M range switch	Ignition switch is turned to the ON position.	M range	1.0 or less	• Selector lever • Related wiring harness
				Except above	B+	
	—*2	—	—		—	—
1AO	Input/turbine speed sensor (+)*1	Input/turbine speed sensor	• Inspect using the wave profile.			• Input/turbine speed sensor • Related wiring harness
	—*2	—	—		—	—
1AP	APP sensor 1	APP sensor	Ignition switch to the ON position	When the accelerator pedal is depressed	Approx. 3.0	• APP sensor • Related wiring harness
				When the accelerator pedal is released	Approx. 0.4	
1AQ	Cruise control switch	Cruise control switch	Ignition switch to the ON position	ON/OFF switch pressed in	Approx. 0	• Cruise control switch • Related wiring harnesses
				CANCEL switch pressed in	Approx. 1.1	
				SET/COAST switch pressed in	Approx. 3.1	
				RES/ACCEL switch pressed in	Approx. 4.2	
				Except above	Approx. 5	
1AR	Sensor GND	MAF sensor	Under any condition		Below 1.0	• Related wiring harness
1AS	Sensor GND	TFT sensor*1, TR switch*1, IAT sensor, APP sensor	Under any condition		Below 1.0	• Related wiring harness

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1AT	IAT	MAF/IAT sensor	Ignition switch to the ON position	IAT 0 °C (32 °F)	Approx. 3.43	• IAT sensor • Related wiring harness
				IAT 20 °C (68 °F)	Approx. 2.38	
				IAT 40 °C (104 °F)	Approx. 1.49	
				IAT 60 °C (140 °F)	Approx. 0.89	
				IAT 80 °C (176 °F)	Approx. 0.53	
				IAT 100 °C (212 °F)	Approx. 0.33	
1AU	A/C on signal	Refrigerant pressure switch (high and low)	Idle	A/C switch and fan switch on	Below 1.0	• Refrigerant pressure switch • Related wiring harness
1AV	—	—	—		—	—
1AW	Vehicle speed*1	VSS	• Inspect using the wave profile.			• VSS • Related wiring harness
	—*2	—	—		—	—
1AX	Drive-by-wire relay control	Drive-by-wire relay	Ignition switch off		B+→ Below 1.0	• Drive-by-wire relay • Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1AY	Ignition switch	Ignition switch	Ignition switch off		Below 1.0	• Related wiring harness
			Ignition switch to the ON position		B+	
1AZ	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BA	Back-up power supply	Battery (positive terminal)	Under any condition		B+	• Battery • Related wiring harness
1BB	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BC	—	—	—		—	—
1BD	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BE	B+	Main relay	Ignition switch off after 15 min		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	
1BF	B+	Drive-by-wire relay	Ignition switch off		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	
1BG	B+*1	Main relay	Ignition switch off after 15 min		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	
	—*2	—	—		—	—
1BH	GND	GND	Under any condition		Below 1.0	• Related wiring harness
2A	Throttle actuator control (+)	Throttle actuator	Ignition switch to the ON position		B+	• Throttle actuator • Related wiring harness
2B	Throttle actuator control (–)	Throttle actuator	Idle (after warm up)		Approx. 3.5—5.5	• Throttle actuator • Related wiring harness
2C	Purge control	Purge solenoid valve	• Inspect using the wave profile.			• Purge solenoid valve • Related wiring harness
2D	—	—	—		—	—

Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
2E	OCV control	OCV	• Inspect using the wave profile.		• OCV valve • Related wiring harness
2F	—	—	—	—	—
2G	EGR valve #2 coil control	EGR valve (terminal A)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2H	EGR valve #4 coil control	EGR valve (terminal F)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2I	Variable tumble control	Variable tumble solenoid valve	ECT above 62 °C {143 °F} while idling.	B+	• Variable tumble solenoid valve • Related wiring harness
			ECT below 63 °C {145 °F} and engine speed below 3,750 rpm	Below 1.0	
2J	Variable intake air control	Variable intake air solenoid valve	Ignition switch to the ON position	Below 1.0	• Variable intake air solenoid valve • Related wiring harness
			Engine speed: below 4,750 rpm [LF]/4,600 rpm [L3]	Below 1.0	
			Engine speed: above 4,750 rpm [LF]/4,600 rpm [L3]	B+	
2K	EGR valve #1 coil control	EGR valve (terminal E)	Ignition switch to the ON position	Below 1.0	• EGR valve • Related wiring harness
			Idle	Below 1.0	
2L	EGR valve #3 coil control	EGR valve (terminal B)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2M	—	—	—	—	—
2N	—	—	—	—	—
2O	—	—	—	—	—
2P	—	—	—	—	—
2Q	Rear HO2S	HO2S (rear)	Ignition switch to the ON position	Approx. 0	• HO2S (rear) • Related wiring harness
			Idle (after warm up)	Alternates between 0 and 1.0	
2R	Middle HO2S	HO2S (Middle)	Ignition switch to the ON position	Approx. 0	• HO2S (Middle) • Related wiring harness
			Idle (after warm up)	Alternates between 0 and 1.0	
2S	CMP	CMP sensor	• Inspect using the wave profile.		• CMP sensor • Related wiring harness
2T	—	—	—	—	—
2U	Knocking (+)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)	Approx. 4.3	• KS • Related wiring harness
2V	Knocking (–)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)	Below 1.0	• KS • Related wiring harness
2W	CKP	CKP sensor	• Inspect using the wave profile.		• CKP sensor • Related wiring harness
2X	GND (shield)	KS harness, HO2S (front, middle, rear) harness, GND	Under any condition	Below 1.0	• Related wiring harness
2Y	—	—	—	—	—

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
2Z	Sensor GND	HO2S (front)	Under any condition		Below 1.0	• Related wiring harness
2AA	—	—	—		—	—
2AB	—	—	—		—	—
2AC	ATF temperature	TFT sensor	Ignition switch is turned to the ON position.	TFT is 20 °C {68 °F}	Approx. 3.3	• TFT sensor • Related wiring harness
				TFT is 40 °C {104 °F}	Approx. 2.4	
				TFT is 60 °C {140 °F}	Approx. 1.5	
2AD	Front HO2S	HO2S (front)	Idle (after warm up): Approx. 0 mA		—	• HO2S (front) • Related wiring harness
2AE	Variable tumble shutter valve monitor	Variable tumble shutter valve switch	ECT above 63 °C {145 °F} while idling.		B+	• Variable tumble shutter valve switch • Related wiring harness
			ECT below 63 °C {145 °F} and engine speed below 3,750 rpm		Below 1.0	
2AF	—	—	—		—	—
2AG	Manifold absolute pressure	MAP sensor	Ignition switch to the ON position (at sea level)		Approx. 4.1	• MAP sensor • Related wiring harness
			Idle		Approx. 1.4	
2AH	ECT	ECT sensor	Ignition switch to the ON position	IAT 20 °C {68 °F}	3.04—3.14	• ECT sensor • Related wiring harness
				IAT 40 °C {104 °F}	2.09—2.21	
				IAT 60 °C {140 °F}	1.29—1.39	
				IAT 80 °C {176 °F}	0.76—0.83	
				IAT 100 °C {212 °F}	0.45—0.49	
2AI	Generator field coil control	Generator (terminal D)	• Inspect using the wave profile.			• Following PIDs: IAT, ECT, RPM, VPWR, ALTT V • Generator • Related wiring harness
2AJ	Generator output voltage	Generator (terminal P)	• Inspect using the wave profile.			• Generator • Related wiring harness
2AK	TP (No. 1)	TP sensor No. 1	Ignition switch to the ON position	APP closed	0.53—1.00	• TP sensor • Related wiring harness
				APP open	4.25—4.75	
2AL	TP (No. 2)	TP sensor No. 2	Ignition switch to the ON position	APP closed	4.00—4.47	• TP sensor • Related wiring harness
				APP open	0.25—0.75	
2AM	Constant voltage (Vref)	CMP sensor	Ignition switch to the ON position		B+	• CMP sensor • Related wiring harness
2AN	—	—	—		—	—
2AO	Constant voltage (Vref)	TP sensor	Ignition switch to the ON position		Approx. 5.0	• TP sensor • Related wiring harness
2AP	Sensor GND	TP sensor	Under any condition		Below 1.0	• TP sensor • Related wiring harness

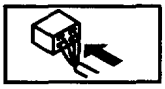
Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
2AQ	Constant voltage (Vref)	CKP sensor	Ignition switch to the ON position	B+	• CKP sensor • Related wiring harness
2AR	—	—	—	—	—
2AS	—	—	—	—	—
2AT	IGT4	Ignition coil (No.4 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2AU	Constant voltage (Vref)	MAP sensor, variable tumble shutter valve switch	Ignition switch to the ON position	Approx. 5.0	• MAP sensor • Variable tumble shutter valve switch • Related wiring harness
2AV	—	—	—	—	—
2AW	IGT2	Ignition coil (No.2 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2AX	IGT3	Ignition coil (No.3 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2AY	Sensor GND	Variable tumble shutter valve switch, ECT sensor, MAP sensor, HO2S (middle, rear)	Under any condition	Below 1.0	• Variable tumble shutter valve switch • ECT sensor • MAP sensor • HO2S (middle, rear) • Related wiring harness
2AZ	Fuel injection (#4)	Fuel injector No.4	• Inspect using the wave profile.		• Fuel injector No.4 • Related wiring harness
2BA	IGT1	Ignition coil (No.1 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2BB	Fuel injection (#1)	Fuel injector No.1	• Inspect using the wave profile.		• Fuel injector No.1 • Related wiring harness
2BC	Fuel injection (#2)	Fuel injector No.2	• Inspect using the wave profile.		• Fuel injector No.2 • Related wiring harness
2BD	Fuel injection (#3)	Fuel injector No.3	• Inspect using the wave profile.		• Fuel injector No.3 • Related wiring harness
2BE	Rear HO2S heater control	HO2S (Rear) heater	• Inspect using the wave profile.		• HO2S (Rear) heater • Related wiring harness
2BF	Middle HO2S heater control	HO2S (Middle) heater	• Inspect using the wave profile.		• HO2S (Middle) heater • Related wiring harness
2BG	Front HO2S heater control	HO2S (Front) heater	• Inspect using the wave profile.		• HO2S (Front) heater • Related wiring harness
2BH	GND	GND	Under any condition	Below 1.0	• Related wiring harness

*1 : ATX
*2 : MTX

PCM
WIRING HARNESS-SIDE CONNECTOR

2BE	2BA	2AW	2AS	2AO	2AK	2AG	2AC	2Y	2U	2Q	2M	2I	2E	2A
2BF	2BB	2AX	2AT	2AP	2AL	2AH	2AD	2Z	2V	2R	2N	2J	2F	2B
2BG	2BC	2AY	2AU	2AQ	2AM	2AI	2AE	2AA	2W	2S	2O	2K	2G	2C
2BH	2BD	2AZ	2AV	2AR	2AN	2AJ	2AF	2AB	2X	2T	2P	2L	2H	2D

1BE	1BA	1AW	1AS	1AO	1AK	1AG	1AC	1Y	1U	1Q	1M	1I	1E	1A
1BF	1BB	1AX	1AT	1AP	1AL	1AH	1AD	1Z	1V	1R	1N	1J	1F	1B
1BG	1BC	1AY	1AU	1AQ	1AM	1AI	1AE	1AA	1W	1S	1O	1K	1G	1C
1BH	1BD	1AZ	1AV	1AR	1AN	1AJ	1AF	1AB	1X	1T	1P	1L	1H	1D



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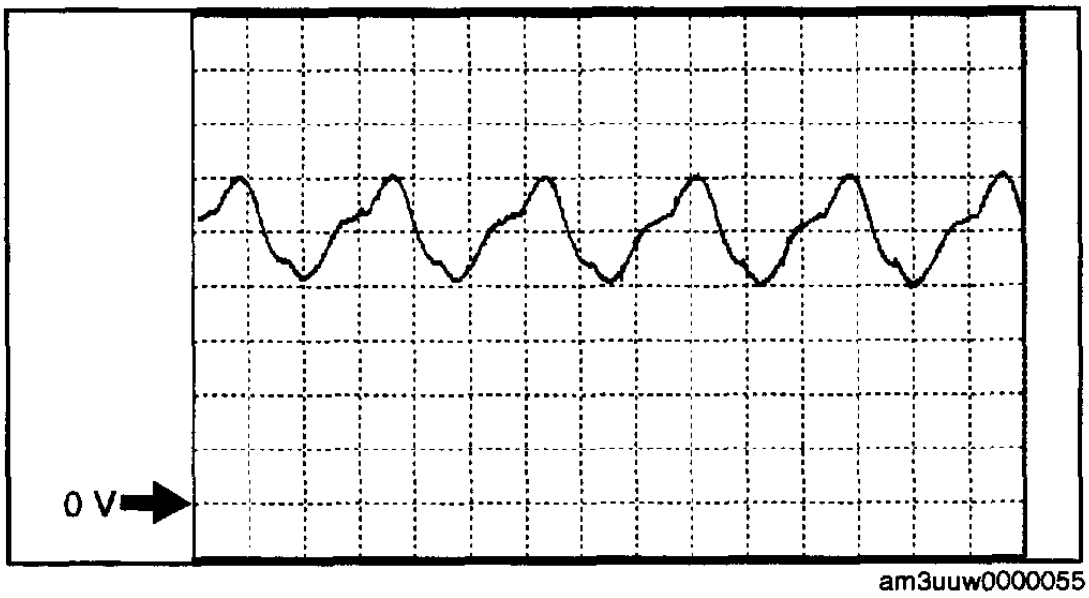
Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1A	B+	Main relay	Ignition switch off after 5 min		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	
1B	Shift solenoid A	Shift solenoid A	(See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid A • Related wiring harness
1C	Shift solenoid B	Shift solenoid B	(See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid B • Related wiring harness
1D	Shift solenoid C	Shift solenoid C	(See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid C • Related wiring harness
1E	Shift solenoid D	Shift solenoid D	During TCC operation		B+	• Shift solenoid D • Related wiring harness
			Except above		1.0 or less	
1F	Shift solenoid E	Shift solenoid E	During TCC operation		B+	• Shift solenoid E • Related wiring harness
			Except above		1.0 or less	
1G	Pressure control solenoid (+)	Pressure control solenoid	(See Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
1H	Pressure control solenoid (–)	Pressure control solenoid	(See Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
1I	—	—	—		—	—
1J	Vehicle speed	VSS	(See Inspection Using An Oscilloscope (Reference).)			• VSS • Related wiring harness
1K	Manual up	Up switch	Ignition switch is turned to the ON position.	Detects up-shift operation of selector lever in M range	1.0 or less	• Selector lever • Related wiring harness
				Others	B+	
1L	—	—	—		—	—
1M	Input/turbine speed sensor (+)	Input/turbine speed sensor	(See Inspection Using An Oscilloscope (Reference).)			• Input/turbine speed sensor • Related wiring harness
1N	—	—	—		—	—

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1O	M range switch	M range switch	Ignition switch is turned to the ON position.	M range	1.0 or less	• Selector lever • Related wiring harness
				Except above	B+	
1P	Manual down	Down switch	Ignition switch is turned to the ON position.	Detects down-shift operation of selector lever in M range	1.0 or less	• Selector lever • Related wiring harness
				Others	B+	
1Q	Input/turbine speed sensor (−)	Input/turbine speed sensor	(See Inspection Using An Oscilloscope (Reference).)			• Input/turbine speed sensor • Related wiring harness
1R	Refrigerant pressure switch (medium)	Refrigerant pressure switch (medium)	A/C ON	Refrigerant pressure is above 1.52 MPa {15.5 kgf/cm^2, 220 psi}	Below 1.0	• Refrigerant pressure switch • Related wiring harness
				Refrigerant pressure is below 1.23 MPa {12.5 kgf/cm^2, 178 psi}	B+	
1S	Selector lever position	TR switch	Ignition switch is turned to the ON position	P position	Approx. 4.6	• TR switch • Related wiring harness
				R position	Approx. 3.9	
				N position	Approx. 3.2	
				D range	Approx. 2.5	
				M range	Approx. 2.5	
1T	—	—	—		—	—
1U	ATF temperature	TFT sensor	Ignition switch is turned to the ON position.	TFT is 20 °C {68 °F}	Approx. 3.3	• TFT sensor • Related wiring harness
				TFT is 40 °C {104 °F}	Approx. 2.4	
				TFT is 60 °C {140 °F}	Approx. 1.5	
1V	—	—	—		—	—
1W	Cooling fan control	Fan control module	• Inspect using the wave profile. (See Inspection Using An Oscilloscope (Reference).)			• Fan control module. • Related wiring harness
1X	—	—	—		—	—
1Y	APP sensor 1	APP sensor	Ignition switch to the ON position	When the accelerator pedal is depressed	Approx. 3.0	• APP sensor • Related wiring harness
				When the accelerator pedal is released	Approx. 0.4	
1Z	—	—	—		—	—
1AA	Sensor GND	TR sensor, TFT sensor, IAT sensor, APP sensor	Under any condition		Below 1.0	• Related wiring harness
1AB	Starter relay control	Starter relay	Under any condition		Below 1.0	• Starter relay • Related wiring harness



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Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1AC	MAF	MAF sensor	Ignition switch to the ON position		Approx. 0.7	• MAF sensor • Related wiring harness
			Idle (after warm up)		Approx. 1.3	
1AD	Cruise control switch	Cruise control switch	Ignition switch to the ON position	ON/OFF switch pressed in	Approx. 0	• Cruise control switch • Related wiring harnesses
				CANCEL switch pressed in	Approx. 1.1	
				SET/COAST switch pressed in	Approx. 3.1	
				RES/ACCEL switch pressed in	Approx. 4.2	
				Except above	Approx. 5	
1AE	Sensor GND	MAF sensor	Under any condition		Below 1.0	• Related wiring harness
1AF	EVAP leak detection pump (pump)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1AG	Atmospheric pressure	BARO sensor	Ignition switch to the ON position (at sea level)		Approx. 4.0	• BARO sensor • Related wiring harness
1AH	IAT	MAF/IAT sensor	Ignition switch to the ON position	IAT 0 °C (32 °F)	Approx. 3.43	• IAT sensor • Related wiring harness
				IAT 20 °C (68 °F)	Approx. 2.38	
				IAT 40 °C (104 °F)	Approx. 1.49	
				IAT 60 °C (140 °F)	Approx. 0.89	
				IAT 80 °C (176 °F)	Approx. 0.53	
				IAT 100 °C (212 °F)	Approx. 0.33	
1AI	CAN (L)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AJ	EVAP leak detection pump (solenoid)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1AK	—	—	—		—	—
1AL	APP sensor 2	APP sensor	• Inspect using the wave profile.			• APP sensor • Related wiring harness
1AM	CAN (H)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AN	A/C	A/C relay	Idle	A/C operating	Below 1.0	• A/C relay • Related wiring harness
				A/C not operating	B+	
1AO	—	—	—		—	—
1AP	A/C on signal	Refrigerant pressure switch (high and low)	Idle	A/C switch and fan switch on	Below 1.0	• Refrigerant pressure switch • Related wiring harness
1AQ	—	—	—		—	—

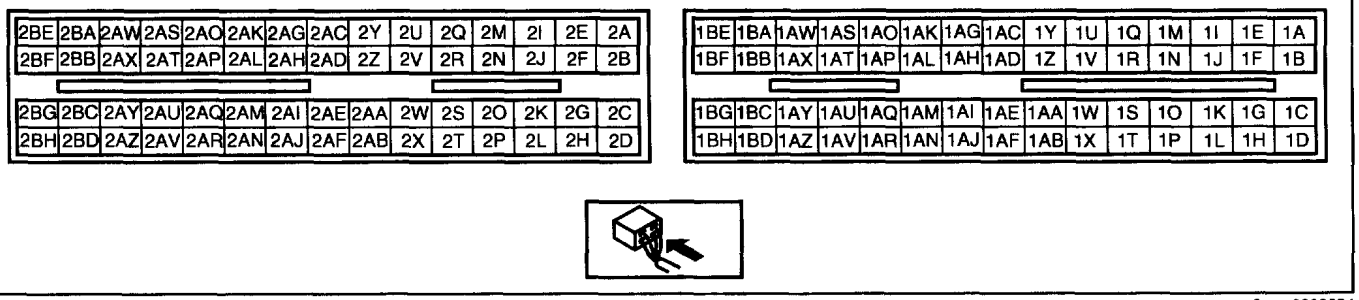
Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
1AR	Fuel pump control	Fuel pump relay	Ignition switch to the ON position after 1 s	B+	• Fuel pump relay • Related wiring harness
			Cranking	Below 1.0	
			Idle	Below 1.0	
1AS	—	—	—	—	—
1AT	Main relay control	Main relay	Ignition switch off after 5 min	B+	• Main relay • Related wiring harness
			Ignition switch to the ON position	Below 1.0	
1AU	Brake	Brake switch	Brake pedal depressed	B+	• Brake switch • Related wiring harness
			Brake pedal released	Below 1.0	
1AV	GND (shield)	Input/turbine speed sensor harness, GND	Under any condition	Below 1.0	• Related wiring harness
1AW	Constant voltage (Vref)	APP sensor	Ignition switch to the ON position	Approx. 5.0	• Related wiring harness
1AX	Ignition switch	Ignition switch	Ignition switch off	Below 1.0	• Related wiring harness
			Ignition switch to the ON position	B+	
1AY	Drive-by-wire relay	Drive-by-wire relay	Ignition switch off	B+	• Related wiring harness
			Ignition switch to the ON position	Below 1.0	
1AZ	GND	GND	Under any condition	Below 1.0	• Related wiring harness
1BA	Back-up power supply	Battery (positive terminal)	Under any condition	B+	• Battery • Related wiring harness
1BB	GND	GND	Under any condition	Below 1.0	• Related wiring harness
1BC	GND	GND	Under any condition	Below 1.0	• Related wiring harness
1BD	GND	GND	Under any condition	Below 1.0	• Related wiring harness
1BE	B+	Main relay	Ignition switch off after 5 min	Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position	B+	
1BF	Throttle actuator power supply	Drive-by-wire relay	Ignition switch off after 10 s	Below 1.0	• Related wiring harness
			Ignition switch to the ON position	B+	
1BG	GND	GND	Under any condition	Below 1.0	• Related wiring harness
1BH	GND	GND	Under any condition	Below 1.0	• Related wiring harness
2A	Throttle actuator control (+)	Throttle actuator	Ignition switch to the ON position	B+	• Throttle actuator • Related wiring harness
2B	Throttle actuator control (–)	Throttle actuator	Idle (after warm up)	Approx. 3.5—5.5	• Throttle actuator • Related wiring harness
2C	Rear HO2S heater control	HO2S (Rear) heater	Idle (after warm up)	Below 1.0	• HO2S (Rear) heater • Related wiring harness
			Engine speed above 4,000 rpm	B+	
2D	—	—	—	—	—
2E	—	—	—	—	—
2F	—	—	—	—	—
2G	Front HO2S heater control	HO2S (Front) heater	• Inspect using the wave profile.		• HO2S (Front) heater • Related wiring harness
2H	—	—	—	—	—

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
2I	TP (No. 2)	TP sensor No. 2	Ignition switch to the ON position	APP closed	4.00—4.47	• TP sensor • Related wiring harness
				APP open	0.25—0.75	
2J	—	—	—		—	—
2K	Constant voltage (Vref)	TP sensor	Ignition switch to the ON position		Approx. 5.0	• TP sensor • Related wiring harness
2L	—	—	—		—	—
2M	TP (No. 1)	TP sensor No. 1	Ignition switch to the ON position	APP closed	0.53—1.00	• TP sensor • Related wiring harness
				APP open	4.25—4.75	
2N	—	—	—		—	—
2O	TP sensor GND	TP sensor	Under any condition		Below 1.0	• TP sensor • Related wiring harness
2P	GND (shield)	KS harness, HO2S (front, rear), GND	Under any condition		Below 1.0	• Related wiring harness
2Q	Knocking (+)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Approx. 4.3	• KS • Related wiring harness
2R	Knocking (–)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Below 1.0	• KS • Related wiring harness
2S	—	—	—		—	—
2T	Constant voltage (Vref)	CKP sensor	Ignition switch to the ON position		B+	• CKP sensor • Related wiring harness
2U	CKP	CKP sensor	• Inspect using the wave profile.			• CKP sensor • Related wiring harness
2V	CMP	CMP sensor	• Inspect using the wave profile.			• CMP sensor • Related wiring harness
2W	Constant voltage (Vref)	MAP sensor, variable tumble shutter valve switch	Ignition switch to the ON position		Approx. 5.0	• Related wiring harness
2X	Constant voltage (Vref)	CMP sensor	Ignition switch to the ON position		B+	• CKP sensor • Related wiring harness
2Y	—	—	—		—	—
2Z	HO2S (front) power supply	HO2S (front)	Idle (after warm up)		Approx. 4.1	• HO2S (front) • Related wiring harness
2AA	Sensor GND	HO2S (rear), ECT sensor, MAP sensor, variable tumble shutter valve switch	Under any condition		Below 1.0	• Related wiring harness
2AB	—	—	—		—	—
2AC	HO2S (front) VSIP	HO2S (front)	Idle (after warm up)		Approx. 4.0	• HO2S (front) • Related wiring harness

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
2AD	HO2S (front) IP+	HO2S (front)	When the engine speed is increased, the voltage increased.			• HO2S (front) • Related wiring harness
2AE	Variable tumble shutter valve monitor	Variable tumble shutter valve switch	ECT above 63 °C (145 °F) while idling.		B+	• Variable tumble shutter valve switch • Related wiring harness
			ECT below 63 °C (145 °F) and engine speed below 3,750 rpm		Below 1.0	
2AF	OCV control	OCV	• Inspect using the wave profile.			• OCV valve • Related wiring harness
2AG	Front HO2S	HO2S (front)	• Inspect using the wave profile.			• HO2S (front) • Related wiring harness
2AH	Rear HO2S	HO2S (rear)	Ignition switch to the ON position		Approx. 0	• HO2S (rear) • Related wiring harness
			Idle (after warm up)		Alternates between 0 and 1.0	
2AI	Variable tumble control	Variable tumble solenoid valve	ECT above 62 °C (143 °F) while idling.		B+	• Variable tumble solenoid valve • Related wiring harness
			ECT below 63 °C (145 °F) and engine speed below 3,750 rpm		Below 1.0	
2AJ	Variable intake air control	Variable intake air solenoid valve	Ignition switch to the ON position		Below 1.0	• Variable intake air solenoid valve • Related wiring harness
			Engine speed: below 4,750 rpm		Below 1.0	
			Engine speed: above 4,750 rpm		B+	
2AK	ECT	ECT sensor	Ignition switch to the ON position	IAT 20 °C (68 °F)	3.04—3.14	• ECT sensor • Related wiring harness
				IAT 40 °C (104 °F)	2.09—2.21	
				IAT 60 °C (140 °F)	1.29—1.39	
				IAT 80 °C (176 °F)	0.76—0.83	
				IAT 100 °C (212 °F)	0.45—0.49	
2AL	Manifold absolute pressure	MAP sensor	Ignition switch to the ON position (at sea level)		Approx. 4.1	• MAP sensor • Related wiring harness
			Idle		Approx. 1.2	
2AM	Generator output voltage	Generator (terminal P)	• Inspect using the wave profile.			• Generator • Related wiring harness
2AN	Purge control	Purge solenoid valve	• Inspect using the wave profile.			• Purge solenoid valve • Related wiring harness
2AO	—	—	—		—	—
2AP	—	—	—		—	—
2AQ	Generator field coil control	Generator (terminal D)	• Inspect using the wave profile.			• Following PIDs: IAT, ECT, RPM, VPWR, ALTT V. • Generator • Related wiring harness
2AR	EGR valve #2 coil control	EGR valve (terminal A)	Ignition switch to the ON position		B+	• EGR valve • Related wiring harness
			Idle		B+	
2AS	—	—	—		—	—
2AT	—	—	—		—	—
2AU	EGR valve #1 coil control	EGR valve (terminal E)	Ignition switch to the ON position		Below 1.0	• EGR valve • Related wiring harness
			Idle		Below 1.0	

Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
2AV	EGR valve #4 coil control	EGR valve (terminal F)	Ignition switch to the ON position	Below 1.0	• EGR valve • Related wiring harness
			Idle	Below 1.0	
2AW	—	—	—	—	—
2AX	—	—	—	—	—
2AY	EGR valve #3 coil control	EGR valve (terminal B)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2AZ	Fuel injection (#4)	Fuel injector No.4	• Inspect using the wave profile.		• Fuel injector No.4 • Related wiring harness
2BA	—	—	—	—	—
2BB	Fuel injection (#1)	Fuel injector No.1	• Inspect using the wave profile.		• Fuel injector No.1 • Related wiring harness
2BC	Fuel injection (#2)	Fuel injector No.2	• Inspect using the wave profile.		• Fuel injector No.2 • Related wiring harness
2BD	Fuel injection (#3)	Fuel injector No.3	• Inspect using the wave profile.		• Fuel injector No.3 • Related wiring harness
2BE	IGT1	Ignition coil (No.1 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2BF	IGT2	Ignition coil (No.2 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2BG	IGT3	Ignition coil (No.3 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2BH	IGT4	Ignition coil (No.4 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness

PCM
WIRING HARNESS-SIDE CONNECTOR



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Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
1A	—	—	—	—	—
1B	Starter relay control	Starter relay	Under any condition	Below 1.0	• Starter relay • Related wiring harness

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1C	—	—	—		—	—
1D	—*1	—	—		—	—
	Clutch operation*2	CPP switch	Clutch pedal depressed		Below 1.0	• CPP switch • Related wiring harness
			Clutch pedal released		B+	
1E	—	—	—		—	—
1F	—	—	—		—	—
1G	—	—	—		—	—
1H	Fuel pump control	Fuel pump relay	Ignition switch to the ON position		B+	• Fuel pump relay • Related wiring harness
			Cranking		Below 1.0	
			Idle		Below 1.0	
1I	A/C	A/C relay	Idle	A/C operating	Below 1.0	• A/C relay • Related wiring harness
				A/C not operating	B+	
1J	Refrigerant pressure switch (medium)	Refrigerant pressure switch (medium)	A/C ON	Refrigerant pressure is above 1.52 MPa (15.5 kgf/cm^2, 220 psi)	Below 1.0	• Refrigerant pressure switch • Related wiring harness
				Refrigerant pressure is below 1.23 MPa (12.5 kgf/cm^2, 178 psi)	B+	
1K	—	—	—		—	—
1L	—	—	—		—	—
1M	—	—	—		—	—
1N	—	—	—		—	—
1O	—	—	—		—	—
1P	—	—	—		—	—
1Q	Main relay control	Main relay	Ignition switch off after 15 min		B+	• Main relay • Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1R	Cooling fan control	Fan control module	• Inspect using the wave profile.			• Fan control module • Related wiring harness
1S	—	—	—		—	—
1T	—	—	—		—	—
1U	EVAP leak detection pump (pump)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1V	EVAP leak detection pump (solenoid)	EVAP leak detection pump	Ignition switch to the ON position		B+	• EVAP leak detection pump • Related wiring harnesses
			Idling		B+	
1W	—	—	—		—	—
1X	—*1	—	—		—	—
	Neutral position*2	Neutral switch	Ignition switch is turned to the ON position	Shift lever is at neutral position	Below 1.0	• Neutral switch • Related wiring harness
				Shift lever is not at neutral position	B+	
1Y	—	—	—		—	—
1Z	—	—	—		—	—
1AA	—	—	—		—	—

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection Item
1AB	Brake	Brake switch	Brake pedal depressed		B+	• Brake switch • Related wiring harness
			Brake pedal released		Below 1.0	
1AC	—	—	—		—	—
1AD	—	—	—		—	—
1AE	—	—	—		—	—
1AF	—	—	—		—	—
1AG	—	—	—		—	—
1AH	—	—	—		—	—
1AI	CAN (L)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AJ	—	—	—		—	—
1AK	MAF	MAF sensor	Ignition switch to the ON position		Approx. 0.7	• MAF sensor • Related wiring harness
			Idle (after warm up)		Approx. 1.5	
1AL	Constant voltage (Vref)	APP sensor	Ignition switch to the ON position		Approx. 5.0	• Related wiring harness
1AM	CAN (H)	Instrument cluster, ABS HU/CM, EHPAS control module	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			• Related wiring harness
1AN	—	—	—		—	—
1AO	APP sensor 2	APP sensor	• Inspect using the wave profile.			• APP sensor • Related wiring harness
1AP	APP sensor 1	APP sensor	Ignition switch to the ON position	When the accelerator pedal is depressed	Approx. 3.0	• APP sensor • Related wiring harness
				When the accelerator pedal is released	Approx. 0.4	
1AQ	Cruise control switch	Cruise control switch	Ignition switch to the ON position	ON/OFF switch pressed in	Approx. 0	• Cruise control switch • Related wiring harnesses
				CANCEL switch pressed in	Approx. 1.1	
				SET/COAST switch pressed in	Approx. 3.1	
				RES/ACCEL switch pressed in	Approx. 4.2	
				Except above	Approx. 5	
1AR	Sensor GND	MAF sensor	Under any condition		Below 1.0	• Related wiring harness
1AS	—	—	—		—	—

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1AT	IAT	MAF/IAT sensor	Ignition switch to the ON position	IAT 0 °C (32 °F)	Approx. 3.43	• IAT sensor • Related wiring harness
				IAT 20 °C (68 °F)	Approx. 2.38	
				IAT 40 °C (104 °F)	Approx. 1.49	
				IAT 60 °C (140 °F)	Approx. 0.89	
				IAT 80 °C (176 °F)	Approx. 0.53	
				IAT 100 °C (212 °F)	Approx. 0.33	
1AU	A/C on signal	Refrigerant pressure switch (high and low)	Idle	A/C switch and fan switch on	Below 1.0	• Refrigerant pressure switch • Related wiring harness
1AV	Sensor GND	IAT sensor, APP sensor	Under any condition		Below 1.0	• Related wiring harness
1AW	—	—	—		—	—
1AX	Drive-by-wire relay control	Drive-by-wire relay	Ignition switch off		B+ → Below 1.0	• Drive-by-wire relay • Related wiring harness
			Ignition switch to the ON position		Below 1.0	
1AY	Ignition switch	Ignition switch	Ignition switch off		Below 1.0	• Related wiring harness
			Ignition switch to the ON position		B+	
1AZ	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BA	Back-up power supply	Battery (positive terminal)	Under any condition		B+	• Battery • Related wiring harness
1BB	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BC	—	—	—		—	—
1BD	GND	GND	Under any condition		Below 1.0	• Related wiring harness
1BE	B+	Main relay	Ignition switch off after 15 min		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	
1BF	B+	Drive-by-wire relay	Ignition switch off		Below 1.0	• Battery • Related wiring harness
			Ignition switch to the ON position		B+	
1BG	—	—	—		—	—
1BH	GND	GND	Under any condition		Below 1.0	• Related wiring harness
2A	Throttle actuator control (+)	Throttle actuator	Ignition switch to the ON position		B+	• Throttle actuator • Related wiring harness
2B	Throttle actuator control (–)	Throttle actuator	Idle (after warm up)		Approx. 3.5—5.5	• Throttle actuator • Related wiring harness
2C	Purge control	Purge solenoid valve	• Inspect using the wave profile.			• Purge solenoid valve • Related wiring harness
2D	—	—	—		—	—
2E	OCV control	OCV	• Inspect using the wave profile.			• OCV valve • Related wiring harness
2F	—	—	—		—	—
2G	EGR valve #2 coil control	EGR valve (terminal A)	Ignition switch to the ON position		B+	• EGR valve • Related wiring harness
			Idle		B+	

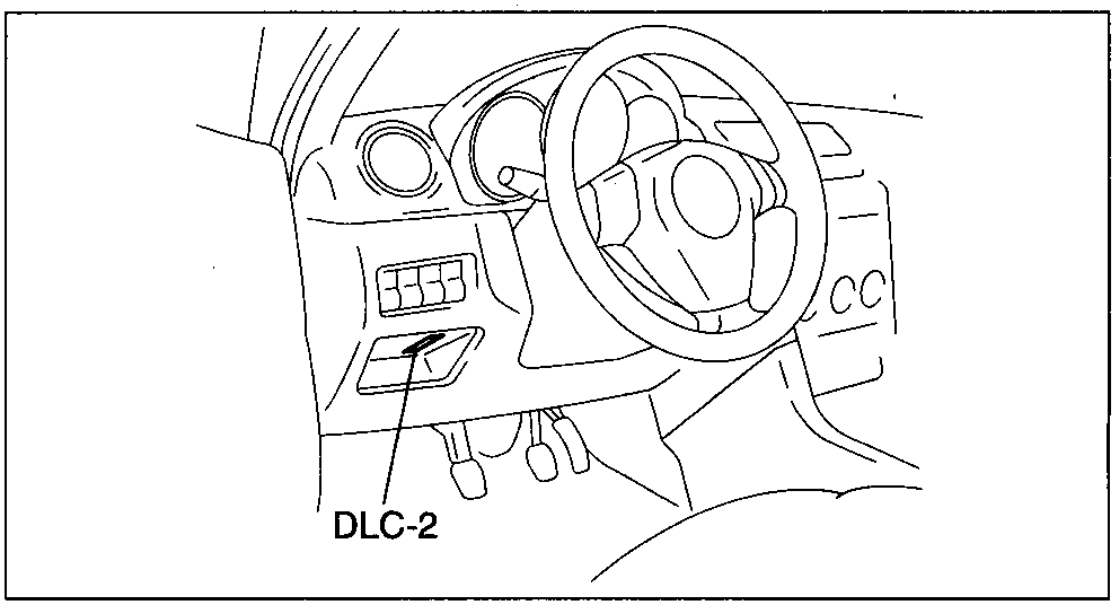
Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
2H	EGR valve #4 coil control	EGR valve (terminal F)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2I	Variable tumble control	Variable tumble solenoid valve	ECT above 62 °C (143 °F) while idling.	B+	• Variable tumble solenoid valve • Related wiring harness
			ECT below 63 °C (145 °F) and engine speed below 3,750 rpm	Below 1.0	
2J	Variable intake air control	Variable intake air solenoid valve	Ignition switch to the ON position	Below 1.0	• Variable intake air solenoid valve • Related wiring harness
			Engine speed: below 4,750 rpm [LF]/4,600 rpm [L3]	Below 1.0	
			Engine speed: above 4,750 rpm [LF]/4,600 rpm [L3]	B+	
2K	EGR valve #1 coil control	EGR valve (terminal E)	Ignition switch to the ON position	Below 1.0	• EGR valve • Related wiring harness
			Idle	Below 1.0	
2L	EGR valve #3 coil control	EGR valve (terminal B)	Ignition switch to the ON position	B+	• EGR valve • Related wiring harness
			Idle	B+	
2M	—	—	—	—	—
2N	—	—	—	—	—
2O	—	—	—	—	—
2P	Sensor GND	Variable tumble shutter valve switch, ECT sensor, MAP sensor, HO2S (middle, rear)	Under any condition	Below 1.0	• Variable tumble shutter valve switch • ECT sensor • MAP sensor • HO2S (middle, rear) • Related wiring harness
2Q	Rear HO2S	HO2S (rear)	Ignition switch to the ON position	Approx. 0	• HO2S (rear) • Related wiring harness
			Idle (after warm up)	Alternates between 0 and 1.0	
2R	—	—	—	—	—
2S	CMP	CMP sensor	• Inspect using the wave profile.		• CMP sensor • Related wiring harness
2T	—	—	—	—	—
2U	Knocking (+)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)	Approx. 4.3	• KS • Related wiring harness
2V	Knocking (–)	KS	Ignition switch to the ON position (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)	Below 1.0	• KS • Related wiring harness
2W	CKP	CKP sensor	• Inspect using the wave profile.		• CKP sensor • Related wiring harness
2X	GND (shield)	KS harness, HO2S (front, middle, rear) harness, GND	Under any condition	Below 1.0	• Related wiring harness
2Y	—	—	—	—	—
2Z	HO2S (front) power supply	HO2S (front)	Idle (after warm up)	Approx. 4.1	• HO2S (front) • Related wiring harness
2AA	—	—	—	—	—

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
2AB	—	—	—		—	—
2AC	HO2S (front) VSIP	HO2S (front)	Idle (after warm up)		Approx. 4.0	• HO2S (front) • Related wiring harness
2AD	HO2S (front) IP+	HO2S (front)	When the engine speed is increased, the voltage increased.			• HO2S (front) • Related wiring harness
2AE	Variable tumble shutter valve monitor	Variable tumble shutter valve switch	ECT above 63 °C (145 °F) while idling.		B+	• Variable tumble shutter valve switch • Related wiring harness
			ECT below 63 °C (145 °F) and engine speed below 3,750 rpm		Below 1.0	
2AF	—	—	—		—	—
2AG	Manifold absolute pressure	MAP sensor	Ignition switch to the ON position (at sea level)		Approx. 4.1	• MAP sensor • Related wiring harness
			Idle		Approx. 1.4	
2AH	ECT	ECT sensor	Ignition switch to the ON position	IAT 20 °C (68 °F)	3.04—3.14	• ECT sensor • Related wiring harness
				IAT 40 °C (104 °F)	2.09—2.21	
				IAT 60 °C (140 °F)	1.29—1.39	
				IAT 80 °C (176 °F)	0.76—0.83	
				IAT 100 °C (212 °F)	0.45—0.49	
2AI	Generator field coil control	Generator (terminal D)	• Inspect using the wave profile.			• Following PIDs: IAT, ECT, RPM, VPWR, ALTT V • Generator • Related wiring harness
2AJ	Generator output voltage	Generator (terminal P)	• Inspect using the wave profile.			• Generator • Related wiring harness
2AK	TP (No. 1)	TP sensor No. 1	Ignition switch to the ON position	APP closed	0.53—1.00	• TP sensor • Related wiring harness
				APP open	4.25—4.75	
2AL	TP (No. 2)	TP sensor No. 2	Ignition switch to the ON position	APP closed	4.00—4.47	• TP sensor • Related wiring harness
				APP open	0.25—0.75	
2AM	Constant voltage (Vref)	CMP sensor	Ignition switch to the ON position		B+	• CMP sensor • Related wiring harness
2AN	—	—	—		—	—
2AO	Constant voltage (Vref)	TP sensor	Ignition switch to the ON position		Approx. 5.0	• TP sensor • Related wiring harness
2AP	Sensor GND	TP sensor	Under any condition		Below 1.0	• TP sensor • Related wiring harness
2AQ	Constant voltage (Vref)	CKP sensor	Ignition switch to the ON position		B+	• CKP sensor • Related wiring harness
2AR	Constant voltage (Vref)	MAP sensor, variable tumble shutter valve switch	Ignition switch to the ON position		Approx. 5.0	• MAP sensor • Variable tumble shutter valve switch • Related wiring harness

Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
2AS	—	—	—	—	—
2AT	IGT4	Ignition coil (No.4 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2AU	—	—	—	—	—
2AV	—	—	—	—	—
2AW	IGT2	Ignition coil (No.2 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2AX	IGT3	Ignition coil (No.3 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2AY	—	—	—	—	—
2AZ	Fuel injection (#4)	Fuel injector No.4	• Inspect using the wave profile.		• Fuel injector No.4 • Related wiring harness
2BA	IGT1	Ignition coil (No.1 cylinders)	• Inspect using the wave profile.		• Ignition coil • Related wiring harness
2BB	Fuel injection (#1)	Fuel injector No.1	• Inspect using the wave profile.		• Fuel injector No.1 • Related wiring harness
2BC	Fuel injection (#2)	Fuel injector No.2	• Inspect using the wave profile.		• Fuel injector No.2 • Related wiring harness
2BD	Fuel injection (#3)	Fuel injector No.3	• Inspect using the wave profile.		• Fuel injector No.3 • Related wiring harness
2BE	Rear HO2S heater control	HO2S (Rear) heater	• Inspect using the wave profile.		• HO2S (Rear) heater • Related wiring harness
2BF	—	—	—	—	—
2BG	Front HO2S heater control	HO2S (Front) heater	• Inspect using the wave profile.		• HO2S (Front) heater • Related wiring harness
2BH	—	—	—	—	—

*1 : ATX
*2 : MTX

KOEO/KOER Self Test (Article 1368616)



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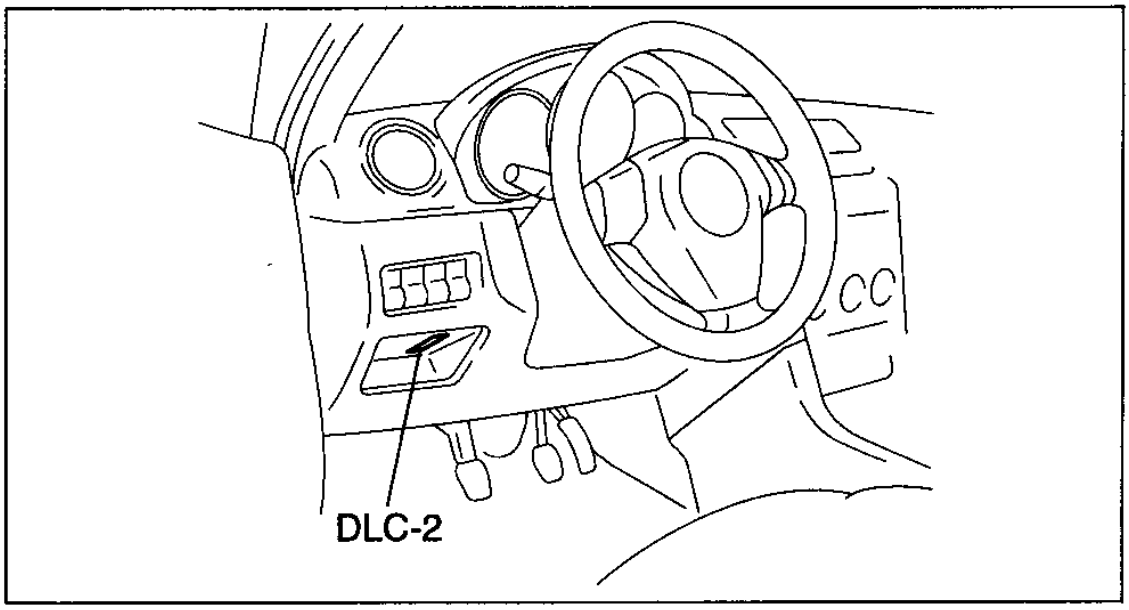
PID/Data Monitor and Record Procedure (Article 1447453)



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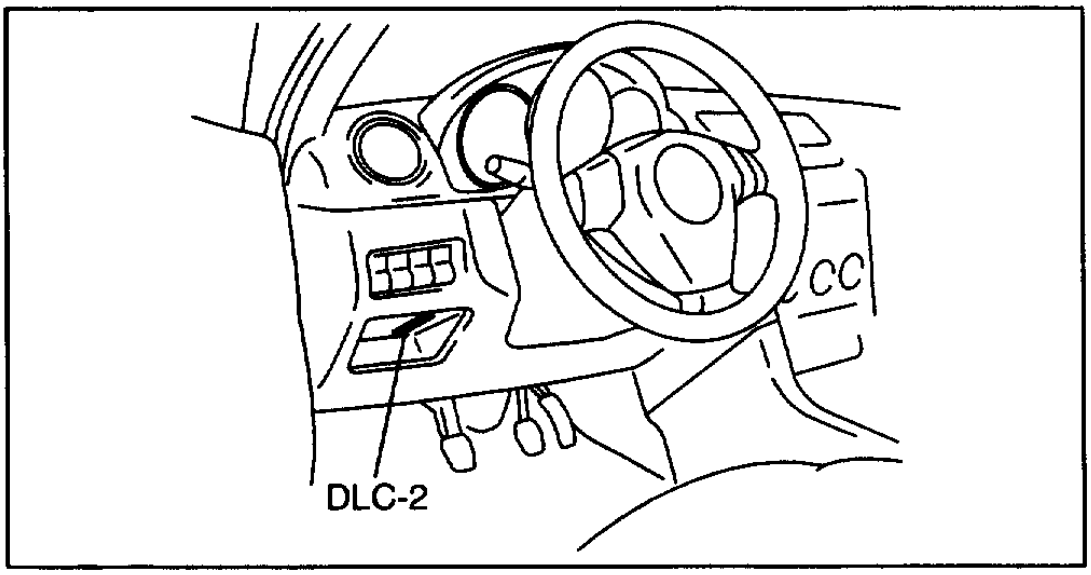
Using SST (M-MDS) (Article 1447471)



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Quick Diagnostic Chart (Article 1430359)

X: Applicable

Troubleshooting Item			Possible factor	Starter motor malfunction (Mechanical or electrical)	Starter circuit including ignition switch is open.	Starter interlock switch malfunction (MTX)	Improper engine oil level	Low or dead battery	Charging system malfunction	Improper engine compression	Improper valve timing	Hydrolocked engine	Improper engine oil viscosity	Improper dipstick	Base engine malfunction	Drive plate or flywheel are seized.	Improper tension or damaged drive belts	Improper engine coolant level	Water and anti-freeze mixture is improper.	Cooling system malfunction (Radiator, hoses/overflow valve, thermostat, etc.)	Clogged fuel system malfunction	Engine or transaxle mounts are improperly installed.	Cooling fan assist is improper.	Cruise control system operation improperly	Fuel quality
1	Melting of main or other fuses																							
2	MIL illuminates																							
3	Will not crank			x	x	x		x	x			x				x								
4	Hard to start/long crank/erratic start/erratic crank			x																				x
5	Engine stalls.	After start/at idle								x	x													x
6	Cranks normally but will not start									x	x													x
7	Slow return to idle																		x					
8	Engine runs rough/rolling idle									x	x													x
9	Fast idle/runs on																						x	
10	Low idle/stalls during deceleration																						x	
11	Engine stalls/quits.	Acceleration/cruise								x	x												x	x
	Engine runs rough.	Acceleration/cruise								x	x													x
	Misses	Acceleration/cruise								x	x													x
	Buck/jerk	Acceleration/cruise/deceleration								x	x													x
	Hesitation/stumble	Acceleration								x	x													x
	Surges	Acceleration/cruise								x	x													x
12	Lack/loss of power	Acceleration/cruise								x	x													x
13	Knocking/pinging	Acceleration/cruise								x										x				
14	Poor fuel economy									x	x									x	x			x
15	Emission compliance									x	x				x					x				
16	High oil consumption/leakage												x	x	x									
17	Cooling system concerns	Overheating														x	x	x	x	x				
18	Cooling system concerns	Runs cold																	x	x				
19	Exhaust smoke									x					x				x					
20	Fuel odor (in engine compartment)																							
21	Engine noise					x									x		x							
22	Vibration concerns (engine)																x				x	x		
23	A/C does not work sufficiently.																							
24	A/C is always on or A/C compressor runs continuously.																							
25	A/C is not cut off under WOT conditions.																						x	
26	Exhaust sulfur smell																							x
27	Fuel refill concerns																							
28	Fuel filling shut off issues																							
29	Spark plug condition									x														
30	ATX concerns	Upshift/downshift engagement	See TROUBLESHOOTING																					

X: Applicable

Troubleshooting item			Possible factor: Variable valve timing system malfunction	Variable tumble system malfunction	Engine overheating	Air cleaner element clogging or restriction	Air leakage from intake air system (Loose tubes,cracks, gaskets leakage)	Intake air temperature is too hot	Idle learning of electronic throttle control system is not completed	Electronic throttle control improper operation	Throttle body malfunction	Variable intake-air system malfunction	Vacuum leakage (Vacuum hose damage, misrouting)	Ignition coil malfunction (e.g. open, short or crack)	Improper ignition timing misadjustment (CKP sensor &crankshaft pulley misadjustment)	Spark plug malfunction	Erratic signal to ignition coil	CKP sensor is damaged. (e.g. open or short circuits)	Crankshaft pulley is damaged	Improper gap between CKP sensor and crankshaft	Fuel pump malfunction (Mechanically or electrically)	Pressure regulator malfunction	Fuel hoses restriction or clogging
1	Melting of main or other fuses																						
2	MIL illuminates		x	x						x		x						x					
3	Will not crank																						
4	Hard to start/long crank/erratic start/erraticocrank					x	x			x			x			x	x	x	x	x	x	x	x
5	Engine stalls.	After start/at idle	x		x	x	x			x			x	x	x	x	x	x	x	x	x	x	x
6	Cranks normally but will not start		x		x	x	x			x			x	x	x	x	x	x	x	x	x	x	x
7	Slow return to idle										x												
8	Engine runs rough/rolling idle		x		x	x	x		x	x			x		x	x	x	x	x	x	x	x	x
9	Fast idle/runs on						x			x	x												
10	Low idle/stalls during deceleration						x			x			x										
11	Engine stalls/quits.	Acceleration/cruise		x	x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Engine runs rough.	Acceleration/cruise		x	x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Misses	Acceleration/cruise		x	x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Buck/jerk	Acceleration/cruise/ deceleration		x	x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Hesitation/stumble	Acceleration		x	x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Surges	Acceleration/cruise		x	x	x	x			x	x		x			x	x	x	x	x	x	x	x
12	Lack/loss of power	Acceleration/cruise	x	x	x	x	x	x		x	x	x	x			x	x	x	x	x	x	x	x
13	Knocking/pinging	Acceleration/cruise			x																	x	x
14	Poor fuel economy		x	x		x								x			x	x				x	
15	Emission compliance					x	x					x				x	x					x	x
16	High oil consumption/leakage																						
17	Cooling system concerns	Overheating																					
18	Cooling system concerns	Runs cold																					
19	Exhaust smoke					x								x			x	x				x	x
20	Fuel odor (in engine compartment)																					x	
21	Engine noise						x						x										
22	Vibration concerns (engine)																						
23	A/C does not work sufficiently.																						
24	A/C is always on or A/C compressor runs continuously.																						
25	A/C is not cut off under WOT conditions.																						
26	Exhaust sulfur smell												x									x	x
27	Fuel refill concerns																						
28	Fuel filling shut off issues																						
29	Spark plug condition					x											x	x				x	x
30	ATX concerns	Upshift/downshift engagement	See TROUBLESHOOTING																				

X: Applicable

Troubleshooting item			Possible factor: Injectors malfunction (Leakage or clogging, Inoperative)	Fuel leakage from fuel system (including Fuel delivery pipe, O-ring)	Fuel filters restriction or clogging	CMP sensor is damaged. (e.g. open or short circuit)	Camshaft is damaged	Improper air/fuel mixture ratio control	Exhaust system restriction or clogging	Catalytic converter malfunction	EGR system malfunction	EVAP control system malfunction	Fuel-filler cap malfunction	Fuel into evaporative purge hose	Check valve (two-way) malfunction	PCV valve malfunction	Constant voltage supply circuit malfunction	Main relay malfunction (Mechanically or electrically)	PCM or sensor GND circuit open or short	ECT sensor malfunction	TR switch misadjustment (ATX)	TR switch malfunction (ATX)	Brake switch and related circuit malfunction	Manifold absolute pressure sensor and related circuit malfunction	HO2S and related circuit malfunction
1	Melting of main or other fuses																								
2	MIL illuminates					x		x												x	x		x	x	x
3	Will not crank																				x	x			
4	Hard to start/long crank/erratic start/erraticcrank				x	x	x	x	x		x	x				x				x					x
5	Engine stalls.	After start/at idle	x	x		x	x	x	x		x	x				x		x							x
6	Cranks normally but will not start		x	x				x	x		x	x				x	x	x							x
7	Slow return to idle																			x					
8	Engine runs rough/rolling idle		x		x	x	x	x	x		x	x				x				x					x
9	Fast idle/runs on																			x					
10	Low idle/stalls during deceleration							x				x										x	x		x
11	Engine stalls/quits.	Acceleration/cruise	x		x	x	x	x	x		x	x	x	x	x	x								x	x
	Engine runs rough.	Acceleration/cruise	x		x	x	x	x	x		x	x	x	x	x	x								x	x
	Misses	Acceleration/cruise	x		x	x	x	x	x		x	x	x	x	x	x								x	x
	Buck/jerk	Acceleration/cruise/ deceleration	x		x	x	x	x	x		x	x	x	x	x	x								x	x
	Hesitation/stumble	Acceleration	x		x	x	x	x	x		x	x	x	x	x	x								x	x
	Surges	Acceleration/cruise	x		x	x	x	x	x		x	x	x	x	x	x								x	x
12	Lack/loss of power	Acceleration/cruise	x			x	x		x		x	x				x									
13	Knocking/pinging	Acceleration/cruise				x														x					
14	Poor fuel economy				x	x	x		x							x									
15	Emission compliance				x	x	x	x	x	x	x	x				x									x
16	High oil consumption/leakage															x									
17	Cooling system concerns	Overheating																							
18	Cooling system concerns	Runs cold																							
19	Exhaust smoke		x		x											x									
20	Fuel odor (in engine compartment)			x								x													
21	Engine noise																								
22	Vibration concerns (engine)																								
23	A/C does not work sufficiently.																								
24	A/C is always on or A/C compressor runs continuously.																								
25	A/C is not cut off under WOT conditions.																								
26	Exhaust sulfur smell				x							x													
27	Fuel refill concerns											x													
28	Fuel filling shut off issues											x													
29	Spark plug condition		x	x				x	x			x								x					x
30	ATX concerns	Upshift/downshift engagement	See TROUBLESHOOTING																						

X: Applicable

No.	Troubleshooting Item		Possible factor	IAT sensor and related circuit malfunction	Barometric pressure sensor malfunction	Mass or volume airflow sensor and related circuitmalfunction (MTX)	MAF sensor and related circuit malfunction	Knock sensor and related circuitmalfunction	TP sensor and related circuit malfunction	Accelerator pedal position sensor and related circuitmalfunction	EHPAS and related circuit malfunction	Improper refrigerant charging amount	A/C relay (A/C control signal circuit malfunction)	A/C compressor magnetic clutch malfunction	Condenser fan system malfunction	Improper fuel grade	Clutch slippage (MTX)	ATX related parts malfunction (ATX)	VSS and related circuit malfunction	Improper ATF level (ATX)	Brake dragging	Loose parts	Improper balance of wheels and tires	Drive line malfunction	Suspension malfunction	Immobilizer system operating (if equipped)	Immobilizer system or related circuit malfunction (if equipped)
1	Melting of main or other fuses																										
2	MIL illuminates			x	x	x	x	x	x		x								x								
3	Will not crank																									x	x
4	Hard to start/long crank/erratic start/erraticcrank						x																				
5	Engine stalls.	After start/at idle			x							x	x													x	x
6	Cranks normally but will not start																									x	x
7	Slow return to idle																										
8	Engine runs rough/rolling idle				x						x	x	x		x	x											
9	Fast idle/runs on															x											
10	Low idle/stalls during deceleration					x	x		x	x			x	x													
11	Engine stalls/quits.	Acceleration/cruise		x			x		x	x		x	x				x	x									
	Engine runs rough.	Acceleration/cruise		x			x		x	x		x	x				x	x									
	Misses	Acceleration/cruise					x		x	x		x	x				x	x									
	Buck/jerk	Acceleration/cruise/ deceleration					x		x	x		x	x				x	x									
	Hesitation/stumble	Acceleration		x			x		x	x		x	x				x	x									
	Surges	Acceleration/cruise					x		x	x		x	x				x	x									
12	Lack/loss of power	Acceleration/cruise					x		x	x		x	x				x	x	x								
13	Knocking/pinging	Acceleration/cruise		x			x	x																			
14	Poor fuel economy						x										x			x	x						
15	Emission compliance																										
16	High oil consumption/leakage																										
17	Cooling system concerns	Overheating										x	x		x												
18	Cooling system concerns	Runs cold													x												
19	Exhaust smoke																										
20	Fuel odor (in engine compartment)																										
21	Engine noise																					x					
22	Vibration concerns (engine)																					x	x	x	x		
23	A/C does not work sufficiently.											x	x	x													
24	A/C is always on or A/C compressor runs continuously.												x	x													
25	A/C is not cut off under WOT conditions.									x																	
26	Exhaust sulfur smell																										
27	Fuel refill concerns																										
28	Fuel filling shut off issues																										
29	Spark plug condition						x																				
30	ATX concerns	Upshift/downshift engagement		See TROUBLESHOOTING																							

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Symptom Troubleshooting Chart - Engine Driveability (Article 1386891)

SYMPTOM DIAGNOSTIC INDEX [LF, L3]

- Confirm trouble symptom using the following diagnostic index, then go to appropriate troubleshooting chart.

Diagnostic Index

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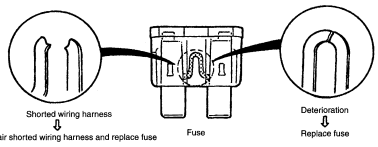
No.	TROUBLESHOOTING ITEM		DESCRIPTION
1	Melting of main or other fuses		—
2	MIL illuminates		The MIL is illuminated incorrectly.
3	Will not crank		The starter does not work.
4	Hard to start/long crank/erratic start/ erratic crank		The starter cranks the engine at normal speed but the engine requires excessive cranking time before starting.
5	Engine stalls.	After start/at idle	The engine stops unexpectedly at idle and/or after start or both.
6	Cranks normally but will not start		The starter cranks engine at normal speed but the engine will not run.
7	Slow return to idle		The engine takes more time than normal to return to idle speed.
8	Engine runs rough/rolling idle		The engine speed fluctuates between the specified idle speed and lower speed and the engine shakes excessively.
9	Fast idle/runs on		The engine speed continues at fast idle after warm-up. The engine runs after the ignition switch is turned off.
10	Low idle/stalls during deceleration		The engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.
11	Engine stalls/quits.	Acceleration/cruise	The engine stops unexpectedly at the beginning of acceleration or during acceleration. The engine stops unexpectedly while cruising.
	Engine runs rough.	Acceleration/cruise	The engine speed fluctuates during acceleration or cruising.
	Misses	Acceleration/cruise	The engine misses during acceleration or cruising.
	Buck/jerk	Acceleration/cruise/ deceleration	The vehicle bucks/jerks during acceleration, cruising, or deceleration.
	Hesitation/stumble	Acceleration	A momentary pause at the beginning of acceleration or during acceleration.
	Surges	Acceleration/cruise	A momentary minor irregularity in engine output.
12	Lack/loss of power	Acceleration/cruise	The performance is poor under load (such as power down when climbing hills).
13	Knocking/pinging	Acceleration/cruise	Sound is produced when the air/fuel mixture is ignited by something other than the spark plug (such as hot spot in combustion chamber).

No.	TROUBLESHOOTING ITEM		DESCRIPTION
14	Poor fuel economy		The fuel economy is unsatisfactory.
15	Emission compliance		Fails emissions test.
16	High oil consumption/leakage		The oil consumption is excessive.
17	Cooling system concerns	Overheating	The engine runs at higher than normal temperature/overheats.
18	Cooling system concerns	Runs cold	The engine does not reach normal operating temperature.
19	Exhaust smoke		Blue, black, or white smoke from exhaust system
20	Fuel odor (in engine compartment)		Gasoline fuel smell or visible leakage
21	Engine noise		Engine noise from under hood
22	Vibration concerns (engine)		Vibration from under hood or driveline
23	A/C does not work sufficiently.		The A/C compressor magnetic clutch does not engage when A/C is turned on.
24	A/C is always on or A/C compressor runs continuously.		The A/C compressor magnetic clutch does not disengage.
25	A/C is not cut off under WOT conditions.		The A/C compressor magnetic clutch does not disengage under wide open throttle.
26	Exhaust sulphur smell		Rotten egg smell (sulphur) from exhaust
27	Fuel refill concerns		The fuel tank does not fill smoothly.
28	Fuel filling shut off issues		The fuel does not shut off properly.
29	Spark plug condition		An incorrect spark plug condition.
30	ATX concerns	Upshift/downshift engagement	ATX concerns not related to engine performance.

No. 1 Melting of Main or Other Fuses (Article 1445513)

1	MELTING OF MAIN OR OTHER FUSES

[TROUBLESHOOTING HINTS]
Inspect condition of fuse.



Damaged fuse	Related wiring harness
MAIN	**MAIN fuse** • Generator • Starter
ENGINE	**ENGINE fuse** • Main Relay — ENG BAR1 fuse — ENG BAR2 fuse — ENG BAR3 fuse — ENG BAR4 fuse (California emission regulation applicable model) — EGI INJ fuse
ENG BAR1	**ENG BAR1 fuse** • PCM (4EAT) • Purge solenoid valve • Variable intake-air solenoid valve • EGR valve • Variable tumble solenoid valve • OCV • MAF/IAT sensor • VSS (4EAT) • Accelerator pedal position sensor • EVAP system leak detection pump • ET control relay
ENG BAR2	**ENG BAR2 fuse** • PCM
ENG BAR3	**ENG BAR3 fuse** • Front HO2S heater (California emission regulation applicable model) • Middle HO2S heater (California emission regulation applicable model) • Rear HO2S heater (except for California emission regulation applicable model)
ENG BAR4 (California emission regulation applicable model)	**ENG BAR4 fuse** • Rear HO2S heater (California emission regulation applicable model)
EGI INJ	**EGI INJ fuse** • Front HO2S heater (except for California emission regulation applicable model) • Fuel injectors
IG KEY1	**IG KEY1 fuse** • Ignition switch — ENGINE fuse (in PJB)
IG KEY2	**IG KEY2 fuse** • Ignition switch — BACK fuse (in PJB)

Damaged fuse	Related wiring harness
ENGINE (in PJB)	**ENGINE fuse (in PJB)** • PCM • Fuel pump relay • Ignition coils • Condenser
STARTER	**STARTER fuse** • Starter relay — Starter
ENG+B	**ENG+B fuse** • PCM
BTN	**BTN fuse** • OBD fuse (in PJB)
OBD (in PJB)	**OBJ fuse (in PJB)** • DLC-2
F/PUMP	**F/PUMP fuse** • Fuel pump relay • ET control relay
FAN	**FAN fuse** • FAN control module
BACK (in PJB)	**BACK fuse (in PJB)** • TR switch

No. 2 MIL Illuminates (Article 1445514)

NO.2 MIL ILLUMINATES [LF, L3]

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2	MIL ILLUMINATES
DESCRIPTION	The MIL is illuminated incorrectly.
POSSIBLE CAUSE	• The PCM illuminates for emission-related concern (DTC is stored in PCM) • Instrument cluster malfunction **Note** • If the MIL blinks at steady rate, misfire condition could possibly exist.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** • Go to appropriate the DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** • Inspect instrument cluster operation.
2	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 3 Will Not Crank (Article 1445515)

3	WILL NOT CRANK
DESCRIPTION	The starter does not work.
POSSIBLE CAUSE	• Open starter circuit between ignition switch and starter • TR switch malfunction (ATX) • TR switch misadjustment (ATX) • Low or dead battery • Charging system malfunction. • Starter interlock switch malfunction (MTX) • Starter malfunction • Seized/hydrolocked engine, flywheel (MTX) or drive plate (ATX) • Immobilizer system and/or circuit malfunction (if equipped) • Immobilizer system operating properly. (Ignition key is not registered) (if equipped)

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**Note** • The following test should be performed for vehicles with immobilizer system. Go to Step 8 for vehicles without immobilizer system. Connect the M-MDS to the DLC-2. Do the following conditions appear? • The engine is not completely started. • DTC P1260 is displayed.	Yes	**Both conditions appear:** Go to Step 4.
		No	**Either or other condition appears:** Go to the next step.
2	Is the coil antenna connector securely connected to the coil antenna?	Yes	Go to the next step.
		No	Connect the coil antenna connector securely. Return to Step 1.
3	Does the security light flash?	Yes	Go to the next step.
		No	Inspect instrument cluster and wiring harness.
4	Connect the M-MDS to the DLC-2 and retrieve DTC. **DTC** **B1213, B2139, B2141, B1600, B1601, B1602, B1681, B2103, B2431, U2510**	Yes	Go to appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	Go to the next step.
5	Inspect for the following wiring harnesses and connectors: • Between coil antenna terminal A and instrument cluster terminal 2O • Between coil antenna terminal B and instrument cluster terminal 2S Is there any malfunction?	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step.
6	Inspect for the following wiring harnesses and connectors: • Between PCM terminal 1AI and instrument cluster terminal 1I • Between PCM terminal 1AM and instrument cluster terminal 1K Is there any malfunction?	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step.
7	Inspect the following: • Battery connection • Battery condition • Fuses (See NO.1 MELTING OF MAIN OR OTHER FUSES [LF, L3].) • Transmission in Park or Neutral (ATX) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 7.
8	Is clicking sound heard from starter relay when the ignition switch is turned to START?	Yes	Go to Step 13.
		No	ATX: Go to the next step. MTX: Go to STEP 10.
9	Connect the M-MDS to the DLC-2. Turn ignition switch to the ON position. (Engine off) Access TR PID. Is TR PID indicated P/N when selecting P or N position	Yes	Go to Step 11.
		No	Inspect TR switch is adjusted properly, inspect for open or short circuit between TR switch and TCM. Repair or replace components as required. Then repeat step 8.
10	INSPECT STARTER INTERLOCK SWITCH Inspect the starter interlock switch Is starter interlock switch normal?	Yes	Go to the next step.
		No	Inspect starter interlock switch and related wiring harnesses. Repair or replace components as required. Then repeat step 8.

STEP	INSPECTION	RESULTS	ACTION
11	Inspect the starter relay and following harnesses. Between starter relay and PCM Between starter relay and ignition switch Are they normal?	Yes	Go to the next step.
		No	Repair or replace components as required. Then repeat step 8
12	Inspect IGNITION switch and related harnesses. Are they normal?	Yes	Go to the next step.
		No	Repair or replace components as required, Then repeat step 8
13	Inspect the following harnesses. Between starter relay and Battery Between starter relay and starter Are they normal?	Yes	Go to the next step.
		No	Repair or replace as required. Then go to next step.
14	Inspect the starting system. Is starting system normal?	Yes	Go to the next step.
		No	Repair or replace components as required.
15	Inspect for seized/hydro locked engine or flywheel. Is ENGINE seized or hydro locked?	Yes	Repair or replace components as required.
		No	Go to the next step.
16	Connect the M-MDS to the DLC-2. Retrieve any continuous memory DTCs. Are there any continuous memory DTCs displayed?	Yes	**DTC is displayed:** • Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].) **Communication error message is displayed:** • Inspect for following: — Open circuit in wiring harness between main relay and PCM terminal 1BE or 1BG*3, 1O*4, 1A*5 (ATX) — Open circuit in wiring harness between main relay terminal E and PCM terminal 1Q*1, 1AT*2 — Main relay is stuck open — Open or short circuit in wiring harness between the DLC-2 and PCM terminals 1AM or 1AI — Open or poor GND circuit (PCM terminal 1BD*1, 1AZ*2, 1BB, 1AZ*1, 1BD*2 or 1BH) — Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.
17	Retrieve any KOEO DTCs using M-MDS. Are there DTCs displayed during KOEO inspection?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
18	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model and Except for California emission regulation applicable LF MTX model
*2 : Except for California emission regulation applicable LF ATX, L3 model
*3 : California emission regulation applicable LF ATX model
*4 : California emission regulation applicable L3 ATX model and Except for California emission regulation applicable L3 ATX model
*5 : Except for California emission regulation applicable LF ATX model

No. 4 Hard to Start/Long Crank/Erratic Start/Erratic Crank (Article 1445516)

4	HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK
DESCRIPTION	• The starter cranks engine at normal speed but engine requires excessive cranking time before starting. • The battery is in normal condition.
POSSIBLE CAUSE	• Erratic signal to ignition coil • Vacuum leakage • Poor fuel quality • Starting system malfunction • Spark plug malfunction • Air leakage from intake-air system • Erratic signal from CKP sensor • Erratic signal from CMP sensor • Improper air/fuel mixture ratio control • Air cleaner restriction • Improper operation of electronic throttle control system • PCV valve malfunction • Inadequate fuel pressure • Purge solenoid valve malfunction • MAF sensor contamination • Incorrect MAF sensor GND voltage • Restriction in exhaust system • EGR valve malfunction • Pressure regulator malfunction (built-in fuel pump unit) **Warning** **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described.** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: • Vacuum leakage • Proper fuel quality (such as proper octane, contamination, winter/summer blend) • Loose bands on intake-air system • Cracks on intake-air system parts • Intake-air system restriction (such as air cleaner element, fresh air duct.) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
3	Is engine overheating?	Yes	Go to symptom troubleshooting "No.17 Cooling system concerns – Overheating". (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF, L3].)
		No	Go to the next step.
4	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.

STEP	INSPECTION	RESULTS	ACTION
5	Inspect the spark plug conditions. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect for fuel leakage from fuel injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
6	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are the CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
7	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
8	Attempt to start engine at part throttle. Does engine run smoothly at part throttle?	Yes	Inspect the electronic throttle control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].)
		No	Go to the next step.
9	Install the fuel pressure gauge between the fuel pipe and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch ON?	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and the fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
10	Is the fuel line pressure held after ignition switch is turned off?	Yes	Go to the next step.
		No	Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit.
11	Disconnect a vacuum hose from purge solenoid valve and plug opening end of vacuum hose. Start engine. Is starting condition improved?	Yes	Inspect if the purge solenoid valve is stuck open.
		No	Go to the next step.
12	Inspect the MAF sensor for following: • Contamination • MAF sensor terminal B voltage (GND circuit) Is there any contamination?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
13	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
14	Inspect engine condition while tapping EGR valve housing. Does engine condition improve?	Yes	Replace the EGR valve.
		No	Go to the next step.
15	Inspect the starting system. Is starting system normal?	Yes	Inspect for loose connectors or poor terminal contact. If there is no malfunction, remove EGR valve and visually inspect for mechanically stuck EGR valve.
		No	Repair or replace components as required.
16	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, Replace the PCM.		

No. 5 Engine Stalls-After Start/At Idle (Article 1445517)

5	ENGINE STALLS—AFTER START/AT IDLE
DESCRIPTION	• Engine stops unexpectedly.
POSSIBLE CAUSE	• A/C system operation is improper • Air leakage from intake-air system parts • Purge solenoid valve malfunction • Improper operation of electronic throttle control system • EGR valve malfunction • No signal from CKP sensor due to sensor, related wire or wrong installation • Vacuum leakage • Engine overheating • Low engine compression • Erratic signal to ignition coil • Poor fuel quality • PCV valve malfunction • Air cleaner restriction • Restriction in exhaust system • Electrical connector disconnection • Open or short circuit in fuel pump body and related wiring harness • No battery power supply to PCM or poor GND • Inadequate fuel pressure • Fuel pump body mechanical malfunction • Fuel leakage from fuel injector • Fuel injector clogging • Ignition coil malfunction • Improper air/fuel mixture ratio control • Improper valve timing • Improper operation variable valve timing control system • Immobilizer system and/or circuit malfunction • Immobilizer system operating property. (Ignition key is not registered.) • Pressure regulator malfunction (built-in fuel pump unit) **Warning** **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual.** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**Note** • The following test should be perform for vehicles with immobilizer system. Go to Step 6 for vehicles without immobilizer system. Connect the M-MDS to the DLC-2. Do the following conditions appear? • The engine is not completely started. • DTC P1260 is displayed.	Yes	**Both conditions appear:** Go to Step 3.
		No	**Either or other condition appears:** Go to the next step.
2	Does the engine stall after **approx. 2 s** since the engine is started?	Yes	Go to the next step.
		No	Immobilizer system is normal. Go to Step 8.
3	Is coil connector securely connected to coil?	Yes	Go to the next step.
		No	Connect the coil connector securely. Return to Step 2.

STEP	INSPECTION	RESULTS	ACTION
4	Turn the ignition switch to the ON position. Does security light flush?	Yes	Go to the next step.
		No	Inspect the instrument cluster and wiring harness.
5	Connect the M-MDS to the DLC-2 and retrieve DTC. Are any of the following DTCs displayed? **DTC** **B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2141, B2431, U2510**	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	Go to the next step.
6	Inspect for the following wiring harnesses and connectors: • Between coil terminal A and instrument cluster terminal 2Q • Between coil terminal B and instrument cluster terminal 2S Are there any malfunctions?	Yes	Repair or replace the suspected wiring harness and connector.
		No	Go to the next step.
7	Inspect for the following wiring harnesses and connectors: • Between PCM terminal 1AI and instrument cluster terminal 1I • Between PCM terminal 1AM and instrument cluster terminal 1K Are there any malfunctions?	Yes	Repair or replace the suspected wiring harness and connector.
		No	Go to the next step.
8	Verify the following: • Vacuum connection • Air cleaner element • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold: EGR valve • Ignition wiring • Fuel quality: proper octane, contamination, winter/summer blend • Electrical connections • Smooth operation of throttle valve Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 8.
9	Connect the M-MDS to the DLC-2. Access the APP1 and APP2 PIDs. Crank the engine with accelerator pedal released. Are the APP1 and APP2 PIDs indicating that the accelerator pedal is in the released position?	Yes	Go to the next step.
		No	Inspect for the following: • APP sensor • Wiring harnesses and connectors for following: — PCM terminal $1AC^{*1}$, $1AL^{*2}$, $1AO^{*3}$ - APP sensor terminal E — PCM terminal $1AP^{*1}$, $1Y^{*2}$, $1AP^{*3}$ - APP sensor terminal B — PCM terminal $1AL^{*1}$, $1AW^{*2}$, $1AL^{*3}$ - APP sensor terminal A — PCM terminal $1AS^{*1}$, $1AA^{*2}$, $1AV^{*3}$ - APP sensor terminal C — Ignition switch terminal A - APP sensor terminal F — APP sensor terminal D - GND
10	Connect the M-MDS to the DLC-2. Access the TP PID. Crank the engine with accelerator pedal released. Are the TP PID indicates the closed throttle position?	Yes	Go to the next step.
		No	Inspect for the following: • TP sensor • Wiring harnesses and connectors for following: — PCM terminal $2AO^{*1}$, $2K^{*2}$, $2AO^{*3}$ - TP sensor terminal B — PCM terminal $2AK^{*1}$, $2M^{*2}$, $2AK^{*3}$ - TP sensor terminal A — PCM terminal $2AL^{*1}$, $2I^{*2}$, $2AL^{*3}$ - TP sensor terminal C — PCM terminal $2AP^{*1}$, $2O^{*2}$, $2AP^{*3}$ - TP sensor terminal D

STEP	INSPECTION	RESULTS	ACTION
11	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to appropriate DTC inspection. (See DTC TABLE [LF, L3].) **"Communication error" message is displayed:** Inspect for the following: • Open circuit in wiring harness between main relay and PCM terminal 1BE or 1A (ATX) • Open main relay GND circuit • Main relay is stuck open. • Open or short circuit in wiring harness between DLC and PCM terminals 1AM or 1AI • Open or poor GND circuit (PCM terminal 1AZ, 1BB, 1BC*2, 1BD, 1BG, 1BH, 2BB*1 or 2BC*1) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.
12	Attempt to start engine at part throttle. Does engine run smoothly at part throttle?	Yes	Inspect electronic throttle control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].)
		No	Go to the next step.
13	Connect the M-MDS to the DLC-2. Access RPM PID. Is RPM PID indicating engine speed during engine cranking?	Yes	Go to the next step.
		No	Inspect for the following: • Open or short circuit in CKP sensor • Open or short circuit in wiring harness between CKP sensor terminal C and PCM terminal 2AQ*1, 2T*2, 2AQ*3 • Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2W*1, 2U*2, 2W*3 • Open or short circuit in CKP sensor wiring harnesses If CKP sensor and wiring harness are normal, go to the next step.
14	Visually inspect CKP sensor and teeth of crankshaft pulley. Are CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
15	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.
16	Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is strong blue spark visible at each cylinder?	Yes	Go to the next step. If symptoms occurs with the A/C on, go to Step 23.
		No	Repair or replace the malfunctioning part according to spark test result.
17	Inspect the spark plug condition. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect for fuel leakage from injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install spark plugs on original cylinders. Go to the next step.
18	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
19	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
20	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch ON?	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
21	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. Is fuel line pressure held after ignition switch is turned off?	Yes	Go to the next step.
		No	Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit.
22	**Note** • The following test is for stall concerns with the A/C on. If other symptoms exist, go to the next step. Connect pressure gauges to A/C low and high pressure side lines. Turn A/C on and measure low side and high side pressures. Are pressures within specifications? (See REFRIGERANT PRESSURE CHECK.)	Yes	Go to the next step.
		No	If A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See NO.24 A/C IS ALWAYS ON/A/C COMPRESSOR RUNS CONTINUOUSLY [LF, L3].) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
23	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid side. Plug opening end of vacuum hose. Start the engine. Is the engine stall now eliminated?	Yes	Inspect if purge solenoid valve is stuck open. Inspect evaporative emission control system.
		No	Go to the next step.
24	Is air leakage felt or heard at intake-air system components while racing the engine to higher speed?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
25	Inspect the engine condition while tapping EGR valve housing. Does the engine condition improve?	Yes	Replace the EGR valve.
		No	Go to the next step.
26	Inspect variable valve timing control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does variable valve timing control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning parts according to variable valve timing control system operation inspection results.
27	Is the engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for cause.
28	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model with LF engine ATX
*3 : Except for California emission regulation applicable model with LF engine MTX and L3 engine

No. 6 Cranks Normally But Will Not Start (Article 1445518)

6	CRANKS NORMALLY BUT WILL NOT START
DESCRIPTION	• The starter cranks engine at normal speed but the engine will not run. • Refer to symptom troubleshooting "No.5 Engine stalls" if this symptom appears after engine stall. • Fuel is in tank. • Battery is in normal condition.
POSSIBLE CAUSE	• No battery power supply to PCM • Air leakage from intake-air system • Open PCM GND or vehicle body GND • Improper operation of electronic throttle control system • EGR valve malfunction • No signal from CKP sensor due to sensor, related wire or incorrect installation • No signal from CMP sensor due to sensor, related wire or incorrect installation • Low engine compression • Engine overheating • Vacuum leakage • Erratic signal to ignition coil • Improper air/fuel mixture ratio control • Poor fuel quality • PCV valve malfunction • Restriction in intake-air system • Restriction in exhaust system • Disconnected electrical connector • Open or short circuit in fuel pump body and related wiring harness • Inadequate fuel pressure • Fuel pump mechanical malfunction • Fuel leakage from injector • Fuel injector is clogged. • Purge solenoid valve malfunction • Spark plug malfunction • Ignition coil malfunction • Improper variable valve timing control system operation • Improper valve timing • Immobilizer system and/or circuit malfunction (if equipped) • Immobilizer system operating properly. (Ignition key is not registered.) (If equipped) • Pressure regulator malfunction (built-in fuel pump unit) **Warning** **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual.** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**Note** • The following test should be perform for vehicles with immobilizer system. Go to Step 8 for vehicles without immobilizer system. Connect the M-MDS to the DLC-2. Do any of the following conditions appear? • Engine does not completely start. • DTC P1260 is displayed.	Yes	**Both conditions appear:** Go to Step 3.
		No	**Either or other condition appears:** Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
2	Does engine stall after **approx. 2 s** from when it is started?	Yes	Go to the next step.
		No	Immobilizer system is normal. Go to Step 8.
3	Is the coil connector securely connected to the coil?	Yes	Go to the next step.
		No	Connect the coil connector securely. Return to Step 2.
4	Turn the ignition switch to the ON position. Does the security light flush?	Yes	Go to the next step.
		No	Inspect the instrument cluster and wiring harness.
5	Connect the M-MDS equivalent to the DLC-2 and retrieve the DTC. Are any of the following DTCs displayed? **DTC** **B1213, B1600, B1601, B1602, B1681, B2103, B2135, B2141, B2431, U2510**	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	Go to the next step.
6	inspect the following wiring harnesses and connectors: • Between coil terminal A and instrument cluster terminal 2O • Between coil terminal B and instrument cluster terminal 2S Is there any malfunction?	Yes	Repair or replace the suspected wiring harness and connector.
		No	Go to the next step.
7	inspect the following wiring harnesses and connectors: • Between PCM terminal 1AI and instrument cluster terminal 1I • Between PCM terminal 1AM and instrument cluster terminal 1K Is there any malfunction?	Yes	Repair or replace the suspected wiring harness and connector.
		No	Go to the next step.
8	Verify the following: • Vacuum connection • External fuel shut off or accessory (such as kill switch, alarm) • Fuel quality: proper octane, contamination, winter/summer blend • No air leakage from intake-air system • Intake-air system restriction (such as air cleaner element, fresh air duct) • Proper sealing of intake manifold and components attached to intake manifold: EGR valve • Ignition wiring • Electrical connections • Fuses • Smooth operation of throttle valve Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 8.
9	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].) **Communication error message is displayed:** Inspect for the following: • Open circuit in wiring harness between main relay and PCM terminal 1BE or 1A(ATX) • Open main relay GND circuit • Open or short circuit in wiring harness between DLC and PCM terminal 1AM or 1AI • Main relay is stuck open. • Open or poor GND circuit (PCM terminal 1AZ, 1BB, 1BC*2, 1BD, 1BG, 1BH, 2BB*1 or 2BC*1) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
10	Connect the M-MDS to the DLC-2. Access the APP1 and APP2 PIDs. Crank the engine with accelerator pedal released. Are the APP1 and APP2 PIDs indicating that the accelerator pedal is in the released position?	Yes	Go to the next step.
		No	Inspect for the following: • APP sensor • Wiring harnesses and connectors for following: — PCM terminal 1AC*1, 1AL*2, 1AO*3, - APP sensor terminal E — PCM terminal 1AP*1, 1Y*2, 1AP*3 - APP sensor terminal B — PCM terminal 1AL*1, 1AW*2, 1AL*3 - APP sensor terminal A — PCM terminal 1AS*1, 1AA*2, 1AV*3 - APP sensor terminal C — Ignition switch terminal A - APP sensor terminal F — APP sensor terminal D - GND
11	Connect the M-MDS to the DLC-2. Access the TP PID. Crank the engine with accelerator pedal released. Are the TP PID indicates the closed throttle position?	Yes	Go to the next step.
		No	Inspect for the following: • TP sensor • Wiring harnesses and connectors for following: — PCM terminal 2AO*1, 2K*2, 2AO*3 - TP sensor terminal B — PCM terminal 2AK*1, 2M*2, 2AK*3 - TP sensor terminal A — PCM terminal 2AL*1, 2I*2, 2AL*3 - TP sensor terminal C — PCM terminal 2AP*1, 2O*2, 2AP*3 - TP sensor terminal D
12	Does the engine start with the throttle valve closed?	Yes	Go to Step 29.
		No	Go to the next step.
13	Will the engine start and run smoothly at part throttle?	Yes	Inspect the electronic throttle control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].)
		No	Go to the next step.
14	Connect the M-MDS to the DLC-2. Access RPM PID. Is RPM PID indicating the engine speed when cranking the engine?	Yes	Go to the next step.
		No	Inspect for the following: • Open or short circuit in CKP sensor • Open or short circuit in wiring harness between CKP sensor terminal C and PCM terminal 2AQ*1, 2T*2, 2AQ*3 • Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2W*1, 2U*2, 2AY*3 • Open or short circuit in CKP sensor wiring harnesses If CKP sensor and wiring harness are normal, go to the next step.
15	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
16	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.
17	Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to spark test result.

STEP	INSPECTION	RESULTS	ACTION
18	Inspect the spark plug conditions. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect for fuel leakage from injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
19	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
20	visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
21	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct when ignition switch is turned on/off **five times**?	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
22	Visually inspect the fuel injector O-ring and fuel line for fuel leakage. Service if necessary. Is the fuel line pressure held after the ignition switch is turned off?	Yes	Go to the next step.
		No	Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit.
23	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Start the engine. Is starting condition improved?	Yes	Inspect if the purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system.
		No	Go to the next step.
24	Is air leakage felt or heard at intake-air system components while racing engine to higher speed?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
25	Inspect the engine condition while tapping EGR valve housing. Is engine condition improved?	Yes	Replace the EGR valve.
		No	Go to the next step.
26	Inspect the variable valve timing control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does variable valve timing control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
27	Is the engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for causes.
28	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model with LF engine ATX
*3 : Except for California emission regulation applicable model with LF engine MTX and L3 engine

No. 7 Slow Return to Idle (Article 1445519)

id0103a6801300

7	SLOW RETURN TO IDLE
DESCRIPTION	Engine takes more time than normal to return to idle speed.
POSSIBLE CAUSE	• ECT sensor malfunction • Thermostat is stuck open. • Throttle body malfunction • Air leakage from intake-air system

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
2	Remove thermostat and inspect operation. Is thermostat normal?	Yes	ECT and thermostat are normal. Go to the next step.
		No	Access ECT PID on the M-MDS. Inspect for both ECT PID and temperature gauge on instrument cluster readings. If temperature gauge on instrument cluster indicates normal range but ECT PID is not same as temperature gauge reading, inspect ECT sensor. If temperature gauge on instrument cluster indicates cold range but ECT PID is normal, inspect temperature gauge and heat gauge unit.
3	Is throttle body free of contamination?	Yes	Inspect for air leakage from the intake-air system components while racing the engine to higher speed.
		No	Clean or replace throttle body.
4	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 8 Engine Runs Rough/Rolling Idle (Article 1413317)

8	ENGINE RUNS ROUGH/ROLLING IDLE
DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and engine shakes excessively. • Idle speed is too slow and engine shakes excessively.
POSSIBLE CAUSE	• Air leakage from intake-air system parts • A/C system operation is improper • Erratic signal to ignition coil • Spark plug malfunction • Purge solenoid valve malfunction • Improper operation of electronic throttle control system • Idle learning of electronic throttle control system is not completed • EGR valve malfunction • Erratic or no signal from CMP sensor • Low engine compression • Improper valve timing • Improper variable valve timing control system operation. • Erratic signal from CKP sensor • Improper air / fuel mixture ratio control operation (abnormal signal form MAF sensor or HO2S) • Open or short circuit in PCM GND circuit • Poor fuel quality • PCV valve malfunction • Air cleaner restriction • Restriction in exhaust system • Disconnected electrical connectors • Inadequate fuel pressure • Fuel pump body mechanical malfunction • Improper load signal input • Fuel line restriction or clogging • Improper fuel injection control operation • Fuel leakage from fuel injector • Fuel injector clogging • Engine overheating • Vacuum leakage • Pressure regulator malfunction (built-in fuel pump unit) **Warning** **The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual.** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Warm up the engine. Idle the engine for **5 min.** Is the symptom disappeared?	Yes	Troubleshooting completed. (Cause of this symptom is that the idle learning of electronic throttle control system is not completed.)
		No	Go to the next step.
2	Verify the following: • External fuel shut off or accessory (such as kill switch, alarm) • Fuel quality (such as proper octane, contamination, winter/summer blend) • No air leakage from intake-air system • Proper sealing of intake manifold and components attached to intake manifold: EGR valve • Ignition wiring • Electrical connections • Fuses • Smooth operation of throttle valve • PCM GND circuit (2BH, 1BH, 1BD, AZ, 1BB)*1 (1BH, 1AZ, 1BD, 1BB)*2 Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 2.

STEP	INSPECTION	RESULTS	ACTION
3	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
4	Is the engine overheating?	Yes	Go to symptom troubleshooting "No.17 Cooling system concerns - Overheating".
		No	Go to the next step.
5	Connect the M-MDS to the DLC-2. Access MAF PID. Drive vehicle with monitoring PID. Is MAF PID within specification?	Yes	Go to the next step.
		No	Inspect for open or short circuit of MAF sensor and related wiring harness.
6	**Note** • The following test is for engine running at rough idle with A/C on. If other symptoms exist, go to the next step. Connect pressure gauge to A/C low and high pressure side lines. Start engine and idle it. Turn the A/C switch on. Measure low side and high side pressures. Are pressures within specifications? (See REFRIGERANT PRESSURE CHECK.)	Yes	Go to the next step.
		No	If the A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
7	**Note** • The following test is for engine running rough with P/S on. If other symptoms exist, go to the next step. Connect the M-MDS to the DLC-2. Start the engine and idle it. Retrieve any DTCs for EHPAS Is there any EHPAS DTC displayed?	Yes	Go to appropriate the DTC inspection. (See DTC TABLE [LF, L3].)
		No	Go to the next step.
8	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are the CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
9	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.
10	Inspect the spark plug condition. Is the spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect for fuel leakage from injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
11	Perform the electronic throttle control system operation inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does the electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle control system operation inspection results.
12	Install fuel pressure gauge between fuel pipe and fuel distributor. Start the engine and run it at idle. Measure fuel line pressure during idle. Is fuel line pressure correct during idle?	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. If there is no malfunction, replace fuel pump unit. **High:** Replace the fuel pump unit.

STEP	INSPECTION	RESULTS	ACTION
13	Visually inspect for fuel leakage at fuel injector, O-ring, and fuel line. Service if necessary. Does fuel line pressure hold after ignition switch is turned off?	Yes	Go to the next step.
		No	Inspect fuel injector. If fuel injector is normal, replace fuel pump unit.
14	Connect the M-MDS to the DLC-2. Start the engine and idle it. Access LONG FT1 PID. Measure LONG FT1 PID at idle. Is PID value between **–14% and +14%**?	Yes	Go to the next step.
		No	LONG FT1 PID is out of specification. Less than specification (too rich): • Inspect EVAP control system. — If system is normal, go to Step 14. Greater than specification (too lean): • Inspect for air leakage at intake-air system components. — If system is normal, go to the next step.
15	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Start the engine. Does the engine condition improve?	Yes	Check if purge solenoid valve is stuck open mechanically. Inspect EVAP control system.
		No	Go to the next step.
16	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
17	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
18	Visually inspect the CMP sensor and teeth of camshaft. Are the CMP sensor and teeth of camshaft normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
19	Inspect the engine condition while tapping EGR valve housing. Does the engine condition improve?	Yes	Replace the EGR valve.
		No	Go to the next step.
20	Inspect variable valve timing control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does variable valve timing control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
21	Is engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for causes.
22	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model

No. 9 Fast Idle/Runs On (Article 1416967)

9	FAST IDLE/RUNS ON
DESCRIPTION	• The engine speed continues at fast idle after warm-up. • The engine runs after the ignition switch is turned off.
POSSIBLE CAUSE	• ECT sensor malfunction • Air leakage from intake-air system • Throttle body malfunction • Accelerator pedal position sensor misadjustment • Cruise control system operation improperly • Improper load signal input • Improper operation of electronic throttle control system

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Access ECT PID. Start and warm up engine to normal operating temperature. Is ECT PID between 82—112°C (180—234°F)?	Yes	Go to the next step.
		No	**ECT PID is higher than 112°C (234°F):** Go to symptom troubleshooting "No.17 Cooling system concerns - Overheating". **ECT PID is less than 82°C (180°F):** Go to symptom troubleshooting "No.18 Cooling system concerns - Runs cold".
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
3	Measure voltages at PCM terminal 1AP, 1R, 1O (MTX) and 1S. (See PCM INSPECTION [LF, L3].) Are voltage normal?	Yes	Go to the next step.
		No	**If PCM terminal 1AU*1, 1AP*2, 1AU*3 voltage is not specified:** Inspect A/C switch, refrigerant pressure switch and fan switch. **If PCM terminal 1J*1, 1R*2, 1J*3 voltage is not specified:** Inspect refrigerant pressure switch (middle pressure). **If PCM terminal 1D voltage is not specified:** Inspect clutch pedal position (CPP) switch. **If PCM terminal 1X voltage is not specified:** Inspect neutral switch (MTX), transaxle range (TR) switch (ATX).
4	Connect the M-MDS to the DLC-2. Start the engine and idle it. Retrieve any DTCs for EHPAS. Is there any EHPAS DTC displayed?	Yes	**DTC is displayed:** Go to appropriate DTC inspection.
		No	**No DTC is displayed:** Go to the next step.
5	Is there air leakage felt or heard at intake-air system components while racing engine to higher speed?	Yes	Repair or replace parts if necessary.
		No	Inspect the following: • Electronic throttle control system operation • Accelerator pedal position sensor
6	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model with LF engine ATX
*3 : Except for California emission regulation applicable model with LF engine MTX and L3 engine

No. 10 Low Idle/Stalls During Deceleration (Article 1445520)

10	LOW IDLE/STALLS DURING DECELERATION
DESCRIPTION	• Engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.
POSSIBLE CAUSE	• Vacuum leakage • Improper operation of electronic throttle control system • Air leakage from intake-air system • Improper air/fuel mixture ratio control • Evaporative emission control system malfunction • Accelerator pedal position sensor or related circuit malfunction • Accelerator pedal position sensor misadjustment • TP sensor or related circuit malfunction • MAF sensor or related circuit malfunction • Brake switch or related circuit malfunction • Neutral/clutch pedal position switch or related circuit malfunction (MTX) • TR switch or related circuit malfunction (ATX) • Improper A/C magnetic clutch operation

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Does the engine idle roughly?	Yes	Go to symptom troubleshooting "No.8 Engine runs rough/rolling idle". (See NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [LF, L3].)
		No	Go to the next step.
2	Turn off the A/C switch and fan switch. Does the A/C magnetic clutch engage?	Yes	Go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See NO.24 A/C IS ALWAYS ON/A/C COMPRESSOR RUNS CONTINUOUSLY [LF, L3].)
		No	Go to the next step.
3	Verify the following: • Proper routing of and no damage to vacuum lines • No air leakage from intake-air system Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 3.
4	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
5	Perform the electronic throttle control system operation inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does the electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle control system operation inspection results.
6	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	Yes	Inspect the evaporative emission control system.
		No	Go to the next step.
7	Connect the M-MDS to the DLC-2. Access APP1, APP2, TP, MAF and VSS PIDs. Monitor each PID while driving vehicle. (See PCM INSPECTION [LF, L3].) Are PIDs normal?	Yes	Go to the next step.
		No	**APP1, APP2 PIDs:** Inspect the accelerator pedal position sensor. **TP PID:** Inspect TP sensor. **MAF PID:** Inspect MAF sensor. **VSS PID:** Inspect VSS.

STEP	INSPECTION	RESULTS	ACTION
8	Measure voltage at PCM terminal 1AU, 1O (MTX), and 1S. (See PCM INSPECTION [LF, L3].) Are voltages normal?	Yes	Intermittent concern exists. (See INTERMITTENT CONCERN TROUBLESHOOTING [LF, L3].)
		No	**If PCM terminal 1AB*1, 1AU*2, 1AB*3 voltage is not as specified:** Inspect the brake switch. **If PCM terminal 1D voltage is not as specified:** Inspect the clutch pedal position switch. **If PCM terminal voltage 1X is not as specified:** Inspect the neutral switch (MTX). Inspect the TR switch (ATX).
9	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model with LF engine ATX
*3 : Except for California emission regulation applicable model with LF engine MTX and L3 engine

No. 11 Engine Stalls/Quits, Engine Runs Rough, Misses, Buck/Jerk, Hesitation/Stumble Surges (Article 1445522)

11	**ENGINE STALLS/QUITS — ACCELERATION/CRUISE** **ENGINE RUNS ROUGH — ACCELERATION/CRUISE** **MISSES — ACCELERATION/CRUISE** **BUCK/JERK — ACCELERATION/CRUISE/DECELERATION** **HESITATION/STUMBLE — ACCELERATION** **SURGES — ACCELERATION/CRUISE**
DESCRIPTION	• Engine stops unexpectedly at the beginning of acceleration or during acceleration. • Engine stops unexpectedly while cruising. • Engine speed fluctuates during acceleration or cruising. • Engine misses during acceleration or cruising. • Vehicle bucks/jerks during acceleration, cruising, or deceleration. • Momentary pause at beginning of acceleration or during acceleration • Momentary minor irregularity in engine output

11	**ENGINE STALLS/QUITS — ACCELERATION/CRUISE** **ENGINE RUNS ROUGH — ACCELERATION/CRUISE** **MISSES — ACCELERATION/CRUISE** **BUCK/JERK — ACCELERATION/CRUISE/DECELERATION** **HESITATION/STUMBLE — ACCELERATION** **SURGES — ACCELERATION/CRUISE**
POSSIBLE CAUSE	• Improper A/C system operation • Erratic signal or no signal from CMP sensor • Air leakage from intake-air system parts • Purge solenoid valve malfunction • Improper operation of electronic throttle control system • EGR valve malfunction • Erratic signal from CKP sensor • Low engine compression • Vacuum leakage • Poor fuel quality • Main relay intermittent malfunction • Throttle body malfunction • Engine overheating • Spark plug malfunction • Improper air/fuel mixture ratio control operation • Improper variable tumble control operation • Erratic signal to ignition coil • Air cleaner restriction • PCV valve malfunction • Fuel flow into evaporative purge hose • Improper valve timing due to jumping out timing chain • Restriction in exhaust system • Intermittent open or short circuit in fuel body pump circuit • Inadequate fuel pressure • Fuel pump mechanical malfunction • Check valve (two-way) malfunction integrated with fuel tank • Fuel leakage from fuel injector • Fuel injector clogging • Fuel line restriction or clogging • Pressure regulator malfunction (built-in fuel pump unit) • Erratic signal form Accelerator pedal position sensor • Erratic signal form TP sensor • Intermittent open or short circuit of MAF sensor, TP sensor, Accelerator pedal position sensor and VSS • ATX malfunction (ATX) • Clutch slippage (MTX) • Improper variable intake-air control operation • Loose attaching bolts or worn engine mounts **Warning** **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described.** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Verify the following: • Vacuum connection • Air cleaner element • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold: such as EGR valve • Ignition wiring • Fuel quality (such as proper octane, contamination, winter/summer blend) • Electrical connections • Smooth operation of throttle valve Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
3	Is engine overheating?	Yes	Go to symptom troubleshooting "No.17 Cooling system concerns - Overheating".
		No	Go to the next step.
4	Connect the M-MDS to the DLC-2. Access APP1, APP2, RPM, VPWR, MAF, TP and VSS PIDs. Drive the vehicle with monitoring PIDs. Are PIDs within specifications? (See PCM INSPECTION [LF, L3].)	Yes	Go to the next step.
		No	**APP1, APP2 PIDs:** Inspect if output signal from accelerator pedal position sensor changes smoothly. **RPM PID:** Inspect the CKP sensor and related wiring harness for vibration or intermittent open/short circuit. **VPWR PID:** Inspect for open circuit intermittently. **MAF PID:** Inspect for open circuit of the MAF sensor and related wiring harness intermittently. **TP PID:** Inspect if output signal from TP sensor changes smoothly. **VSS PID:** Inspect for open circuit of VSS and related wiring harness intermittently.
5	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
6	Inspect the spark plug conditions. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect for fuel leakage from fuel injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
7	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
8	Perform the electronic throttle control system operation inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does the electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle system operation inspection results.
9	Visually inspect deformed exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
10	Install fuel pressure gauge between the fuel pipe and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch to ON position?	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
11	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. Is fuel line pressure held after ignition switch is turned off?	Yes	Go to the next step.
		No	Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit.
12	**Note** • The following test is for engine stall with the A/C on. If other symptom exists, go to the next step. Connect a pressure gauge to A/C low and high pressure side lines. Turn the A/C on and measure low side and high side pressure. Are pressures within specifications? (See REFRIGERANT PRESSURE CHECK.)	Yes	Go to the next step.
		No	If the A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See NO.24 A/C IS ALWAYS ON/A/C COMPRESSOR RUNS CONTINUOUSLY [LF, L3].) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
13	**Note** • The following test should be performed for symptom with cruise control ON. If other symptoms exist, go to the next step. Inspect cruise control system. Is cruise control system normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
14	Inspect the front HO2S. Is the front HO2S normal?	Yes	Go to the next step.
		No	Replace the front HO2S.
15	Inspect the evaporative purge hose between the fuel tank and the purge valve. Does fuel flow into evaporative purge hose?	Yes	Inspect the check valve (two-way).
		No	Go to the next step.
16	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from the purge solenoid valve side. Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	Yes	Go to the next step. Inspect if the purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system.
		No	Go to the next step.
17	Visually inspect the CMP sensor and projections of camshaft pulley. Are CMP sensor and projections of camshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
18	Inspect the variable tumble control operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is the variable tumble control normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
19	Inspect the EGR system. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is the EGR system normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.

STEP	INSPECTION	RESULTS	ACTION
20	Is the engine compression correct?	Yes	Inspect the following: • Valve timing • Internal transaxle part (ATX) • Clutch (MTX) • EGR valve (mechanical stuck) • Engine mounts • Check valve (two-way)
		No	Inspect for cause.
21	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 12 Lack/Loss of Power-Acceleration/Cruise (Article 1445524)

12	LACK/LOSS OF POWER — ACCELERATION/CRUISE
DESCRIPTION	Performance is poor under load (such as power down when climbing hills).
POSSIBLE CAUSE	• Improper A/C system operation • Erratic signal or no signal from CMP sensor • Air leakage from intake-air system parts • Restriction in intake-air system • Intake air temperature too hot • Improper variable intake-air control operation • Improper variable tumble control operation • Improper operation of electronic throttle control system • Purge control solenoid malfunction • Improper EGR valve operation • Brake dragging • Erratic signal from CKP sensor • Low engine compression • Vacuum leakage • Poor fuel quality • Erratic signal to ignition coil • Engine overheating • Throttle body malfunction • Spark plug malfunction • PCV valve malfunction • Improper valve timing due to jumping out of timing chain • Improper variable valve timing control operation • Restriction in exhaust system • Intermittent open or short in fuel pump related circuit • Inadequate fuel pressure • Fuel pump mechanical malfunction • Fuel line restriction or clogging • Fuel leakage from fuel injector • Fuel injector clogging • Erratic signal from accelerator pedal position sensor • Erratic signal from TP sensor • Intermittent open or short circuit in MAF sensor, Accelerator pedal position sensor, TP sensor, IAT sensor and VSS • ATX malfunction (ATX) • Clutch slippage (MTX) **Warning** **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described.** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Verify the following: • Vacuum connection • Restriction in intake-air system (such as air cleaner element, fresh air duct) • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold; such as EGR valve • Fuel quality (such as proper octane, contamination, winter/summer blend) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.

STEP	INSPECTION	RESULTS	ACTION
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
3	Is the engine overheating?	Yes	Go to symptom troubleshooting "No.17 Cooling system concerns - Overheating".
		No	Go to the next step.
4	Connect the M-MDS to the DLC-2. Access APP1, APP2, RPM, MAF, TP, IAT and VSS PIDs. Drive vehicle while monitoring PIDs. Are PIDs within specifications? (See PCM INSPECTION [LF, L3].)	Yes	Go to the next step.
		No	**APP1, APP2 PIDs:** Inspect if output signal accelerator pedal position sensor changes smoothly. **RPM PID:** Inspect CKP sensor and related wiring harness for vibration or intermittent open/short circuit or both. **MAF PID:** Inspect for intermittent open circuit of MAF sensor and related wiring harness. **TP PID:** Inspect if output signal TP sensor changes smoothly. **IAT PID:** Inspect for air suction in intake-air system. If normal, inspect intermittent short circuit of IAT sensor and related wiring harnesses. **VSS PID:** Inspect for intermittent open circuit of VSS and related wiring harness.
5	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are the CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
6	Inspect the spark plug condition. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect the fuel injector for fuel leakage. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
7	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace PCV valve.
8	Perform electronic throttle control system operation inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle control system operation inspection results.
9	visually inspect deformed exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
10	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch to ON position?	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
11	Inspect variable tumble control operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does variable tumble control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.

STEP	INSPECTION	RESULTS	ACTION
12	Inspect variable intake-air control operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does VIS function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
13	**Note** • **The following test is for engine stalling with the A/C on concern. If other symptoms exist, go to the next step.** Connect pressure gauge to the A/C low and high side pressure lines. Turn the A/C on and measure low side and high side pressures. Are pressures within specifications? (See REFRIGERANT PRESSURE CHECK.)	Yes	Go to the next step.
		No	If A/C is always on, go to symptom troubleshooting *No.24 A/C is always on or A/C compressor runs continuously*. (See NO.24 A/C IS ALWAYS ON/A/C COMPRESSOR RUNS CONTINUOUSLY [LF, L3].) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
14	Inspect for A/C cut-off operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does the A/C cut-off function properly?	Yes	Go to the next step.
		No	Inspect A/C cut-off system components.
15	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	Yes	Inspect if purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].)
		No	Go to the next step.
16	Visually inspect the CMP sensor and projections of camshaft pulley. Are the CMP sensor and projections of camshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
17	Inspect EGR system. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is EGR system normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part according to EGR control system operation inspection results.
18	Inspect the variable valve timing control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does the variable valve timing control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to variable valve timing control system inspection results.
19	Is the engine compression correct?	Yes	Inspect the following: • Valve timing • Internal transaxle components (ATX) • Clutch (MTX) • Brake system for dragging
		No	Inspect for cause.
20	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 13 Knocking/Pinging/Detonation-Acceleration/Cruise (Article 1415854)

13	KNOCKING/PINGING - ACCELERATION/CRUISE
DESCRIPTION	Sound is heard when air/fuel mixture is ignited by something other than spark plug (such as hot spot in combustion chamber).
POSSIBLE CAUSE	• Engine overheating due to cooling system malfunction • ECT sensor malfunction • IAT sensor malfunction • MAF sensor malfunction • Knock sensor malfunction • Erratic signal from CMP sensor • Inadequate engine compression • Inadequate fuel pressure **Warning** **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line splits and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described .** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Access ECT PID. Verify ECT PID is **less than 116°C (241°F)** during driving. Is ECT PID less than specification?	Yes	Go to the next step.
		No	Inspect the cooling system for cause of overheating.
2	Connect the M-MDS to the DLC-2. Access IAT and MAF PIDs. Monitor each PID. (See PCM INSPECTION [LF, L3].) Are PIDs normal?	Yes	Go to the next step.
		No	**IAT PID:** Inspect IAT sensor **MAF PID:** Inspect MAF sensor
3	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (engine off). Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
4	Is engine compression correct?	Yes	Go to the next step.
		No	Inspect for cause.
5	Install fuel pressure gauge between fuel pipe and fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle?	Yes	Inspect the ignition timing.
		No	**Low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
6	Inspect the knock sensor. Is the knock sensor normal?	Yes	Inspect ignition timing.
		No	Replace the knock sensor.
7	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 14 Poor Fuel Economy (Article 1445525)

14	POOR FUEL ECONOMY
DESCRIPTION	Fuel economy is unsatisfactory.
POSSIBLE CAUSE	• Contaminated air cleaner element • Variable intake-air control malfunction • Engine cooling system malfunction • Improper ATF level (ATX) • Weak spark • Poor fuel quality • Erratic or no signal from CMP sensor • Clutch slippage (MTX) • Variable tumble control malfunction • Improper variable valve timing control system operation • Improper coolant level • Inadequate fuel pressure • Spark plug malfunction • PCV valve malfunction • Brake dragging • Improper valve timing due to jumping out of timing chain • Contaminated MAF sensor • Improper engine compression • Exhaust system clogging **Warning** **The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described.** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: • Air cleaner element for contamination • ATF level (ATX) • Fuel quality • Coolant level • Brake dragging • Clutch slippage (MTX) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
3	Access ECT PID. Drive vehicle while monitoring PID. (See PCM INSPECTION [LF, L3].) Is PID within specification?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan and condenser fan operations or thermostat operation.
4	Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to spark test result.

STEP	INSPECTION	RESULTS	ACTION
5	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle?	Yes	Go to the next step.
		No	**Low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit **High:** Replace the fuel pump unit.
6	Inspect for the variable tumble control operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does the variable tumble control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
7	Inspect for variable valve timing control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does the variable valve timing control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
8	Inspect for the variable intake-air control operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does variable intake-air control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
9	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
10	visually inspect the exhaust system part. Is there any deformed exhaust system?	Yes	Replace the suspected part.
		No	Go to the next step.
11	Inspect for contaminated MAF sensor. Is there any contamination?	Yes	Go to the next step.
		No	Inspect for cause.
12	Inspect the MAF sensor for contamination. Is there any contamination?	Yes	Replace MAF sensor.
		No	Go to the next step.
13	Is engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for cause.
14	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 15 Emission Compliance (Article 1445526)

15	EMISSION COMPLIANCE
DESCRIPTION	Fails emissions test.
POSSIBLE CAUSE	• Vacuum lines leakage or blockage • Cooling system malfunction • Spark plug malfunction • Leakage from intake manifold • Erratic or no signal from CMP sensor • Inadequate fuel pressure • PCV valve malfunction or incorrect valve installation • EGR valve malfunction • Exhaust system clogging • Fuel tank ventilation system malfunction • Fuel-filler cap malfunction • Charcoal canister damage • Air cleaner element clogging or restriction • Throttle body malfunction • Erratic signal to ignition coil • Improper air/fuel mixture ratio control operation • Bend or open circuit HO2S wiring harness • Catalyst converter malfunction • Engine internal parts malfunction • Excessive carbon is built up in combustion chamber • Improper engine compression • Improper valve timing **Warning** **The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described .** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: • Vacuum lines for leakage or blockage • Electrical connections • Proper maintenance schedule followed • Intake-air system and air cleaner element concerns: obstructions, leakage or dirtiness Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
3	Is any other driveability concern present?	Yes	Go to appropriate symptom troubleshooting.
		No	Go to the next step.
4	Connect the M-MDS to the DLC-2. Access ECT PID. Warm up the engine and idle it. Verify ECT PID is correct. (See PCM INSPECTION [LF, L3].) Is ECT PID correct?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan and condenser fan operation or thermostat operation.
5	Inspect fuel-filler cap. Is there any leakage at fuel-filler cap?	Yes	Replace the fuel-filler cap.
		No	Go to the next step.
6	Inspect the front HO2S. Is front HO2S normal?	Yes	Go to the next step.
		No	Replace the front HO2S.
7	Perform spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is strong blue spark visible at electrode under?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to spark test result.
8	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle?	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
9	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
10	Inspect for fuel saturation inside charcoal canister. Is excess amount of liquid fuel present in canister?	Yes	Replace the charcoal canister.
		No	Inspect the fuel tank vent system. Then, go to the next step.
11	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the part.
		No	Go to the next step.
12	Inspect the three-way catalytic converter. Is the three-way catalytic converter normal?	Yes	Inspect the EGR system. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].)
		No	Replace the three-way catalytic converter.
13	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 16 High Oil Consumption/Leakage (Article 1445527)

16	HIGH OIL CONSUMPTION/LEAKAGE
DESCRIPTION	Oil consumption is excessive.
POSSIBLE CAUSE	• PCV valve malfunction • Improper dipstick • Improper engine oil viscosity • Engine internal parts malfunction

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
2	Inspect for the following: • External leakage • Proper dipstick • Proper engine oil viscosity Are all items normal?	Yes	Inspect the internal engine parts such as valves, valve guides, valve stem seals, cylinder head drain passage, and piston rings.
		No	Service if necessary. Repeat Step 2.
3	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 17 Cooling System Concerns-Overheating (Article 1413315)

17	COOLING SYSTEM CONCERNS -OVERHEATING
DESCRIPTION	Engine runs at higher than normal temperature/overheats.
POSSIBLE CAUSE	• Improper coolant level • Blown fuses • Coolant leakage • Excessive A/C system pressure • A/C system operation is improper • Improper water/anti-freeze mixture • Fans reverse rotation • Poor radiator condition • Thermostat malfunction • Radiator hoses damage • Improper or damaged radiator cap • Cooling fan is inoperative. • Coolant overflow system malfunction • Improper tension of drive chain • Drive belt damage

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Inspect the following: • Engine coolant level • Coolant leakage • Water and anti-freeze mixture • Radiator condition • Collapsed or restricted radiator hoses • Radiator pressure cap • Overflow system • Fan rotational direction • Fuses Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
3	Start the engine and idle it. Turn the A/C switch on and set blower fan to any speed. Does the A/C compressor engage?	Yes	Go to Step 5.
		No	Inspect for the following and repair or replace if necessary: • Refrigerant charging amount • Open circuit in wiring harness between A/C relay and PCM terminal 1I*1, 1AN*2, 1I*3 • Seized A/C magnetic clutch • A/C magnetic clutch malfunction If all items are normal, go to the next step.
4	Start the engine and idle it. Turn the A/C switch on and set blower fan any speed. Measure voltage at PCM terminal 1AP. (SeePCM INSPECTION [LF, L3].) Is voltage normal?	Yes	Go to the next step.
		No	Inspect the following: • Refrigerant pressure switch operation • The A/C switch is stuck open. • Open or short circuit between refrigerant pressure switch and PCM terminal 1AU*1, 1AP*2, 1AU*3 • Open circuit of blower motor fan switch and resistor (If blower motor does not operate) • The evaporator temperature sensor and A/C amplifier
5	Inspect cooling fan control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does the cooling fan control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
6	Is the drive belt normal?	Yes	Go to the next step.
		No	Replace the drive belt.
7	Is there leakage around the heater unit in passenger compartment?	Yes	Inspect and service heater for leakage.
		No	Go to the next step.
8	Is there leakage at the coolant hoses and/or radiator?	Yes	Replace the malfunctioning part.
		No	Go to the next step.
9	Cool down the engine. Remove thermostat and inspect operation. Is thermostat normal?	Yes	The engine coolant temperature and thermostat are normal, inspect engine block for leakage or blockage.
		No	Access ECT PID. Inspect for both ECT PID and temperature gauge readings. If temperature gauge on instrument cluster indicates normal range but ECT PID is not same as temperature gauge reading, inspect ECT sensor. If temperature gauge on instrument cluster indicates overheating but ECT PID is normal, inspect temperature gauge and heat gauge unit.
10	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model with LF engine ATX
*3 : Except for California emission regulation applicable model with LF engine MTX and L3 engine

No. 18 Cooling System Concerns-Runs Cold (Article 1413313)

18	COOLING SYSTEM CONCERNS-RUNS COLD
DESCRIPTION	Engine takes excessive time to reach normal operating temperature.
POSSIBLE CAUSE	• Thermostat malfunction • Cooling fan system malfunction

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Is customer complaint "Lack of passenger compartment heat" only?	Yes	Inspect A/C and heater system.
		No	Go to the next step.
2	Does the engine speed continue at fast idle?	Yes	Go to symptom troubleshooting "No.9 Fast idle/runs on" (See NO.9 FAST IDLE/RUNS ON [LF, L3].)
		No	Go to the next step.
3	Remove the thermostat and inspect operation. Is thermostat normal?	Yes	Go to the next step.
		No	Replace the thermostat.
4	Inspect cooling fan control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Does the cooling fan control system function properly?	Yes	Access ECT PID. Inspect for both ECT PID and temperature gauge on instrument cluster readings. If the temperature gauge on the instrument cluster indicates normal range but ECT PID is not the same as temperature gauge reading, inspect the ECT sensor. If the temperature gauge on the instrument cluster indicates cold range but ECT PID is normal, inspect the temperature gauge and heat gauge unit.
		No	Repair or replace the malfunctioning part.
5	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace PCM.		

No. 19 Exhaust Smoke (Article 1445529)

19	EXHAUST SMOKE
DESCRIPTION	Blue, black, or white smoke from exhaust system
POSSIBLE CAUSE	**Blue smoke (Burning oil):** • PCV valve malfunction • Engine internal oil leakage **White smoke (Water in combustion):** • Cooling system malfunction (coolant loss) • Engine internal coolant leakage **Black smoke (Rich fuel mixture):** • Air cleaner restriction • Intake-air system is collapsed or restricted. • Fuel return line is restricted. • Excessive fuel pressure • Improper engine compression • Injector fuel leakage • Ignition system malfunction **Warning** **The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described .** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	What color is smoke coming from the exhaust system?	Blue	Burning oil is indicated. Go to the next step.
		White	Water in combustion is indicated. Go to Step 3.
		Black	Rich fuel mixture is indicated. Go to Step 4.
2	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Inspect for the following: • Damaged valve guide, stems or valve seals • Blocked oil drain passage in cylinder head • Piston ring is not seated, seized or worn. • Damaged cylinder bore If other drivability symptoms are present, return to diagnostic index to service any additional symptoms.
		No	Replace the PCV valve.
3	Does the cooling system hold pressure?	Yes	Inspect for the following: • Cylinder head gasket leakage • Intake manifold gasket leakage • Cracked or porous engine block If other drivability symptoms are present, return to diagnostic index to service any additional symptoms.
		No	Inspect for cause.
4	Inspect for the following: • Air cleaner restriction • Collapsed or restricted intake-air system • Restricted fuel return line Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 4.

STEP	INSPECTION	RESULTS	ACTION
5	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
6	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See FUEL LINE PRESSURE INSPECTION [LF, L3].)	Yes	Go to the next step.
		No	**Low:** • Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. **High:** • Replace the fuel pump unit.
7	Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is strong blue spark visible at each cylinder?	Yes	Inspect the CMP sensor.
		No	Repair or replace the malfunctioning part according to spark test result.
8	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 20 Fuel Odor (In Engine Compartment) (Article 1445530)

20	FUEL ODOR (IN ENGINE COMPARTMENT)
DESCRIPTION	Gasoline fuel smell or visible leakage
POSSIBLE CAUSE	• Excessive fuel pressure • Purge solenoid valve malfunction • Fuel tank vent system blockage • Charcoal canister malfunction • Fuel leakage from fuel system **Warning** **The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described .** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle?	Yes	Go to the next step.
		No	Replace the fuel pump unit.
2	Inspect for blockage/restriction or open circuit in wiring harness between the engine vacuum port and the charcoal canister. Inspect for blockage in fuel tank vent system. Is malfunction indicated?	Yes	Replace vacuum hose.
		No	Go to the next step.
3	Inspect the purge solenoid valve. Is the solenoid operating properly?	Yes	Go to the next step.
		No	Replace the purge solenoid valve.
4	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Inspect charcoal canister for fuel saturation. If excess amount of liquid fuel is present, replace the charcoal canister.
5	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 21 Engine Noise (Article 1445531)

21	ENGINE NOISE
DESCRIPTION	Engine noise from under hood
POSSIBLE CAUSE	**Squeal, click or chirp noise:** • Improper engine oil level • Improper drive belt tension • Generator installation (alignment) • Splash shield or under cover looseness (splashed water to drive belts) **Rattle sound noise:** • Loose parts **Hiss sound noise:** • Vacuum leakage • Loose spark plug • Air leakage from intake-air system **Rumble or grind noise:** • Improper drive belt tension • Improper P/S fluid level **Rap or roar noise:** • Dynamic dumper looseness • Exhaust system looseness • Intake-air system looseness **Other noise:** • Camshaft friction gear noise or MLA noise • Timing chain noise

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Is a squealing, click or chirping sound present?	Yes	Inspect for the followings: • Engine oil level • Drive belt tension • Splash shield or under cover looseness • Generator installation (alignment)
		No	Go to the next step.
2	Is a rumbling or grinding noise present?	Yes	Inspect for the followings: • Drive belt tension • P/S fluid level
		No	Go to the next step.
3	Is a rattling noise present?	Yes	Inspect rattling location for loose parts.
		No	Go to the next step.
4	Is a hissing noise present?	Yes	Inspect for the following: • Vacuum leakage • Spark plug looseness • Intake-air system leakage
		No	Go to the next step.
5	Is a rapping or roar noise present?	Yes	Inspect looseness for followings: • Dynamic dumper • Intake-air system • Exhaust system
		No	Go to the next step.
6	Is a knocking noise present?	Yes	Go to symptom troubleshooting "No.13 Knocking/ pinging". (See NO.13 KNOCKING/PINGING/ DETONATION-ACCELERATION/CRUISE [LF, L3].)
		No	If the noise comes from the engine internal, inspect for friction gear, timing chain or MLA noise.
7	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 22 Vibration Concerns (Engine) (Article 1445532)

22	VIBRATION CONCERNS (ENGINE)
DESCRIPTION	• Vibration from under hood or driveline
POSSIBLE CAUSE	• Loose attaching bolts or worn parts • Components malfunction such as worn parts

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Inspect the following components for loose attaching bolts or worn parts: • Cooling fan • Drive belt and pulleys • Generator • Engine mounts • Exhaust system mounts All items normal?	Yes	Inspect the following systems: • Wheels • ATX • Driveline • Suspension
		No	Readjust or retighten engine mount installation position. Service if necessary for other parts.
2	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 23 A/C Does Not Work Sufficiently (Article 1390975)

23	A/C DOES NOT WORK SUFFICIENTLY.
DESCRIPTION	A/C compressor magnetic clutch does not engage when the A/C switch is turned on.
POSSIBLE CAUSE	• Improper refrigerant charging amount • Open the A/C magnetic clutch • Open circuit in wiring harness between A/C relay and A/C magnetic clutch • Poor GND of A/C magnetic clutch • Refrigerant pressure switch is stuck open. • A/C relay is stuck open. • Seized A/C compressor • Open circuit in wiring harness between A/C switch and PCM through both refrigerant pressure switch and A/C amplifier

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
2	Disconnect A/C compressor connector. Start engine and turn A/C switch on. Is there correct voltage at A/C compressor magnetic clutch terminal? **Specification** **10.5 V or more**	Yes	Inspect for GND condition of magnetic clutch on A/C compressor. If GND condition is normal, inspect for open circuit magnetic clutch coil.
		No	Go to the next step.
3	Disconnect refrigerant pressure switch connector. Connect jumper wiring between A/C high pressure switch terminal. Connect jumper wiring between refrigerant pressure switch terminal. Turn the ignition switch to the ON position. Turn A/C switch on and set blower fan to any speed. Does A/C work?	Yes	Inspect refrigerant pressure switch operation. If switch is normal, go to the next step.
		No	Inspect for the following: • A/C switch is stuck open. • Open circuit in wiring harness between refrigerant pressure switch and PCM terminal 1AU*1, 1AP*2, 1AU*3 • Open circuit in wiring harness between blower motor fan switch and resistor (if blower motor does not operate) • Evaporator temperature sensor and A/C amplifier
4	Remove jumper wiring from the switch connector. Reconnect connector to refrigerant pressure switch. Start the engine and turn the A/C switch on. Does the fan operate?	Yes	Inspect whether A/C relay is stuck open. Replace if necessary.
		No	Inspect the following and repair or replace if necessary: • Refrigerant charging amount • A/C compressor for seizure
5	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model with LF engine ATX
*3 : Except for California emission regulation applicable model with LF engine MTX and L3 engine

No. 24 A/C Always ON or A/C Compressor Runs Continuously (Article 1414377)

24	A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY.
DESCRIPTION	A/C compressor magnetic clutch does not disengage.
POSSIBLE CAUSE	• A/C compressor magnetic clutch engagement is stuck. • A/C relay is stuck closed. • Short to GND in wiring harness between A/C switch and PCM • Short to GND in wiring harness between A/C relay and PCM • Short circuit to battery power in A/C relay to magnetic clutch

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
2	Start the engine and idle it. Turn the A/C switch on. Remove the A/C relay. Does the A/C magnetic clutch disengage?	Yes	Inspect for the following: • A/C relay is stuck closed. • Short to GND in wiring harness between A/C relay and PCM terminal 1AN. If both items normal, go to the next step.
		No	Inspect if circuit between the A/C relay and magnetic clutch shorts to battery power circuit. If the circuit is normal, inspect the magnetic clutch for stuck engagement or clearance.
3	Disconnect refrigerant pressure switch connector. Start the engine and turn A/C switch on. **Note** • A/C should not work when disconnecting connector. If A/C remains working, short to GND circuit may be present. Does the A/C remain working?	Yes	Inspect for short to GND in wiring harness between refrigerant pressure switch and PCM terminal 1AU*1, 1AP*2, 1AU*3.
		No	Go to the next step.
4	Reconnect refrigerant pressure switch connector. Turn off A/C switch. **Note** • A/C should not work when turning A/C switch off. If A/C remains working, short to GND circuit may be present. Does A/C remain working?	Yes	Inspect following: • Short to GND in wiring harness between A/C switch and A/C amplifier • Short to GND circuit between A/C amplifier and refrigerant pressure switch
		No	Inspect whether A/C switch is stuck closed.
5	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model with LF engine ATX
*3 : Except for California emission regulation applicable model with LF engine MTX and L3 engine

No. 25 A/C Does Not Cut Off Under Wide Open Throttle Conditions (Article 1445533)

25	A/C IS NOT CUT off UNDER WOT CONDITIONS.
DESCRIPTION	A/C compressor magnetic clutch does not disengage under WOT.
POSSIBLE CAUSE	• Accelerator pedal position sensor malfunction • Accelerator pedal position sensor misadjustment • Loosely installed accelerator pedal position sensor

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Does A/C compressor disengage when the A/C switch is turned off?	Yes	Go to the next step.
		No	Go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously".
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Inspect accelerator pedal position sensor.
3	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 26 Exhaust Sulphur Smell (Article 1445534)

26	EXHAUST SULPHUR SMELL
DESCRIPTION	Rotten egg smell (sulphur) from exhaust
POSSIBLE CAUSE	• Electrical connectors are disconnected or connected poorly • Charcoal canister malfunction • Vacuum lines are disconnected or connected improperly. • Improper fuel pressure • Poor fuel quality **Warning** **The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described .** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Are any drivability or exhaust smoke concerns present?	Yes	Go to the appropriate flow chart.
		No	Go to the next step.
2	Inspect the following: • Electrical connections • Vacuum lines • Fuel quality Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 2.
3	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
4	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start engine and idle it. Is fuel line pressure correct at idle?	Yes	Go to the next step.
		No	**Low:** Inspect fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
5	Inspect the charcoal canister for fuel saturation. Is excess amount of liquid fuel present in canister?	Yes	Replace the charcoal canister.
		No	Inspect the fuel tank vent system. If the fuel tank vent system is normal, suggest trying a different brand since sulfur content can vary in different fuels. If the fuel tank vent system is not normal, repair or replace the malfunctioning part.
6	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 27 Fuel Refill Concerns (Article 1445535)

27	FUEL REFILL CONCERNS
DESCRIPTION	• Fuel tank is not filled smoothly.
POSSIBLE CAUSE	• Clogged EVAP pipes • Nonreturn valve malfunction • Improper use of fuel nozzle • Inadequate fuel filling speed **Warning** • **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** — **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** — **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described .** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION		ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
2	Remove the fuel-filler pipe. Make sure the nonreturn valve is installed properly. Inspect nonreturn valve operation. Is the nonreturn valve normal?	Yes	Inspect for the following: • Improper use of fuel nozzle • Inadequate fuel filling speed
		No	**Nonreturn valve is installed improperly:** • Reinstall nonreturn valve to proper position. **Nonreturn valve does not operate properly:** • Replace nonreturn valve.
3	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 28 Fuel Filling Shut Off Concerns (Article 1445536)

28	FUEL FILLING SHUT OFF CONCERNS
DESCRIPTION	• Fuel does not shut off properly.
POSSIBLE CAUSE	• Clogged EVAP pipes • Nonreturn valve malfunction • Fuel shut-off valve malfunction • Fuel nozzle malfunction • Fuel nozzle is not inserted correctly. **Warning** • **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** **— Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** **— Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described.** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION		ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (SeeDTC TABLE [LF, L3].)
		No	**No DTC is displayed:** Go to the next step.
2	Remove the fuel-filler pipe. Make sure the nonreturn valve is installed properly. Inspect nonreturn valve operation. Is the nonreturn valve normal?	Yes	Inspect for the following: • Improper use of fuel nozzle • Fuel is not inserted correctly. • Inspect fuel shut-off valve.
		No	**Nonreturn valve is installed improperly:** • Reinstall the nonreturn valve to proper position. **Nonreturn valve does not operate properly:** • Replace the nonreturn valve.
3	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

No. 29 Spark Plug Condition (Article 1445537)

29	SPARK PLUG CONDITION
DESCRIPTION	Incorrect spark plug condition
POSSIBLE CAUSE	**Note** • Inspecting spark plugs condition can determine whether problem is related to a specific cylinder or possibly all cylinders. **Wet/carbon stuck on specific plug:** • Spark—Weak, not visible • Air/fuel mixture—Excessive fuel injection volume • Compression—No compression, low compression • Malfunction spark plug **Grayish white with specific plug:** • Air/fuel mixture—Insufficient fuel injection volume • Malfunction spark plug **Wet/carbon is stuck on all plugs:** • Spark—Spark weak • Air/fuel mixture—Too rich • Compression—Low compression • Clogging in intake/exhaust system **Grayish white with all plugs:** • Air/fuel mixture—Too lean **Warning** **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described.** **Caution** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Remove all the spark plugs. Inspect spark plug condition. Is spark plug condition normal?	Yes	Troubleshooting completed.
		No	**Specific plug is wet or covered with carbon:** Go to the next step. **Specific plug looks grayish white:** Go to Step 7. **All plugs are wet or covered with carbon:** Go to Step 9. **All plugs look grayish white:** Go to Step 15.
2	Are the spark plug wet/covered with carbon by the engine oil?	Yes	Inspect all areas related to oil, working up and down.
		No	Go to the next step.
3	Inspect the spark plug for the following: • Cracked insulator • Heat range • Air gap • Worn electrode Is the spark plug normal?	Yes	Go to the next step.
		No	Replace the spark plug.
4	Inspect compression pressure at suspected malfunctioning cylinder. Is compression pressure correct?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.

STEP	INSPECTION	RESULTS	ACTION
5	Install all spark plugs. Perform the spark test at suspected malfunctioning cylinder. Is strong blue spark visible? (Compare with normal cylinder.)	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
6	Install the fuel pressure gauge between fuel filter and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position (Engine off). Is the fuel line pressure correct with the ignition switch at ON? (See FUEL LINE PRESSURE INSPECTION [LF, L3].)	Yes	Inspect fuel injector for the following: • Open or short circuit in injector • Leakage • Injection volume
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
7	Inspect the spark plug for the following. • Heat range • Air gap Is the spark plug normal?	Yes	Go to the next step.
		No	Replace the spark plug.
8	Remove the suspected fuel injector. Inspect the following: • Resistance • Fuel injection volume Are all above items normal?	Yes	Inspect for open circuit in wiring harness between fuel injector connector terminal A and PCM at the following terminals: • **For No.1 cylinder: 2AW*1, 2BB*2, 2BA*1, 2BE*2, 2BA*3** • **For No.2 cylinder: 2AS*1, 2BC*2, 2AW*1, 2BF*2, 2AW*3** • **For No.3 cylinder: 2AX*1, 2BD*2, 2AX*1, 2BG*2, 2AX*3** • **For No.4 cylinder: 2AT*1, 2AZ*2, 2AT*1, 2BH*2, 2AT*3**
		No	Replace the fuel injector.
9	Is the air cleaner element free of clogging?	Yes	Go to the next step.
		No	Replace the air cleaner element.
10	Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
11	Install the fuel pressure gauge between the fuel filter and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position (Engine off). Is the fuel line pressure correct with ignition switch at ON? (See FUEL LINE PRESSURE INSPECTION [LF, L3].)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
12	Inspect the following PIDs: • ECT • O2S11 (When engine can be started.) • O2S12 (When engine can be started.) • O2S13*1 (When engine can be started.) • MAF (See PCM INSPECTION [LF, L3].) Are PIDs normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.

STEP	INSPECTION	RESULTS	ACTION
13	Perform the purge control inspection. (When engine can be started.) (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF, L3].) Is the purge control correct?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
14	Perform compression inspection. (See COMPRESSION INSPECTION [LF, L3].) Is compression correct?	Yes	Visually inspect for deformed exhaust system part.
		No	Repair or replace the malfunctioning part.
15	When the engine cannot be started, inspect the intake-air system for air leakage. When the engine can be started, perform intake manifold vacuum inspection. Is air sucked in from intake-air system?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
16	Install the fuel pressure gauge between the fuel filter and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position (Engine off). Is fuel line pressure correct with the ignition switch at ON? (See FUEL LINE PRESSURE INSPECTION [LF, L3].)	Yes	Inspect the following PIDs: • ECT • O2S11 • O2S12 • O2S13*1 • MAF (See PCM INSPECTION [LF, L3].) Inspect PCM GND condition.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. **High:** Replace the fuel pump unit.
17	• Verify test results. — If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [LF, L3].) — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.		

*1 : California emission regulation applicable model
*2 : Except for California emission regulation applicable model with LF engine ATX
*3 : Except for California emission regulation applicable model with LF engine MTX and L3 engine

Abnormal wear/deterioration (itype_122)

Tsbs

- Engine Controls - MIL ON/DTC's P0131/P2251 (0101510, 2010/02/15)

Noise (itype_156)

Tsbs

- Engine - VVT Noise At Engine Start Up (0101011, 2011/12/21)

Sticking/Binding (itype_173)

Tsbs

- Emissions - MIL ON/DTC P0441 Set (0100309, 2009/01/23)

New / Updated Parts (itype_117)

Tsbs

- Engine/Fuel - MIL ON/DTC P2006 Stored (0100611, 2011/02/09)
- Fuel System - MIL ON/DTC's P0442/P0455/P0456 (0102010, 2010/03/26)

- Emissions - MIL ON/DTC P0441 Set (0100309, 2009/01/23)
- Engine - MIL ON/DTC P2004 Set (0101209, 2009/04/09)

Service Manual Updates (itype_115)

Tsbs

- Engine Controls - Revised DTC P0441 Diagnostics (0102908, 2008/04/28)