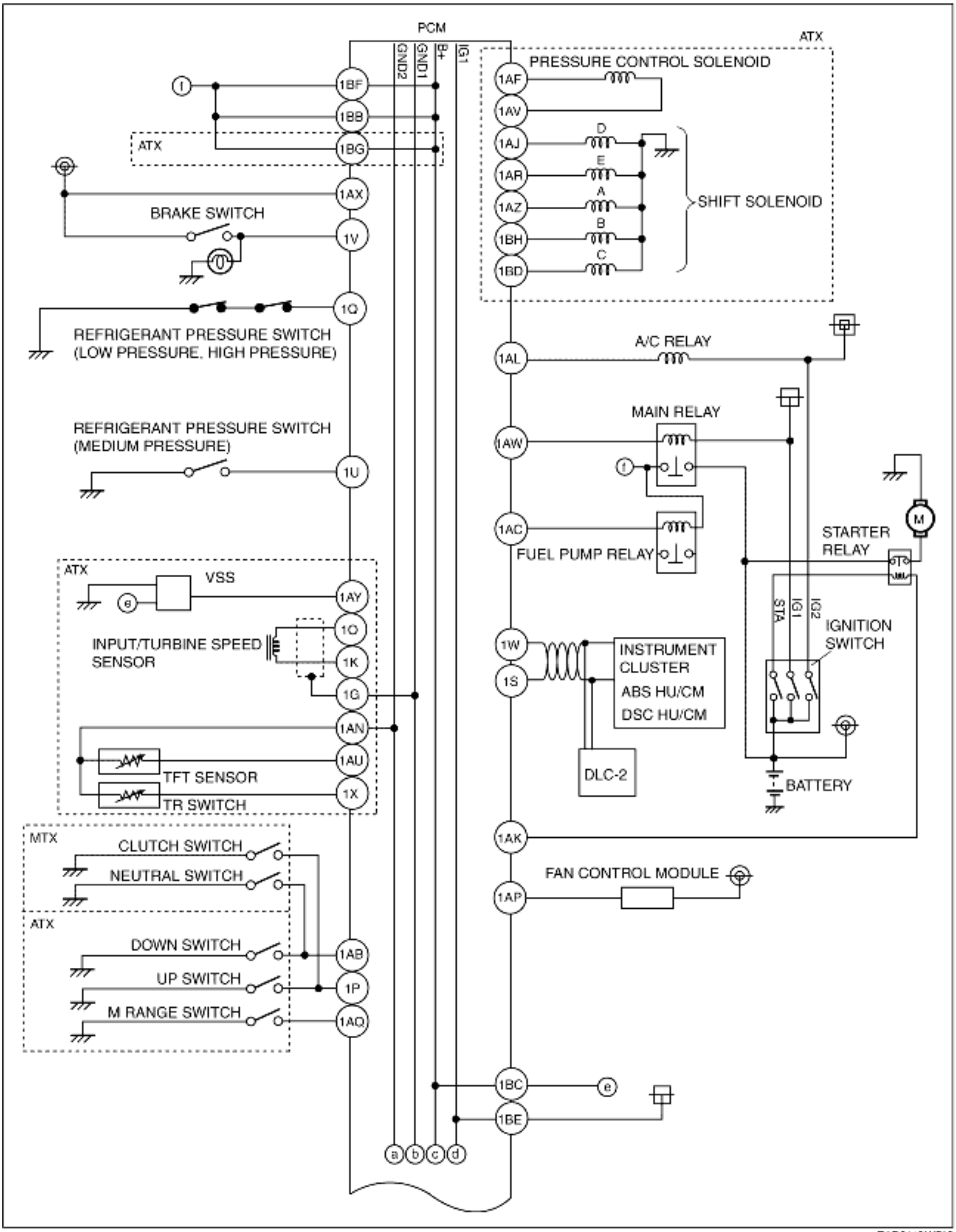
Mazda 3 Workshop Manual – Engine + Wiring Diagrams + Diagnostic Trouble Codes

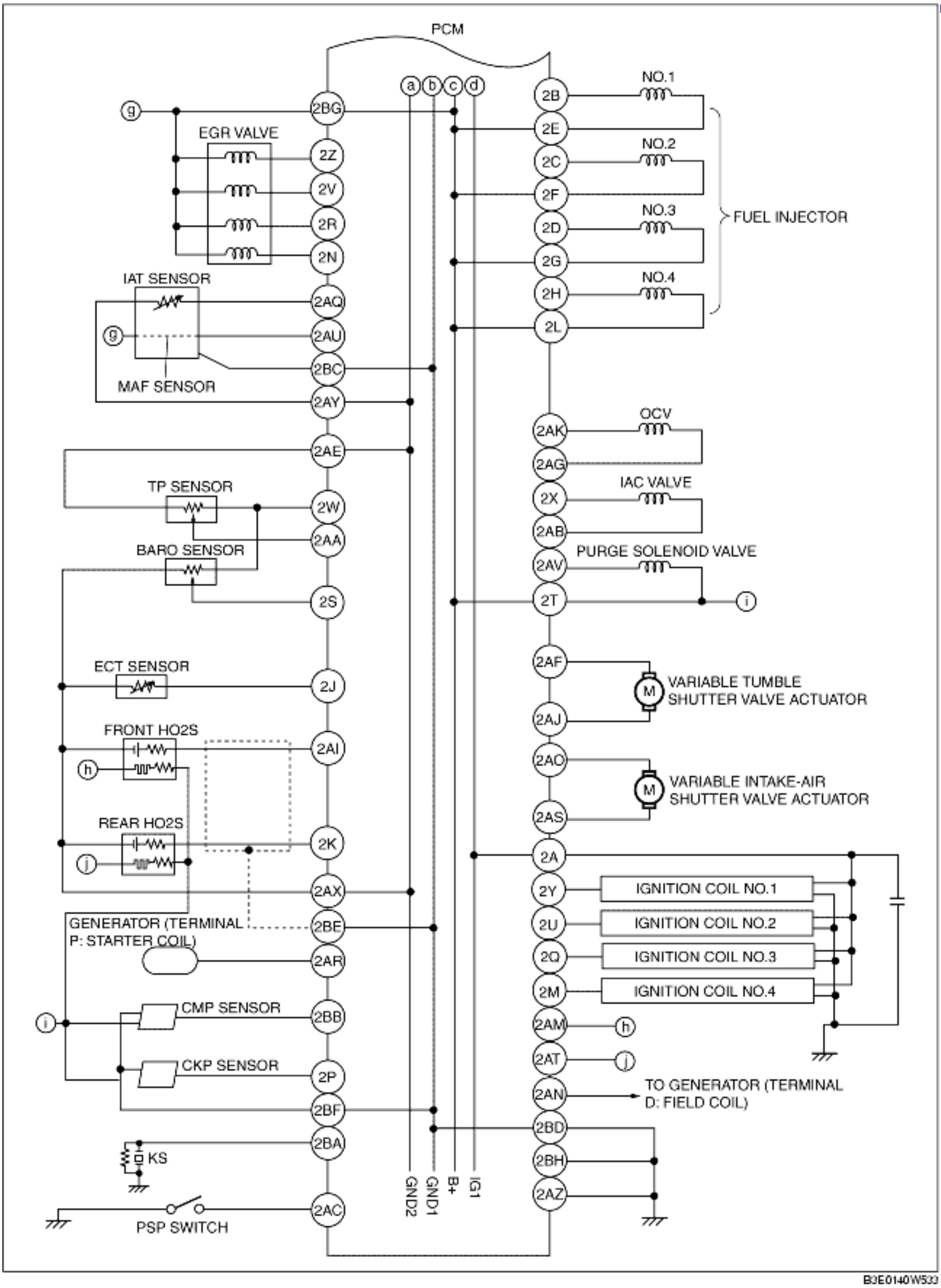
Contents

CONTROL SYSTEM WIRING DIAGRAM [Z6]

B3E010200102W12



B3E0140W532


PCM
EGR VALVE
IAT SENSOR
MAF SENSOR
TP SENSOR
BARO SENSOR
ECT SENSOR
FRONT HO2S
REAR HO2S
GENERATOR (TERMINAL P: STARTER COIL)
CMP SENSOR
CKP SENSOR
KS
PSP SWITCH
2BG
2Z
2V
2R
2N
2AQ
2AU
2BC
2AY
2AE
2W
2AA
2S
2J
2AI
2K
2AX
2BE
2AR
2BB
2P
2BF
2BA
2AC
GND2
GND1
B+
IG1
NO.1
NO.2
NO.3
NO.4
FUEL INJECTOR
2B
2E
2C
2F
2D
2G
2H
2L
OCV
2AK
2AG
IAC VALVE
2X
2AB
PURGE SOLENOID VALVE
2AV
2T
2AF
VARIABLE TUMBLE SHUTTER VALVE ACTUATOR
2AJ
2AO
VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR
2AS
2A
2Y
IGNITION COIL NO.1
2U
IGNITION COIL NO.2
2Q
IGNITION COIL NO.3
2M
IGNITION COIL NO.4
2AM
2AT
2AN
TO GENERATOR (TERMINAL D: FIELD COIL)
2BD
2BH
2AZ
B3E0140W533

MONITORING SYSTEM AND CONTROL SYSTEM DEVICE RELATIONSHIP CHART [Z6]

B3E010200102W13

×: Applicable

Component	HO2S	HO2S heater	Fuel system	Misfire	Catalyst
Input					
ECT sensor	×	×	×	×	×
IAT sensor	×	×	×	×	×
CKP sensor	×	×	×	×	×
CMP sensor	×	×	×	×	×
TP sensor	×	×	×	×	×
MAF sensor	×	×	×	×	×
Front HO2S	×		×		×
Rear HO2S	×		×		×
BARO sensor	×	×	×	×	×
Vehicle speed signal	×		×	×	
Output					
Fuel injector	×		×		
Purge solenoid valve					
Front HO2S heater		×			
Rear HO2S heater		×			
MIL	×	×	×	×	×

OBD PENDING TROUBLE CODE [Z6]

B3E010200102W14

• 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 problem is not found in a second drive cycle, the PCM judges that the system returned to normal or the problem was mistakenly detected, and deletes the pending code (1DC). If the problem is not found in a second drive cycle, the PCM judges that the system returned to normal or the problem was mistakenly detected, and deletes the pending code when the ignition switch is turned to the ON position in the next drive cycle (2DC). 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 [Z6]

B3E010200102W15

• 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 DTC is stored, with the exception of fuel system or misfire DTCs. Once freeze frame data for a fuel system or misfire DTC is stored, it will overwrite any previous data and the freeze frame will not be overwritten again.

OBD ON-BOARD SYSTEM READINESS TEST [Z6]

B3E010200102W16

• This shows the OBD systems operating status. If any monitor function is incomplete, WDS or equivalent will identify which monitor function has not been completed. The fuel system, misfire and CCM are continuous monitoring-type functions. The HO2S and catalyst will be monitored under drive cycles. The OBD diagnostic system is initialized by performing the DTC cancellation procedure or disconnecting the negative battery cable.

OBD READ/CLEAR DIAGNOSTIC TEST RESULT [Z6]

B3E010200102W17

- This retrieves all stored DTCs in the PCM and clears the on-board readiness test results, freeze frame data, DTC, diagnostic monitoring test results and pending trouble code.

OBD PARAMETER IDENTIFICATION (PID) ACCESS [Z6]

B3E010200102W18

• 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.

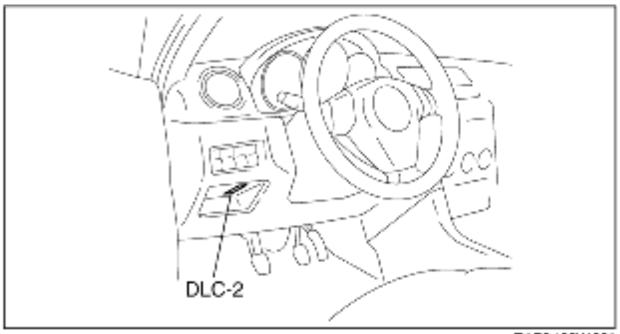
ON-BOARD DIAGNOSTIC TEST [Z6]

B3E010200102W19

DTC Reading Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



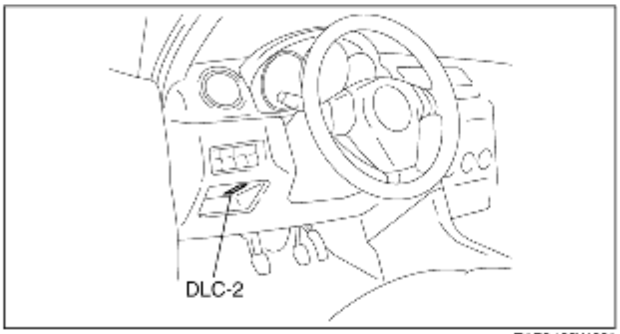
B3E0102W003

3. Retrieve the DTCs using the WDS or equivalent.

Pending Trouble Code Access Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



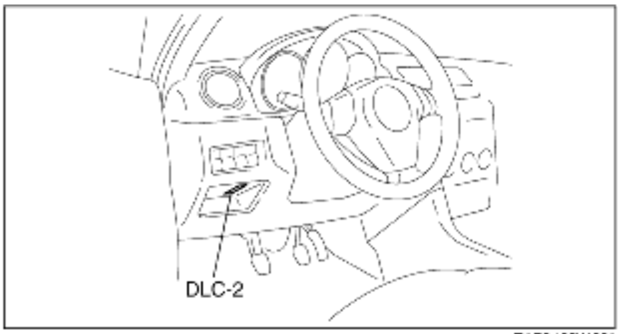
B3E0102W003

3. Retrieve the pending trouble codes using the WDS or equivalent.

Freeze Frame PID Data Access Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



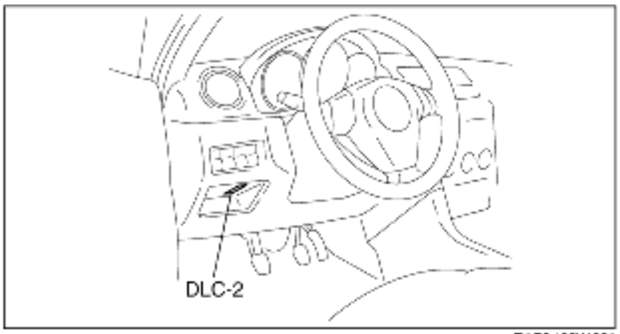
B3E0102W003

3. Record the freeze frame PID data using the WDS or equivalent.

On-Board System Readiness Tests Access Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



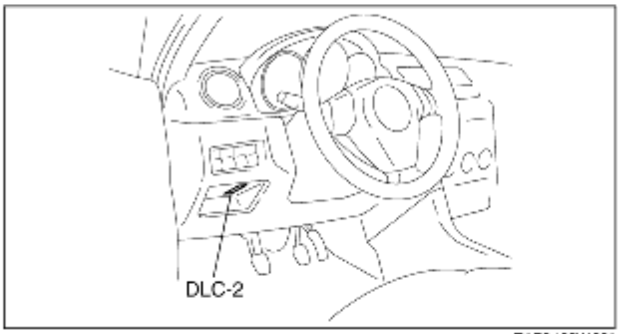
B3E0102W003

3. Monitor the OBD systems operating status using the WDS or equivalent.

PID/DATA Monitor and Record Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



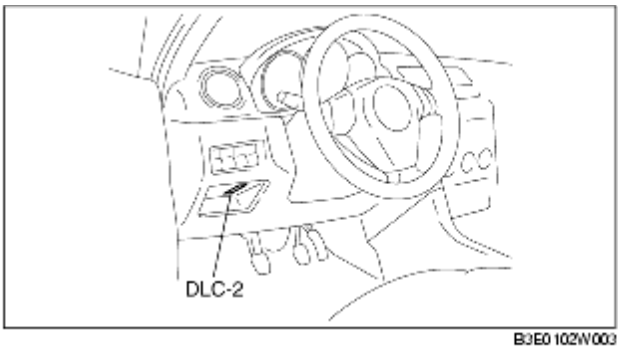
B3E0102W003

3. Access and monitor PIDs using the WDS or equivalent.

Diagnostic Monitoring Test Results Access Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.

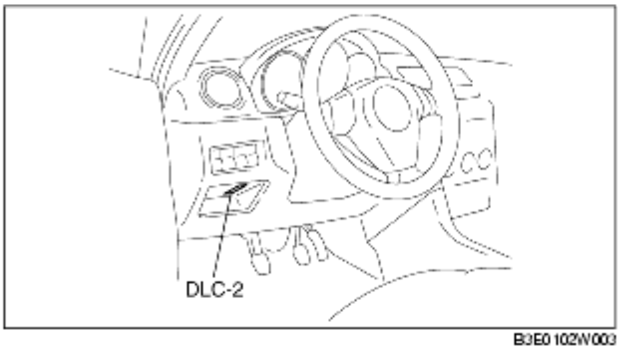


3. Access to the diagnostic monitoring test results and read the test results using the WDS or equivalent.

AFTER REPAIR PROCEDURE [Z6]

B3E010200102W20

1. Connect the WDS or equivalent to the DLC-2.



2. Cycle the ignition switch off, then to the ON position (Engine off).

3. Record DTC if retrieved.

4. Clear all diagnostic data using the WDS or equivalent.

OBD DRIVE MODE [Z6]

B3E010200102W21

• Performing the Drive Mode inspects the OBD system for proper operation and must be performed to ensure that no additional DTCs are present.

• During the Drive Mode, the following systems are inspected:

- HO2S heater
- HO2S
- TWC
- Fuel system and Misfire

Caution

• While performing the Drive Mode, always operate the vehicle in a safe and lawful manner.

• When the WDS or equivalent is used to observe monitor system status while driving, be sure to have another technician with you, or record the data in the WDS or equivalent using the PID/DATA MONITOR AND RECORD function and inspect later.

Note

• Vehicle speed and engine speed detected by the PCM may differ from that indicated by the speedometer and tachometer. Use the WDS or equivalent to monitor vehicle speed.

• If the OBD system inspection is not completed during the Drive Mode, the following causes are considered:

- The OBD system detected a malfunction.
- The Drive Mode procedure was not completed correctly.

• Disconnecting the battery will reset the memory. Do not disconnect the battery during and after the Drive Mode.

• The WDS or equivalent can be used at anytime through the course of the Drive Mode to monitor the completion status. Monitoring can be done by viewing the ON BOARD SYSTEM READINESS menu.

PCM Adaptive Memory Produce Drive Mode

1. Start the engine and warm it up completely.

2. Verify the following conditions and correct if necessary:

   • All accessory loads (A/C, headlights, blower fan, rear window defroster) are off.

   • Initial ignition timing and idle speed are within specification.

3. Idle the engine for **more than 120 s**.

4. Perform no load racing at the engine speed of **2,800-3,200 rpm** for **more than 30 s**.

5. Idle the engine for **more than 30 s** after the cooling fan stopped.

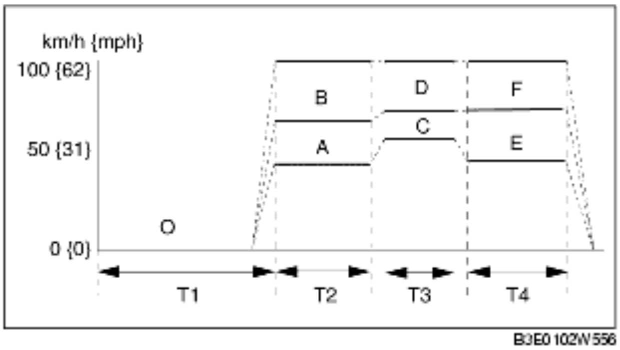
6. Turn the ignition switch off.

HO2S heater, HO2S, and TWC Repair Verification Drive Mode

1. Perform the "PCM Adaptive Memory Produce Drive Mode" first.

2. Verify that all accessory loads (A/C, headlights, blower fan, rear window defroster) are off.

3. Drive the vehicle as shown in the graph; first drive in zone O, then A or B, followed by C or D, finally E or F. The driving condition before driving at constant speed is not specified.



For MTX

Zone	Shift Position	Vehicle Speed (km/h {mph})	Time (s)
O	Neutral	0 {0}	T1: above 450
A	2nd	40-50 {25-31}	T2: above 30
B	3rd	65-75 {41-46}	
C	2nd	60-75 {38-46}	T3: above 20
D	3rd	75-100 {47-62}	
E	4th	50-75 {32-46}	T4: above 120
F	5th	75-95 {47-59}	

For ATX

Zone	Shift Position	Vehicle Speed (km/h {mph})	Time (s)
O	P or N	0 {0}	T1: above 450
A	M (3GR)	40-60 {25-37}	T2: above 30
B	M (3GR)	65-95 {41-59}	
C	M (2GR)	60-75 {38-46}	T3: above 20
D	M (3GR)	85-100 {53-62}	
E	M (4GR)	50-75 {32-46}	T4: above 120

F	M (5GR)	75-100 {47-62}	

4. Stop the vehicle and access the ON BOARD SYSTEM READINESS to inspect the Drive Mode completion status.

- If completed, RFC changes from No to Yes.
- If not completed, turn the ignition switch off, then go back to Step 3.

5. Verify that no DTCs are available.

DTC TABLE [Z6]

B3E010200102W22

×: Applicable

-: Not applicable

DTC No.	Condition	MIL	DC	Monitor item	Memory function	Page
P0011	CMP-timing over-advanced	ON	1	CCM	×	(See DTC P0011 [Z6].)
P0012	CMP-timing over-retarded	ON	2	CCM	×	(See DTC P0012 [Z6].)
P0031	Front HO2S heater control circuit low	ON	2	HO2S heater	×	(See DTC P0031 [Z6].)
P0032	Front HO2S heater control circuit high	ON	2	HO2S heater	×	(See DTC P0032 [Z6].)
P0037	Rear HO2S heater control circuit low	ON	2	HO2S heater	×	(See DTC P0037 [Z6].)
P0038	Rear HO2S heater control circuit high	ON	2	HO2S heater	×	(See DTC P0038 [Z6].)
P0102	MAF sensor circuit low input	ON	1	CCM	×	(See DTC P0102 [Z6].)
P0103	MAF sensor circuit high input	ON	1	CCM	×	(See DTC P0103 [Z6].)
P0111	IAT sensor circuit range/performance problem	ON	2	CCM	×	(See DTC P0111 [Z6].)
P0112	IAT sensor circuit low input	ON	1	CCM	×	(See DTC P0112 [Z6].)
P0113	IAT sensor circuit high input	ON	1	CCM	×	(See DTC P0113 [Z6].)
P0117	ECT sensor circuit low input	ON	1	CCM	×	(See DTC P0117 [Z6].)
P0118	ECT sensor circuit high input	ON	1	CCM	×	(See DTC P0118 [Z6].)
P0121	TP sensor circuit range/performance problem	ON	2	CCM	×	(See DTC P0121 [Z6].)
P0122	TP sensor circuit low input	ON	1	CCM	×	(See DTC P0122 [Z6].)

P0123	TP sensor circuit high input	ON	1	CCM	×	(See DTC P0123 [Z6].)
P0125	Insufficient coolant temperature for closed loop fuel control	ON	2	CCM	×	(See DTC P0125 [Z6].)
P0132	Front HO2S circuit high voltage	ON	2	HO2S	×	(See DTC P0132 [Z6].)
P0133	Front HO2S circuit slow response	ON	2	HO2S	×	(See DTC P0133 [Z6].)
P0134	Front HO2S circuit no activity detected	ON	2	HO2S	×	(See DTC P0134 [Z6].)
P0138	Rear HO2S circuit high voltage	ON	2	HO2S	×	(See DTC P0138 [Z6].)
P0140	Rear HO2S circuit no activity detected	ON	2	HO2S	×	(See DTC P0140 [Z6].)
P0300	Random misfire detected	Flash/ON	2	Misfire	×	(See DTC P0300 [Z6].)
P0301	Cylinder No.1 misfire detected	Flash/ON	2	Misfire	×	(See DTC P0301, P0302, P0303, P0304 [Z6].)
P0302	Cylinder No.2 misfire detected	Flash/ON	2	Misfire	×	(See DTC P0301, P0302, P0303, P0304 [Z6].)
P0303	Cylinder No.3 misfire detected	Flash/ON	2	Misfire	×	(See DTC P0301, P0302, P0303, P0304 [Z6].)
P0304	Cylinder No.4 misfire detected	Flash/ON	2	Misfire	×	(See DTC P0301, P0302, P0303, P0304 [Z6].)
P0327	KS circuit low input	ON	1	CCM	×	(See DTC P0327 [Z6].)
P0328	KS circuit high input	ON	1	CCM	×	(See DTC P0328 [Z6].)
P0335	CKP sensor circuit problem	ON	1	CCM	×	(See DTC P0335 [Z6].)
P0340	CMP sensor circuit problem	ON	1	CCM	×	(See DTC P0340 [Z6].)
P0403	EGR control circuit problem	ON	2	CCM	×	(See DTC P0403 [Z6].)
P0420	Catalyst system efficiency below threshold	ON	2	Catalyst	×	(See DTC P0420 [Z6].)

P0443	Purge solenoid valve circuit problem	ON	2	CCM	×	(See DTC P0443 [Z6].)
P0480	Cooling fan control circuit problem	OFF	1	Other	×	(See DTC P0480 [Z6].)
P0500	VSS circuit problem	ON	2	CCM	×	(See DTC P0500 [Z6].)
P0505	IAC system problem	OFF	-	-	-	(See DTC P0505 [Z6].)
P0506	IAC system RPM lower than expected	ON	2	CCM	×	(See DTC P0506 [Z6].)
P0507	IAC system RPM higher than expected	ON	2	CCM	×	(See DTC P0507 [Z6].)
P0511	IAC circuit problem	ON	1	CCM	×	(See DTC P0511 [Z6].)
P0550	PSP switch circuit problem	ON	2	CCM	×	(See DTC P0550 [Z6].)
P0602	PCM programming error	ON	1	CCM	×	(See DTC P0602 [Z6].)
P0610	PCM vehicle options error	ON	1	CCM	×	(See DTC P0610 [Z6].)
P0660	Variable intake-air control circuit/open	OFF	1	Other	×	(See DTC P0660 [Z6].)
P0668	PCM temperature sensor circuit low input	OFF	1	Other	×	(See DTC P0668 [Z6].)
P0669	PCM temperature sensor circuit high input	OFF	1	Other	×	(See DTC P0669 [Z6].)
P0703	Brake switch input circuit problem	ON	2	CCM	×	(See DTC P0703 [Z6].)
P0704	CPP switch input circuit problem	ON	2	CCM	×	(See DTC P0704 [Z6].)
P0706	Transaxle range (TR) switch circuit range/performance	(See DTC TABLE [FN4A-EL].)				
P0707	Transaxle range (TR) switch circuit low input	(See DTC TABLE [FN4A-EL].)				
P0708	Transaxle range (TR) switch circuit high input	(See DTC TABLE [FN4A-EL].)				
P0711	Transaxle fluid temperature (TFT) sensor circuit range/performance (stuck)	(See DTC TABLE [FN4A-EL].)				

P0712	Transaxle fluid temperature (TFT) sensor circuit malfunction (short to ground)	(See DTC TABLE [FN4A-EL].)
P0713	Transaxle fluid temperature (TFT) sensor circuit malfunction (open circuit)	(See DTC TABLE [FN4A-EL].)
P0715	Input/turbine speed sensor circuit malfunction	(See DTC TABLE [FN4A-EL].)
P0731	Gear 1 incorrect (incorrect gear ratio detected)	(See DTC TABLE [FN4A-EL].)
P0732	Gear 2 incorrect (incorrect gear ratio detected)	(See DTC TABLE [FN4A-EL].)
P0733	Gear 3 incorrect (incorrect gear ratio detected)	(See DTC TABLE [FN4A-EL].)
P0734	Gear 4 incorrect (incorrect gear ratio detected)	(See DTC TABLE [FN4A-EL].)
P0741	Torque converter clutch (TCC) (stuck off)	(See DTC TABLE [FN4A-EL].)
P0742	Torque converter clutch (TCC) (stuck on)	(See DTC TABLE [FN4A-EL].)
P0745	Pressure control solenoid malfunction	(See DTC TABLE [FN4A-EL].)
P0751	Shift solenoid A stuck off	(See DTC TABLE [FN4A-EL].)
P0752	Shift solenoid A stuck on	(See DTC TABLE [FN4A-EL].)
P0753	Shift solenoid A malfunction (electrical)	(See DTC TABLE [FN4A-EL].)
P0756	Shift solenoid B stuck off	(See DTC TABLE [FN4A-EL].)
P0757	Shift solenoid B stuck on	(See DTC TABLE [FN4A-EL].)
P0758	Shift solenoid B malfunction (electrical)	(See DTC TABLE [FN4A-EL].)
P0761	Shift solenoid C stuck off	(See DTC TABLE [FN4A-EL].)
P0762	Shift solenoid C stuck on	(See DTC TABLE [FN4A-EL].)
P0763	Shift solenoid C malfunction (electrical)	(See DTC TABLE [FN4A-EL].)
P0766	Shift solenoid D stuck off	(See DTC TABLE [FN4A-EL].)
P0767	Shift solenoid D stuck on	(See DTC TABLE [FN4A-EL].)

P0768	Shift solenoid D malfunction (electrical)	(See DTC TABLE [FN4A-EL].)				
P0771	Shift solenoid E stuck off	(See DTC TABLE [FN4A-EL].)				
P0772	Shift solenoid E stuck on	(See DTC TABLE [FN4A-EL].)				
P0773	Shift solenoid E malfunction (electrical)	(See DTC TABLE [FN4A-EL].)				
P0850	Neutral switch input circuit problem	ON	2	CCM	×	(See DTC P0850 [Z6].)
P0894	Forward clutch torque transmission	(See DTC TABLE [FN4A-EL].)				
P1260	Immobilizer system problem	OFF	-	Other	-	(See DTC P1260 [Z6].)
P2006	Variable tumble control stuck close	ON	2	CCM	×	(See DTC P2006 [Z6].)
P2008	Variable tumble control circuit/open	ON	2	CCM	×	(See DTC P2008 [Z6].)
P2088	Variable valve timing control circuit low	ON	1	CCM	×	(See DTC P2088 [Z6].)
P2089	Variable valve timing control circuit high	ON	1	CCM	×	(See DTC P2089 [Z6].)
P2096	Target A/F feedback system too lean	ON	2	Fuel system	×	(See DTC P2096 [Z6].)
P2097	Target A/F feedback system too rich	ON	2	Fuel system	×	(See DTC P2097 [Z6].)
P2177	System too lean off idle	ON	2	Fuel system	×	(See DTC P2177 [Z6].)
P2178	System too rich off idle	ON	2	Fuel system	×	(See DTC P2178 [Z6].)
P2187	System too lean at idle	ON	2	Fuel system	×	(See DTC P2187 [Z6].)
P2188	System too rich at idle	ON	2	Fuel system	×	(See DTC P2188 [Z6].)
P2195	Front HO2S signal stuck lean	ON	2	HO2S	×	(See DTC P2195 [Z6].)
P2196	Front HO2S signal stuck rich	ON	2	HO2S	×	(See DTC P2196 [Z6].)
P2228	BARO sensor circuit low input	ON	1	CCM	×	(See DTC P2228 [Z6].)

P2229	BARO sensor circuit high input	ON	1	CCM	×	(See DTC P2229 [Z6].)
P2502	Charging system voltage problem	OFF	1	-	-	(See DTC P2502 [Z6].)
P2503	Charging system voltage low	OFF	1	-	-	(See DTC P2503 [Z6].)
P2504	Charging system voltage high	OFF	1	-	-	(See DTC P2504 [Z6].)
P2507	PCM power input signal low	ON	1	CCM	×	(See DTC P2507 [Z6].)
U0073	Control module communication bus off	(See DTC TABLE [MULTIPLEX COMMUNICATION SYSTEM].)				
U0121	Lost communication with anti-lock brake system (ABS) control module	(See DTC TABLE [MULTIPLEX COMMUNICATION SYSTEM].)				
U0155	Lost communication with instrument panel cluster (IPC) control module	(See DTC TABLE [MULTIPLEX COMMUNICATION SYSTEM].)				

DTC P0011 [Z6]

B3E010200001W01

DTC P0011	CMP-timing over-advanced
DETECTION CONDITION	• The actual valve timing is over-advanced from the target valve timing when the OCV is controlled within the maximum valve timing retard condition. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• OCV malfunction • Spool valve in OCV is stuck in advance position. • Variable valve timing actuator is stuck in advance position. • Loose timing chain or improper valve timing due to timing chain slippage • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT OCV FOR MALFUNCTION** • Start the engine. • Increase the engine speed. • Stop the engine. • Remove the OCV.	Yes	Go to the next step.
		No	Replace the OCV, then go to Step 6. (See OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6].)

	(See OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6].) • Inspect the position of the spool valve in the OCV. (See OIL CONTROL VALVE (OCV) INSPECTION [Z6].) • Is the spool valve located at valve retard position?		
4	**INSPECT STOPPER PIN MECHANISM** • Inspect the stopper pin. (See VARIABLE VALVE TIMING ACTUATOR INSPECTION [Z6].) • Is the stopper pin mechanism normal?	Yes	Go to the next step.
		No	Replace the variable valve timing actuator, then go to Step 6. (See VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [Z6].)
5	**INSPECT ROTOR POSITION** • Remove the variable valve timing actuator. (See VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [Z6].) • Is the rotor position at maximum valve timing retard?	Yes	**VARIABLE VALVE TIMING MECHANISM IS NORMAL** **Note** • This DTC is detected by intermittent concern. • Intermittent concern might be removed by cleaning mode of variable valve timing control function. Go to the next step.
		No	Replace the variable valve timing actuator, go to the next step. (See VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [Z6].)
6	**VERIFY TROUBLESHOOTING OF DTC P0011 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Access RPM PID using the WDS or equivalent. • Turn off all electrical roads. • Increase and keep the engine speed at **4,500 rpm or more** for **5 s**. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

7	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0012 [Z6]

B3E010200001W02

DTC P0012	CMP-timing over-retarded
DETECTION CONDITION	• The actual valve timing is over-retarded from the target valve timing when the OCV system control is within feed-back range. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Low engine oil pressure • OCV malfunction • Spool valve in OCV is stuck in retard position. • Variable valve timing actuator is stuck in retard position. • Following oil runners are clogged or have leakage. **Oil runners** • Between oil pressure switch and OCV • Between OCV and variable valve timing actuator • In variable valve timing actuator • Loose timing chain or improper valve timing due to timing chain slippage • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY**	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.

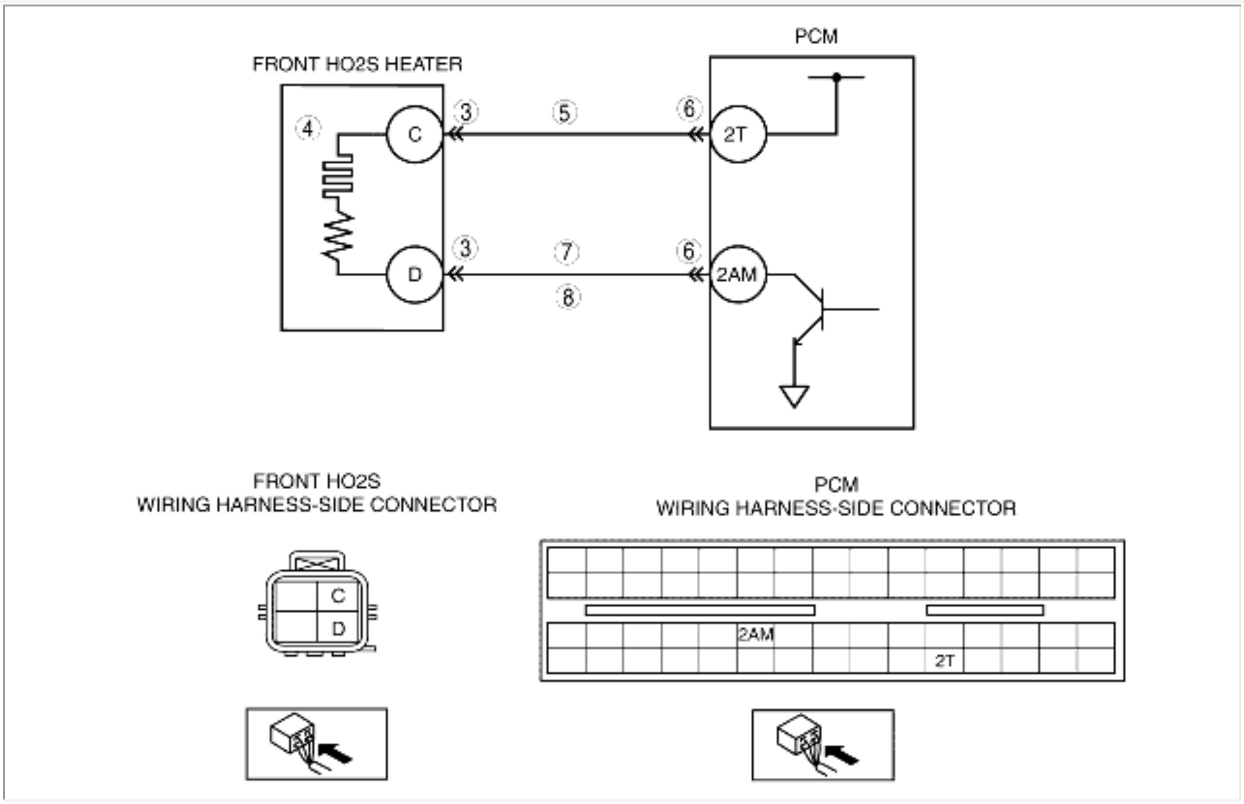
	• Verify related service repair information availability. • Is any related repair information available?	No	Go to the next step.
3	**VERIFY ENGINE OIL PRESSURE** • Start the engine. • Does the oil pressure warning light illuminate?	Yes	Inspect engine oil pressure, then go to Step 7. (See OIL PRESSURE INSPECTION [Z6].)
		No	Go to the next step.
4	**VERIFY TIMING CHAIN INSTALLATION** • Is camshaft timing mark at correct point? (See Timing Chain Installation Note.)	Yes	Go to the next step.
		No	Reinstall the timing chain, then go to Step 7. (See TIMING CHAIN REMOVAL/INSTALLATION [Z6].)
5	**INSPECT OCV FOR MALFUNCTION** • Stop the engine. • Remove the OCV. (See OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6].) • Inspect position of the spool valve in the OCV. (See OIL CONTROL VALVE (OCV) INSPECTION [Z6].) • Is the spool valve located at valve retard position?	Yes	**VARIABLE VALVE TIMING MECHANISM IS NORMAL** **Note** • This DTC is detected by intermittent concern. • Intermittent concern might be removed by cleaning mode of variable valve timing control function. Go to the next step.
		No	Replace the OCV, then go to Step 7. (See OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6].)
6	**INSPECT ENGINE OIL RUNNER** • Inspect following engine oil runners for clogging or leakage. - Between the oil pressure switch and the OCV - Between the OCV and the variable valve timing actuator - In the variable valve timing actuator • Is there any clogging or leakage?	Yes	Repair or replace suspected runner, then go to the next step.
		No	**VARIABLE VALVE TIMING MECHANISM IS NORMAL** **Note** • This DTC is detected by intermittent concern. • Intermittent concern might be removed by cleaning mode of variable valve timing control function. Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0012 COMPLETED** • Make sure to reconnect all disconnected connectors.	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

	• Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the PCM memory using WDS or equivalent. • Start the engine. • Access RPM PID using the WDS or equivalent. • Warm up the engine completely. • Turn off all electrical roads. • Increase and keep the engine speed **2,500 rpm or more** for **10 s**. • Is the PENDING CODE for this DTC present?		
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [Z6].)
		No	Troubleshooting completed.

DTC P0031 [Z6]

B3E010200001W03

DTC P0031	Front HO2S heater control circuit low
DETECTION CONDITION	• The PCM monitors front HO2S heater control voltage at PCM terminal 2AM. If PCM turns front HO2S heater off but front HO2S heater circuit has low voltage, PCM determines that front HO2S heater circuit has malfunction. **Note** • Front HO2S heater is controlled by duty signal. **Diagnostic support note** • This is a continuous monitor (HO2S heater). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S heater malfunction • Connector or terminal malfunction • Open circuit in wiring harness between front HO2S terminal C and PCM terminal 2T • Open circuit in wiring harness between front HO2S terminal D and PCM terminal 2AM • Short to ground in wiring harness between front HO2S terminal D and PCM terminal 2AM • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT FRONT HO2S CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the front HO2S connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT FRONT HO2S HEATER** • Inspect the front HO2S heater.	Yes	Replace the front HO2S, then go to Step 9. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)

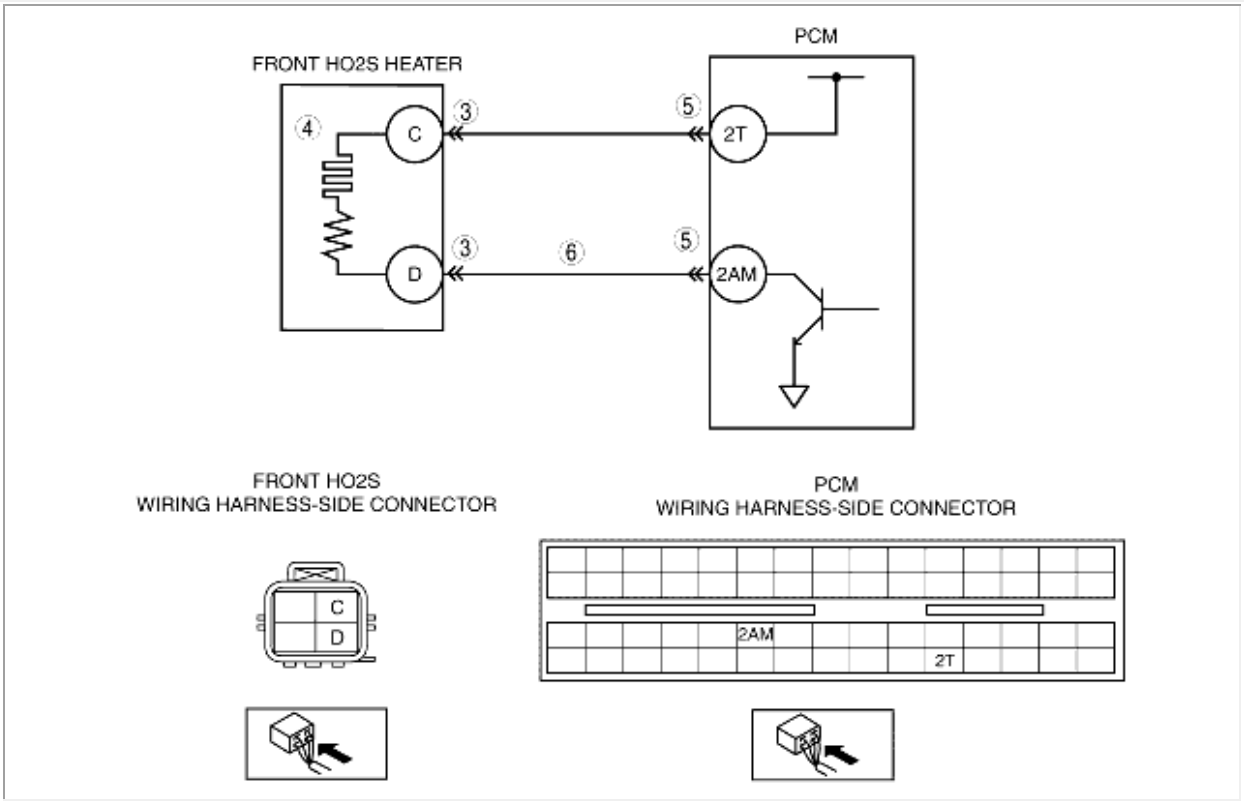
	(See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].) • Is there any malfunction?	No	Go to the next step.
5	**INSPECT FRONT HO2S HEATER POWER CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for continuity between front HO2S terminal C (wiring harness-side) and PCM terminal 2T (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to Step 9.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
7	**INSPECT FRONT HO2S CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between front HO2S terminal D (wiring harness-side) and body GND. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
8	**INSPECT FRONT HO2S CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between front HO2S terminal D (wiring harness-side) and PCM terminal 2AM (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0031 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0032 [Z6]

B3E010200001W04

DTC P0032	Front HO2S heater control circuit high
DETECTION CONDITION	• The PCM monitors the front HO2S heater control voltage at PCM terminal 2AM. If the PCM turns the front HO2S heater on but the front HO2S heater circuit has high voltage, the PCM determines that the front HO2S heater circuit has a malfunction. **Note** • Front HO2S heater is controlled by a duty signal. **Diagnostic support note** • This is a continuous monitor (HO2S heater). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Short to power supply in wiring harness between front HO2S terminal D and PCM terminal 2AM • Short circuit in front HO2S or PCM terminal • Front HO2S heater malfunction • PCM malfunction



Diagnostic procedure

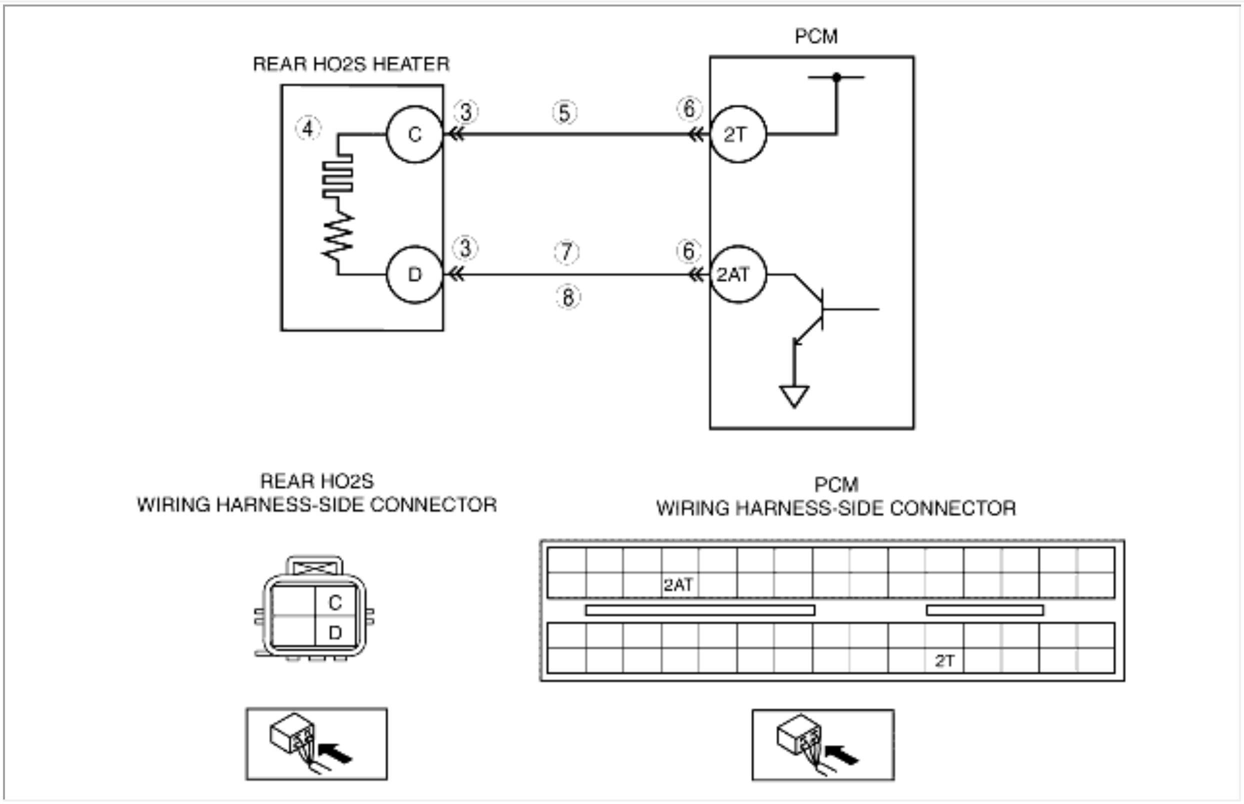
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT FRONT HO2S CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the front HO2S connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT FRONT HO2S HEATER**	Yes	Replace the front HO2S, then go to Step 7.

	• Inspect the front HO2S heater. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].) • Is there any malfunction?		(See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
5	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
6	**INSPECT FRONT HO2S HEATER CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between front HO2S terminal D (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0032 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0037 [Z6]

B3E010200001W05

DTC P0037	Rear HO2S heater control circuit low
DETECTION CONDITION	• The PCM monitors the rear HO2S heater control voltage at PCM terminal 2AT. If the PCM turns the rear HO2S heater off but the rear HO2S heater circuit has low voltage, the PCM determines that the rear HO2S heater circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (HO2S heater). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Rear HO2S heater malfunction • Open circuit in wiring harness between rear HO2S terminal C and PCM terminal 2T • Open circuit in wiring harness between rear HO2S terminal D and PCM terminal 2AT • Short to GND in wiring harness between rear HO2S terminal D and PCM terminal 2AT • Connector or terminal malfunction • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT REAR HO2S CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the rear HO2S connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT REAR HO2S HEATER** • Inspect the rear HO2S heater.	Yes	Replace the rear HO2S, then go to Step 9. (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)

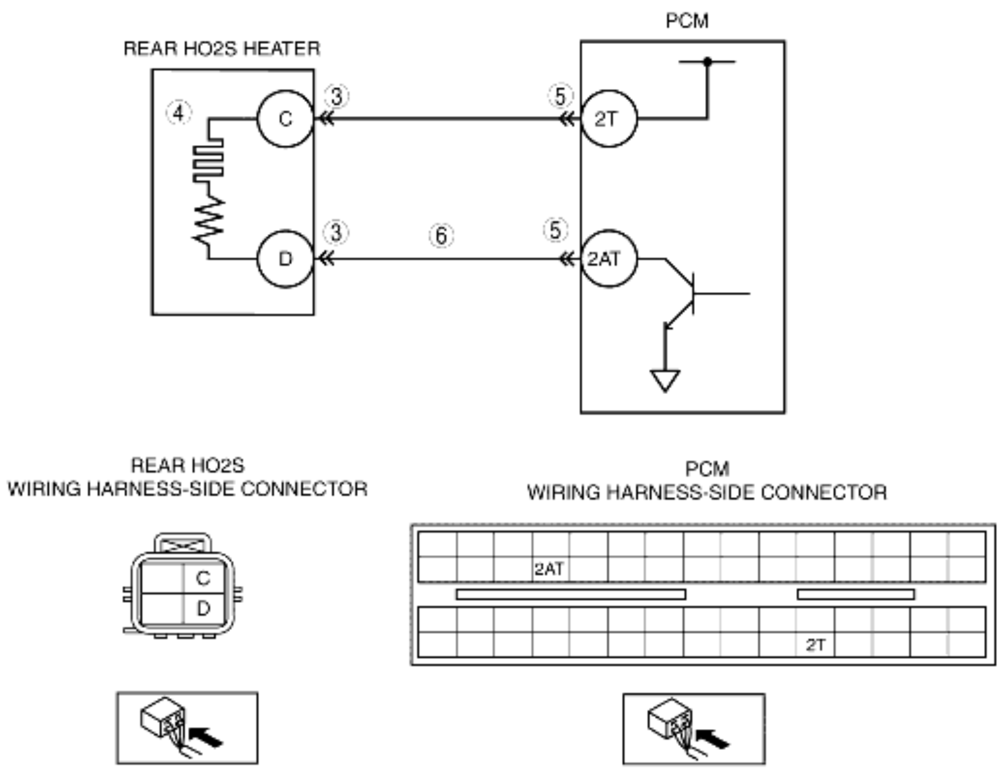
	(See REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].) • Is there any malfunction?	No	Go to the next step.
5	**INSPECT REAR HO2S HEATER POWER CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for continuity between rear HO2S terminal C (wiring harness-side) and PCM terminal 2T (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to Step 9.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
7	**INSPECT REAR HO2S CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between rear HO2S terminal D (wiring harness-side) and body GND. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
8	**INSPECT REAR HO2S CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between rear HO2S terminal D (wiring harness-side) and PCM terminal 2AT (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0037 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].)	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

	• Is the PENDING CODE for this DTC present?		
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0038 [Z6]

B3E010200001W06

DTC P0038	Rear HO2S heater control circuit high
DETECTION CONDITION	• The PCM monitors the rear HO2S heater control voltage at PCM terminal 2AT. If the PCM turns the rear HO2S heater on but the rear HO2S heater circuit has high voltage, the PCM determines that the rear HO2S heater circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (HO2S heater). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Short to power supply in wiring harness between rear HO2S terminal D and PCM terminal 2AT • Short circuit in rear HO2S or PCM terminal • Rear HO2S heater malfunction • PCM malfunction



Diagnostic procedure

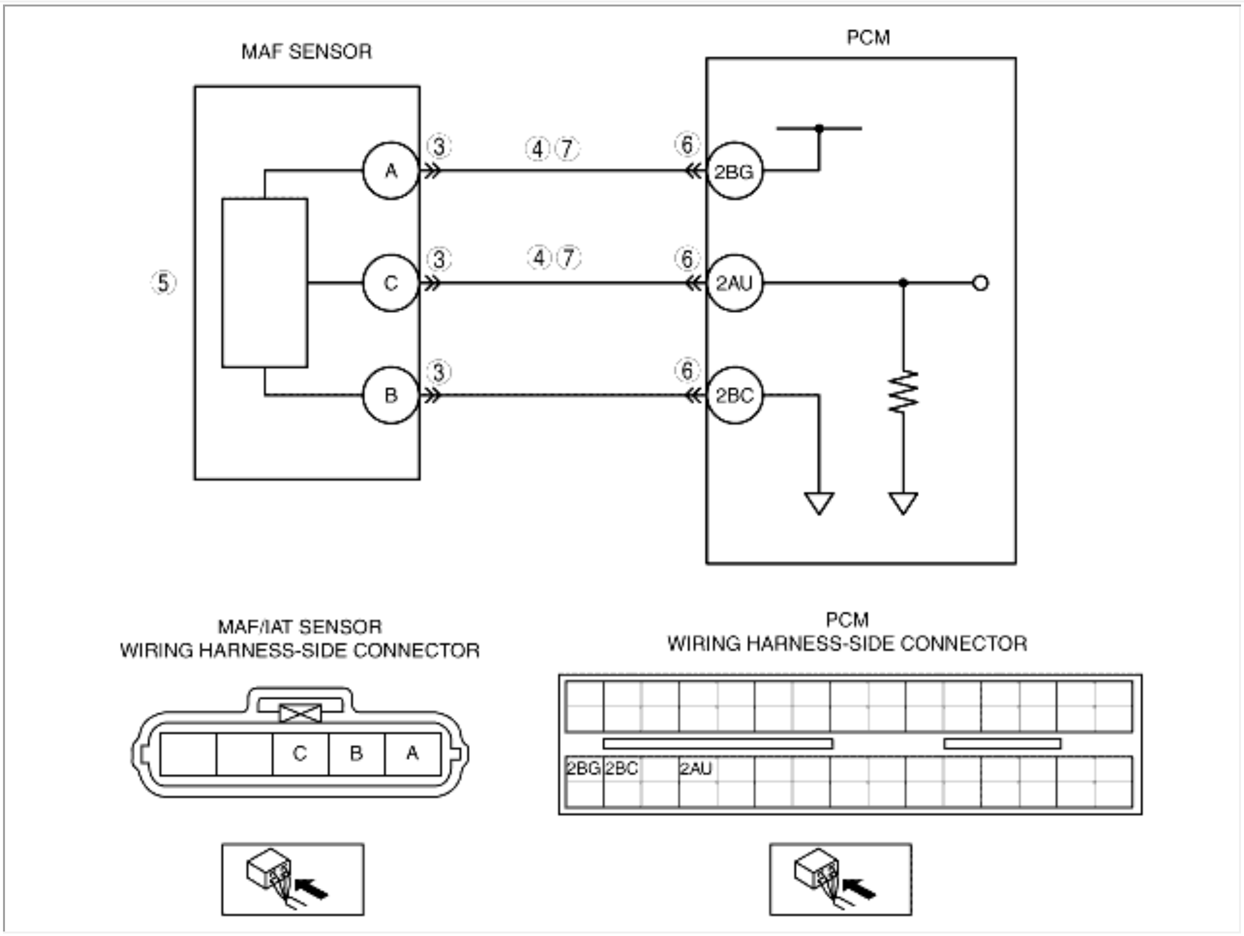
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT REAR HO2S CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect rear HO2S connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT REAR HO2S HEATER** • Inspect the rear HO2S heater. (See REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the rear HO2S, then go to Step 7. (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
5	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
6	**INSPECT REAR HO2S HEATER CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between rear HO2S terminal D (wiring harness-side) and body GND.	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to the next step.
		No	Go to the next step.

	• Is the voltage **B+**?		
7	**VERIFY TROUBLESHOOTING OF DTC P0038 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0102 [Z6]

B3E010200100W01

DTC P0102	MAF sensor circuit low input
DETECTION CONDITION	• The PCM monitors the input voltage from the MAF sensor when the engine is running. If the input voltage at PCM terminal 2AU is **less than 0.21 V**, the PCM determines that the MAF circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• MAF sensor malfunction • Connector or terminal malfunction • Short to ground in wiring harness between MAF/IAT sensor terminal A and PCM terminal 2BG • Open circuit in wiring harness between MAF/IAT sensor terminal A and PCM terminal 2BG • Short to ground in wiring harness between MAF/IAT sensor terminal C and PCM terminal 2AU • Open circuit in wiring harness between MAF/IAT sensor terminal C and PCM terminal 2AU • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT MAF/IAT SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion).	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.

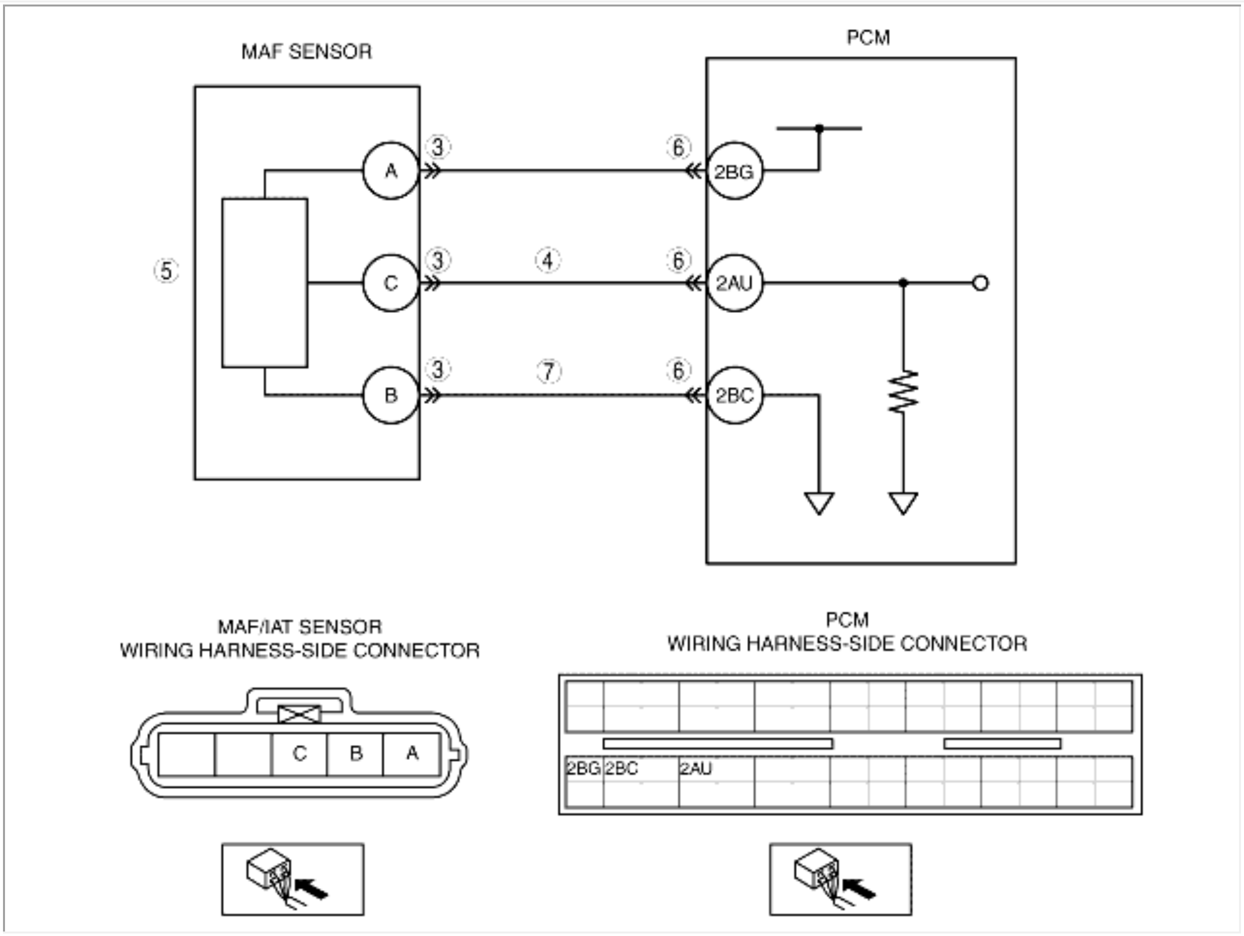
	• Is there any malfunction?		
4	**INSPECT MAF SENSOR CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - MAF/IAT sensor terminal A (wiring harness-side) and body GND - MAF/IAT sensor terminal C (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 8.
		No	Go to the next step.
5	**INSPECT MAF SENSOR** • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the MAF/IAT sensor, then go to Step 8. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
7	**INSPECT MAF SENSOR CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - MAF/IAT sensor terminal A (wiring harness-side) and PCM terminal 2BG (wiring harness-side) - MAF/IAT sensor terminal C (wiring harness-side) and PCM terminal 2AU (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P0102 COMPLETED**	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)

	• Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0103 [Z6]

B3E010200100W02

DTC P0103	MAF sensor circuit high input
DETECTION CONDITION	• The PCM monitors the input voltage from the MAF sensor when the engine is running. If input the voltage at PCM terminal 2AU is **more than 4.9 V**, the PCM determines that the MAF circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• MAF malfunction • Connector or terminal malfunction • Short to power supply in wiring harness between MAF/IAT sensor terminal C and PCM terminal 2AU • Open circuit in wiring harness between MAF/IAT sensor terminal B and PCM terminal 2BC • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT MAF/IAT SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.

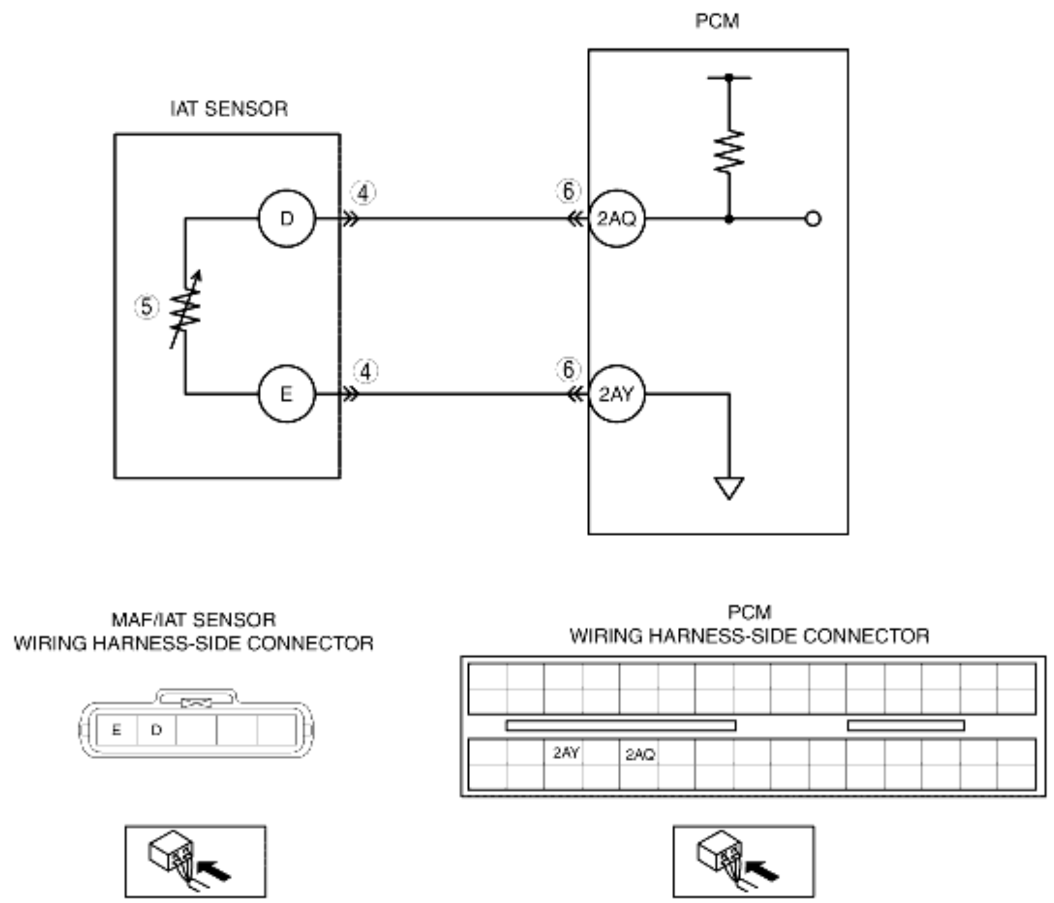
4	**INSPECT MAF SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between MAF/IAT sensor terminal C (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 8.
		No	Go to the next step.
5	**INSPECT MAF SENSOR** • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the MAF/IAT sensor, then go to Step 8. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
7	**INSPECT MAF SENSOR GND CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between MAF/IAT sensor terminal B (wiring harness-side) and PCM terminal 2BC (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P0103 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].)	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

	• Are any DTCs present?		

DTC P0111 [Z6]

B3E010200100W03

DTC P0111	IAT sensor circuit range/performance problem
DETECTION CONDITION	• The PCM compares the IAT with the ECT when the engine is running. If the IAT is higher than the ECT by **40 °C {104 °F}**, the PCM determines that there is an IAT sensor circuit range/performance problem. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAT sensor malfunction • Connector or terminal malfunction • PCM malfunction



Diagnostic procedure

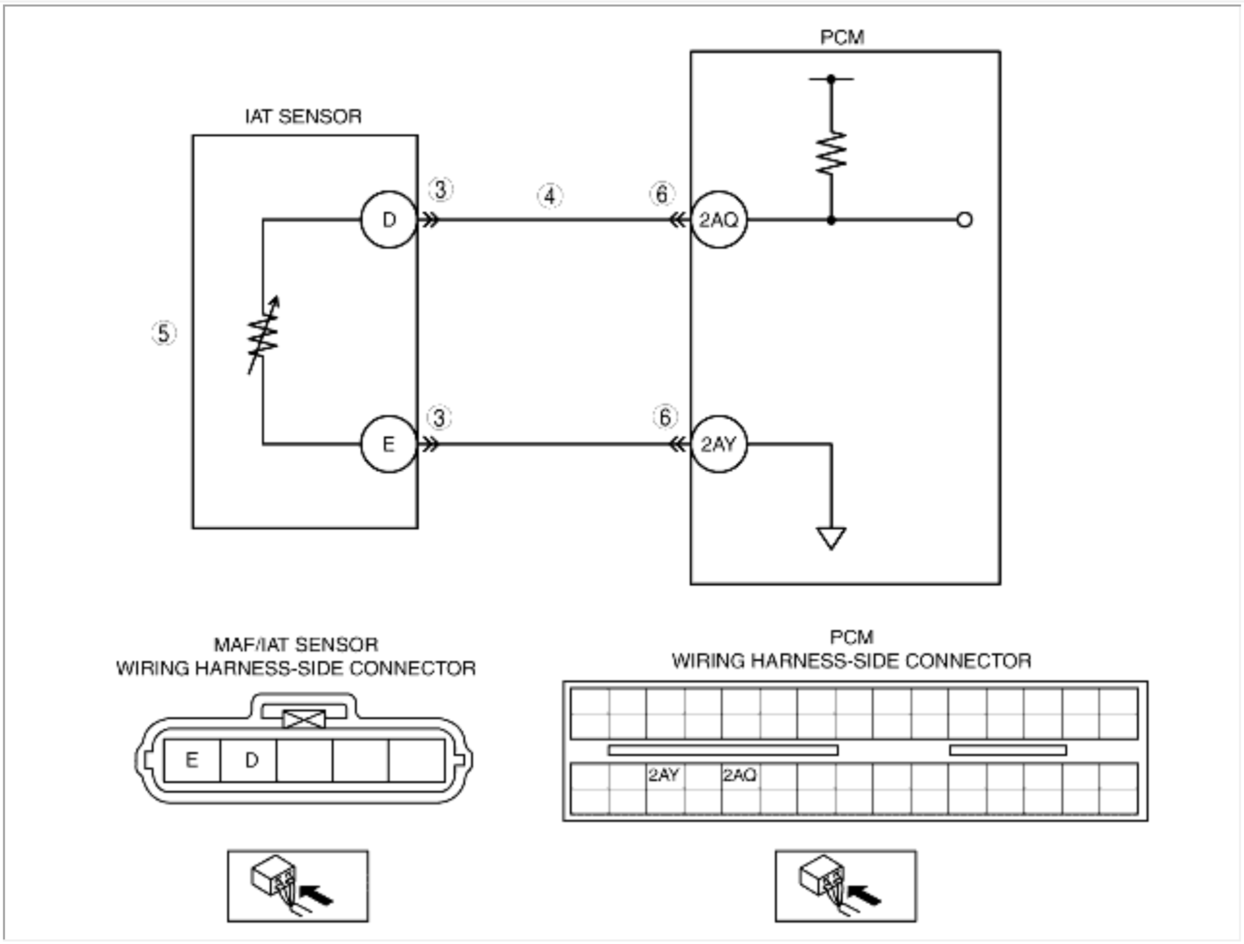
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**INSPECT MAF/IAT SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
5	**INSPECT IAT SENSOR** • Inspect the IAT sensor. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the MAF/IAT sensor, then go to Step 7. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion).	Yes	Repair or replace the terminal, then go to the next step.
		No	Go to the next step.

	• Is there any malfunction?		
7	**VERIFY TROUBLESHOOTING OF DTC P0111 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine and warm it up completely. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0112 [Z6]

B3E010200100W04

DTC P0112	IAT sensor circuit low input
DETECTION CONDITION	• The PCM monitors the IAT sensor signal at PCM terminal 2AQ. If the PCM detects that the IAT sensor voltage is **less than 0.16 V**, the PCM determines that the IAT sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAT sensor malfunction • Connector or terminal malfunction • Short to ground in wiring harness between MAF/IAT sensor terminal D and PCM terminal 2AQ • PCM malfunction



Diagnostic procedure

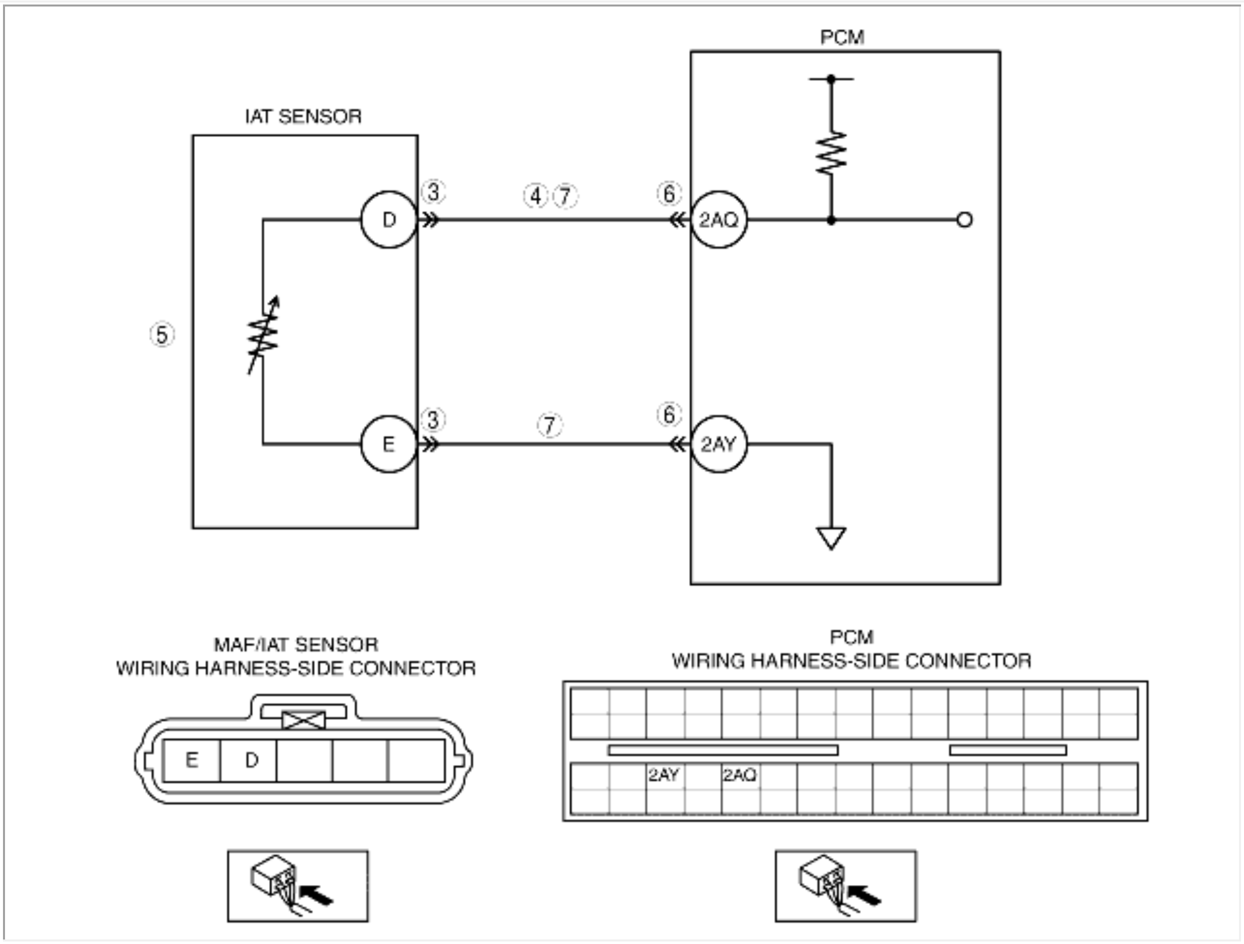
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT MAF/IAT SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector.	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?		
4	**INSPECT IAT SENSOR SIGNAL CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between MAF/IAT sensor terminal D (wiring harness-side) and body GND. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 7.
		No	Go to the next step.
5	**INSPECT IAT SENSOR** • Inspect the IAT sensor. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the MAF/IAT sensor, then go to Step 7. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0112 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0113 [Z6]

B3E010200100W05

DTC P0113	IAT sensor circuit high input
DETECTION CONDITION	• The PCM monitors the input voltage from the IAT sensor. If the input voltage at PCM terminal 2AQ is **more than 4.8 V**, the PCM determines that the IAT sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAT sensor malfunction • Connector or terminal malfunction • Open circuit in wiring harness between MAF/IAT sensor terminal D and PCM terminal 2AQ • Short to power supply in wiring harness between MAF/IAT sensor terminal D and PCM terminal 2AQ • Open circuit in wiring harness between MAF/IAT sensor terminal E and PCM terminal 2AY • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT MAF/IAT SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector.	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.

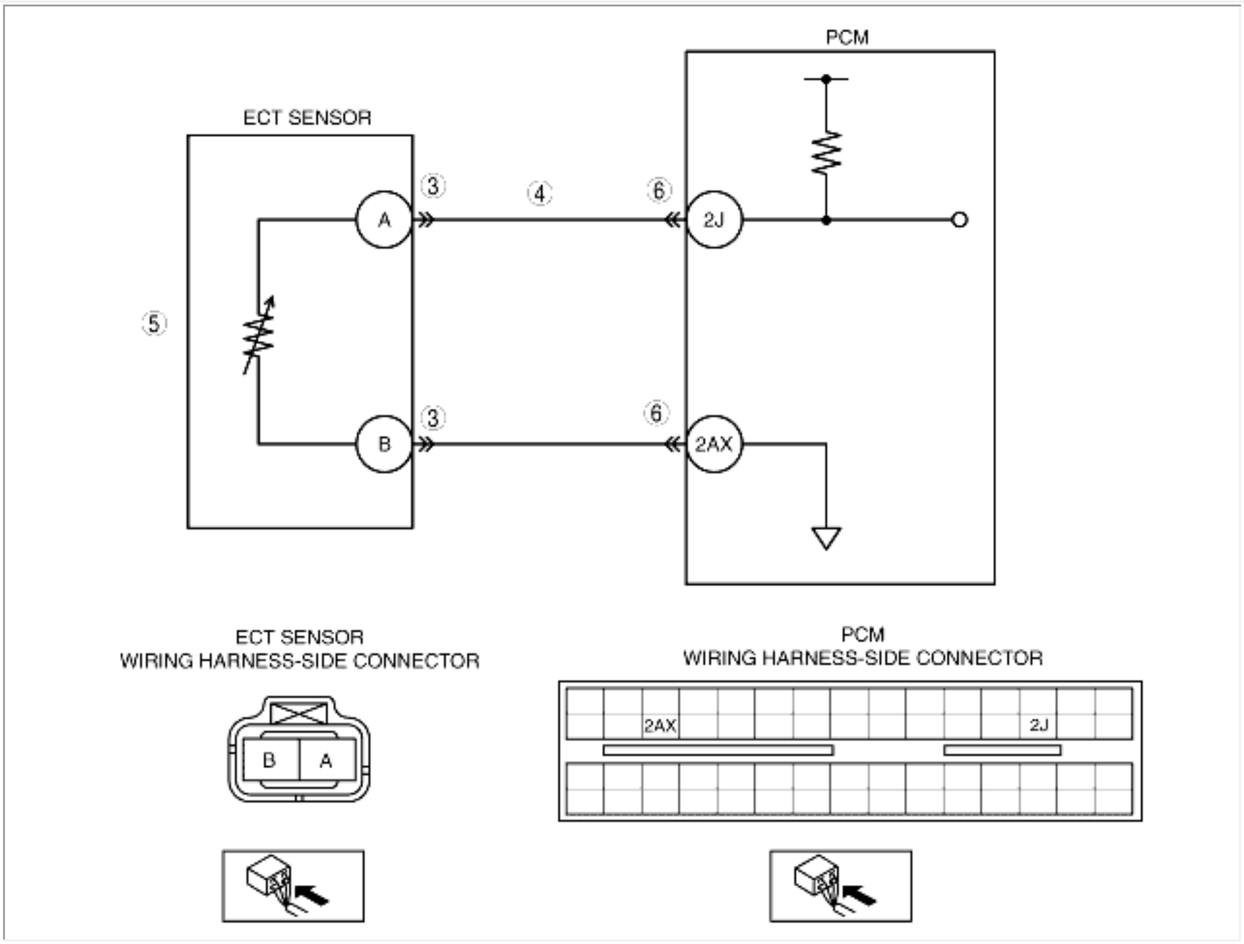
	• Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?		
4	**INSPECT IAT SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between MAF/IAT sensor terminal D (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 8.
		No	Go to the next step.
5	**INSPECT IAT SENSOR** • Inspect the IAT sensor. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the MAF/IAT sensor, then go to Step 8. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
7	**INSPECT IAT SENSOR CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - MAF/IAT sensor terminal D (wiring harness-side) and PCM terminal 2AQ (wiring harness-side) - MAF/IAT sensor terminal E (wiring harness-side) and PCM terminal 2AY (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P0113 COMPLETED** • Make sure to reconnect all disconnected connectors.	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

	• Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?		
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0117 [Z6]

B3E010200100W06

DTC P0117	ECT sensor circuit low input
DETECTION CONDITION	• The PCM monitors the ECT sensor signal at PCM terminal 2J. If the PCM detects that the ECT sensor voltage is **less than 0.20 V**, the PCM determines that the ECT sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• ECT sensor malfunction • Connect or terminal malfunction • Short to ground in wiring harness between ECT sensor terminal A and PCM connector terminal 2J • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT ECT SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the ECT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.

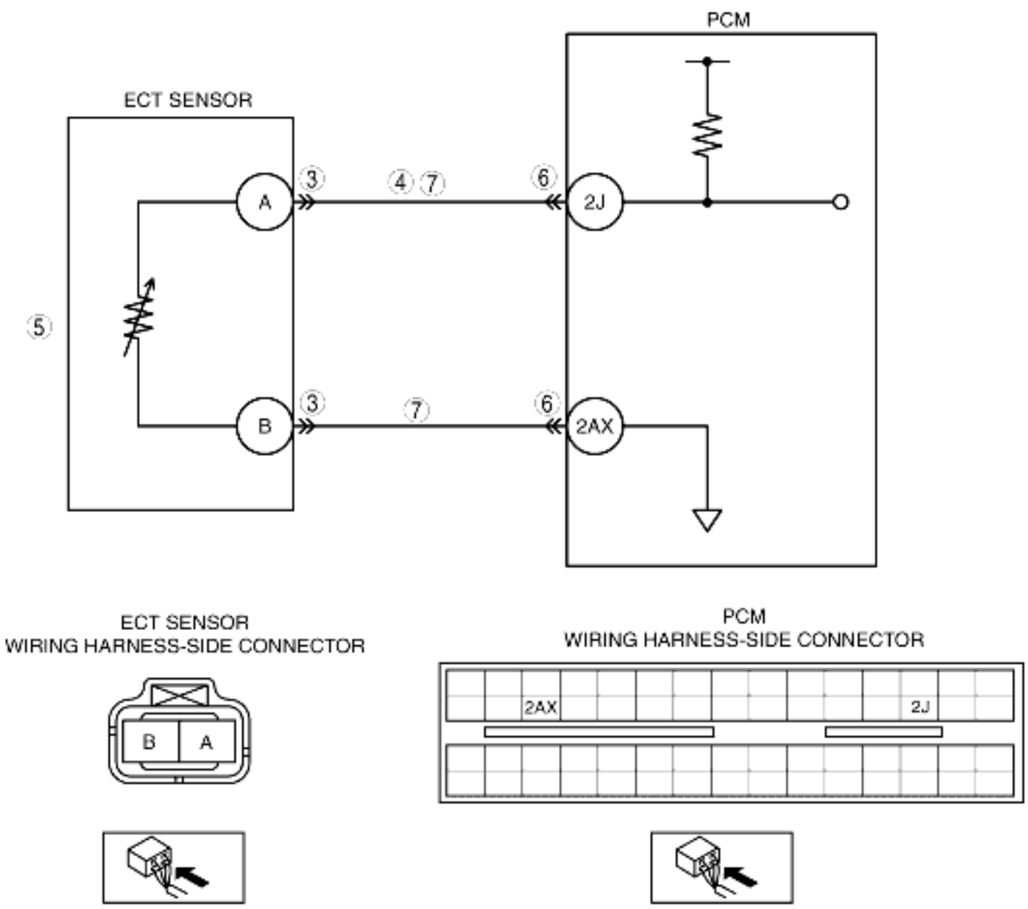
4	**INSPECT ECT SENSOR SIGNAL CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between ECT sensor terminal A (wiring harness-side) and body GND. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 7.
		No	Go to the next step.
5	**INSPECT ECT SENSOR** • Inspect the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the ECT sensor, then go to Step 7. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0117 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0118 [Z6]

B3E010200100W07

DTC P0118	**ECT sensor circuit high input**

DETECTION CONDITION	• The PCM monitors the ECT sensor signal at PCM terminal 2J. If the PCM detects that the ECT sensor voltage is **more than 4.9 V**, the PCM determines that the ECT sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• ECT sensor malfunction • Connector or terminal malfunction • Open circuit in wiring harness between ECT sensor terminal A and PCM terminal 2J • Short to power supply in wiring harness between ECT sensor terminal A and PCM terminal 2J • Open circuit in wiring harness between ECT sensor terminal B and PCM terminal 2AX • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT ECT SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the ECT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
4	**INSPECT ECT SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between ECT sensor terminal A (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 8.
		No	Go to the next step.
5	**INSPECT ECT SENSOR** • Inspect the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the ECT sensor, then go to Step 8. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.

7	**INSPECT ECT SENSOR CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - ECT sensor terminal A (wiring harness-side) and PCM terminal 2J (wiring harness-side) - ECT sensor terminal B (wiring harness-side) and PCM terminal 2AX (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P0118 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0121 [Z6]

B3E010200100W08

DTC P0121	TP sensor circuit range/performance problem
DETECTION CONDITION	• If the PCM detects that the throttle valve opening angle is **less than 12.5 %** for **5 s** after the following conditions are met, the PCM determines that there is a TP sensor circuit range/performance problem: **MONITORING CONDITION** - Engine coolant temperature is **more than 70 °C {158 °F}**. - MAF sensor signal is **more than 59.5 g/s {7.9 lb/min}.** • If the PCM detects that the throttle valve opening angle is **more than 50%** for **5 s** after the following conditions are met, the PCM determines that there is a TP sensor circuit range/performance problem. **MONITORING CONDITION**

	- MAF sensor signal is **less than 3.3 g/s {0.4 lb/min}**. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TP sensor malfunction • Electrical corrosion in TP signal circuit • MAF sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTC present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**VERIFY CURRENT INPUT SIGNAL STATUS : IS CONCERN INTERMITTENT OR CONSTANT?** • Start the engine. • Access the ECT, TP and MAF PIDs using the WDS or equivalent.	Yes	Go to Step 7.
		No	Go to the next step.

	• Warm up the engine until ECT PID is **more than 70 °C {158 °F}** • Drive the vehicle. • Read the TP PID while MAF PID is **more than 59.5 g/s {7.9 lb/min}**. • Is the TP PID **less than 12.5 %**?		
5	**VERIFY TP PID** • Start the engine. • Access the TP, MAF PIDs using the WDS or equivalent. • Read the TP PID while MAF PID is **less than 3.3 g/s {0.4 lb/min}**. • Is the TP PID **more than 50 %**?	Yes	Go to Step 11.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS : IS CONCERN INTERMITTENT OR CONSTANT?** • Drive the vehicle and read the MAF PID. • Does the MAF PID change in compliance with driving condition?	Yes	Intermittent concern exists. Perform the "INTERMITTENT CONCERNS TROUBLESHOOTING". (See INTERMITTENT CONCERN TROUBLESHOOTING [Z6].)
		No	Inspect the MAF sensor and related circuits and terminals. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [Z6].) Repair or replace as necessary, then go to Step 14.
7	**INSPECT TP SENSOR TERMINAL FOR ELECTRICAL CORROSION** • Turn the ignition switch off. • Disconnect the TP sensor connector. • Inspect for electrical corrosion on TP sensor terminals. • Is any electrical corrosion found?	Yes	Repair or replace the terminal, then go to Step 10.
		No	Go to the next step.
8	**VERIFY TP SENSOR** • Does TP sensor resistance smoothly change while gradually opening throttle valve?	Yes	Go to the next step.
		No	Replace TP sensor, then go to Step 10. (See THROTTLE POSITION (TP) SENSOR REMOVAL/INSTALLATION [Z6].)
9	**INSPECT PCM TERMINAL FOR ELECTRICAL CORROSION** • Disconnect the PCM connector.	Yes	Repair terminal, then go to Step 10.
		No	Go to the next step.

	• Inspect for electrical corrosion on PCM terminals. • Is any electrical corrosion found?		
10	**VERIFY TROUBLESHOOTING OF DTC P0121 COMPLETED** • Make sure to reconnect all disconnected connectors. • Start the engine. • Clear DTC from PCM memory using WDS or equivalent. • Access ECT, TP and MAF PIDs using WDS or equivalent. • Warm up the engine until ECT PID is reading **more than 70 °C {158 °F}**. • Drive the vehicle and read TP and MAF PIDs. • Verify PIDs reading are within specifications. - MAF PID: **more than 59.5 g/s {7.9 lb/min}** - TP PID: **12.5 % or more** • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to Step 15. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to Step 15.
11	**INSPECT TP SENSOR TERMINAL FOR ELECTRICAL CORROSION** • Turn the ignition switch off. • Disconnect the TP sensor connector. • Inspect for electrical corrosion on TP sensor terminals. • Is any electrical corrosion found?	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.
12	**VERIFY TP SENSOR** • Does resistance smoothly change while gradually opening throttle valve?	Yes	Go to the next step.
		No	Replace the TP sensor, then go to Step 14. (See THROTTLE POSITION (TP) SENSOR REMOVAL/INSTALLATION [Z6].)
13	**INSPECT PCM TERMINAL FOR ELECTRICAL CORROSION** • Disconnect PCM connector. • Inspect for electrical corrosion on PCM and PCM connector male and female terminals. • Is any electrical corrosion found?	Yes	Repair terminal, then go to the next step.
		No	Go to the next step.

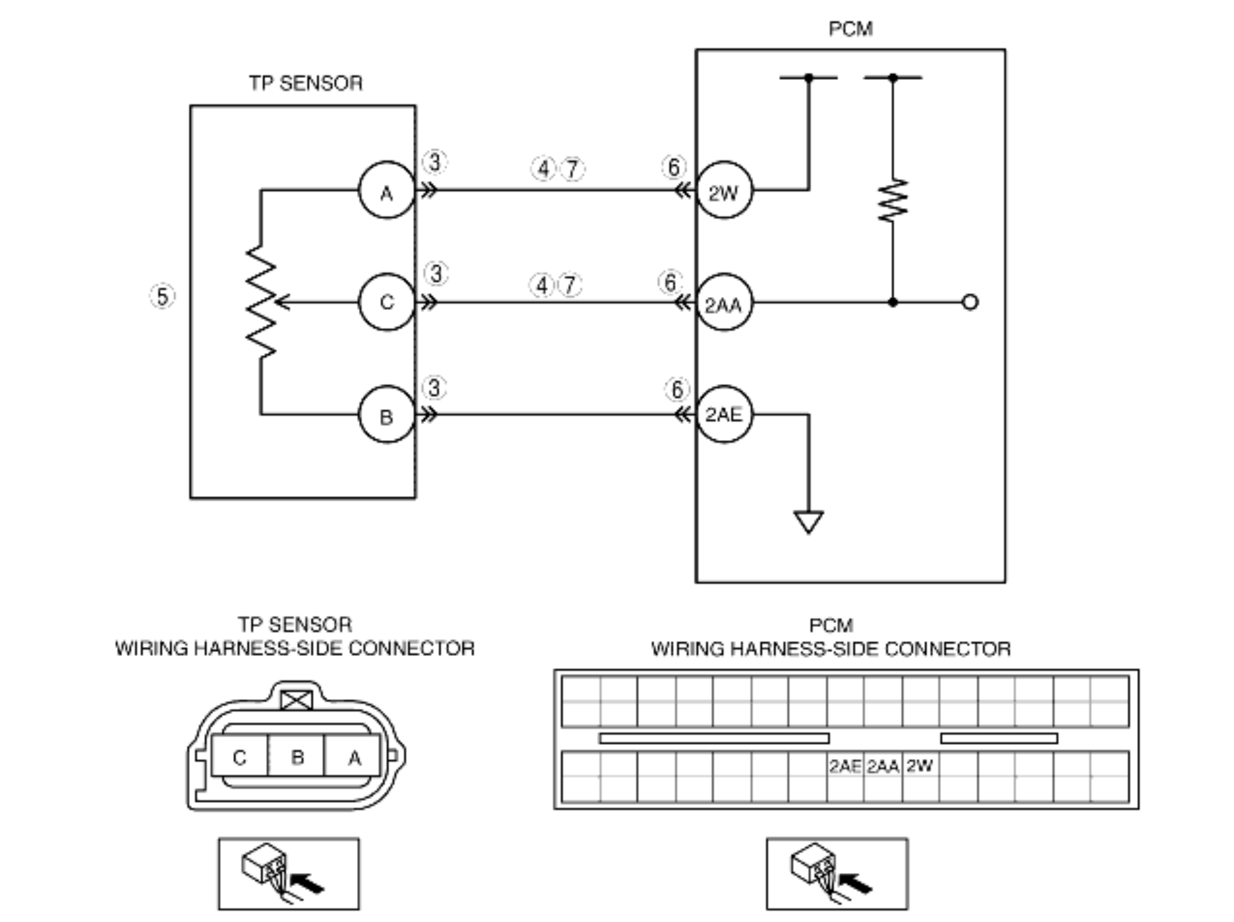
14	**VERIFY TROUBLESHOOTING OF DTC P0121 COMPLETED** • Make sure to reconnect all disconnected connectors. • Start engine. • Clear DTC from PCM memory using the WDS or equivalent. • Access the TP and MAF PIDs using the WDS or equivalent. • Verify the TP PID is **50% or less** while MAF PID is **less than 3.3 g/s {0.4 lb/min}**. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
15	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0122 [Z6]

B3E010200100W09

DTC P0122	TP sensor circuit low input
DETECTION CONDITION	• If the PCM detects that the TP sensor voltage at PCM terminal 2AA is **less than 0.10 V** while the engine is running, the PCM determines that the TP sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TP sensor malfunction • Connector or terminal malfunction

	• Open circuit in wiring harness between TP sensor terminal A and PCM terminal 2W • Short to GND in wiring harness between TP sensor terminal A and PCM terminal 2W • Open circuit in wiring harness between TP sensor terminal C and PCM terminal 2AA • Short to GND in wiring harness between TP sensor terminal C and PCM terminal 2AA • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability.	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.

	• Is any related repair information available?	No	Go to the next step.
3	**INSPECT TP SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the TP sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
4	**INSPECT TP SENSOR CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - TP sensor terminal A (wiring harness-side) and body GND - TP sensor terminal C (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 8.
		No	Go to the next step.
5	**INSPECT TP SENSOR** • Inspect the TP sensor. (See THROTTLE POSITION (TP) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the TP sensor, then go to Step 8. (See THROTTLE POSITION (TP) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
7	**INSPECT TP SENSOR CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - TP sensor terminal A (wiring harness-side) and PCM terminal 2W (wiring harness-side)	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.

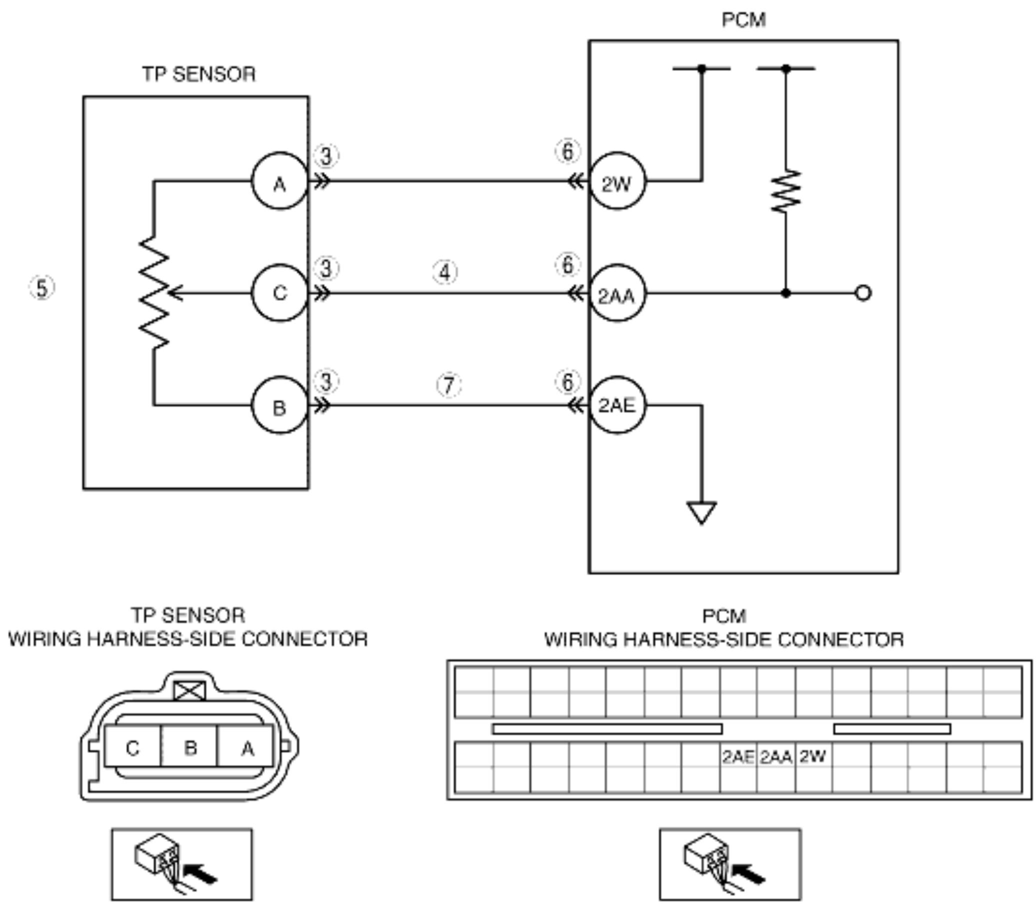
	- TP sensor terminal C (wiring harness-side) and PCM terminal 2AA (wiring harness-side) • Is there continuity?		
8	**VERIFY TROUBLESHOOTING OF DTC P0122 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0123 [Z6]

B3E010200100W10

DTC P0123	TP sensor circuit high input
DETECTION CONDITION	• If the PCM detects that the TP sensor voltage at PCM terminal 2AA is **more than 4.9 V** after the ignition switch is turned to the ON position, the PCM determines that the TP sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TP sensor malfunction • Connector or terminal malfunction

	• Short to power supply in wiring harness between TP sensor terminal C and PCM terminal 2AA • Open circuit in wiring harness between TP sensor terminal B and PCM terminal 2AE • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT TP SENSOR CONNECTOR FOR POOR CONNECTION**	Yes	Repair or replace the terminal, then go to Step 8.

	• Turn the ignition switch off. • Disconnect the TP sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	No	Go to the next step.
4	**INSPECT TP SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between TP sensor terminal C (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 8.
		No	Go to the next step.
5	**INSPECT TP SENSOR** • Inspect the TP sensor. (See THROTTLE POSITION (TP) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the TP sensor, then go to Step 8. (See THROTTLE POSITION (TP) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
7	**INSPECT TP SENSOR GND CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between TP sensor terminal B (wiring harness-side) and PCM terminal 2AE (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P0123 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine.	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

	• Is the same DTC present?		
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0125 [Z6]

B3E010200100W11

DTC P0125	Insufficient coolant temperature for closed loop fuel control
DETECTION CONDITION	• The PCM monitors the ECT after cold engine start. If the ECT does not reach the specification in a certain period, the PCM determines that the engine coolant temperature for closed loop fuel control is insufficient. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• ECT sensor malfunction • MAF sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability.	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.

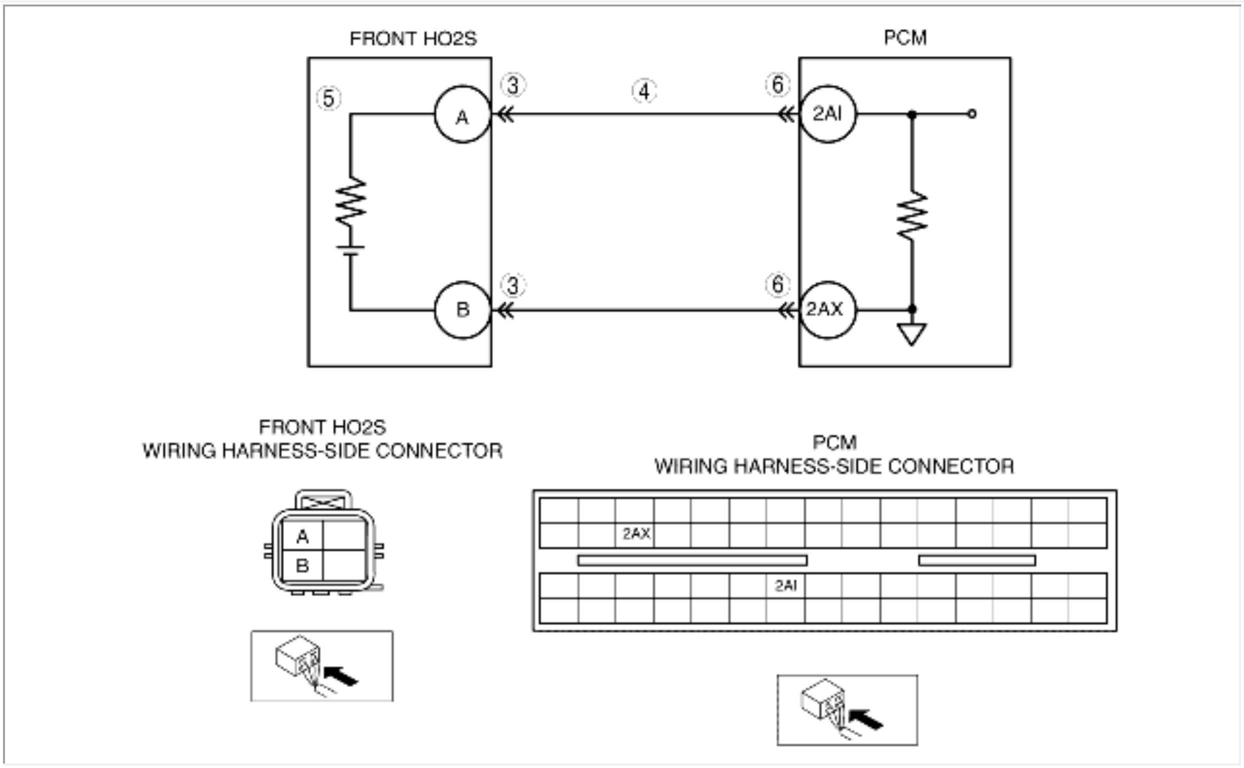
	• Is any related repair information available?	No	Go to the next step.
3	**VERIFY CURRENT INPUT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Connect the WDS or equivalent to the DLC-2. • Start the engine and warm it up completely. • Access the ECT PID. • Is the ECT PID **more than 70 °C {158 °F}**?	Yes	Intermittent concern exists. Perform the "INTERMITTENT CONCERNS TROUBLESHOOTING". (See INTERMITTENT CONCERN TROUBLESHOOTING [Z6].)
		No	Go to the next step.
4	**INSPECT ECT SENSOR** • Inspect the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the ECT sensor, then go to Step 6. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
5	**INSPECT MAF SENSOR** • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the MAF/IAT sensor, then go to the next step. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**VERIFY TROUBLESHOOTING OF DTC P0125 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Access the ECT PID. • Wait until the ECT PID is **less than 20 °C {68 °F}**. • Start the engine and warm it up completely. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE".	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

	(See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?		

DTC P0132 [Z6]

B3E010200100W12

DTC P0132	Front HO2S circuit high voltage
DETECTION CONDITION	• The PCM monitors the input voltage from the front HO2S when the engine is running. If the input voltage is **more than 1.2 V**, the PCM determines that the front HO2S circuit voltage is high. **Diagnostic support note** • This is a continuous monitor (HO2S). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S malfunction • Connector or terminal malfunction • Short to power supply in wiring harness between front HO2S terminal A and PCM terminal 2AI • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT FRONT HO2S CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the front HO2S connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT FRONT HO2S CIRCUIT FOR SHORT TO POWER SUPPLY**	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 7.

	• Turn the ignition switch to the ON position (Engine off). • Measure the voltage between front HO2S terminal A (wiring harness-side) and body GND. • Is the voltage **B+**?	No	Go to the next step.
5	**INSPECT FRONT HO2S** • Inspect the front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the front HO2S, then go to Step 7. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0132 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0133 [Z6]

B3E010200100W13

DTC P0133	Front HO2S circuit slow response
DETECTION CONDITION	• The PCM monitors the inversion cycle period, lean-to-rich response time and rich-to-lean response time of the sensor. The PCM calculates the average of the inversion cycle period-specified inversion cycles, average response time from lean-to-rich, and from rich-to-lean when the following conditions are met. If any exceeds the threshold, the PCM determines that circuit has a malfunction. **MONITORING CONDITIONS** - HO2S heater, HO2S, and TWC repair verification drive mode - Following conditions are met: • Calculation load is **18.0-59.4 %** (at **2,000 rpm**). • Engine speed is **1,410- 4,000 rpm**. • Vehicle speed is **more than 3.76 km/h {2.33 mph}**. • Engine coolant temperature is **more than -10 °C {14 °F}**. • Front HO2S signal inversion cycle is **more than 10 cycles**. **Diagnostic support note** • This is a intermittent monitor (HO2S). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • DIAGNOSTIC MONITORING TEST RESULTS is available. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S deterioration • Looseness front HO2S • Pressure regulator (built-in fuel pump unit) malfunction • Fuel pump malfunction • Clogged or restricted fuel filter (built-in fuel pump unit) • Fuel leakage on fuel line from fuel distribution pipe and fuel pump • Leakage exhaust system • Purge solenoid valve malfunction • Purge solenoid hoses improper connection • Insufficient compression • Engine malfunction (leakage engine coolant)

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Is DTC P0443 present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P0133 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See DTC TABLE [Z6].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Warm up the engine. • Access the O2S11 PID using the WDS or equivalent. • Inspect the PID under following accelerator pedal conditions (in PARK (ATX) or NEUTRAL (MTX)). • Is the PID normal? - **More than 0.55 V** when suddenly depressing the accelerator pedal (rich condition) - **Less than 0.55 V** just after releasing the accelerator pedal (lean condition)	Yes	Go to step 8.
		No	Go to the next step.
6	**INSPECT INSTALLATION OF FRONT HO2S** • Inspect if the front HO2S is loosely installed.	Yes	Go to the next step.
		No	Retighten the front HO2S, then go to Step 13.

	• Is the front HO2S installed securely?		(See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
7	**INSPECT GAS LEAKAGE FROM EXHAUST SYSTEM** • Visually inspect if there is any gas leakage between the exhaust manifold and front HO2S. • Is there gas leakage?	Yes	Repair or replace any malfunctioning exhaust part, then go to Step 13.
		No	Replace the front HO2S, then go to Step 13. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
8	**INSPECT LONG TERM FUEL TRIM** • Access the LONGFT1 PID. • Compare it with FREEZE FRAME DATA recorded at Step 1. • Is it below FFD value?	Yes	The engine is driven under rich condition. Go to the next step.
		No	The engine is driven under lean condition. Go to step 10.
9	**INSPECT FUEL LINE PRESSURE (EXCESSIVE FUEL LINE PRESSURE)** • Turn the ignition switch off. • Inspect the fuel line pressure while the engine running. (See FUEL LINE PRESSURE INSPECTION.) • Is the fuel line pressure normal?	Yes	Go to Step 12.
		No	Inspect the fuel pump maximum pressure and fuel return pipe for clogging. (See FUEL PUMP UNIT INSPECTION.) • If there is any malfunction, repair or replace suspected parts. • If all items above are normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) Then go to Step 13.
10	**INSPECT FUEL LINE PRESSURE (LOW FUEL LINE PRESSURE)** • Turn the ignition switch off. • Inspect the fuel line pressure while the engine running. (See FUEL LINE PRESSURE INSPECTION.) • Is the fuel line pressure normal?	Yes	Go to step 12.
		No	Go to the next step.
11	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace suspected fuel line, then go to Step 13.
		No	Inspect the fuel filter for following: • Foreign materials or stain inside fuel filter (low-pressure side) Perform following actions according to result.

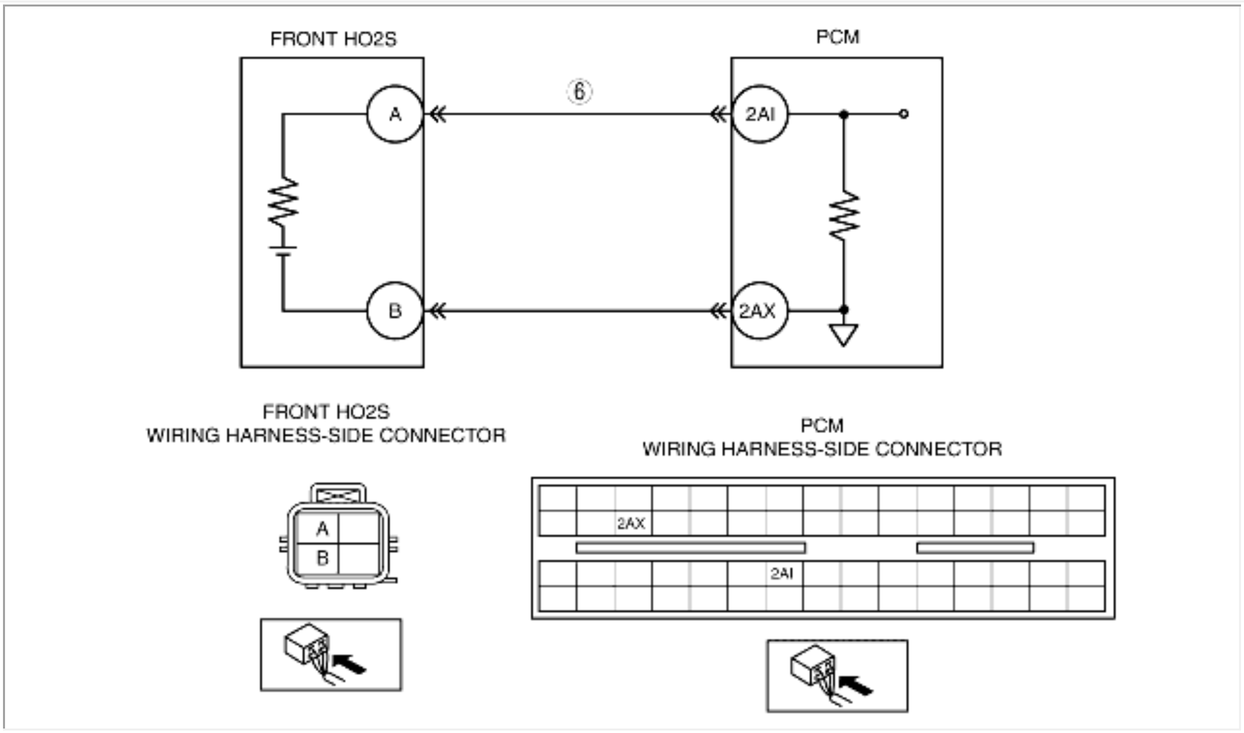
			• If there is any foreign material or stain inside fuel filter (low-pressure side), clean the fuel tank and filter. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) Then go to Step 13.
12	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** • Perform the "ENGINE COOLANT LEAKAGE INSPECTION". (See ENGINE COOLANT LEAKAGE INSPECTION.) • Is there any malfunction?	Yes	Repair or replace malfunctioning part according to the inspection result. Then go to the next step.
		No	Go to the next step.
13	**VERIFY TROUBLESHOOTING OF DTC P0133 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0134 [Z6]

B3E010200100W14

DTC P0134	**Front HO2S circuit no activity detected**
DETECTION CONDITION	• The PCM monitors the input voltage from the front HO2S when the following conditions are met. If the input voltage from sensor never **exceeds**

	0.55 V for **120 s or more**, the PCM determines that sensor circuit is not activated. **MONITORING CONDITIONS** - HO2S, HO2S heater and TWC repair verification drive mode - Following conditions are met: • Engine speed is **1,500 rpm or more**. • Engine coolant temperature is **70 °C {158 °F} or more**. • Within feed-back range **Diagnostic support note** • This is a continuous monitor (HO2S). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S deterioration • Front HO2S heater malfunction • Leakage in exhaust system • Open circuit in wiring harness between front HO2S terminal A and PCM terminal 2AI • Short to GND in wiring harness between front HO2S terminal A and PCM terminal 2AI • Insufficient compression • Engine malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING AND STORED DTC** **Note** • If fuel monitor DTC, DTC P0132 is retrieved, ignore it until P0134 is fixed. • Turn the ignition switch off, then to the ON position (Engine off). • Verify pending and stored DTCs using the WDS or equivalent. • Is other DTC present?	Yes	Go to appropriate DTC troubleshooting procedures. (See DTC TABLE [Z6].)
		No	Go to the next step.
4		Yes	Go to step 7.

	VERIFY CURRENT INPUT SIGNAL STATUS • Warm up the engine. • Access O2S11 PID using the WDS or equivalent. • Verify PID while racing engine (in NEUTRAL (MTX) or PARK (ATX)). • Is PID normal? - **More than 0.55 V** when suddenly depressing the accelerator pedal (rich condition) - **Less than 0.55 V** just after releasing the accelerator pedal (lean condition)	No	Go to the next step.
5	**INSPECT INSTALLATION OF FRONT HO2S** • Inspect if the front HO2S is loosely installed. • Is sensor installed securely?	Yes	Go to the next step.
		No	Install sensor securely, then go to Step 9. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
6	**INSPECT GAS LEAKAGE FROM EXHAUST SYSTEM** • Visually inspect if there is any gas leakage between the exhaust manifold and the front HO2S. • Is there gas leakage?	Yes	Repair or replace any malfunctioning exhaust part, then go to Step 9.
		No	• Inspect the following wiring harnesses for open circuit or short to GND in wiring harness. - Front HO2S terminal A (wiring harness-side) to PCM terminal 2AI (wiring harness-side) • Repair or replace wiring harness if necessary. • If all items above are normal, replace the malfunctioning sensor. Then go to Step 9.
7	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** **Warning** • Removing the radiator cap when the radiator is hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. • When removing the radiator cap, wrap a thick cloth around and turn it slowly. • Remove the radiator cap.	Yes	Air gets in from poor sealing on head gasket or other areas between combustion chamber and engine coolant passage. Repair or replace the malfunctioning part, then go to Step 9.
		No	Go to the next step.

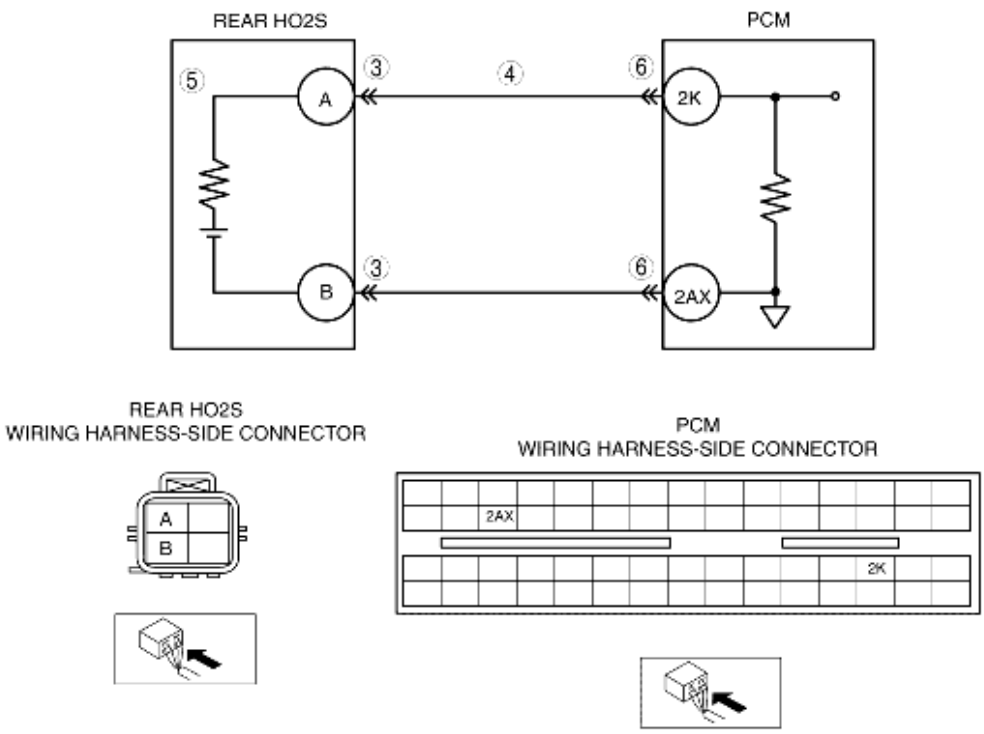
	• Implement procedure to bleed air from engine coolant, then idle the engine. • Is there any small bubble, which makes engine coolant white at filling opening? **Note** • Large bubbles are normal since they are remaining air coming out from engine coolant passage.		
8	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [Z6].) • Is it normal?	Yes	Go to the next step.
		No	Perform engine overhaul for repairs, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0134 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0138 [Z6]

B3E010200100W15

DTC P0138	Rear HO2S circuit high voltage
DETECTION CONDITION	• The PCM monitors the input voltage from the rear HO2S when the engine is running. If the input voltage is **more than 1.2 V**, the PCM determines that the rear HO2S circuit voltage is high. **Diagnostic support note** • This is a continuous monitor (HO2S).

	• The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Rear HO2S malfunction • Connector or terminal malfunction • Short to power supply in wiring harness between rear HO2S terminal A and PCM terminal 2K • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability.	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.

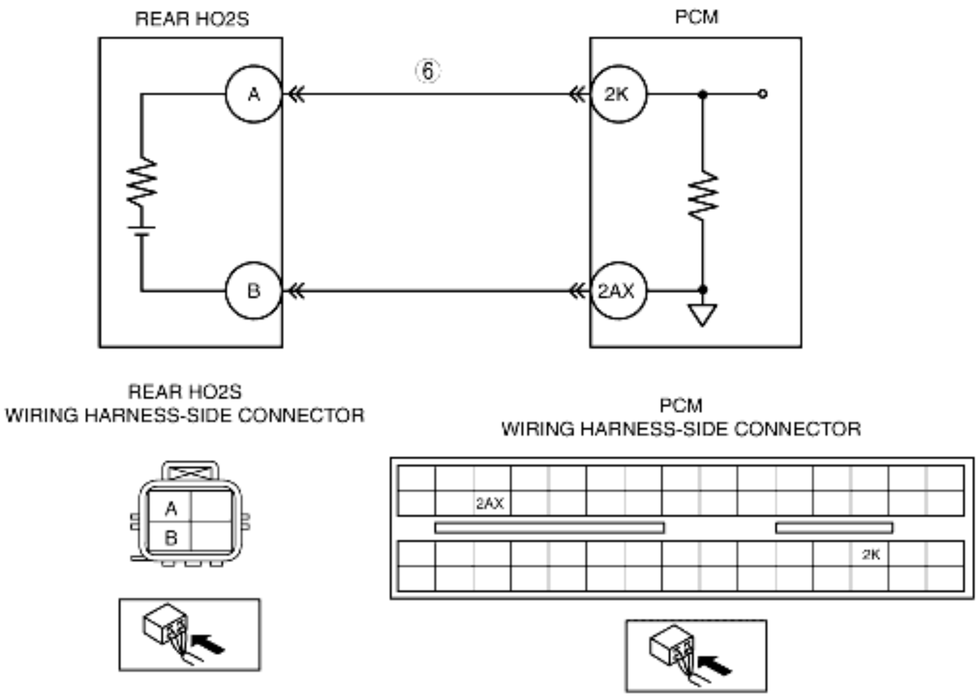
	• Is any related repair information available?	No	Go to the next step.
3	**INSPECT REAR HO2S CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the rear HO2S connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT REAR HO2S CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between rear HO2S terminal A (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 7.
		No	Go to the next step.
5	**INSPECT REAR HO2S** • Inspect the rear HO2S. (See REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the rear HO2S, then go to Step 7. (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0138 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0140 [Z6]

B3E010200100W16

DTC P0140	Rear HO2S circuit no activity detected
DETECTION CONDITION	• The PCM monitors the input voltage from the rear HO2S when the following conditions are met. If the input voltage from the sensor never **exceeds 0.55 V** for **30.4 s**, the PCM determines that the sensor circuit is not activated. **MONITORING CONDITIONS** - HO2S, HO2S heater and TWC repair verification drive mode - Following conditions are met: • Engine speed is **1,500 rpm or more**. • Engine coolant temperature is **70 °C {158 °F} or more**. • Within feed-back range **Diagnostic support note** • This is a continuous monitor (HO2S). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Rear HO2S deterioration • Rear HO2S heater malfunction • Leakage exhaust system • Open circuit in wiring harness between rear HO2S terminal A and PCM terminal 2K • Short to GND in wiring harness between rear HO2S terminal A and PCM terminal 2K • Insufficient compression • Engine malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING AND STORED DTC** **Note** • If fuel monitor DTC, DTC P0132 is retrieved, ignore it until P0140 is fixed. • Turn the ignition switch off, then the ON position (Engine off). • Verify pending and stored DTCs using WDS or equivalent. • Is other DTC present?	Yes	Go to appropriate DTC troubleshooting procedures. (See DTC TABLE [Z6].)
		No	Go to the next step.
4		Yes	Go to step 7.

	VERIFY CURRENT INPUT SIGNAL STATUS • Warm up engine. • Access O2S12 PID using WDS or equivalent. • Verify PID while racing engine at least **10 times** (in NEUTRAL (MTX) or PARK (ATX)). • Is PID normal? - **More than 0.55 V** at least once during engine racing	No	Go to the next step.
5	**INSPECT INSTALLATION OF REAR HO2S** • Inspect if rear HO2S is loosely installed. • Is sensor installed securely?	Yes	Go to the next step.
		No	Install sensor securely, then go to Step 9. (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
6	**INSPECT GAS LEAKAGE FROM EXHAUST SYSTEM** • Visually inspect if any gas leakage is found between exhaust pipe and rear HO2S. • Is there gas leakage?	Yes	Repair or replace any malfunctioning exhaust part, then go to Step 9.
		No	• Inspect the following wiring harnesses for open circuit or short to GND in wiring harness. - Rear HO2S terminal A (wiring harness-side) to PCM terminal 2K (wiring harness-side) • Repair or replace wiring harness if necessary. • If all items above are normal, replace the malfunctioning sensor. Then go to Step 9.
7	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** **Warning** • Removing radiator cap when radiator is hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. • When removing radiator cap, wrap a thick cloth around and turn it slowly. • Remove radiator cap. • Implement procedure to bleed air from engine coolant, then run engine at idle. • Is there any small bubble, which makes engine coolant white at filling opening?	Yes	Air gets in from poor sealing on head gasket or other areas between combustion chamber and engine coolant passage. Repair or replace the malfunctioning part, then go to Step 9.
		No	Go to the next step.

	Note • Large bubbles are normal since they are remaining air coming out from engine coolant passage.		
8	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [Z6].) • Is it normal?	Yes	Go to the next step.
		No	Implement engine overhaul for repairs, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0140 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0300 [Z6]

B3E010200300W01

DTC P0300	**Random misfire detected**
DETECTION CONDITION	• The PCM monitors the CKP sensor input signal interval time. the PCM calculates the change of interval time for each cylinder. If change of interval time exceeds the preprogrammed criteria, the PCM detects misfire in the corresponding cylinder. While the engine is running, the PCM counts the number of misfires that occurred at **200 crankshaft revolutions** and **1,000 crankshaft revolutions** and calculates the misfire ratio for each crankshaft revolution. If the ratio exceeds the preprogrammed criteria, the PCM determines that a misfire, which can damage the catalytic converter or affect emission performance, has occurred. **Diagnostic support note** • This is a continuous monitor (Misfire).

	• The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • The MIL flashes if the PCM detects misfire which can damage the catalytic converter during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• CKP sensor malfunction • CMP sensor malfunction • Ignition coil malfunction • Erratic signal to ignition coil • Spark plug malfunction • MAF sensor contamination • Excess air suction in intake air system (between MAF sensor and intake manifold) • Fuel pump malfunction • Fuel pressure regulator (built-in fuel pump unit) malfunction • Fuel line clogged • Fuel filter clogged • Fuel leakage in fuel line • Fuel runout • Poor quality fuel • Purge solenoid valve malfunction • PCV valve malfunction • EGR valve malfunction • Vacuum hoses damages or improper connection • Related connector and terminal malfunction • Related wiring harness malfunction • Insufficient compression • Variable valve timing control system improper

Diagnostic procedure

STEP	INSPECTION		ACTION
1		Yes	Go to the next step.

	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**VERIFY CURRENT INPUT SIGNAL STATUS (IGNITION SWITCH TO ON/IDLE)** • Access the BOO, ECT, IAT, MAF, RPM, TP, and VSS PIDs using the WDS or equivalent. (See PCM INSPECTION [Z6].) • Is there any signal that is far out of specification when ignition switch is the ON position and engine runs at idle?	Yes	Inspect suspected circuit and/or part according to inspection results. (See PCM INSPECTION [Z6].) Then go to Step 22.
		No	Go to the next step.
5	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect same PIDs as in Step 4 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect suspected circuit and/or part according to inspection results. (See PCM INSPECTION [Z6].) Then go to Step 22.
		No	Go to the next step.
6	**INSPECT CMP SENSOR** • Inspect the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [Z6].) • Is the CMP sensor normal?	Yes	Go to the next step.
		No	Inspect installation condition and damages on the timing belt and gears, repair the malfunctioning part. • If it is normal, replace the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [Z6].) Then go to Step 22.

7	**VERIFY CKP SENSOR INSTALLATION CONDITION** • Inspect for the CKP sensor looseness. • Is the CKP sensor loosen?	Yes	Retighten the CKP sensor, then go to Step 22. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**INSPECT IGNITION COIL HARNESS** • 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 suspected wiring harnesses, then go to Step 22.
9	**INSPECT IGNITION SYSTEM OPERATION** • Perform the spark test. (See Spark Test.) • Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to spark test result. Then go to Step 22.
10	**INSPECT POWER SUPPLY TERMINAL AT IGNITION COIL CONNECTOR** • Disconnect the ignition coil connector. • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between ignition coil terminal A (harness-side) and body ground. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Inspect for open circuit in wiring harness between ignition coil terminal A and PCM terminal 2A. Repair or replace wiring harness, then go to Step 22.
11	**INSPECT IGNITION COIL RESISTANCE** • Inspect the ignition coil resistance. (See IGNITION COIL INSPECTION [Z6].) • Is coil resistance normal?	Yes	Go to step 22.
		No	Replace the ignition coil, then go to Step 22. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)
12	**INSPECT MAF PID** • Start the engine. • Access the MAF PID using the WDS or equivalent. • Verify that the MAF PID changes quickly according to race the engine RPM. • Is the MAF PID response normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 22. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
13	**INSPECT EXCESSIVE AIR SUCTION IN INTAKE AIR SYSTEM** • Inspect for air leakage at following:	Yes	Repair or replace suspected part, then go to Step 22.
		No	Go to the next step.

	- Between MAF sensor and throttle body - Between throttle body and intake manifold • Is there any malfunction?		
14	**INSPECT FUEL LINE PRESSURE** • Inspect the fuel line pressure. (See FUEL LINE PRESSURE INSPECTION.) • Is the fuel line pressure normal?	Yes	Go to step 16.
		No	If the fuel line pressure is too low, go to the next step. If the fuel line pressure is excess high, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) then go to Step 22.
15	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect for fuel leakage in fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace the fuel line, then go to Step 22.
		No	Inspect the fuel filter for following: • Foreign materials or stain inside fuel filter (low-pressure side) Perform following actions depending on the result above. • If there is any foreign materials or stain inside fuel filter (low-pressure side), clean the fuel tank and filter (low-pressure side). • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) Then, go to Step 22.
16	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See COMPRESSION INSPECTION [Z6].) • Is it normal?	Yes	Go to the next step.
		No	Perform the engine overhaul for repairs, then go to Step 22.
17	**INSPECT VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION** • Inspect the variable valve timing control system operation. (See Variable Valve Timing Control System Operation Inspection.) • Does the variable valve timing control system?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to variable valve timing control system inspection results, then go to Step 22.

18	**INSPECT OPERATION OF PURGE SOLENOID VALVE** • Turn the ignition switch off. • Connect vacuum pump to the purge solenoid valve and apply vacuum to the purge solenoid valve. • Verify that the purge solenoid valve holds vacuum. • Turn the ignition switch to the ON position (Engine off). • Access the EVAPCP PID in SIMULATION TEST using the WDS or equivalent. • Set duty value to **100%** for the EVAPCP PID. • Apply vacuum while turning the purge solenoid valve from Off to On and simulating EVAPCP PID with **100%**duty value. • Verify that the purge solenoid valve releases vacuum while the purge solenoid valve is turned ON. • Is the purge solenoid valve operation normal?	Yes	Go to the next step.
		No	Replace the purge solenoid valve, then go to Step 22. (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [Z6].)
19	**INSPECT PCV VALVE OPERATION** • Turn the ignition switch off. • Remove the PCV valve and inspect valve operation. (See INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [Z6].) (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION.) • Is the PCV valve operation normal?	Yes	Replace the PCV valve, then go to Step 22. (See INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [Z6].)
		No	Go to the next step.
20	**INSPECT OPERATION OF EGR VALVE** • Remove the EGR valve. (See EGR VALVE REMOVAL/INSTALLATION [Z6].) • Visually inspect for stuck to open. • Does EGR valve stuck to open?	Yes	Repair or replace the EGR valve, then go to Step 22. (See EGR VALVE REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
21	**INSPECT SEALING OF ENGINE COOLANT PASSAGE**	Yes	Repair or replace malfunctioning part according to inspection result.

	• Perform "ENGINE COOLANT LEAKAGE INSPECTION". (See ENGINE COOLANT LEAKAGE INSPECTION.) • Is there any malfunction?		Then go to the next step.
		No	Go to the next step.
22	**VERIFY TROUBLESHOOTING OF MISFIRE DTC COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "PCM Adaptive Memory Produce Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
23	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0301, P0302, P0303, P0304 [Z6]

B3E010200300W02

DTC P0301 **DTC P0302** **DTC P0303** **DTC P0304**	**Cylinder No.1 misfire detected** **Cylinder No.2 misfire detected** **Cylinder No.3 misfire detected** **Cylinder No.4 misfire detected**
DETECTION CONDITION	• The PCM monitors the CKP sensor input signal interval time. The PCM calculates the change of interval time for each cylinder. If the change of interval time exceeds the preprogrammed criteria, the PCM detects a misfire in the corresponding cylinder. While the engine is running, the PCM counts the number of misfires that occurred at **200 crankshaft revolutions** and **1,000 crankshaft revolutions** and calculates the misfire ratio for each crankshaft revolution. If the ratio exceeds the preprogrammed criteria, the PCM determines that a misfire, which can damage the catalytic converter or affect emission performance, has occurred. **Diagnostic support note** • This is a continuous monitor (Misfire).

	• The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • The MIL flashes if the PCM detects the misfire which can damage the catalytic converter during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Spark plug malfunction • Erratic signal to ignition coil • Fuel injector malfunction • Air suction in intake air system (between dynamic chamber and cylinder head) • Inadequate engine compression due to engine internal malfunction • Related connector or terminal malfunction • Related wiring harness malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**VERIFY CURRENT INPUT SIGNAL STATUS (IGNITION SWITCH TO ON /IDLE)**	Yes	Inspect suspected circuit and/or part according to inspection results. Then go to Step 13. (See PCM INSPECTION [Z6].)

	• Access BOO, ECT, IAT, MAF, RPM, TP and VSS PIDs using WDS or equivalent. (See PCM INSPECTION [Z6].) • Is there any signal that is far out of specification when ignition switch is ON and engine runs at idle?	No	Go to the next step.
5	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect the same PIDs as in Step 4 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect suspected circuit and/or part according to inspection results. Then go to Step 13. (See PCM INSPECTION [Z6].)
		No	Go to the next step.
6	**INSPECT SPARK PLUG CONDITION** • Turn the ignition switch off. • Remove the spark plug from suspected cylinder. (See SPARK PLUG REMOVAL/INSTALLATION [Z6].) • Inspect the spark plug condition: - Cracks - Excess wear - Gap - Wet • Is any problem found on spark plug?	Yes	• If the spark plug is wet, fuel flooding is suspected. Go to step 13. • If the spark plug has a cracks, excessive wear or improper gap, replace the malfunctioning spark plug. Then go to Step 13. (See SPARK PLUG REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**INSPECT IGNITION COIL HARNESS** • 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 suspected wiring harnesses, then go to Step 13.
8	**INSPECT FOR AIR SUCTION AT INTAKE-AIR SYSTEM** • Inspect for air leakage at following: - Around connection of dynamic chamber and intake manifold - Around connection of intake manifold and cylinder head • Is air leakage found?	Yes	Repair or replace suspected part, then go to Step 13.
		No	Go to the next step.
9	**INSPECT FUEL INJECTOR HARNESS**	Yes	Go to the next step.

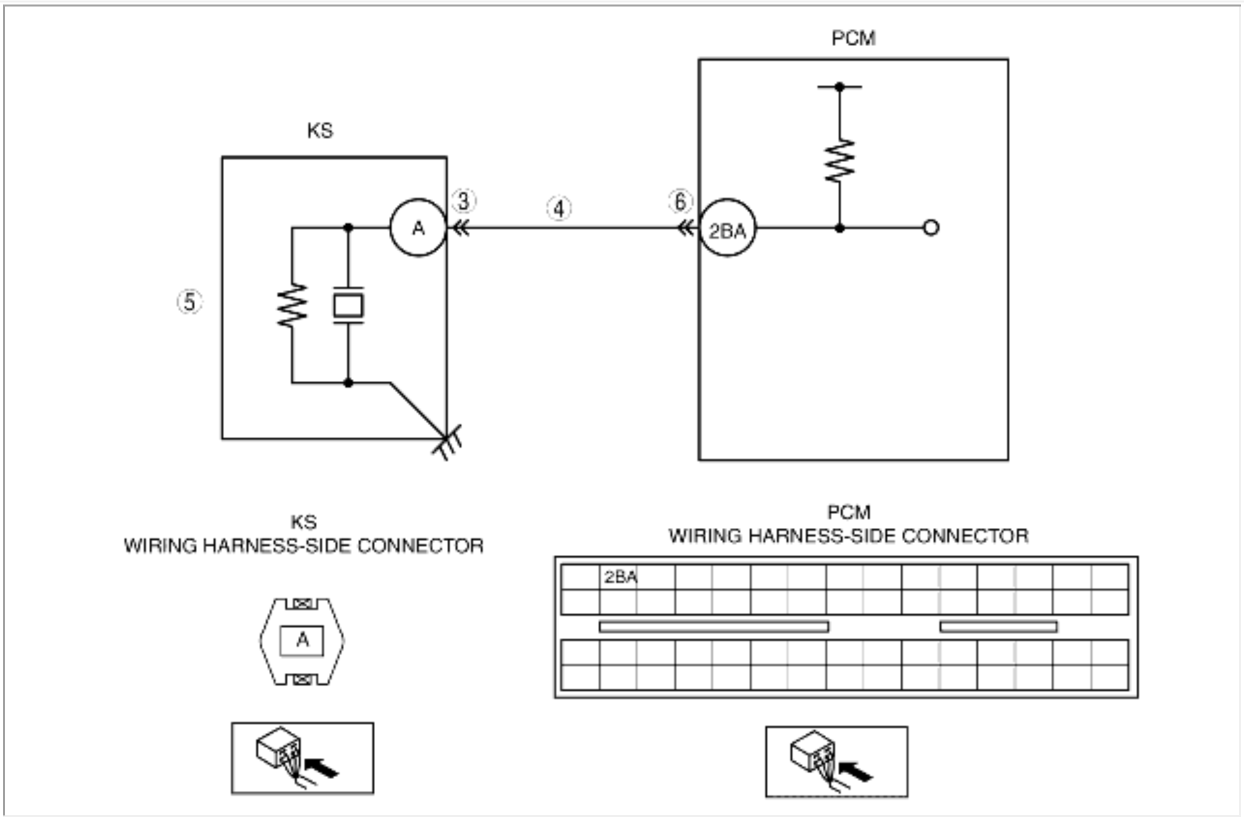
	• Remove the intake air system parts. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].) • Disconnect the fuel injector connector on suspected cylinder. • Connect noid light to the fuel injector connector terminals. • Inspect dim of light during cranking. • Does noid light illuminate?	No	Inspect for fuel injector wiring harnesses. Repair or replace it if necessary, then go to Step 13.
10	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** • Perform the "ENGINE COOLANT LEAKAGE INSPECTION". (See ENGINE COOLANT LEAKAGE INSPECTION.) • Is there any malfunction?	Yes	Repair or replace malfunctioning part according to inspection result. Then go to Step 13.
		No	Go to the next step.
11	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See COMPRESSION INSPECTION [Z6].) • Is the engine compression normal?	Yes	Go to the next step.
		No	Overhaul the engine, then go to Step 13.
12	**INSPECT FUEL INJECTOR OPERATION** • Remove the fuel injector from suspected cylinder. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].) • Switch injector with injector on other cylinder. • Start the engine and run it at idle. • Is misfire DTC for cylinder which has a suspected fuel injector?	Yes	Replace fuel injector, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
13	**VERIFY TROUBLESHOOTING OF DTC P0301, P0302, P0303, P0304 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "PCM Adaptive Memory Produce Drive Mode". (See OBD DRIVE MODE [Z6].)	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

	• Is the PENDING CODE for this DTC present?		
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0327 [Z6]

B3E010200300W03

DTC P0327	KS circuit low input
DETECTION CONDITION	• The PCM monitors the input signal from the KS when the engine is running. If the input voltage at PCM terminal 2BA is **less than 1.25 V**, the PCM determines that the KS circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• KS malfunction • Connector or terminal malfunction • Short to GND in wiring harness between KS terminal A and PCM terminal 2BA • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT KS CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the KS connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT KS SIGNAL CIRCUIT FOR SHORT TO GND**	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 7.

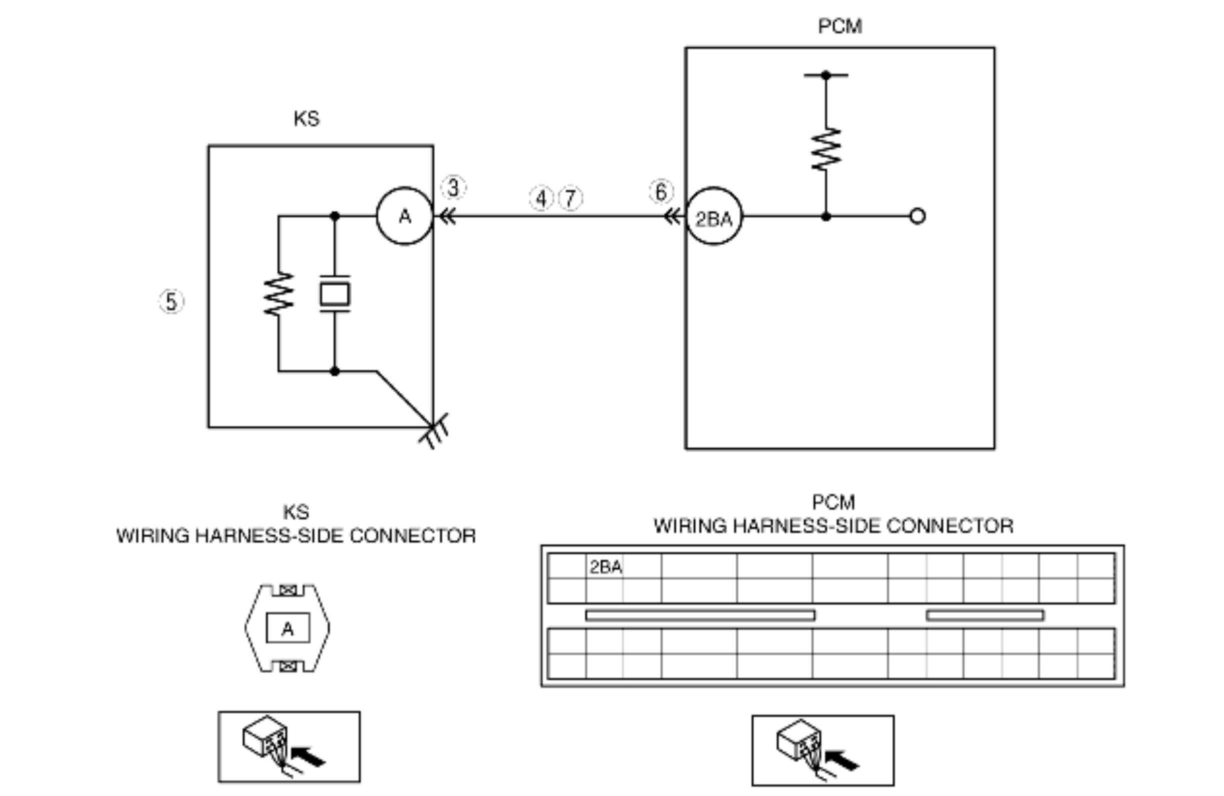
	• Turn the ignition switch off. • Inspect for continuity between KS terminal A (wiring harness-side) and body GND. • Is there continuity?	No	Go to the next step.
5	**INSPECT KS** • Inspect the KS. (See KNOCK SENSOR (KS) INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the KS, then go to Step 7. (See KNOCK SENSOR (KS) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0327 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0328 [Z6]

B3E010200300W04

DTC P0328	KS circuit high input
DETECTION CONDITION	• The PCM monitors the input signal from the KS when the engine is running. If the input voltage at PCM terminal 2BA is **more than 3.75 V**, the PCM determines that the KS circuit has a malfunction. **Diagnostic support note**

	• This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• KS malfunction • Connector or terminal malfunction • Open circuit in wiring harness between KS terminal A and PCM terminal 2BA • Short to power supply in wiring harness between KS terminal A and PCM terminal 2BA • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.

2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT KS CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the KS connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
4	**INSPECT KS SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between KS terminal A (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 8.
		No	Go to the next step.
5	**INSPECT KS** • Inspect the KS. (See KNOCK SENSOR (KS) INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the KS, then go to Step 8. (See KNOCK SENSOR (KS) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
7	**INSPECT KS SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between KS terminal A (wiring harness-side) and PCM terminal 2BA (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.

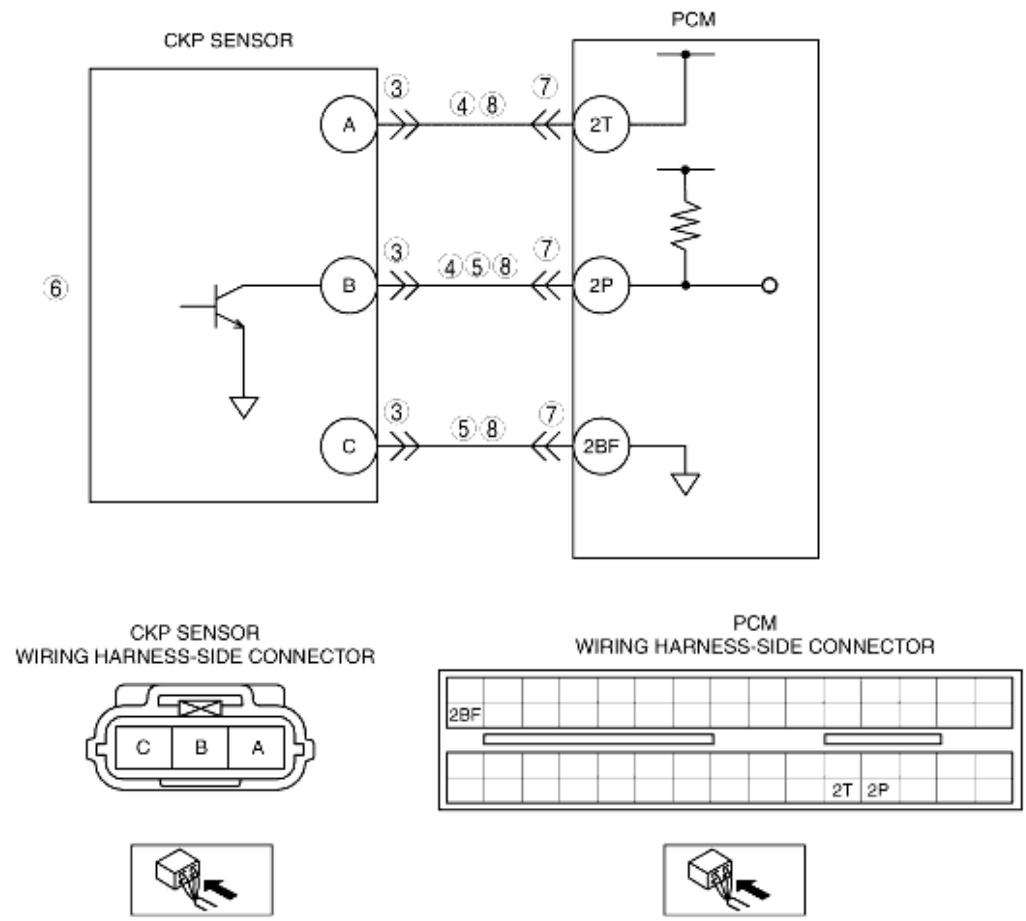
8	**VERIFY TROUBLESHOOTING OF DTC P0328 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0335 [Z6]

B3E010200300W05

DTC P0335	CKP sensor circuit problem
DETECTION CONDITION	• If the PCM does not receive the input voltage from the CKP sensor for **4.2 s or more** while the MAF is **1.43 g/s {0.189 lb/min} or more**, the PCM determines that there is a CKP sensor circuit problem. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• CKP sensor malfunction • Connector or terminal malfunction • Open circuit in wiring harness between CKP sensor terminal A and PCM terminal 2T • Short to GND in wiring harness between CKP sensor terminal A and PCM terminal 2T • Open circuit in wiring harness between CKP sensor terminal B and PCM terminal 2P • Short to power supply in wiring harness between CKP sensor terminal B and PCM terminal 2P

	• Short to GND in wiring harness between CKP sensor terminal B and PCM terminal 2P • Open circuit in wiring harness between CKP sensor terminal C and PCM terminal 2BF • Short to power supply in wiring harness between CKP sensor terminal C and PCM terminal 2BF • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

3	**INSPECT CKP SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the CKP sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT CKP SENSOR CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - CKP sensor terminal A (wiring harness-side) and body GND - CKP sensor terminal B (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
5	**INSPECT CKP SENSOR CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between the following terminals: - CKP sensor terminal B (wiring harness-side) and body GND - CKP sensor terminal C (wiring harness-side) and body GND • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT CKP SENSOR** • Inspect the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the CKP sensor, then go to Step 9. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

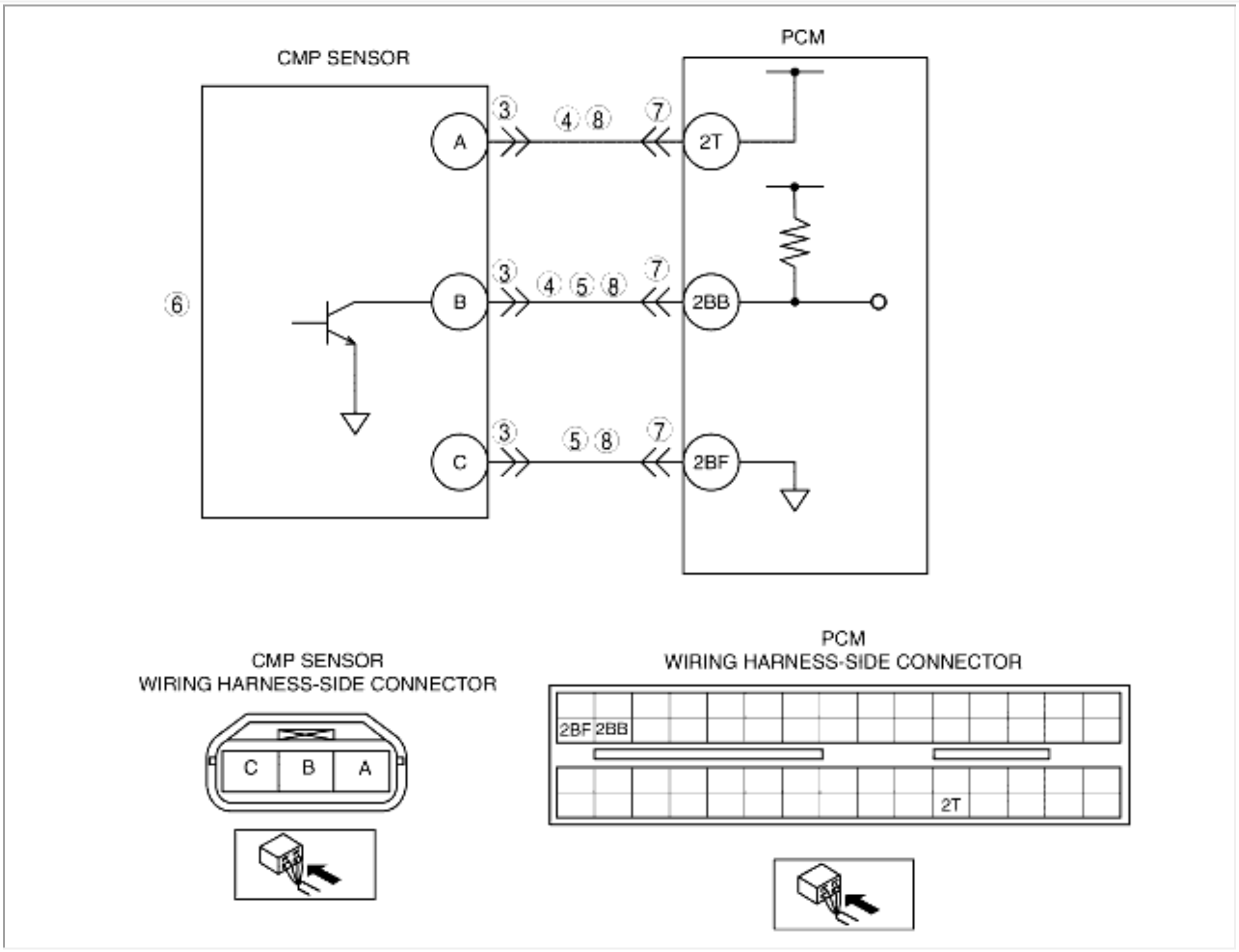
8	**INSPECT CKP SENSOR CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - CKP sensor terminal A (wiring harness-side) and PCM terminal 2T (wiring harness-side) - CKP sensor terminal B (wiring harness-side) and PCM terminal 2P (wiring harness-side) - CKP sensor terminal C (wiring harness-side) and PCM terminal 2BF (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0335 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Run the engine for **4.2 s or more** when the MAF PID is **1.43 g/s {0.189 lb/min} or more**. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0340 [Z6]

B3E010200300W06

DTC P0340	**CMP sensor circuit problem**
DETECTION CONDITION	• The PCM monitors the input voltage from the CMP sensor when the engine is running. If the PCM does not receive the input voltage from the CMP sensor for **12** consecutive engine rotations, the PCM determines that there is a CKP sensor circuit problem. **Diagnostic support note**

	• This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• CMP sensor malfunction • Connector or terminal malfunction • Open circuit in wiring harness between CMP sensor terminal A and PCM terminal 2T • Short to GND in wiring harness between CMP sensor terminal A and PCM terminal 2T • Open circuit in wiring harness between CMP sensor terminal B and PCM terminal 2BB • Short to power supply in wiring harness between CMP sensor terminal B and PCM terminal 2BB • Short to GND in wiring harness between CMP sensor terminal B and PCM terminal 2BB • Open circuit in wiring harness between CMP sensor terminal C and PCM terminal 2BF • Short to power supply in wiring harness between CMP sensor terminal C and PCM terminal 2BF • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT CMP SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the CMP sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

4	**INSPECT CMP SENSOR CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - CMP sensor terminal A (wiring harness-side) and body GND - CMP sensor terminal B (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
5	**INSPECT CMP SENSOR CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between the following terminals: - CMP sensor terminal B (wiring harness-side) and body GND - CMP sensor terminal C (wiring harness-side) and body GND • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT CMP SENSOR** • Inspect the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the CMP sensor, then go to Step 9. (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT CMP SENSOR CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals:	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.

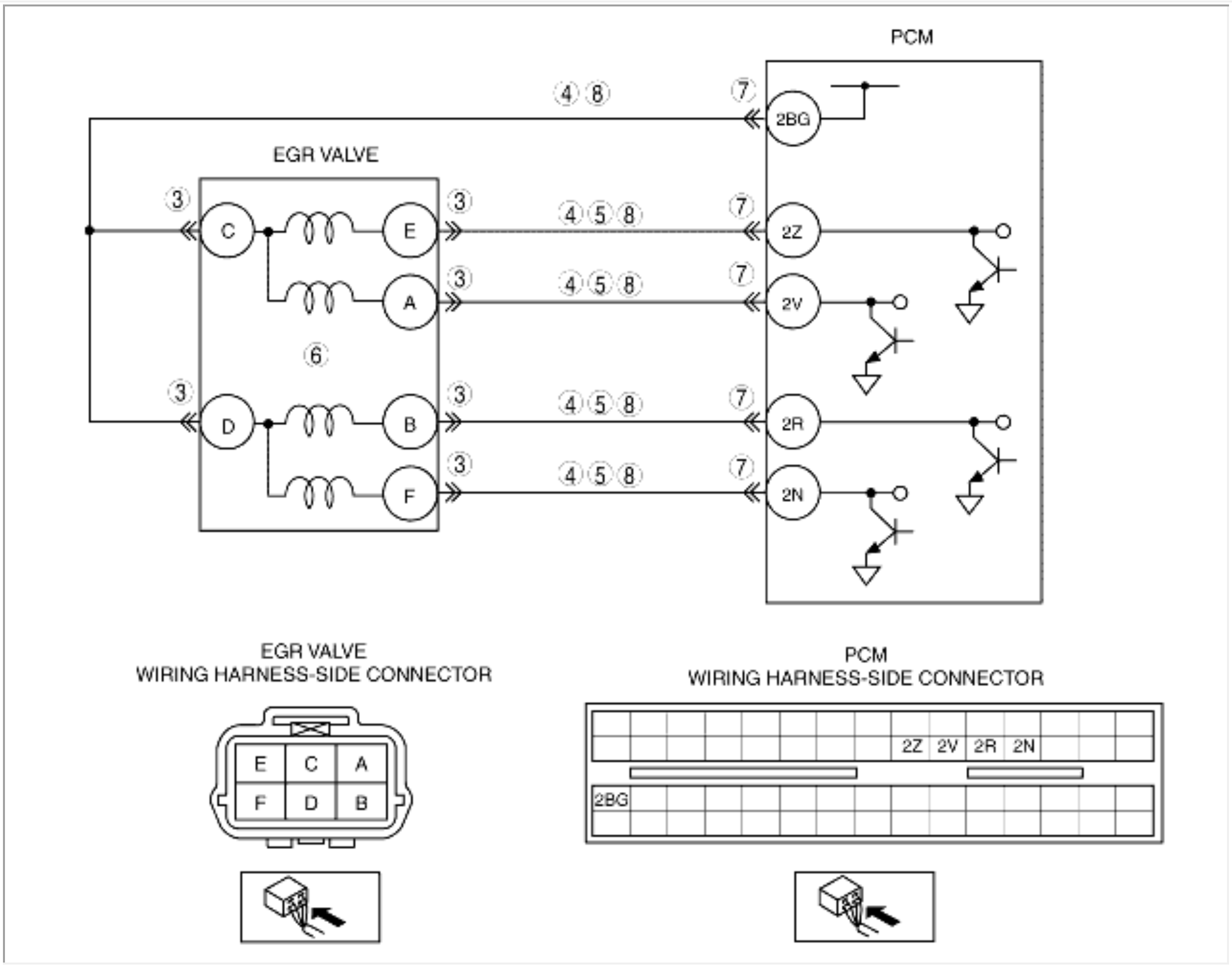
	- CMP sensor terminal A (wiring harness-side) and PCM terminal 2T (wiring harness-side) - CMP sensor terminal B (wiring harness-side) and PCM terminal 2BB (wiring harness-side) - CMP sensor terminal C (wiring harness-side) and PCM terminal 2BF (wiring harness-side) • Is there continuity?		
9	**VERIFY TROUBLESHOOTING OF DTC P0340 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Run the engine when the MAF PID is **more than 1.43 g/s {0.189 lb/min}**. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0403 [Z6]

B3E010200400W01

DTC P0403	EGR control circuit problem
DETECTION CONDITION	• The PCM monitors the input voltage from the EGR valve. If the voltages at PCM terminals 2Z, 2V, 2R and/or 2N remain low or high, the PCM determines that the there is a EGR control circuit problem. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle.

	• FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• EGR valve malfunction • Connector or terminal malfunction • Open circuit in wiring harness between EGR valve terminal C and PCM terminal 2BG • Short to GND in wiring harness between EGR valve terminal C and PCM terminal 2BG • Open circuit in wiring harness between EGR valve terminal D and PCM terminal 2BG • Short to GND in wiring harness between EGR valve terminal D and PCM terminal 2BG • Open circuit in wiring harness between EGR valve terminal E and PCM terminal 2Z • Short to power supply in wiring harness between EGR valve terminal E and PCM terminal 2Z • Short to GND in wiring harness between EGR valve terminal E and PCM terminal 2Z • Open circuit in wiring harness between EGR valve terminal A and PCM terminal 2V • Short to power supply in wiring harness between EGR valve terminal A and PCM terminal 2V • Short to GND in wiring harness between EGR valve terminal A and PCM terminal 2V • Open circuit in wiring harness between EGR valve terminal B and PCM terminal 2R • Short to power supply in wiring harness between EGR valve terminal B and PCM terminal 2R • Short to GND in wiring harness between EGR valve terminal B and PCM terminal 2R • Open circuit in wiring harness between EGR valve terminal F and PCM terminal 2N • Short to power supply in wiring harness between EGR valve terminal F and PCM terminal 2N • Short to GND in wiring harness between EGR valve terminal F and PCM terminal 2N • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT EGR VALVE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the EGR valve connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion).	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

	• Is there any malfunction?		
4	**INSPECT EGR VALVE CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - EGR valve terminal C (wiring harness-side) and body GND - EGR valve terminal D (wiring harness-side) and body GND - EGR valve terminal E (wiring harness-side) and body GND - EGR valve terminal A (wiring harness-side) and body GND - EGR valve terminal B (wiring harness-side) and body GND - EGR valve terminal F (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace wiring harness for short to GND, then go to Step 9.
		No	Go to the next step.
5	**INSPECT EGR VALVE CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between the following terminals: - EGR valve terminal E (wiring harness-side) and body GND - EGR valve terminal A (wiring harness-side) and body GND - EGR valve terminal B (wiring harness-side) and body GND - EGR valve terminal F (wiring harness-side) and body GND • Is the voltage **B+**?	Yes	Repair or replace wiring harness for short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT EGR VALVE** • Inspect the EGR valve. (See EGR VALVE INSPECTION.) • Is there any malfunction?	Yes	Replace the EGR valve, then go to Step 9. (See EGR VALVE REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION**	Yes	Repair or replace the terminal, then go to Step 9.

	• Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	No	Go to the next step.
8	**INSPECT EGR VALVE CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - EGR valve terminal C (wiring harness-side) and PCM terminal 2BG (wiring harness-side) - EGR valve terminal D (wiring harness-side) and PCM terminal 2BG (wiring harness-side) - EGR valve terminal E (wiring harness-side) and PCM terminal 2Z (wiring harness-side) - EGR valve terminal A (wiring harness-side) and PCM terminal 2V (wiring harness-side) - EGR valve terminal B (wiring harness-side) and PCM terminal 2R (wiring harness-side) - EGR valve terminal F (wiring harness-side) and PCM terminal 2N (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0403 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].)	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

	• Are any DTCs present?		

DTC P0420 [Z6]

B3E010200400W02

DTC P0420	Catalyst system efficiency below threshold
DETECTION CONDITION	• The PCM compares the number of the front HO2S and rear HO2S inversions for a predetermined time. The PCM monitors the number of inversions the rear side performs while the front side inverts for a specified number of times when the following monitoring conditions are met. The PCM detects the inversion ratio. If inversion ratio is below the threshold, the PCM determines that the catalyst system has deteriorated. **MONITORING CONDITION** - HO2S, HO2S heater and TWC repair verification drive mode - Engine speed is **1,500- 3,000 rpm**. - Calculated TWC temperature in PCM is **more than 600 °C {1112 °F}** (MTX), **more than 620 °C {1148 °F}** (ATX). - Calculated load is **17- 48 %**.*1 *1: Maximum calculated load value varies depending on engine speed. **Diagnostic support note** • This is a intermittent monitor (Catalyst). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • DIAGNOSTIC MONITORING TEST RESULTS and PENDING CODE are available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TWC deterioration or malfunction • Exhaust gas leakage • Loose front HO2S • Loose rear HO2S • Front HO2S malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1		Yes	Go to the next step.

	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**INSPECT GAS LEAKAGE OF EXHAUST SYSTEM** • Visually inspect exhaust gas leakage in exhaust system. • Is there gas leakage?	Yes	Repair or replace the malfunctioning exhaust parts, then go to Step 7.
		No	Go to the next step.
5	**INSPECT INSTALLATION OF FRONT HO2S AND REAR HO2S** • Inspect the front HO2S and rear HO2S for looseness. • Is it normal?	Yes	Go to the next step.
		No	Retighten the sensor, then go to Step 7. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].) (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
6	**INSPECT TWC** • Clear the DTC from the PCM memory using the WDS or equivalent. • Turn the ignition switch off then to the ON position. • Inspect the TWC. • Is it normal?	Yes	Replace the HO2S, then go to the next step. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].) (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
		No	Replace the TWC, then go to the next step. (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)
7	**VERIFY TROUBLESHOOTING OF DTC P0420 COMPLETED** • Make sure to reconnect all disconnected connectors.	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

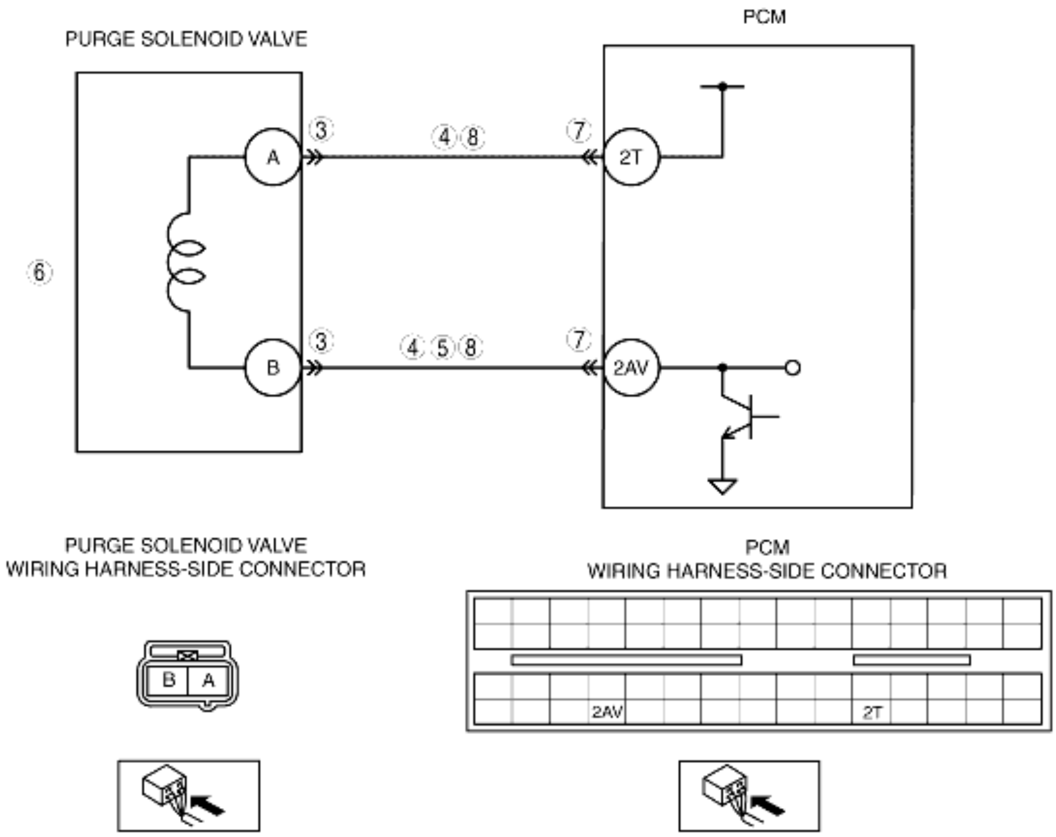
	• Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?		
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0443 [Z6]

B3E010200400W03

DTC P0443	Purge solenoid valve circuit problem
DETECTION CONDITION	• The PCM monitors the purge solenoid valve control signal. If the voltage at PCM terminal 2AV remains low or high, the PCM determines that there is a purge solenoid valve circuit problem. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Purge solenoid valve malfunction • Connector or terminal malfunction • Open circuit in wiring harness between purge solenoid valve terminal A and PCM terminal 2T • Short to GND in wiring harness between purge solenoid valve terminal A and PCM terminal 2T • Open circuit in wiring harness between purge solenoid valve terminal B and PCM terminal 2AV • Short to power supply in wiring harness between purge solenoid valve terminal B and PCM terminal 2AV

	• Short to GND in wiring harness between purge solenoid valve terminal B and PCM terminal 2AV • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT PURGE SOLENOID VALVE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the purge solenoid valve connector.	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?		
4	**INSPECT PURGE SOLENOID VALVE CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - Purge solenoid valve terminal A (wiring harness-side) and body GND - Purge solenoid valve terminal B (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace wiring harness for short to GND, then go to Step 9.
		No	Go to the next step.
5	**INSPECT PURGE SOLENOID VALVE CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between purge solenoid valve terminal B (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace wiring harness for short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT PURGE SOLENOID VALVE** • Inspect the purge solenoid valve. (See PURGE SOLENOID VALVE INSPECTION.) • Is there any malfunction?	Yes	Replace the purge solenoid valve, then go to Step 9. (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT PURGE SOLENOID VALVE CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals:	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.

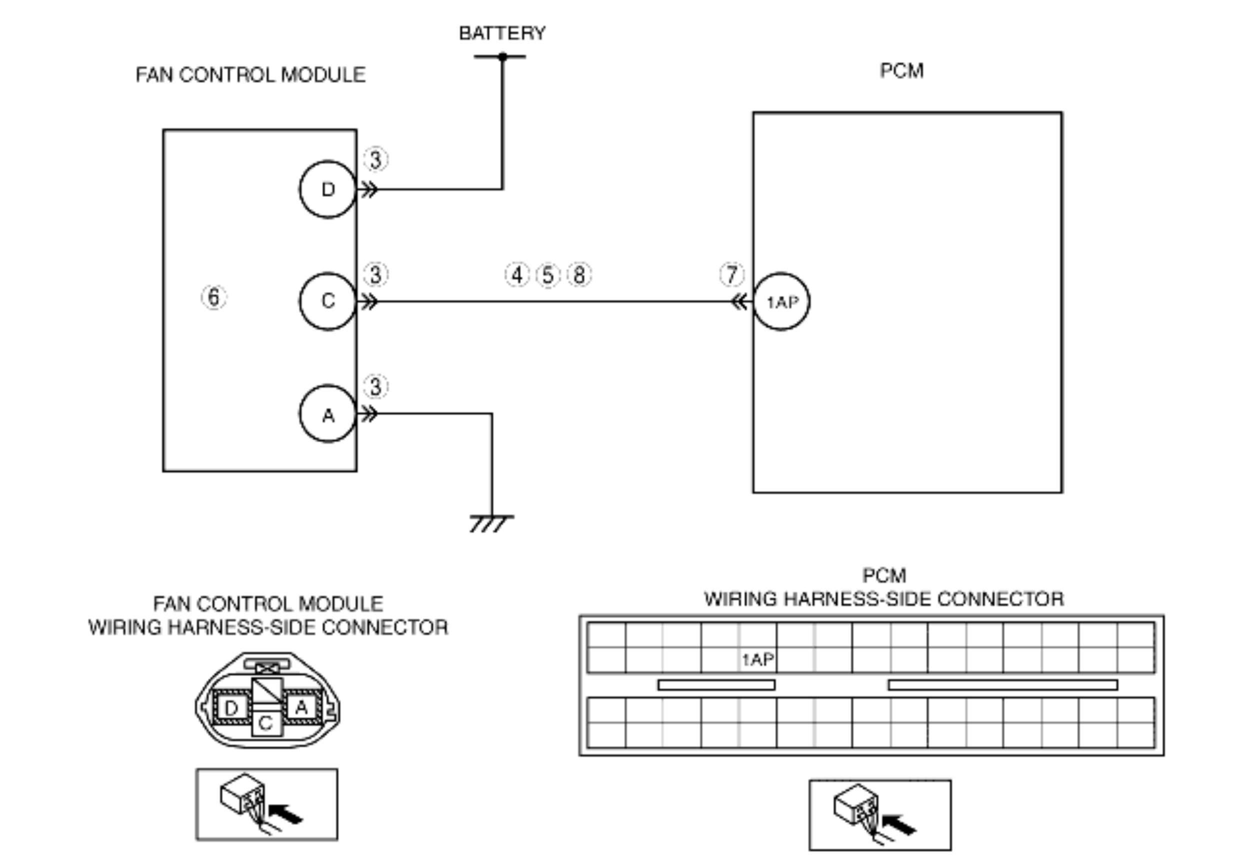
	- Purge solenoid valve terminal A (wiring harness-side) and PCM terminal 2T (wiring harness-side) - Purge solenoid valve terminal B (wiring harness-side) and PCM terminal 2AV (wiring harness-side) • Is there continuity?		
9	**VERIFY TROUBLESHOOTING OF DTC P0443 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0480 [Z6]

B3E010200400W04

DTC P0480	Cooling fan control circuit problem
DETECTION CONDITION	• The PCM monitors input voltage from the fan control module. If the voltage at PCM terminal 1AP remains low or high, the PCM determines that there is a cooling fan control circuit problem. **Diagnostic support note** • This is a continuous monitor (Other). • The MIL does not illuminate. • FREEZE FRAME DATA is not available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Fan control module malfunction • Connector or terminal malfunction • Open circuit in wiring harness between fan control module terminal C and PCM terminal 1AP

	• Short to power supply in wiring harness between fan control module terminal C and PCM terminal 1AP • Short to GND in wiring harness between fan control module terminal C and PCM terminal 1AP • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT FAN CONTROL MODULE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the fan control module connector.	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?		
4	**INSPECT FAN CONTROL MODULE SIGNAL CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between fan control module terminal C (wiring harness-side) and body GND. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
5	**INSPECT FAN CONTROL MODULE SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between fan control module terminal C (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT FAN CONTROL MODULE** • Inspect the fan control module. (See COOLING FAN MOTOR COMPONENT INSPECTION.) • Is there any malfunction?	Yes	Replace the cooling fan component, then go to Step 9. (See RADIATOR REMOVAL/INSTALLATION.)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT FAN CONTROL MODULE SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between fan control module terminal C (wiring harness-side) and PCM terminal 1AP (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9		Yes	Replace the PCM, then go to the next step.

	VERIFY TROUBLESHOOTING OF DTC P0480 COMPLETED • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Turn the A/C switch on to operate the cooling fan motor. • Is the same DTC present?		(See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0500 [Z6]

B3E010200500W01

DTC P0500	VSS circuit problem
DETECTION CONDITION	• The PCM monitors the vehicle speed from the ABS HU/CM or DSC HU/CM. If the PCM does not receive the input vehicle speed signal, the PCM determines that there is a VSS circuit problem. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• VSS circuit malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1		Yes	Go to the next step.

	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY STORED DTC IN ABS HU/CM OR DSC HU/CM** • Turn the ignition switch to the ON position (Engine off). • Verify stored DTCs in ABS HU/CM or DSC HU/CM. (See ON-BOARD DIAGNOSIS [ABS].) (See ON-BOARD DIAGNOSIS [DSC (DYNAMIC STABILITY CONTROL)]) • Are DTCs stored?	Yes	Go to the appropriate DTC inspection. (See DTC Table) (See DTC Table.)
		No	Go to the next step.
4	**VERIFY TROUBLESHOOTING OF DTC P0500 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	**MTX** Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].) **ATX** **Note** • Possible VSS circuit problem related to ATX control. Go to DTC inspection for ATX control. (See DTC P0500 [FN4A-EL].)
		No	Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0505 [Z6]

B3E010200500W02

DTC P0505	IAC system problem
DETECTION CONDITION	• The PCM cannot control idle speed toward target idle speed while KOER self test.
POSSIBLE CAUSE	• IAC valve circuit malfunction • Air cleaner element clogged • Air intake passage clogged • A/C relay control circuit malfunction • Generator control circuit malfunction • Low engine compression (Over capacity of blow-by gas) • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
2	**VERIFY RELATED PENDING OR STORED DTC** • Turn the ignition switch off, then to the ON position. (Engine OFF) • Verify pending code or stored DTCs using the WDS or equivalent. • Does DTC P0511,P2502, P2503 or P2504 present?	Yes	Perform the applicable DTC troubleshooting. (See DTC TABLE [Z6].)
		No	Go to the next step.
3	**INSPECT IAC VALVE MALFUNCTION** • Start engine. • Disconnect IAC valve connector. • Is engine speed decreased?	Yes	Go to the next step.
		No	Repair the IAC valve, then go to Step 9. (See IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION [Z6].)
4	**INSPECT A/C MAGNETIC CLUTCH OPERATION** **Note** • The following test should be performed for A/C. Go to the	Yes	Go to "A/C ALWAYS ON / A/C COMPRESSOR RUNS CONTINUOUSLY." of ENGINE SYMPTOM TROUBLESHOOTING, then go to step 9. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].)
		No	Go to the next step.

	next step for vehicles without A/C. • Turn the A/C switch off. • Is magnetic clutch still on?		
5	**INSPECT GENERATOR CONTROL CIRCUIT MALFUNCTION** • Apply electrical load. • Is engine speed increased?	Yes	Go to the next step.
		No	Repair short to power supply in generator control circuit, then go to Step 9.
6	**INSPECT AIR CLEANER ELEMENT** • Remove the air cleaner element with the engine running. • Is the engine speed increased?	Yes	Clean or replace the air cleaner element, then go to Step 9.
		No	Go to the next step.
7	**INSPECT THROTTLE BODY PASSAGE** • Is throttle body clogged?	Yes	Clean the throttle body passage or replace the throttle body, then go to Step 9.
		No	Go to the next step.
8	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [Z6].) • Is engine compression normal?	Yes	Go to the next step.
		No	Overhaul engine, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0505 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC using the WDS or equivalent. • Perform KOER self-test. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0506 [Z6]

B3E010200500W03

DTC P0506	IAC system RPM lower than expected
DETECTION CONDITION	• The PCM compares the actual idle speed with the target idle speed when the engine is running. If the actual idle speed is lower than the targeted by **100 rpm for 14 s**, the PCM determines that the IAC system RPM is lower than expected. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAC valve malfunction • A/C cut-off control malfunction • Generator control system malfunction • Intake-air line clogged - Clogged air cleaner - Clogged throttle body • Purge solenoid valve malfunction • IAT sensor malfunction • ECT sensor malfunction • CKP sensor malfunction • Insufficient compression - Engine oil malfunction - Oil pressure decrease - Oil pump malfunction - Oil pump control malfunction - Engine malfunction • Fuel line pressure malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1		Yes	Go to the next step.

	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related Service Information availability. • Is any related repair Information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**INSPECT IAC VALVE** • Inspect the IAC valve. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [Z6].) • Is there any malfunction?	Yes	Repair IAC valve, then go to Step 19. (See IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
5	**INSPECT A/C MAGNETIC CLUTCH OPERATION** **Note** • The following test should be performed for A/C. Go to the next step for vehicles without A/C. • Turn the A/C switch off. • Is magnetic clutch still on?	Yes	Go to the "NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY.". (See NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [Z6].)
		No	Go to the next step.
6	**INSPECT GENERATOR CONTROL SYSTEM OPERATION** • Apply the electrical load during idle. • Is the engine speed increased?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible short to power supply, then go to Step 19.
7	**INSPECT AIR CLEANER ELEMENT** • Remove the air cleaner element with the engine running. • Is the engine speed increased?	Yes	Clean or replace the air cleaner element, then go to Step 18. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

8	**INSPECT THROTTLE BODY PASSAGE** • Remove the throttle body. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].) • Is throttle body clogged?	Yes	Clean the throttle body passage or replace the throttle body, then go to Step 19. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**INSPECT PURGE SOLENOID VALVE** • Inspect the purge solenoid valve. (See PURGE SOLENOID VALVE INSPECTION.) • Is there any malfunction?	Yes	Replace the purge solenoid valve, then go to Step 19. (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**INSPECT IAT SENSOR** • Inspect the IAT sensor. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the MAF/IAT sensor, then go to Step 19. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
11	**INSPECT ECT SENSOR** • Inspect the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the ECT sensor, then go to Step 19. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
12	**INSPECT CKP SENSOR** • Inspect the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the CKP sensor, then go to Step 19. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
13	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See COMPRESSION INSPECTION [Z6].) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 16.
14	**INSPECT OIL PUMP** • Inspect the oil pump. (See OIL PUMP INSPECTION [Z6].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results. Overhaul or replace the engine. Then go to Step 19.
		No	Go to the next step.
15	**INSPECT ENGINE OIL CONDITION**	Yes	Go to the next step.

	• Inspect the engine oil condition. • Is the engine oil condition normal?	No	Replace the engine oil. Inspect the ECT sensor and related wiring harnesses. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6].) Overhaul or replace the engine. Then go to Step 19.
16	**INSPECT OIL PRESSURE** • Inspect the oil pressure. (See OIL PRESSURE INSPECTION [Z6].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results. Overhaul or replace the engine. Then go to Step 19.
		No	Go to the next step.
17	**INSPECT OIL PASSAGE** • Inspect the oil passage. • Is there any malfunction?	Yes	Inspect for leakage and/or clogging in oil passage of engine and repair if necessary. Overhaul or replace the engine. Then go to Step 19.
		No	Overhaul or replace the engine. Then go to the next step.
18	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See FUEL LINE PRESSURE INSPECTION.) • Is there any malfunction?	Yes	Replace the fuel pump unit, then go to the next step. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
		No	Go to the next step.
19	**VERIFY TROUBLESHOOTING OF DTC P0506 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
20	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0507 [Z6]

B3E010200500W04

DTC P0507	IAC system RPM higher than expected
DETECTION CONDITION	• The PCM compares the actual idle speed with the target idle speed when the engine is running. If the actual idle speed is higher than the targeted by **200 rpm** for **14 s**, the PCM determines that the IAC system RPM is higher than expected. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Vacuum hoses improper connection • IAC valve malfunction • Accelerator cable misadjustment • Throttle valve malfunction • IAT sensor malfunction • ECT sensor malfunction • CKP sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair Information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**INSPECT VACUUM HOSE FOR POOR CONNECTION** • Are the vacuum hoses connected completely? (See INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [Z6].)	Yes	Go to the next step.
		No	Connect the vacuum hose completely, then go to Step 11. (See INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [Z6].)
5	**INSPECT IAC VALVE** • Inspect the IAC valve. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [Z6].) • Is there any malfunction?	Yes	Repair IAC valve, then go to Step 11. (See IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT ACCELERATOR CABLE FREE PLAY** • Inspect the accelerator cable free play. (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [Z6].) • Is there any malfunction?	Yes	Adjust the accelerator cable free play, then go to Step 11. (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [Z6].)
		No	Go to the next step.
7	**INSPECT THROTTLE VALVE** • Remove the throttle body. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].) • Is there any malfunction?	Yes	Clean or repair the throttle body, then go to Step 11. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**INSPECT IAT SENSOR** • Inspect the IAT sensor. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the MAF/IAT sensor, then go to Step 11. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**INSPECT ECT SENSOR** • Inspect the ECT sensor.	Yes	Replace the ECT sensor, then go to Step 11. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [Z6].)

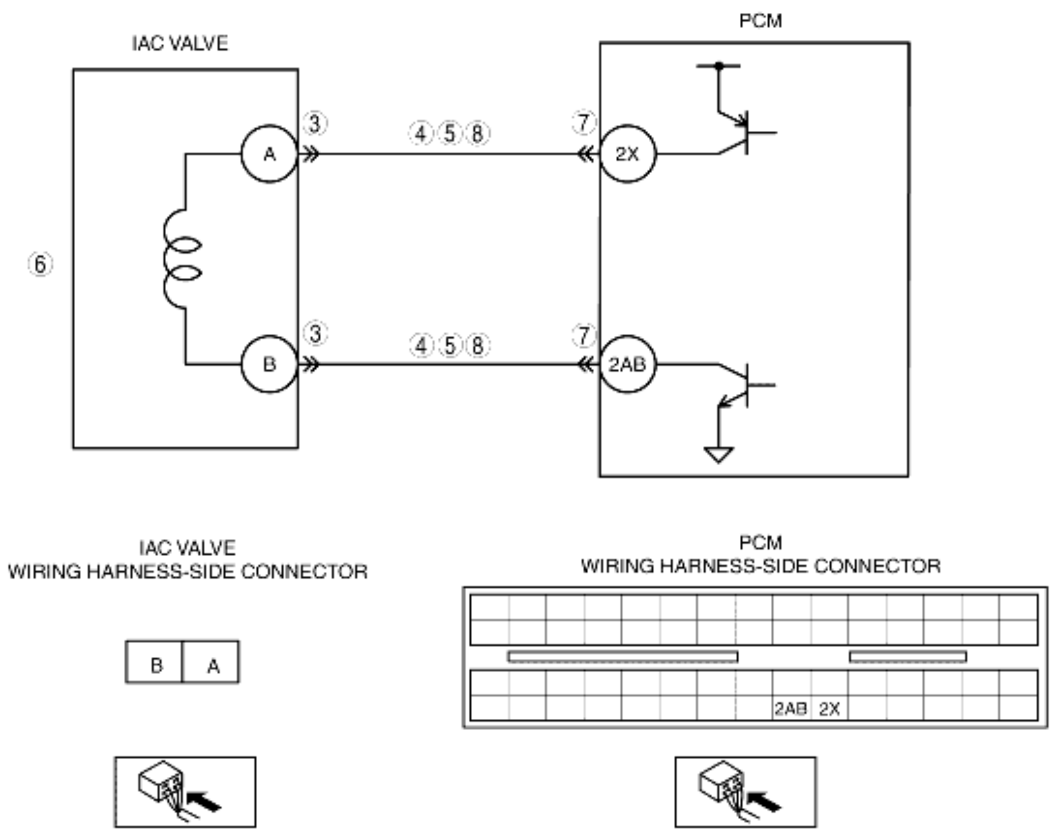
	(See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6].) • Is there any malfunction?	No	Go to the next step.
10	**INSPECT CKP SENSOR** • Inspect the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the CKP sensor, then go to the next step. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
11	**VERIFY TROUBLESHOOTING OF DTC P0507 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0511 [Z6]

B3E010200500W05

DTC P0511	IAC circuit problem
DETECTION CONDITION	• If the PCM detects that the IAC signal voltage is above or below the threshold* when the IAC control duty target is **within 19-50%**, the PCM determines that the IAC circuit problem. *: Detected threshold value depends on the battery voltage and the IAC control signal duty value. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle.

	• PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAC valve malfunction • Connector or terminal malfunction • Open circuit in wiring harness between IAC valve terminal A and PCM terminal 2X • Short to power supply in wiring harness between IAC valve terminal A and PCM terminal 2X • Short to GND in wiring harness between IAC valve terminal A and PCM terminal 2X • Open circuit in wiring harness between IAC valve terminal B and PCM terminal 2AB • Short to power supply in wiring harness between IAC valve terminal B and PCM terminal 2AB • Short to GND in wiring harness between IAC valve terminal B and PCM terminal 2AB • PCM malfunction



Diagnostic procedure

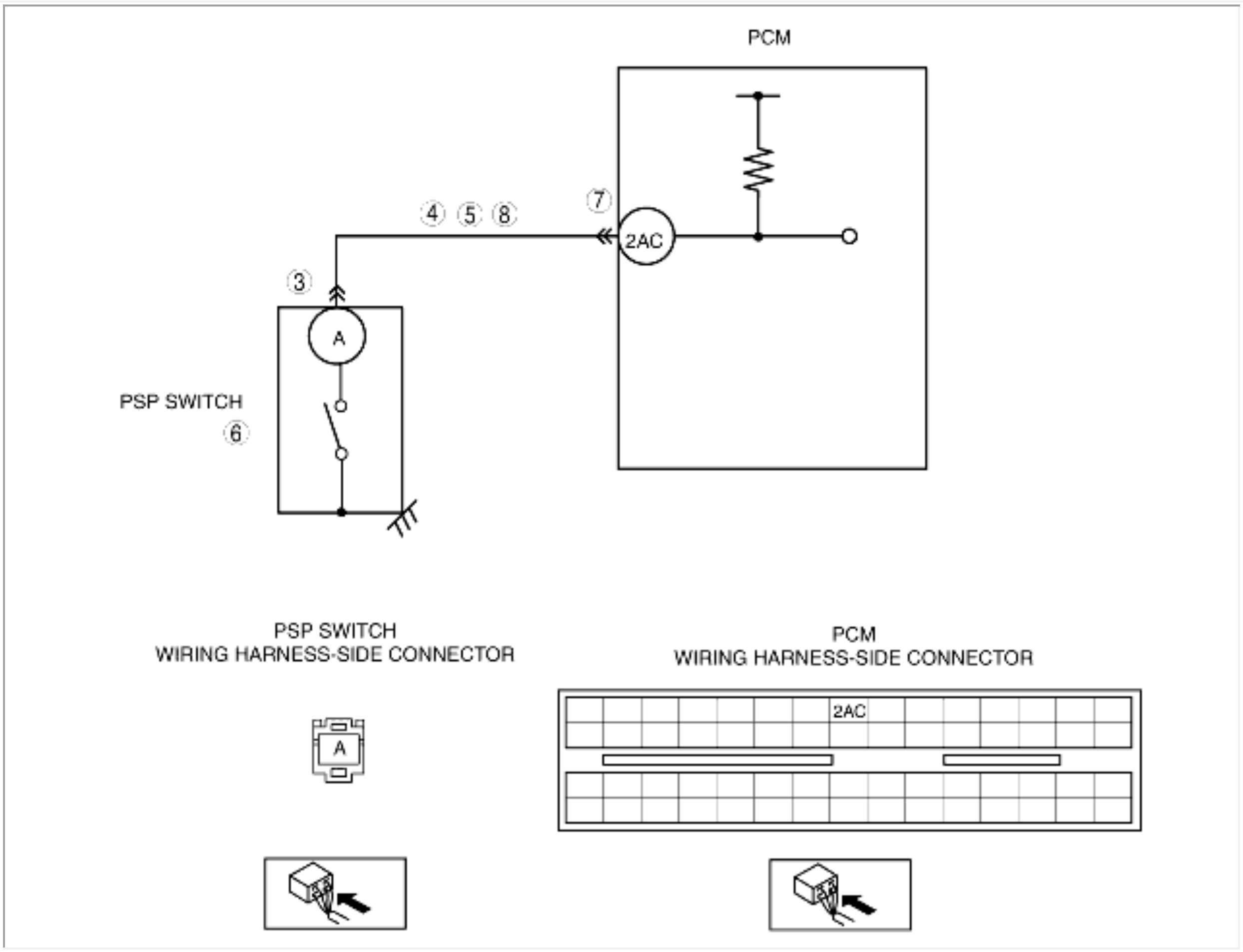
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT IAC VALVE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the IAC valve connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT IAC VALVE CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following circuits: - IAC valve terminal A (wiring harness-side) and body GND - IAC valve terminal B (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
5	**INSPECT IAC VALVE CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between the following circuits: - IAC valve terminal A (wiring harness-side) and body GND - IAC valve terminal B (wiring harness-side) and body GND • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT IAC VALVE**	Yes	Replace the IAC valve, then go to Step 9.

	• Inspect the IAC valve. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [Z6].) • Is there any malfunction?		(See IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT IAC VALVE CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following circuits: - IAC valve terminal A (wiring harness-side) and PCM terminal 2X (wiring harness-side) - IAC valve terminal B (wiring harness-side) and PCM terminal 2AB (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0511 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0550 [Z6]

B3E010200500W06

DTC P0550	PSP switch circuit problem
DETECTION CONDITION	• The PCM monitors the input signal from the PSP switch. If the input signal does not change for **1 min**, the PCM determines that the PSP switch circuit problem. • The PCM monitors the input voltage from the PSP switch when the following conditions are met. If the input voltage is low for **1 min**, the PCM determines that the PSP switch circuit problem. **MONITORING CONDITION** - Vehicle speed is **more than 60 km/h {37.3 mph}**. - ECT is **more than 60 °C {140 °F}**. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• PSP switch malfunction • Connector or terminal malfunction • Open circuit in wiring harness between PSP switch terminal A and PCM terminal 2AC • Short to power supply in wiring harness between PSP switch terminal A and PCM terminal 2AC • Short to GND in wiring harness between PSP switch terminal A and PCM terminal 2AC • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT PSP SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PSP switch connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

4	**INSPECT PSP SWITCH SIGNAL CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between PSP switch terminal A (wiring harness-side) and body GND. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
5	**INSPECT PSP SWITCH SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between PSP switch terminal A (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT PSP SWITCH** • Inspect the PSP switch. (See POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the PSP switch, then go to Step 9. (See POWER STEERING OIL PUMP (Z6) DISASSEMBLY/ASSEMBLY.)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT PSP SWITCH SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between PSP switch terminal A (wiring harness-side) and PCM terminal 2AC (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0550 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent.	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

	• Start the engine. • Access the ECT PID. • Warm up the engine until the ECT PID is **more than 60 °C {140 °F}**. • Drive the vehicle **more than 60 km/h {37.3 mph}** for **1 min**. • Is the PENDING CODE for this DTC present?		
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0602 [Z6]

B3E010200600W01

DTC P0602	PCM programming error
DETECTION CONDITION	• No configuration data in the PCM. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Complete configuration has not been completed • PCM malfunction

Diagnostic procedure

STEP	INSPECTION	ACTION	
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.

2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Perform the "PCM CONFIGURATION", then go to the next step. (See PCM CONFIGURATION [Z6].)
3	**VERIFY TROUBLESHOOTING OF DTC P0602 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
4	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0610 [Z6]

B3E010200600W02

DTC P0610	PCM vehicle options error
DETECTION CONDITION	• PCM data configuration error. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Configuration procedure has not been completed • PCM malfunction

Diagnostic procedure

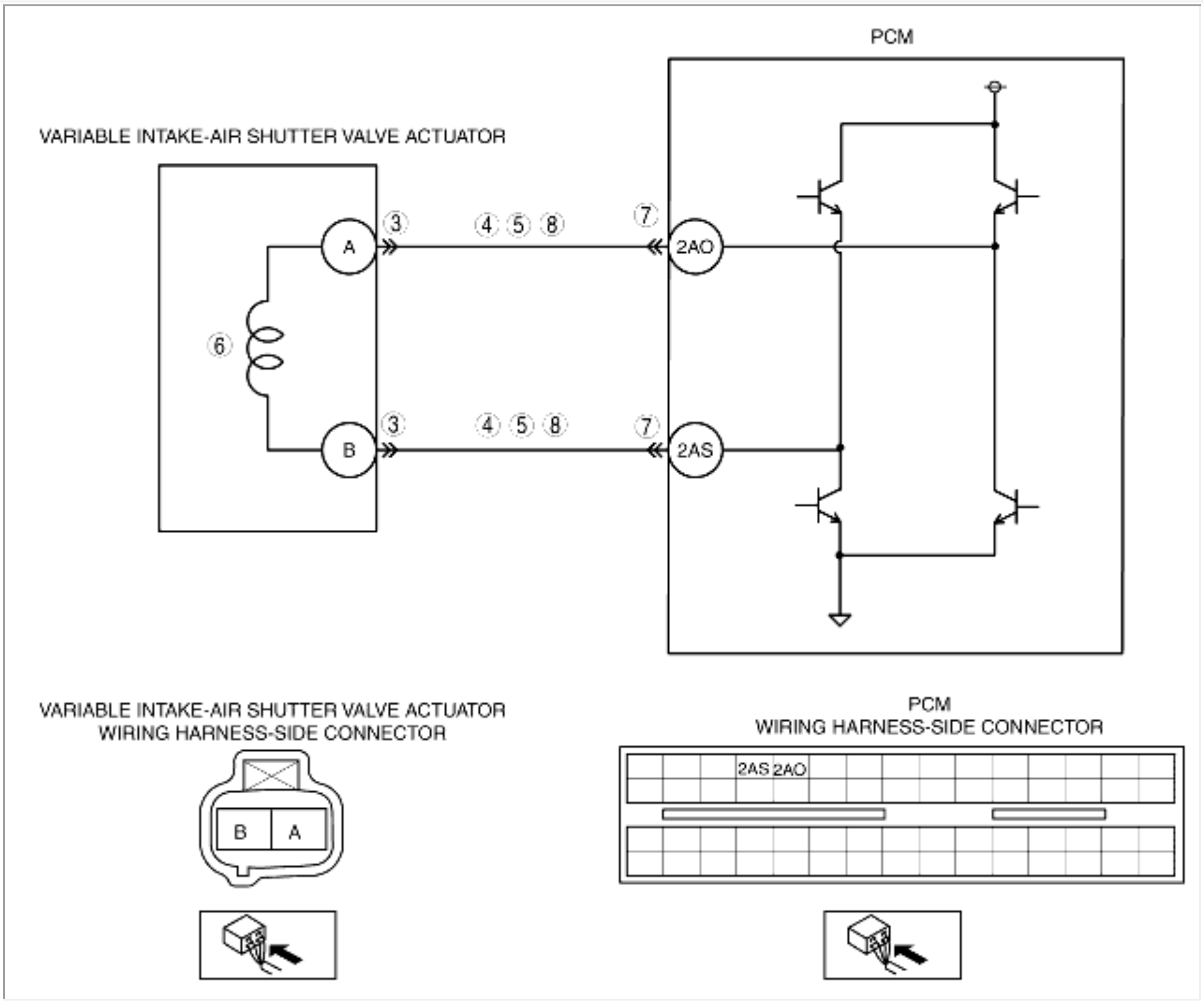
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Perform the "PCM CONFIGURATION", then go to the next step. (See PCM CONFIGURATION [Z6].)
3	**VERIFY TROUBLESHOOTING OF DTC P0610 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
4	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0660 [Z6]

B3E010200600W03

DTC P0660	Variable intake-air control circuit/open
DETECTION CONDITION	• The PCM monitors the variable intake-air control signal at PCM terminals 2AS and 2AO. If the PCM turns the variable intake-air shutter valve actuator to open or close but the voltages at PCM terminals 2AS and 2AO do not coincide with the PCM signal voltages, the PCM determines that the variable intake-air control circuit has a malfunction.

	• The PCM could not perform the self-test for the variable intake-air control circuit. **Diagnostic support note** • This is a continuous monitor (Other). • The MIL does not illuminate. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is not available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Variable intake-air shutter valve actuator malfunction • Connector or terminal malfunction • Open circuit in wiring harness between variable intake-air shutter valve actuator terminal A and PCM terminal 2AO • Short to power supply in wiring harness between variable intake-air shutter valve actuator terminal A and PCM terminal 2AO • Short to GND in wiring harness between variable intake-air shutter valve actuator terminal A and PCM terminal 2AO • Open circuit in wiring harness between variable intake-air shutter valve actuator terminal B and PCM terminal 2AS • Short to power supply in wiring harness between variable intake-air shutter valve actuator terminal B and PCM terminal 2AS • Short to GND in wiring harness between variable intake-air shutter valve actuator terminal B and PCM terminal 2AS • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the variable intake-air shutter valve actuator connector.	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged/pulled-out pins, and corrosion). • Is there any malfunction?		
4	**INSPECT VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between the following circuits: - Variable intake-air shutter valve actuator terminal A (wiring harness-side) and body GND - Variable intake-air shutter valve actuator terminal B (wiring harness-side) and body GND • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 9.
		No	Go to the next step.
5	**INSPECT VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following circuits: - Variable intake-air shutter valve actuator terminal A (wiring harness-side) and body GND - Variable intake-air shutter valve actuator terminal B (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
6	**INSPECT VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR** • Inspect the variable intake-air shutter valve actuator. (See VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the variable intake-air shutter valve actuator, then go to Step 9. (See VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector.	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged/pulled-out pins, and corrosion). • Is there any malfunction?		
8	**INSPECT VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following circuits: - Variable intake-air shutter valve actuator terminal A (wiring harness-side) and PCM terminal 2AO (wiring harness-side) - Variable intake-air shutter valve actuator terminal B (wiring harness-side) and PCM terminal 2AS (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0660 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Access the RPM PID. • Increase the engine speed **4,100 rpm or more**. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [Z6].)
		No	Troubleshooting completed.

DTC P0668 [Z6]

B3E010200600W04

DTC P0668	**PCM temperature sensor circuit low input**

DETECTION CONDITION	• The PCM monitors the PCM temperature sensor (integrated in the PCM) signal. If the PCM detects that the PCM temperature sensor voltage is **0.10 V or less**, the PCM determines that the PCM temperature sensor has a malfunction. **Diagnostic support note** • This is a continuous monitor (Other). • The MIL does not illuminate. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is not available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• PCM temperature sensor malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY TROUBLESHOOTING OF DTC P0668 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
4	**VERIFY AFTER REPAIR PROCEDURE** • Perform "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].)	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [Z6].)
		No	Troubleshooting completed.

	• Are any DTCs present?		

DTC P0669 [Z6]

B3E010200600W05

DTC P0669	PCM temperature sensor circuit high input
DETECTION CONDITION	• The PCM monitors the PCM temperature sensor (integrated the PCM) signal. If the PCM detects that the PCM temperature sensor voltage is **4.98 V or more**, the PCM determines that the PCM temperature sensor has a malfunction. **Diagnostic support note** • This is a continuous monitor (Other). • The MIL does not illuminate. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is not available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• PCM temperature sensor malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY TROUBLESHOOTING OF DTC P0669 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off).	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

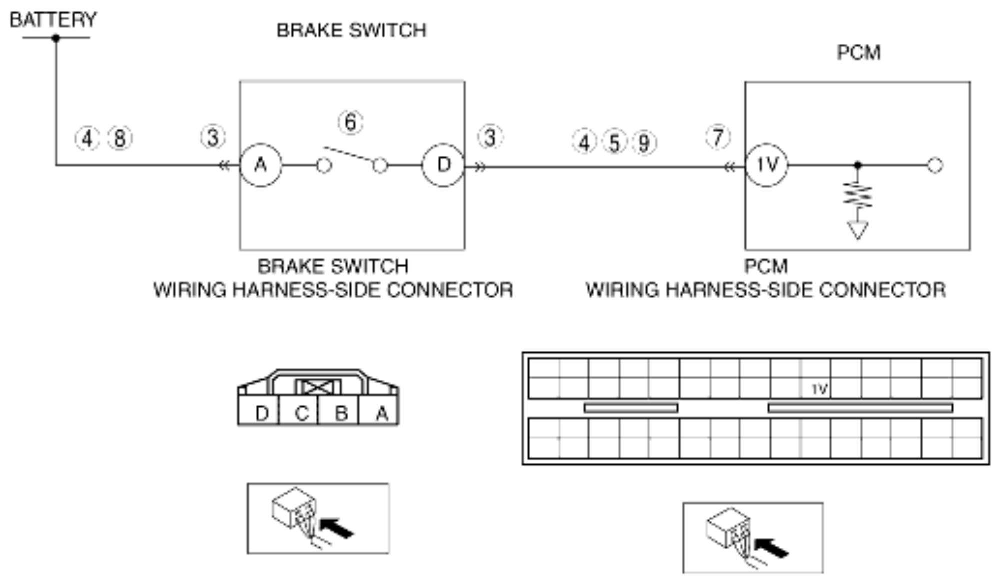
	• Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is same DTC present?		
4	**VERIFY AFTER REPAIR PROCEDURE** • Perform "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [Z6].)
		No	Troubleshooting completed.

DTC P0703 [Z6]

B3E010200700W01

DTC P0703	Brake switch input circuit problem
DETECTION CONDITION	• The PCM monitors the input signal from the brake switch. If the input signal does not change while following decelerating **8 times**, the PCM determines that there is a brake switch input circuit problem. **MONITORING CONDITION** - Vehicle speed is from **above 30 km/h {19 mph}** to **30 km/h {19 mph} or less** - Deceleration rate **exceeds 3.8 km/h {2.4 mph} per 0.1 s** **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Brake switch malfunction • Connector or terminal malfunction • Open circuit in wiring harness between brake switch terminal A and battery positive terminal • Short to GND in wiring harness between brake switch terminal A and battery positive terminal

	• Open circuit in wiring harness between brake switch terminal D and PCM terminal 1V • Short to power supply in wiring harness between brake switch terminal D and PCM terminal 1V • Short to GND in wiring harness between brake switch terminal D and PCM terminal 1V • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT BRAKE SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the brake switch connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 10.
		No	Go to the next step.

4	**INSPECT BRAKE SWITCH CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following circuits: - Brake switch terminal A (wiring harness-side) and body GND - Brake switch terminal D (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 10.
		No	Go to the next step.
5	**INSPECT BRAKE SWITCH CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between brake switch terminal D (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace harness for short to power supply, then go to Step 10.
		No	Go to the next step.
6	**INSPECT BRAKE SWITCH** • Inspect the brake switch. (See BRAKE SWITCH INSPECTION.) • Is there any malfunction?	Yes	Replace the brake switch, then go to Step 10. (See BRAKE PEDAL REMOVAL/INSTALLATION.)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 10.
		No	Go to the next step.
8	**INSPECT BRAKE SWITCH POWER CIRCUIT FOR OPEN CIRCUIT** • Measure the voltage between brake switch terminal A (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to Step 10.
9	**INSPECT BRAKE SWITCH SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off.	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.

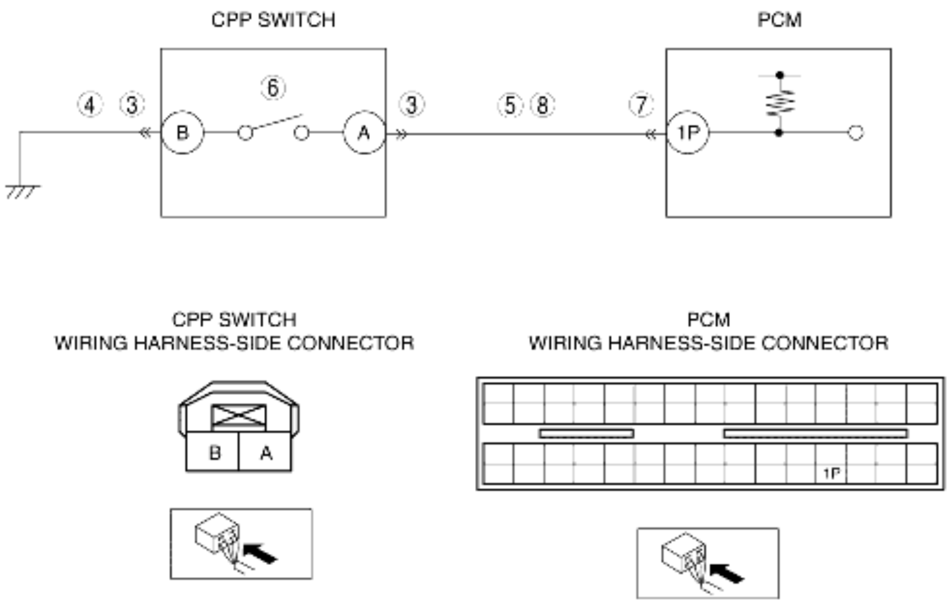
	• Inspect for continuity between brake switch terminal D (wiring harness-side) and PCM terminal 1V (wiring harness-side). • Is there continuity?		
10	**VERIFY TROUBLESHOOTING OF DTC P0703 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Drive the vehicle. • Repeat deceleration **8 times** under both of the following conditions: - Vehicle speed: from **above 30 km/h {19 mph}** to **30 km/h {19 mph} or less** - Deceleration rate should **exceed 3.8 km/h {2.4 mph} per 0.1 s** • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0704 [Z6]

B3E010200700W02

DTC P0704	CPP switch input circuit problem
DETECTION CONDITION	• The PCM monitors the input signal from the CPP switch. If the input signal does not change while following decelerating **8 times**, the PCM determines that there is a CPP switch input circuit problem. **MONITORING CONDITION** - Vehicle speed: from **above 30 km/h {19 mph}** to **30 km/h {19 mph} or less** **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM.

	• PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• CPP switch malfunction • Connector or terminal malfunction • Open circuit in wiring harness between CPP switch terminal A and PCM terminal 1P • Short to GND in wiring harness between CPP switch terminal A and PCM terminal 1P • Open circuit in wiring harness between CPP switch terminal B and GND • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

3	**INSPECT CPP SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the CPP switch connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT CPP SWITCH GND CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between CPP switch terminal B (wiring harness-side) and body GND. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to Step 9.
5	**INSPECT CPP SWITCH SIGNAL CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between CPP switch terminal A (wiring harness-side) and body GND. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
6	**INSPECT CPP SWITCH** • Inspect the CPP switch. (See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the CPP switch, then go to Step 9. (See CLUTCH PEDAL REMOVAL/INSTALLATION.)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT CPP SWITCH SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between CPP switch terminal A (wiring harness-side) and PCM terminal 1P (wiring harness-side).	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.

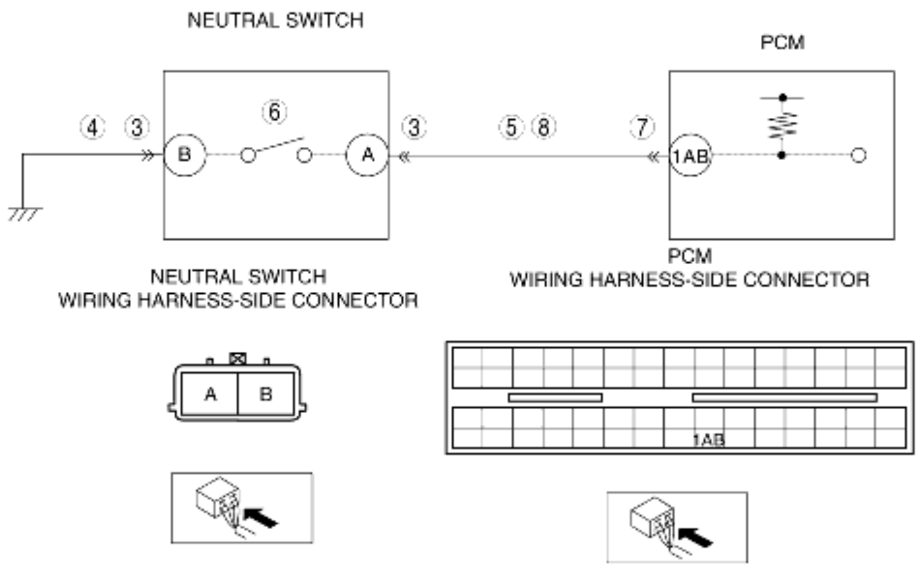
	• Is there continuity?		
9	**VERIFY TROUBLESHOOTING OF DTC P0704 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Drive the vehicle. • Repeat deceleration **8 times** under the following conditions: - Vehicle speed: from **above 30 km/h {19 mph}** to **30 km/h {19 mph} or less** • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P0850 [Z6]

B3E010200800W01

DTC P0850	Neutral switch input circuit problem
DETECTION CONDITION	• The PCM monitors changes in input voltage from neutral switch. If the PCM does not detect PCM terminal 1AB voltage changes while running vehicle with vehicle speed **30 km/h {19 mph} or more** and clutch pedal turns press and depress **10 times** repeatedly, the PCM determines that there is a neutral switch circuit problem. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Neutral switch malfunction

	• Connector or terminal malfunction • Open circuit in wiring harness between neutral switch terminal A and PCM terminal 1AB • Short to GND in wiring harness between neutral switch terminal A and PCM terminal 1AB • Open circuit in wiring harness between neutral switch terminal B and GND • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related Service Information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT NEUTRAL SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the neutral switch connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

4	**INSPECT NEUTRAL SWITCH GND CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between neutral switch terminal B (wiring harness-side) and body GND. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to Step 9.
5	**INSPECT NEUTRAL SWITCH SIGNAL CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between neutral switch terminal A (wiring harness-side) and body GND. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 9.
		No	Go to the next step.
6	**INSPECT NEUTRAL SWITCH** • Inspect the neutral switch. (See NEUTRAL SWITCH INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the neutral switch, then go to Step 9. (See NEUTRAL SWITCH REMOVAL/INSTALLATION [F35M-R].)
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT NEUTRAL SWITCH SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between neutral switch terminal A (wiring harness-side) and PCM terminal 1AB (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0850 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Depress and release clutch pedal **more than 10 times** repeatedly under the following condition:	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

	- Vehicle speed: **30 km/h {19 mph} or more** • Is the PENDING CODE for this DTC present?		
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P1260 [Z6]

B3E010201200W02

DTC P1260	**Immobilizer system problem**
DETECTION CONDITION	• The instrument cluster detects an immobilizer system problem. **Diagnostic support note** • This is a continuous monitor (Other). • The MIL does not illuminate. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is not stored in the PCM memory.
POSSIBLE CAUSE	• Immobilizer system malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3		Yes	Go to the appropriate DTC inspection.

	VERIFY STORED DTC IN INSTRUMENT CLUSTER • Turn the ignition switch to the ON position (Engine off). • Verify stored DTCs in instrument cluster. (See DTC INSPECTION [IMMOBILIZER SYSTEM].) • Are DTCs stored?		(See DTC TABLE [IMMOBILIZER SYSTEM].)
		No	Go to the next step.
4	**VERIFY TROUBLESHOOTING OF DTC P1260 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2006 [Z6]

B3E010202000W06

DTC P2006	Variable tumble control stuck close
DETECTION CONDITION	• The PCM monitors the mass air amount. If the actual air flow amount is below the estimated air flow amount when the following monitoring conditions are met. The PCM determines that the variable tumble control is stuck closed. **MONITORING CONDITION** - Engine coolant temperature is **70 °C {158 °F} or more**. - Throttle valve opening angle is **more than 75 %**. - Engine speed is **3,500 rpm or more**. **Diagnostic support note** • This is a continuous monitor (CCM).

	• The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• MAF sensor malfunction • Excessive air suction of intake-air system (from MAF sensor onward) • Improper intake-air system hose routing • Variable tumble shutter valve stuck closed • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**INSPECT MAF SENSOR** • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the MAF/IAT sensor, then go to Step 6. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

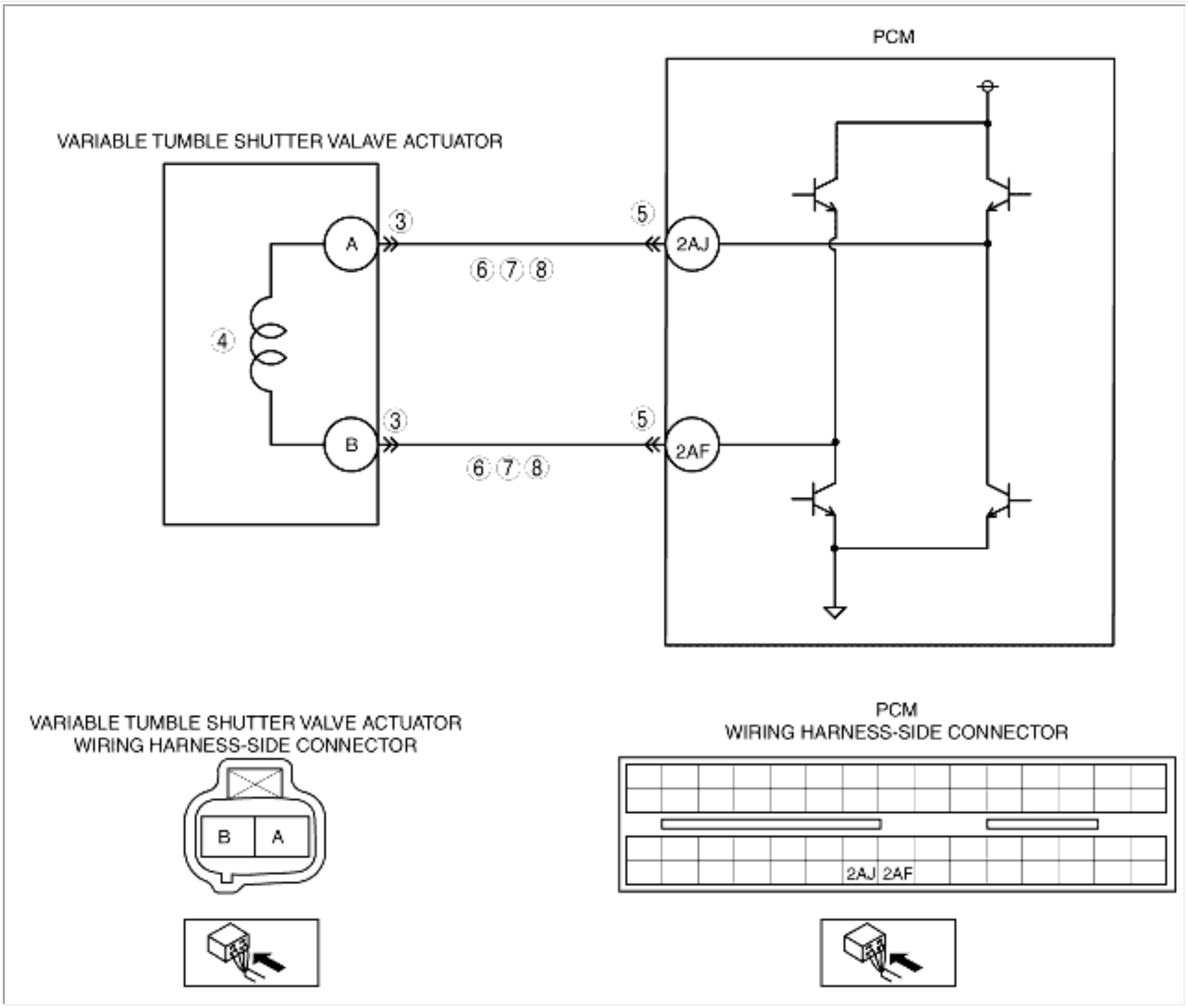
5	**INSPECT FOR EXCESSIVE AIR SUCTION OF INTAKE-AIR SYSTEM OR IMPROPER ROUTING OF INTAKE-AIR SYSTEM HOSE** • Visually inspect hoses on intake air system for looseness, cracks or damages. • Is there any malfunction?	Yes	Repair or replace source of air suction, then go to the next step.
		No	Go to the next step.
6	**VERIFY TROUBLESHOOTING OF DTC P2006 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Access the ECT PID. • Warm up the engine until the ECT PID is **70 °C {158 °F} or more**. • Perform no load racing at the engine speed of **3,500 rpm or more** with the throttle valve opening angle **more than 75 %**. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2008 [Z6]

B3E010202000W07

DTC P2008	Variable tumble control circuit/open
DETECTION CONDITION	• The PCM monitors the variable tumble control signal at PCM terminals 2AF and 2AJ. If the PCM turns the variable tumble shutter valve actuator to open or close but voltages at PCM terminals 2AF and 2AJ do not coincide with the PCM signal voltages the PCM determines that the variable tumble control circuit has a malfunction. • Variable tumble control IC error. **Diagnostic support note** • This is a continuous monitor (CCM).

	• The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Variable tumble shutter valve actuator malfunction • Short to power supply in wiring harness between variable tumble shutter valve actuator terminal A and PCM terminal 2AJ • Short to ground in wiring harness between variable tumble shutter valve actuator terminal A and PCM terminal 2AJ • Open circuit in wiring harness between variable tumble shutter valve actuator terminal A and PCM terminal 2AJ • Short to power supply in wiring harness between variable tumble shutter valve actuator terminal B and PCM terminal 2AF • Short to ground in wiring harness between variable tumble shutter valve actuator terminal B and PCM terminal 2AF • Open circuit in wiring harness between variable tumble shutter valve actuator terminal B and PCM terminal 2AF • Poor connection at variable tumble shutter valve actuator or PCM • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT VARIABLE TUMBLE SHUTTER VALVE ACTUATOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the variable tumble shutter valve actuator connector.	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged, pulled-out pins, and corrosion). • Is there any malfunction?		
4	**INSPECT VARIABLE TUMBLE SHUTTER VALVE ACTUATOR MALFUNCTION** • Perform the variable tumble shutter valve actuator inspection. (See VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [Z6].) • Is the variable tumble shutter valve actuator normal?	Yes	Go to the next step.
		No	Replace the variable tumble shutter valve actuator, then go to Step 9. (See VARIABLE TUMBLE SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION [Z6].)
5	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair terminal, then go to Step 9.
		No	Go to the next step.
6	**INSPECT VARIABLE TUMBLE SHUTTER VALVE ACTUATOR CONTROL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between followings; - Between variable tumble shutter valve actuator terminal A (wiring harness-side) and PCM terminal 2AJ (wiring harness-side) - Between variable tumble shutter valve actuator terminal B (wiring harness-side) and PCM terminal 2AF (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace wiring harness for open circuit, then go to Step 9.
7	**INSPECT VARIABLE TUMBLE SHUTTER VALVE ACTUATOR CONTROL CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between followings; - Between variable tumble shutter valve actuator terminal A (wiring harness-side) and body ground - Between variable tumble shutter valve actuator terminal B (wiring harness-side) and body ground • Is there continuity?	Yes	Repair or replace for short to ground, then go to Step 9.
		No	Go to the next step.

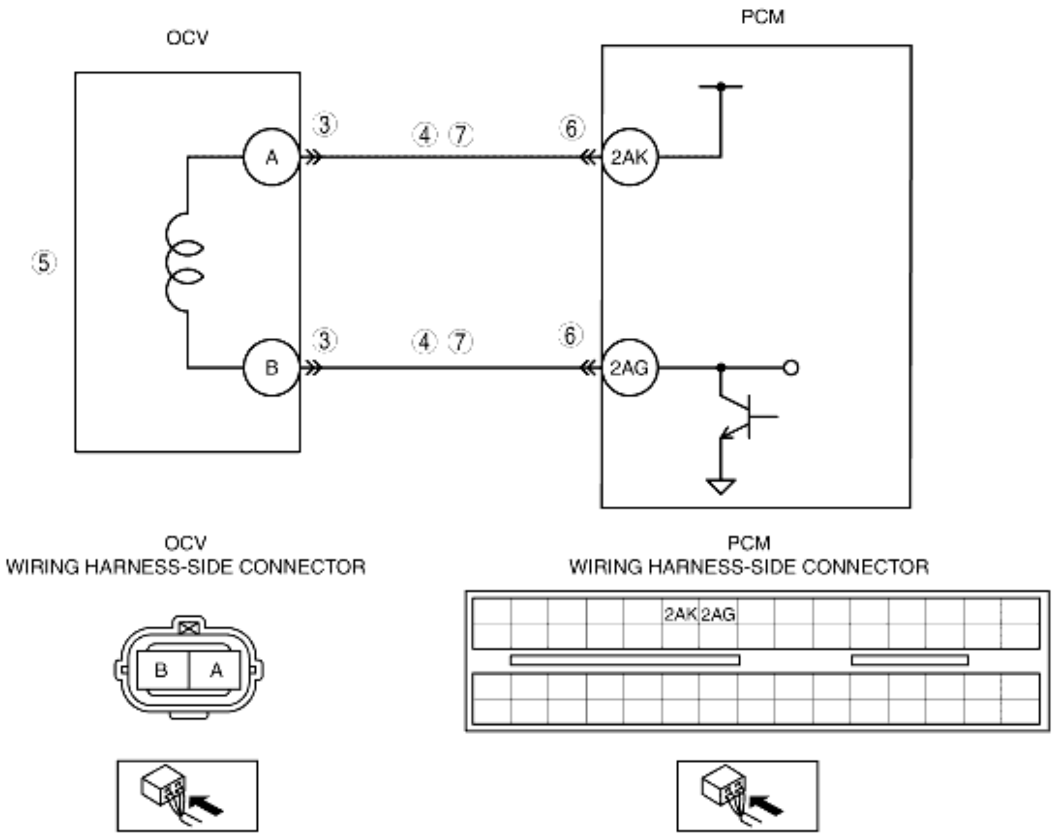
8	**INSPECT VARIABLE TUMBLE SHUTTER VALVE ACTUATOR CONTROL CIRCUIT FOR SHORT TO POWER** • Turn the ignition switch to the ON position. (Engine off). • Measure the voltage following wiring harness-side terminals: - Variable tumble shutter valve actuator terminal A - Variable tumble shutter valve actuator terminal B • Are each terminal voltage **B+**?	Yes	Repair or replace for short to power supply, then go to the next step.
		No	Go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P2008 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [Z6].)
		No	Troubleshooting completed.

DTC P2088 [Z6]

B3E010202000W08

DTC P2088	Variable valve timing control circuit low
DETECTION CONDITION	• If the PCM detects that the OCV drive current is less than the specification* when the OCV control duty target is **approx. 100 %**, the PCM determines that the variable valve timing control circuit low. *: Detected specification value depends on the battery voltage. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition.

	• FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• OCV malfunction • Connector or terminal malfunction • Open circuit in wiring harness between OCV terminal A and PCM terminal 2AK • Short to GND in wiring harness between OCV terminal A and PCM terminal 2AK • Open circuit in wiring harness between OCV terminal B and PCM terminal 2AG • Short to GND in wiring harness between OCV terminal B and PCM terminal 2AG • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.

2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT OCV CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the OCV connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
4	**INSPECT OCV CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following circuits: - OCV terminal A (wiring harness-side) and body GND - OCV terminal B (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 8.
		No	Go to the next step.
5	**INSPECT OCV** • Inspect the OCV. (See OIL CONTROL VALVE (OCV) INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the OCV, then go to Step 8. (See OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
7	**INSPECT OCV CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following circuits:	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.

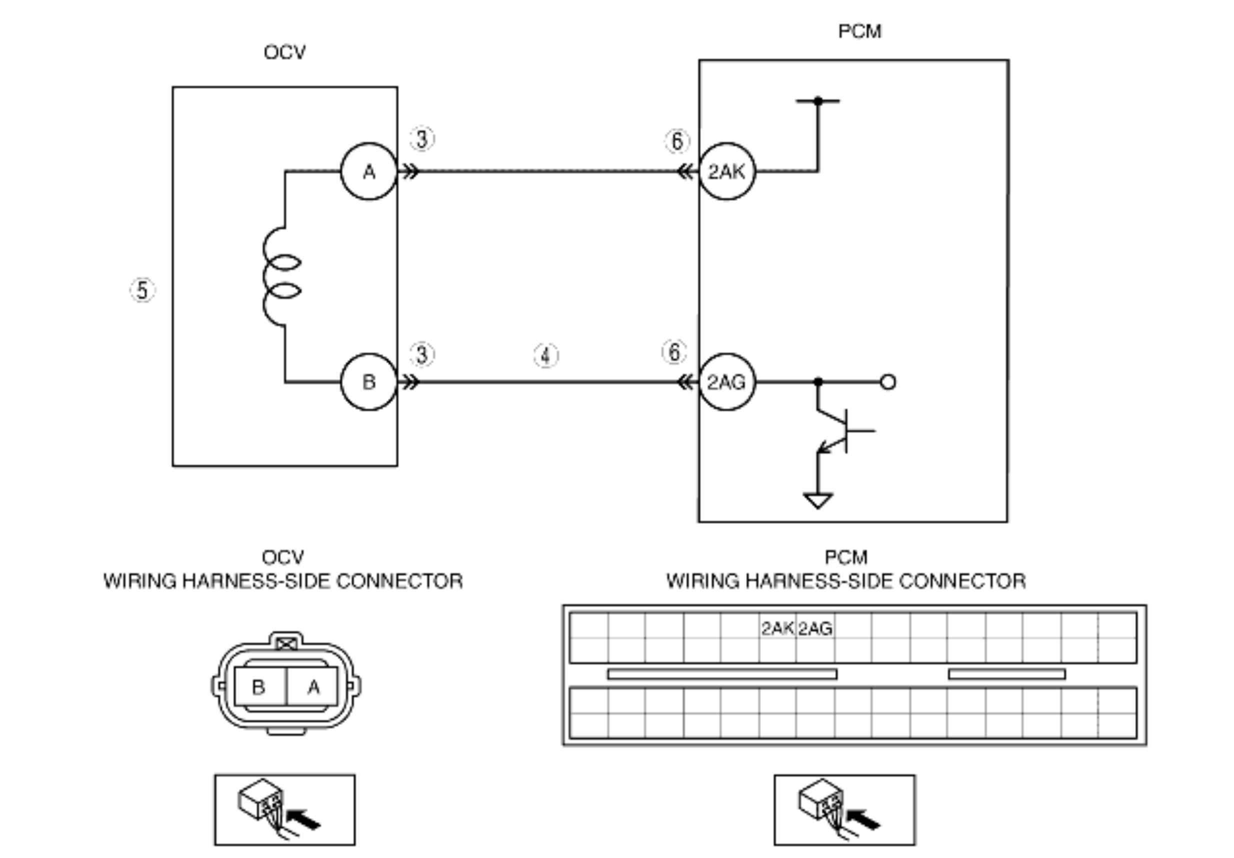
	- OCV terminal A (wiring harness-side) and PCM terminal 2AK (wiring harness-side) - OCV terminal B (wiring harness-side) and PCM terminal 2AG (wiring harness-side) • Is there continuity?		
8	**VERIFY TROUBLESHOOTING OF DTC P2088 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2089 [Z6]

B3E010202000W09

DTC P2089	Variable valve timing control circuit high
DETECTION CONDITION	• If the PCM detects that the OCV drive current is as specified or more when the OCV control duty target is **3 % or less**, the PCM determines that the variable valve timing control circuit high. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• OCV circuit malfunction • Connector or terminal malfunction

	• Short to power supply in wiring harness between OCV terminal B and PCM terminal 2AG • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT OCV CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the OCV connector.	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged/pulled-out pins, and corrosion). • Is there any malfunction?		
4	**INSPECT OCV CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between OCV terminal B (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 7.
		No	Go to the next step.
5	**INSPECT OCV** • Inspect the OCV. (See OIL CONTROL VALVE (OCV) INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the OCV, then go to Step 7. (See OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, and corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P2089 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2096 [Z6]

B3E010202000W10

DTC P2096	Target A/F feedback system too lean
DETECTION CONDITION	• The PCM monitors the target A/F fuel trim when under the target A/F feedback control. If the fuel trim is more than the specification, the PCM determines that the target A/F feedback system is too lean. **Diagnostic support note** • This is a continuous monitor (Fuel system). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Leakage exhaust gas • Rear HO2S malfunction • IAT sensor malfunction • ECT sensor malfunction • Air suction in intake-air system • Front HO2S malfunction • MAF sensor malfunction • Insufficient fuel line pressure • Fuel pump unit malfunction • Leakage fuel • Improper operation ignition system • Insufficient engine compression • Fuel injector malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY REPAIR INFORMATION AVAILABILITY**	Yes	Perform repair or diagnosis according to the available repair information.

	• Verify related service repair information availability. • Is any related repair information available?		• If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Is the DTC P2177 or P2187 also present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2096 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See DTC TABLE [Z6].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS OF REAR HO2S** • Connect the WDS or equivalent to the DLC-2. • Start the engine and warm it up completely. • Access the O2S12 PID. • Read the O2S12 PID under following accelerator pedal condition (in PARK or NEUTRAL). - **More than 0.45 V** when suddenly depressing accelerator pedal (rich condition) - **Less than 0.45 V** just after releasing accelerator pedal (lean condition) • Is the PID normal?	Yes	Go to the next step.
		No	Visually inspect for gas leakage between the TWC and rear HO2S. • If there is no leakage, replace the rear HO2S. (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].) Then go to Step 17.
6	**VERIFY CURRENT INPUT SIGNAL STATUS** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See PCM INSPECTION [Z6].) - ECT - MAF	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 17.

	- TP - VSS • Are the PIDs normal?		
7	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER FREEZE FRAME DATA CONDITION** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs under the FREEZE FRAME DATA condition. (See PCM INSPECTION [Z6].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 17.
8	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Connect the WDS or equivalent to the DLC-2. • Start the engine and warm it up completely. • Access O2S11 PID. • Read O2S11 PID under following accelerator pedal condition (in PARK or NEUTRAL). - **More than 0.45 V** when suddenly depressing accelerator pedal (rich condition) - **Less than 0.45 V** just after releasing accelerator pedal (lean condition) • Is the PID normal?	Yes	Go to the next step.
		No	Visually inspect for exhaust gas leakage between exhaust manifold and front HO2S. • If there is no leakage, replace front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].) Then go to Step 17.
9	**VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR** • Connect the WDS or equivalent to the DLC-2. • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed.	Yes	Go to the next step.
		No	Replace MAF/IAT sensor, then go to Step 17. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)

	• Is the PID normal?		
10	**INSPECT INTAKE-AIR SYSTEM FOR EXCESSIVE AIR SUCTION** • Visually inspect hoses in intake-air system for looseness, cracks or damages . • Is there any malfunction?	Yes	Repair or replace the malfunctioning part, then go to Step 17.
		No	Go to the next step.
11	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See FUEL LINE PRESSURE INSPECTION.) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 13.
12	**INSPECT FUEL SYSTEM FOR FUEL LEAKAGE** • Visually inspect fuel leakage in the fuel system. • Is there fuel leakage?	Yes	Repair or replace the malfunctioning part, then go to Step 17.
		No	Replace the fuel pump unit, then go to Step 17. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
13	**INSPECT IGNITION COIL HARNESS** • Inspect the ignition coil related harness condition (intermittent open or short circuit) for all cylinders. • Are harness conditions normal?	Yes	Go to the next step.
		No	Repair suspected wiring harnesses, then go to Step 17.
14	**INSPECT IGNITION SYSTEM OPERATION** • Perform the spark test. (See Spark Test.) • Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to spark test result. Then go to Step 17.
15	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See COMPRESSION INSPECTION [Z6].) • Is there any malfunction?	Yes	Go to the next step.
		No	Overhaul engine, then go to Step 17.
16	**INSPECT FUEL INJECTOR** • Inspect the fuel injector. (See FUEL INJECTOR INSPECTION.)	Yes	Replace suspected fuel injector, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)

	• Is there any malfunction?	No	Go to the next step.
17	**VERIFY TROUBLESHOOTING OF DTC P2096 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "PCM Adaptive Memory Produce Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
18	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2097 [Z6]

B3E010202000W11

DTC P2097	**Target A/F feedback system too rich**
DETECTION CONDITION	• The PCM monitors the target A/F fuel trim when under the target A/F feedback control. If the fuel trim is less than the specification, the PCM determines that the target A/F feedback system is too rich. **Diagnostic support note** • This is a continuous monitor (Fuel system). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Leakage exhaust gas • Rear HO2S malfunction • IAT sensor malfunction • ECT sensor malfunction

	• Front HO2S malfunction • Excessive fuel line pressure • Fuel pump unit malfunction • Purge solenoid valve malfunction • Insufficient engine compression • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Is the DTC P2178 or P2188 also present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2097 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See DTC TABLE [Z6].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS OF REAR HO2S** • Connect the WDS or equivalent to the DLC-2. • Start the engine and warm it up completely. • Access the O2S12 PID.	Yes	Go to the next step.
		No	Visually inspect for exhaust gas leakage between the TWC and rear HO2S. • If there is no leakage, replace the rear HO2S. (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].) Then go to Step 11.

	• Read the O2S12 PID under following accelerator pedal condition (in PARK or NEUTRAL). - **More than 0.45 V** when suddenly depressing accelerator pedal (rich condition) - **Less than 0.45 V** just after releasing accelerator pedal (lean condition) • Is the PID normal?		
6	**VERIFY CURRENT INPUT SIGNAL STATUS** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See PCM INSPECTION [Z6].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 11.
7	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER FREEZE FRAME DATA CONDITION** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs under the FREEZE FRAME DATA condition. (See PCM INSPECTION [Z6].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 11.
8	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Connect the WDS or equivalent to the DLC-2. • Start the engine and warm it up completely.	Yes	Go to the next step.
		No	Visually inspect for exhaust gas leakage between the exhaust manifold and front HO2S. • If there is no leakage, replace front HO2S.

	• Access the O2S11 PID. • Read the O2S11 PID under following accelerator pedal condition (in PARK or NEUTRAL). - **More than 0.45 V** when accelerator pedal is suddenly depressed (rich condition) - **Less than 0.45 V** just after release of accelerator pedal (lean condition) • Is the PID normal?		(See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].) Then go to Step 11.
9	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See FUEL LINE PRESSURE INSPECTION.) • Is there any malfunction?	Yes	Replace the fuel pump unit, then go to Step 11. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
		No	Go to the next step.
10	**INSPECT LONG TERM FUEL TRIM** • Connect the WDS or equivalent to the DLC-2. • Access the LONGFT1 PID. • Compare the LONGFT1 PID with recorded FREEZE FRAME DATA at Step 1. • Is the LONGFT1 PID above FREEZE FRAME DATA?	Yes	Inspect the purge solenoid valve. (See PURGE SOLENOID VALVE INSPECTION.) • If there is any malfunction, replace the purge solenoid valve. (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [Z6].) Then go to Step 17.
		No	Go to the next step.
11	**VERIFY TROUBLESHOOTING OF DTC P2097 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "PCM Adaptive Memory Produce Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE".	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

	(See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?		

DTC P2177 [Z6]

B3E010202100W07

DTC P2177	System too lean off idle
DETECTION CONDITION	• The PCM monitors short term fuel trim (SHRTFT) and long term fuel trim (LONGFT) during closed loop fuel control during off-idle. If the LONGFT or the sum total of these fuel trims exceed preprogrammed criteria, PCM determines that fuel system is too lean during off-idle. **Diagnostic support note** • This is a continuous monitor. (Fuel system) • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Misfire • Front HO2S deterioration • Front HO2S heater malfunction • MAF sensor malfunction • Pressure regulator (built-in fuel pump unit) malfunction • Fuel pump malfunction • Fuel filter clogged or restricted • Fuel leakage on fuel line from fuel delivery pipe and fuel pump • Leakage exhaust system • Purge solenoid valve improper operation • Purge solenoid valve malfunction (stuck open) • Purge solenoid hoses improper connection • Air suction in intake-air system • Insufficient engine compression • Variable valve timing control system improper operation

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	• If misfire DTC is present, go to Step 8. • If other DTC is present, go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	• If drive ability concern is present, go to Step 8. • If other, go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2177 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See DTC TABLE [Z6].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS (IGNITION SWITCH TO ON/IDLE)** • Access ECT, MAF, TP and VSS PIDs using the WDS or equivalent. • Is there any signal that is far out of specification when KOER?	Yes	Inspect suspected sensor and excessive resistance in related wiring harnesses. Repair or if necessary. Then go to Step 17.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect same PIDs as Step 4 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect suspected sensor and related wiring harnesses repair or replace it. Then go to Step 17.
		No	Go to the next step.
7	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Access O2S11 for P2177 PID using the WDS or equivalent.	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between exhaust manifold and front HO2S.

	• Verify PID under following accelerator pedal condition (in PARK (ATX) or NEUTRAL (MTX)). • Is PID normal? - **Above 0.45 V** when suddenly depressing accelerator pedal (rich condition) - **Below 0.45 V** just after releasing accelerator pedal (lean condition)		Then go to Step 17.
8	**INSPECT MAF PID** • Start engine. • Access MAF PID using WDS or equivalent. • Verify that MAF PID changes quickly according to race engine RPM. • Is MAF PID response normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 17. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
9	**INSPECT FOR EXCESSIVE AIR SUCTION OF INTAKE-AIR SYSTEM** • Visually inspect hoses on intake-air system for looseness, cracks or damages . • Is there any malfunction?	Yes	Repair or replace source of air suction, then go to Step 17.
		No	Go to the next step.
10	**INSPECT PURGE SOLENOID OPERATION** • Perform the Purge Control System Inspection. (See Purge Control System Inspection.) • Does the purge control system function properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection result, then go to Step 17.
11	**INSPECT FUEL LINE PRESSURE** • Turn the ignition switch off. **Note** • If engine will not start, inspect the fuel line pressure with ignition switch to the ON position. • Inspect fuel line pressure while engine running. (See FUEL LINE PRESSURE INSPECTION.) • Is fuel line pressure normal?	Yes	Go to Step 13.
		No	If fuel pressure is too high, replace fuel pump unit, then go to Step 17. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) If fuel line pressure is low, go to the next step.

12	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace suspected fuel line, then go to Step 17.
		No	Inspect for foreign materials or stain inside fuel filter (low pressure). If for foreign materials or stain inside fuel filter (low pressure), clean the fuel tank and filter. Then go to Step 17.
13	**INSPECT IGNITION SYSTEM** • Perform the spark test. (See Spark Test.) • Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to spark test results, then go to Step 17.
14	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See COMPRESSION INSPECTION [Z6].) • Is it normal?	Yes	Go to the next step.
		No	Perform engine overhaul for repairs, then go to Step 17.
15	**INSPECT VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION** • Inspect variable valve timing control system operation. (See Variable Valve Timing Control System Operation Inspection.) • Does the variable valve timing control system work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection results, then go to Step 17. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)
16	**INSPECT FUEL INJECTOR OPERATION** • Remove the fuel injector. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].) • Inspect the fuel injector (resistance, injection amount). (See FUEL INJECTOR INSPECTION.) • Is the fuel injector normal?	Yes	Go to the next step.
		No	Replace suspected fuel injector, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)
17	**VERIFY TROUBLESHOOTING OF DTC P2177 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent.	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

	• Perform the "PCM Adaptive Memory Produce Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?		
18	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2178 [Z6]

B3E010202100W08

DTC P2178	System too rich off idle
DETECTION CONDITION	• The PCM monitors short term fuel trim (SHRTFT) and long term fuel trim (LONGFT) during closed loop fuel control at off-idle. If the LONGFT or the sum total of these fuel trims exceed preprogrammed criteria, PCM determines that fuel system is too rich at off-idle. **Diagnostic support note** • This is a continuous monitor. (Fuel system) • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Misfire • Front HO2S deterioration • Front HO2S heater malfunction • MAF sensor malfunction • Pressure regulator (built-in fuel pump unit) malfunction • Fuel pump malfunction • EGR valve improper operation • Variable tumble shutter valve actuator improper operation • Purge solenoid valve improper operation • Purge solenoid valve malfunction (stuck open)

	• Purge solenoid hoses improper connection • Variable valve timing control system improper operation • PCV valve malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	• If misfire DTC is present, go to Step 8. • If other DTC is present, go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	• If drive ability concern is present, go to Step 8. • If other, go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2178 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See DTC TABLE [Z6].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS (IGNITION SWITCH TO ON/IDLE)** • Access ECT, MAF, TP and VSS PIDs using WDS or equivalent. • Is there any signal that is far out of specification when KOER?	Yes	Inspect suspected sensor and excessive resistance in related wiring harnesses. Repair or if necessary. Then go to Step 16.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect same PIDs as Step 4 while simulating FREEZE FRAME DATA condition.	Yes	Inspect suspected sensor and related wiring harnesses repair or replace it. Then go to Step 16.
		No	Go to the next step.

	• Is there any signal which causes drastic changes?		
7	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Access O2S11 for P2177 PID using WDS or equivalent. • Verify PID under following accelerator pedal condition (in PARK (ATX) or NEUTRAL (MTX)). • Is PID normal? - **Above 0.45 V** when suddenly depressing accelerator pedal (rich condition) - **Below 0.45 V** just after releasing accelerator pedal (lean condition)	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between exhaust manifold and front HO2S. Then go to Step 16.
8	**INSPECT MAF PID** • Start engine. • Access MAF PID using WDS or equivalent. • Verify that MAF PID changes quickly according to race engine RPM. • Is MAF PID response normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 16. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
9	**INSPECT PURGE SOLENOID OPERATION** • Perform the "Purge Control System Inspection". (See Purge Control System Inspection.) • Does purge control system work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection result, then go to Step 16.
10	**INSPECT PCV VALVE OPERATION** • Inspect the PCV valve operation. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION.) • Is the PCV valve normal?	Yes	Go to the next step.
		No	Replace the PCV valve, then go to Step 16. (See INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [Z6].)
11	**INSPECT EGR VALVE OPERATION** • Perform the "EGR Control System Inspection". (See EGR Control System Inspection.)	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection result, then go to Step 16.

	• Does the EGR control system work properly?		
12	**INSPECT VARIABLE TUMBLE SHUTTER VALVE ACTUATOR OPERATION** • Perform the "Variable Tumble Control Operation Inspection". (See Variable Tumble Control Operation Inspection.) • Does the variable tumble control work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection results, then go to Step 16.
13	**INSPECT FUEL LINE PRESSURE** • Turn the ignition switch off. **Note** • If the engine will not start, inspect the fuel line pressure with the ignition switch to the ON position. • Inspect the fuel line pressure while the engine running. (See FUEL LINE PRESSURE INSPECTION.) • Is the fuel line pressure normal?	Yes	Go to the next step.
		No	If the fuel pressure is too high, replace the fuel pump unit, then go to Step 16. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) If the fuel line pressure is low, go to the next step.
14	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect fuel line for leakage. • Is any fuel leakage found?	Yes	Replace suspected fuel line, then go to Step 16.
		No	Inspect inside fuel filter (low pressure) for foreign materials or stain. If there is foreign materials or stain inside fuel filter (low pressure), clean the fuel tank and filter. Then go to Step 16.
15	**INSPECT VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION** • Inspect the variable valve timing control system operation. (See Variable Valve Timing Control System Operation Inspection.) • Does the variable valve timing control system work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection results, then go to the next step.
16	**VERIFY TROUBLESHOOTING OF DTC P2178 COMPLETED**	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)

	• Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "PCM Adaptive Memory Produce Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	No	Go to the next step.
17	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2187 [Z6]

B3E010202100W09

DTC P2187	System too lean at idle
DETECTION CONDITION	• The PCM monitors short term fuel trim (SHRTFT) and long term fuel trim (LONGFT) during closed loop fuel control during idle. If the LONGFT or the sum total of these fuel trims and correction exceed preprogrammed criteria, PCM determines that fuel system is too lean during idle. **Diagnostic support note** • This is a continuous monitor. (Fuel system) • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Misfire • Front HO2S deterioration • Front HO2S heater malfunction • MAF sensor malfunction • Pressure regulator (built-in fuel pump unit) malfunction • Fuel pump malfunction

	• Fuel filter clogged or restricted • Fuel leakage on fuel line from fuel delivery pipe and fuel pump • Leakage exhaust system • Purge solenoid valve malfunction • Purge solenoid hoses improper connection • Air suction in intake-air system • Insufficient engine compression • Variable valve timing control system improper operation

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	• If misfire DTC is present, go to Step 8. • If other DTC is present, go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	• If drive ability concern is present, go to Step 8. • If other, go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2187 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See DTC TABLE [Z6].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS (IGNITION SWITCH TO ON/IDLE)** • Access ECT, MAF, TP and VSS PIDs using WDS or equivalent. • Is there any signal that is far out of specification when KOER?	Yes	Inspect suspected sensor and excessive resistance in related wiring harnesses. Repair or if necessary. Then go to Step 17.
		No	Go to the next step.

6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect same PIDs as Step 4 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect suspected sensor and related wiring harnesses repair or replace it. Then go to Step 17.
		No	Go to the next step.
7	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Access O2S11 for P2187 PID using WDS or equivalent. • Verify PID under following accelerator pedal condition (in PARK (ATX) or NEUTRAL (MTX)). • Is PID normal? - **Above 0.45 V** when suddenly depressing accelerator pedal (rich condition) - **Below 0.45 V** just after releasing accelerator pedal (lean condition)	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between exhaust manifold and front HO2S. Then go to Step 17.
8	**INSPECT MAF PID** • Start the engine. • Access MAF PID using the WDS or equivalent. • Verify that the MAF PID changes quickly according to the engine speed. • Is the MAF PID response normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 17. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
9	**INSPECT FOR EXCESSIVE AIR SUCTION OF INTAKE AIR SYSTEM** • Visually inspect hoses in the intake-air system for looseness, cracks or damages. • Is there any malfunction?	Yes	Repair or replace source of air suction, then go to Step 17.
		No	Go to the next step.
10	**INSPECT PURGE SOLENOID VALVE STUCK OPEN** • Turn the ignition switch off. • Disconnect the both hoses from the purge solenoid valve. • Blow air through the purge solenoid valve. • Does air blow through?	Yes	Replace the purge solenoid valve. (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [Z6].) Then go to Step 17.
		No	Go to the next step.
11	**INSPECT FUEL LINE PRESSURE**	Yes	Go to Step 13.

	• Turn the ignition switch off. **Note** • If the engine will not start, inspect the fuel line pressure with the ignition switch to the ON position. • Inspect the fuel line pressure while the engine running. (See FUEL LINE PRESSURE INSPECTION.) • Is the fuel line pressure normal?	No	If the fuel pressure is too high, replace the fuel pump unit, then go to Step 17. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) If the fuel line pressure is low, go to the next step.
12	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect the fuel line for any leakage. • Is the any fuel leakage?	Yes	Replace suspected fuel line, then go to Step 17.
		No	Inspect for foreign materials or stain inside fuel filter (low pressure). If for foreign materials or stain inside fuel filter (low pressure), clean the fuel tank and filter. Then go to Step 17.
13	**INSPECT IGNITION SYSTEM** • Perform the spark test. (See Spark Test.) • Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to the spark test results, then go to Step 17.
14	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See COMPRESSION INSPECTION [Z6].) • Is it normal?	Yes	Go to the next step.
		No	Perform the engine overhaul for repairs, then go to Step 17.
15	**INSPECT VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION** • Inspect the variable valve timing control system operation. (See Variable Valve Timing Control System Operation Inspection.) • Does the variable valve timing control system function properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection results, then go to Step 17.
16	**INSPECT FUEL INJECTOR OPERATION** • Remove the fuel injector. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)	Yes	Go to the next step.
		No	Replace suspected fuel injector, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)

	• Inspect the fuel injector (resistance, injection amount). (See FUEL INJECTOR INSPECTION.) • Is the fuel injector normal?		
17	**VERIFY TROUBLESHOOTING OF DTC P2187 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "PCM Adaptive Memory Produce Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
18	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2188 [Z6]

B3E010202100W10

DTC P2188	**System too rich at idle**
DETECTION CONDITION	• The PCM monitors the short term fuel trim (SHRTFT) and long term fuel trim (LONGFT) during the closed loop fuel control at idle. If the LONGFT or the sum total of these fuel terms exceed the preprogrammed criteria, PCM determines that fuel system is too rich at idle. **Diagnostic support note** • This is a continuous monitor. (Fuel system) • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Misfire

	• Front HO2S deterioration • Front HO2S heater malfunction • MAF sensor malfunction • Pressure regulator (built-in fuel pump unit) malfunction • Fuel pump malfunction • EGR valve stuck open • Variable tumble shutter valve actuator improper operation • Purge solenoid valve improper operation • Purge solenoid valve malfunction (stuck open) • Purge solenoid hoses improper connection • Variable valve timing control system improper operation • PCV valve malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are other DTCs present?	Yes	• If misfire DTC is present, go to Step 8. • If other DTC is present, go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	• If drive ability concern is present, go to Step 8. • If other, go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2188 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See DTC TABLE [Z6].)

5	**VERIFY CURRENT INPUT SIGNAL STATUS (IGNITION SWITCH TO ON/IDLE)** • Access ECT, MAF, TP and VSS PIDs using the WDS or equivalent. • Is there any signal that is far out of specification when KOER?	Yes	Inspect suspected sensor and excessive resistance in related wiring harnesses. Repair or if necessary. Then go to Step 16.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect same PIDs as Step 4 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect suspected sensor and related wiring harnesses repair or replace it. Then go to Step 16.
		No	Go to the next step.
7	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Access O2S11 for P2188 PID using the WDS or equivalent. • Verify PID under following accelerator pedal condition (in PARK (ATX) or NEUTRAL (MTX)). • Is PID normal? - **Above 0.45 V** when suddenly depressing accelerator pedal (rich condition) - **Below 0.45 V** just after releasing accelerator pedal (lean condition)	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between exhaust manifold and front HO2S. Then go to Step 16.
8	**INSPECT MAF PID** • Start the engine. • Access the MAF PID using the WDS or equivalent. • Verify that the MAF PID changes quickly according to race engine RPM. • Is the MAF PID response normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 16. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
9	**INSPECT PURGE SOLENOID OPERATION** • Perform the "Purge Control System Inspection". (See Purge Control System Inspection.) • Does the purge control system work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection result, then go to Step 16.
10	**INSPECT PCV VALVE OPERATION**	Yes	Go to the next step.

	• Inspect the PCV valve operation. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION.) • Is the PCV valve normal?	No	Replace the PCV valve, then go to Step 16. (See INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [Z6].)
11	**INSPECT VARIABLE TUMBLE SHUTTER VALVE ACTUATOR OPERATION** • Perform the "Variable Tumble Control Operation Inspection". (See Variable Tumble Control Operation Inspection.) • Does the variable tumble control work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection results, then go to Step 16.
12	**INSPECT FUEL LINE PRESSURE** • Turn the ignition switch off. **Note** • If the engine will not start, inspect the fuel line pressure with the ignition switch to the ON position. • Inspect the fuel line pressure while the engine running. (See FUEL LINE PRESSURE INSPECTION.) • Is the fuel line pressure normal?	Yes	Go to the next step.
		No	If the fuel pressure is too high, replace the fuel pump unit, then go to Step 16. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) If the fuel line pressure is low, go to the next step.
13	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace suspected fuel line, then go to Step 16.
		No	Inspect for foreign materials or stain inside fuel filter (low pressure). If for foreign materials or stain inside fuel filter (low pressure), clean of fuel tank and filter. Then go to Step 16.
14	**INSPECT VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION** • Inspect the variable valve timing control system operation. (See Variable Valve Timing Control System Operation Inspection.) • Does the variable valve timing control system work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection results, then go to Step 16.
15	**INSPECT EGR VALVE STUCK OPEN**	Yes	Clean or replace the EGR valve, then go to the next step.

	• Remove the EGR valve. (See EGR VALVE REMOVAL/INSTALLATION [Z6].) • Does the EGR valve stuck open?		(See EGR VALVE REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
16	**VERIFY TROUBLESHOOTING OF DTC P2188 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "PCM Adaptive Memory Produce Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
17	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2195 [Z6]

B3E010202100W11

DTC P2195	Front HO2S signal stuck lean
DETECTION CONDITION	• The PCM monitors the front HO2S output voltage when the following conditions are met. If the output voltage is **less than 0.45 V** for **46 s**, the PCM determines that the front HO2S signal remains lean. **MONITORING CONDITION** - Fuel injection control system status: feedback zone - ECT is **more than 70 °C {158 °F}.** - Engine speed is **more than 1,500 rpm**. **Diagnostic support note** • This is a continuous monitor. (HO2S) • The MIL illuminates if the PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle.

	• FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S malfunction • Fuel injector malfunction • Insufficient fuel line pressure • Leakage exhaust gas • Air suction at intake-air system • Leakage fuel • MAF sensor malfunction • ECT sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Is the DTC P2177 or P2187 also present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2195 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See DTC TABLE [Z6].)
5		Yes	Go to the next step.

	VERIFY CURRENT INPUT SIGNAL STATUS • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See PCM INSPECTION [Z6].) - ECT - MAF - TP - VSS • Are the PIDs normal?	No	Inspect the malfunctioning part according to the inspection results. Then go to Step 13.
6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER FREEZE FRAME DATA CONDITION** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs under the FREEZE FRAME DATA condition. (See PCM INSPECTION [Z6].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 13.
7	**INSPECT INTAKE-AIR SYSTEM FOR EXCESSIVE AIR SUCTION** • Visually inspect the hose in the intake-air system for looseness, cracks or damages. • Is there any malfunction?	Yes	Repair or replace the malfunctioning part, then go to Step 13.
		No	Go to the next step.
8	**VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR** • Connect the WDS or equivalent to the DLC-2. • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 13. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)

9	**INSPECT FRONT HO2S** • Inspect the front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the front HO2S, then go to Step 13. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**INSPECT FUEL INJECTOR** • Inspect the fuel injector. (See FUEL INJECTOR INSPECTION.) • Is there any malfunction?	Yes	Replace suspected fuel injector, then go to Step 13. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
11	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See FUEL LINE PRESSURE INSPECTION.) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 13.
12	**INSPECT FUEL SYSTEM FOR FUEL LEAKAGE** • Visually inspect the fuel system for fuel leakage. • Is there fuel leakage?	Yes	Repair or replace the malfunctioning part, then go to the next step.
		No	Replace the fuel pump unit, then go to the next step. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
13	**VERIFY TROUBLESHOOTING OF DTC P2195 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2196 [Z6]

B3E010202100W12

DTC P2196	Front HO2S signal stuck rich
DETECTION CONDITION	• The PCM monitors the front HO2S output voltage when the following conditions are met. If output voltage is **more than 0.45 V** for **46 s**, the PCM determines that the front HO2S signal remains rich. **MONITORING CONDITION** - Fuel injection control system status: feedback zone - ECT: **more than 70 °C {158 °F}** - Engine speed: **more than 1,500 rpm** **Diagnostic support note** • This is a continuous monitor. (HO2S) • The MIL illuminates if the PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S malfunction • Fuel injector malfunction • Excessive fuel pressure • Restriction in intake-air system • MAF sensor malfunction • ECT sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY**	Yes	Perform repair or diagnosis according to the available repair information. If the vehicle is not repaired, go to the next step.

	• Verify related service repair information availability. • Is any related repair information available?	No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Is the DTC P2177 or P2187 also present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2196 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See DTC TABLE [Z6].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See PCM INSPECTION [Z6].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 11.
6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER FREEZE FRAME DATA CONDITION** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs under the FREEZE FRAME DATA condition. (See PCM INSPECTION [Z6].) - ECT - MAF - TP - VSS	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 11.

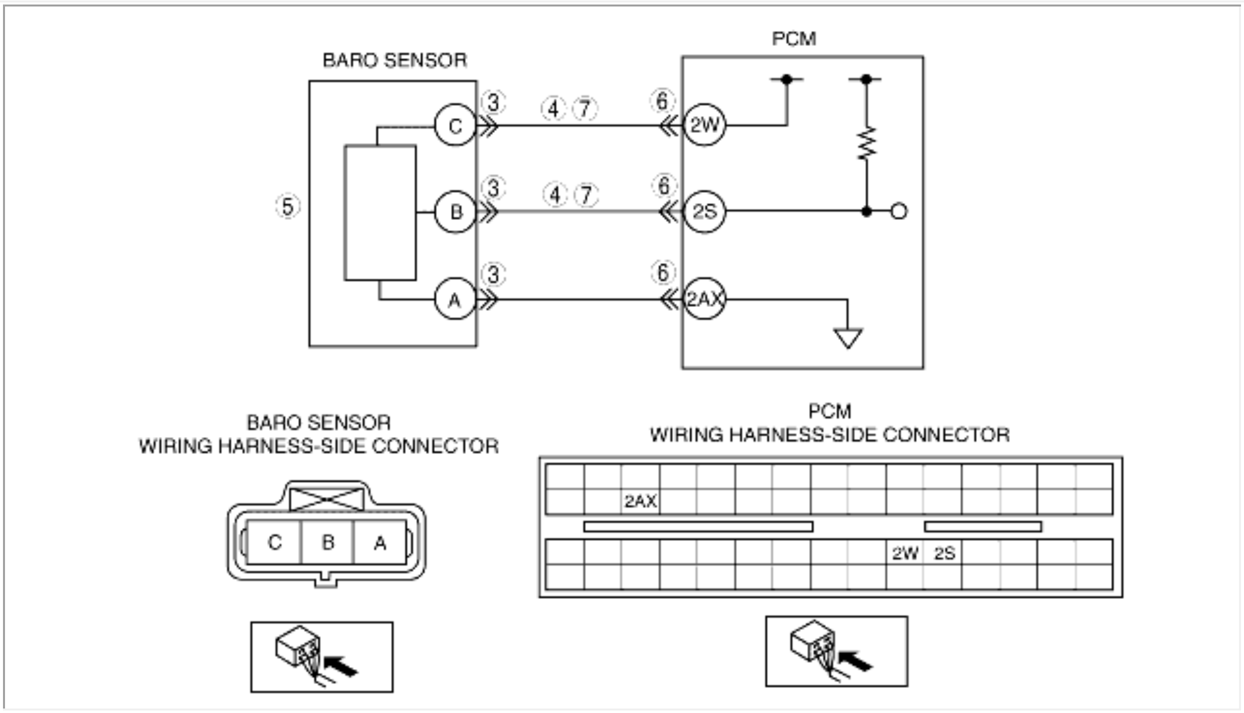
	• Are the PIDs normal?		
7	**VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR** • Connect the WDS or equivalent to the DLC-2. • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 11. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)
8	**INSPECT FRONT HO2S** • Inspect the front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the front HO2S, then go to Step 11. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**INSPECT FUEL INJECTOR** • Inspect the fuel injector. (See FUEL INJECTOR INSPECTION.) • Is there any malfunction?	Yes	Replace the fuel injector, then go to Step 11. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
10	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See FUEL LINE PRESSURE INSPECTION.) • Is there any malfunction?	Yes	Replace the fuel pump unit, then go to the next step. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
		No	Go to the next step.
11	**VERIFY TROUBLESHOOTING OF DTC P2196 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the "HO2S heater, HO2S, and TWC Repair Verification Drive Mode". (See OBD DRIVE MODE [Z6].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE**	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)

	• Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	No	DTC troubleshooting completed.

DTC P2228 [Z6]

B3E010202200W01

DTC P2228	BARO sensor circuit low input
DETECTION CONDITION	• The PCM monitors input voltage from the BARO sensor. If the input voltage at PCM terminal 2S is **less than 1.7 V**, the PCM determines that the BARO sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• BARO sensor malfunction • Connector or terminal malfunction • Open circuit in wiring harness between BARO sensor terminal C and PCM terminal 2W • Short to GND in wiring harness between BARO sensor terminal C and PCM terminal 2W • Open circuit in wiring harness between BARO sensor terminal B and PCM terminal 2S • Short to GND in wiring harness between BARO sensor terminal B and PCM terminal 2S • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT BARO SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the BARO sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
4	**INSPECT BARO SENSOR CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between the following terminals:	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 8.
		No	Go to the next step.

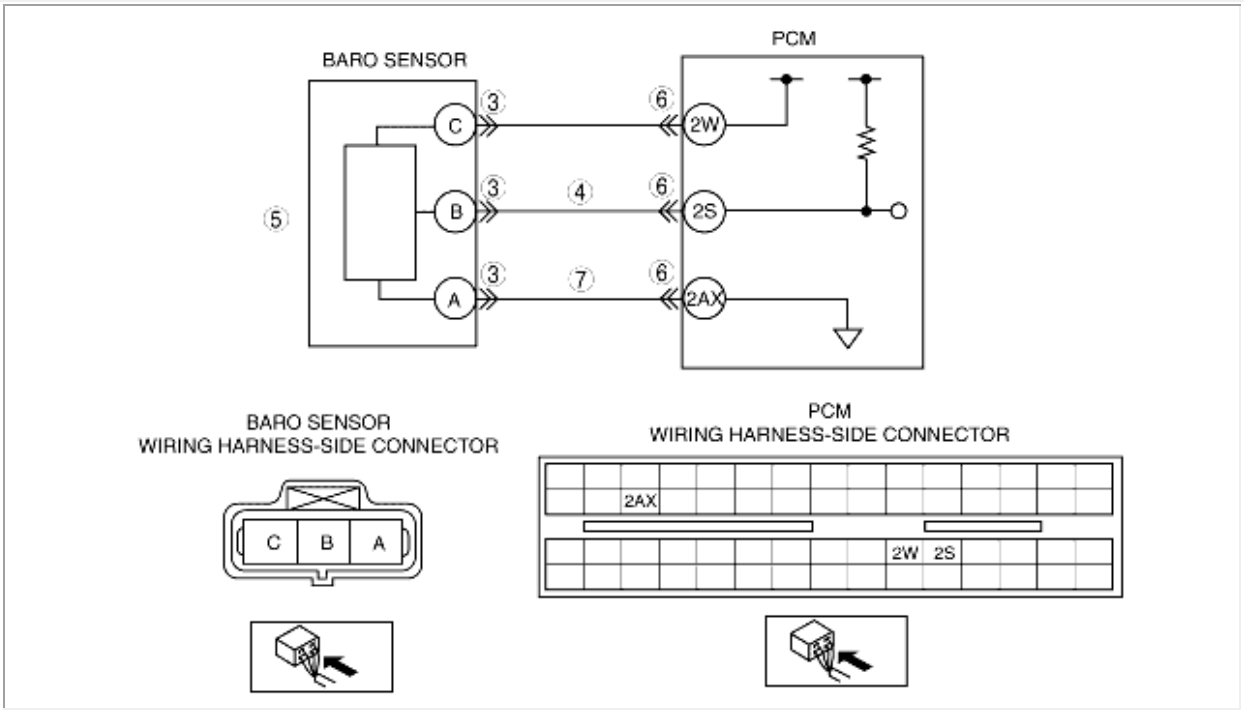
	- BARO sensor terminal C (wiring harness-side) and body GND - BARO sensor terminal B (wiring harness-side) and body GND • Is there continuity?		
5	**INSPECT BARO SENSOR** • Inspect the BARO sensor. (See BAROMETRIC PRESSURE (BARO) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the BARO sensor, then go to Step 8.
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
7	**INSPECT BARO SENSOR CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - BARO sensor terminal C (wiring harness-side) and PCM terminal 2W (wiring harness-side) - BARO sensor terminal B (wiring harness-side) and PCM terminal 2S (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P2228 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE**	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)

	• Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	No	DTC troubleshooting completed.

DTC P2229 [Z6]

B3E010202200W02

DTC P2229	BARO sensor circuit high input
DETECTION CONDITION	• The PCM monitors input voltage from the BARO sensor. If the input voltage at PCM terminal 2S is **2.9 V or more**, PCM determines that the BARO sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in the first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• BARO sensor malfunction • Connector or terminal malfunction • Short to power supply in wiring harness between BARO sensor terminal B and PCM terminal 2S • Open circuit in wiring harness between BARO sensor terminal A and PCM terminal 2AX • PCM malfunction



Diagnostic procedure

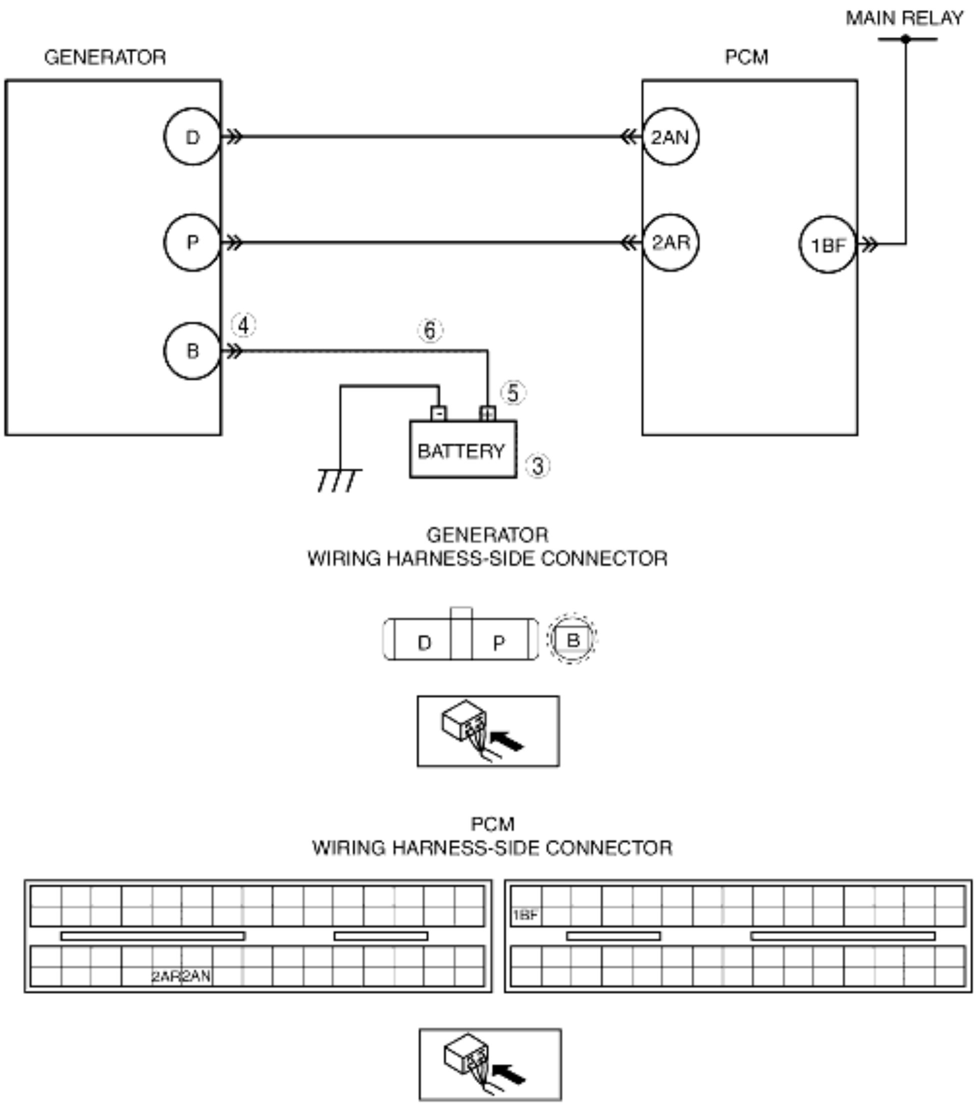
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT BARO SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the BARO sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
4	**INSPECT BARO SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off).	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 8.
		No	Go to the next step.

	• Measure the voltage between BARO sensor terminal B (wiring harness-side) and body GND. • Is the voltage **B+**?		
5	**INSPECT BARO SENSOR** • Inspect the BARO sensor. (See BAROMETRIC PRESSURE (BARO) SENSOR INSPECTION [Z6].) • Is there any malfunction?	Yes	Replace the BARO sensor, then go to Step 8.
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
7	**INSPECT BARO SENSOR GND CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between BARO sensor terminal A (wiring harness-side) and PCM terminal 2AX (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P2229 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2502 [Z6]

B3E010202500W01

DTC P2502	Charging system voltage problem
DETECTION CONDITION	• The PCM determines that the generator output voltage is **more than 17 V** or the battery voltage is **less than 11 V** while the engine running.
POSSIBLE CAUSE	• Generator malfunction • Battery malfunction • Connector or terminal malfunction • Open circuit in wiring harness between generator terminal B and battery positive terminal • PCM malfunction



Diagnostic procedure

STEP	INSPECTION	ACTION

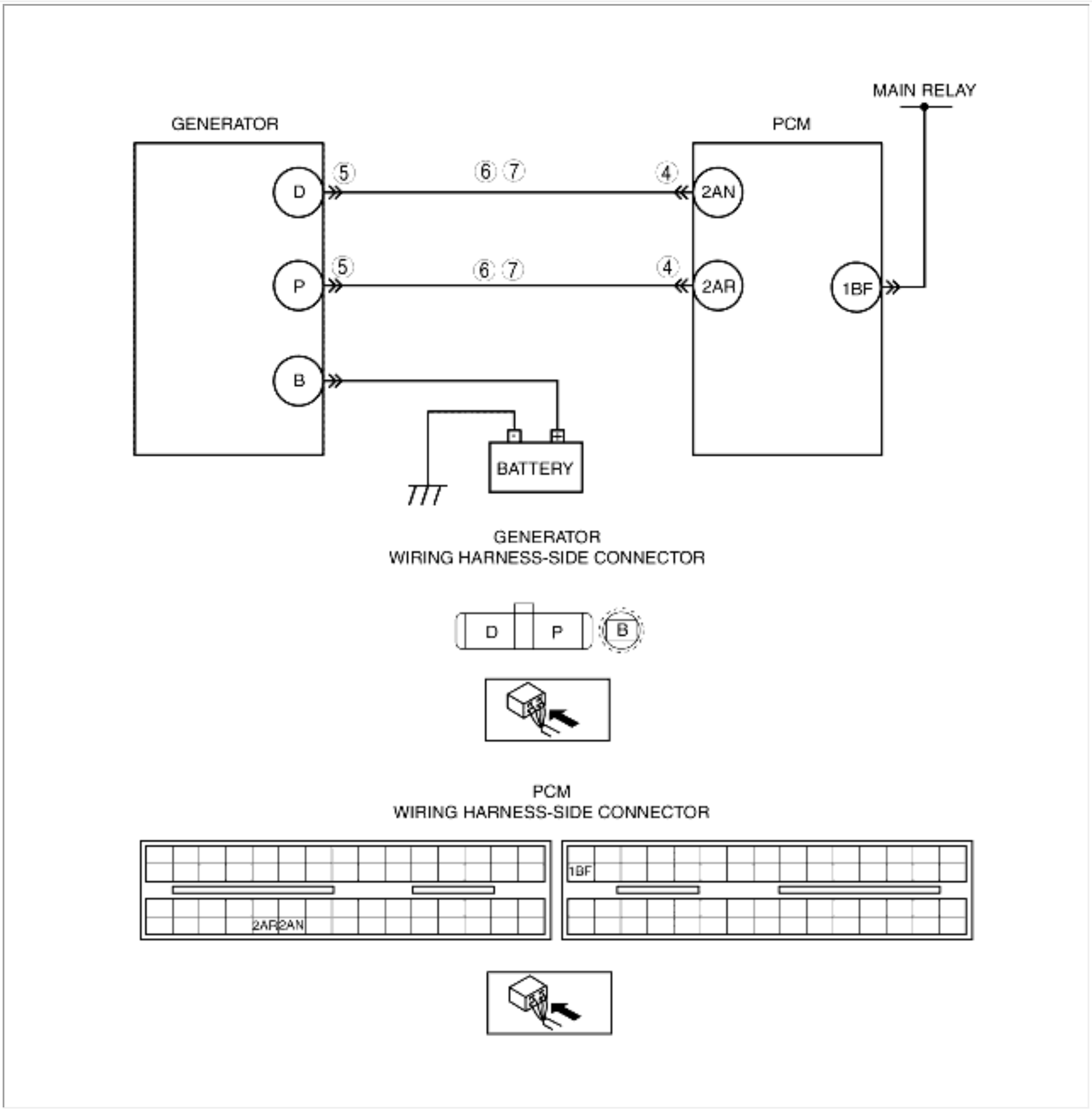
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT BATTERY** • Turn the ignition switch off. • Inspect the battery. (See BATTERY INSPECTION.) • Is the battery normal?	Yes	Go to the next step.
		No	Replace the battery, then go to Step 7. (See BATTERY REMOVAL/INSTALLATION [Z6].)
4	**INSPECT POOR INSTALLATION OF GENERATOR TERMINAL** • Turn the ignition switch off. • Inspect the generator terminal B installation nut for looseness. • Is the nut loose?	Yes	Tighten the generator terminal B installation nut, then go to Step 7.
		No	Go to the next step.
5	**INSPECT POOR INSTALLATION OF BATTERY POSITIVE TERMINAL** • Inspect the battery positive terminal for looseness. • Is the terminal loose?	Yes	Connect the battery positive terminal correctly, then go to Step 7.
		No	Go to the next step.
6	**INSPECT BATTERY CHARGING CIRCUIT** • Disconnect the generator terminal B. • Measure the voltage between generator terminal B (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace wiring harness between generator terminal B and battery positive terminal, then go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P2502 COMPLETED** • Make sure to reconnect all connectors. • Clear DTC from memory using the WDS or equivalent. • Start the engine.	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.

	• Is same DTC present?		
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2503 [Z6]

B3E010202500W02

DTC P2503	Charging system voltage low
DETECTION CONDITION	• The PCM needs **more than 20 A** from the generator, and determines that the generator output voltage is **less than 8.5 V** while the engine running.
POSSIBLE CAUSE	• Generator malfunction • Drive belt misadjustment • Connector or terminal malfunction • Open circuit in wiring harness between generator terminal D and PCM terminal 2AN • Short to GND in wiring harness between generator terminal D and PCM terminal 2AN • Open circuit in wiring harness between generator terminal P and PCM terminal 2AR • Short to GND in wiring harness between generator terminal P and PCM terminal 2AR • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

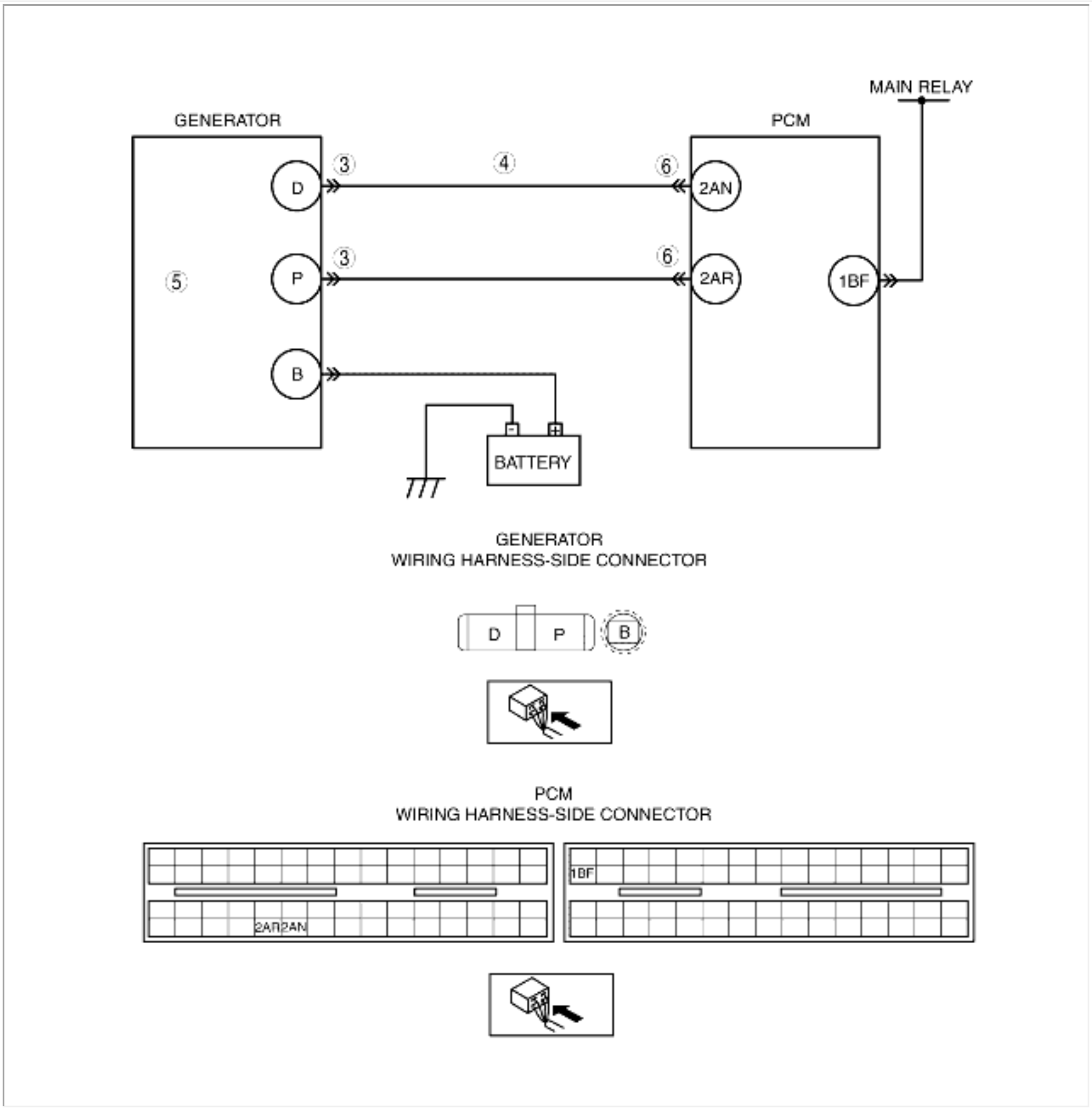
3	**INSPECT DRIVE BELT CONDITION** • Verify that the drive belt auto tensioner indicator mark does not exceed the limit. (See DRIVE BELT INSPECTION [Z6].) • Is the drive belt normal?	Yes	Go to the next step.
		No	Replace and/or adjust the drive belt, then go to Step 8. (See DRIVE BELT REPLACEMENT [Z6].)
4	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
5	**INSPECT GENERATOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the generator connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
6	**INSPECT GENERAOR CIRCUIT FOR SHORT TO GND** • Turn the ignition switch to the ON position (Engine off). • Inspect for continuity between the following terminals: - Generator terminal D (wiring harness-side) and body GND - Generator terminal P (wiring harness-side) and body GND • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 8.
		No	Go to the next step.
7	**INSPECT GENERATOR CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between the following terminals: - Generator terminal D (wiring harness-side) and PCM terminal 2AN (wiring harness-side)	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.

	- Generator terminal P (wiring harness-side) and PCM terminal 2AR (wiring harness-side) • Is there continuity?		
8	**VERIFY TROUBLESHOOTING OF DTC P2503 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

DTC P2504 [Z6]

B3E010202500W03

DTC P2504	Charging system voltage high
DETECTION CONDITION	• The PCM determines that the generator output voltage is **more than 18.5 V** or battery voltage is **more than 16.0 V** while the engine running.
POSSIBLE CAUSE	• Short to power supply in wiring harness between generator connector terminal D and PCM connector terminal 2AN • Generator malfunction • PCM and/or generator are poorly connected.



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

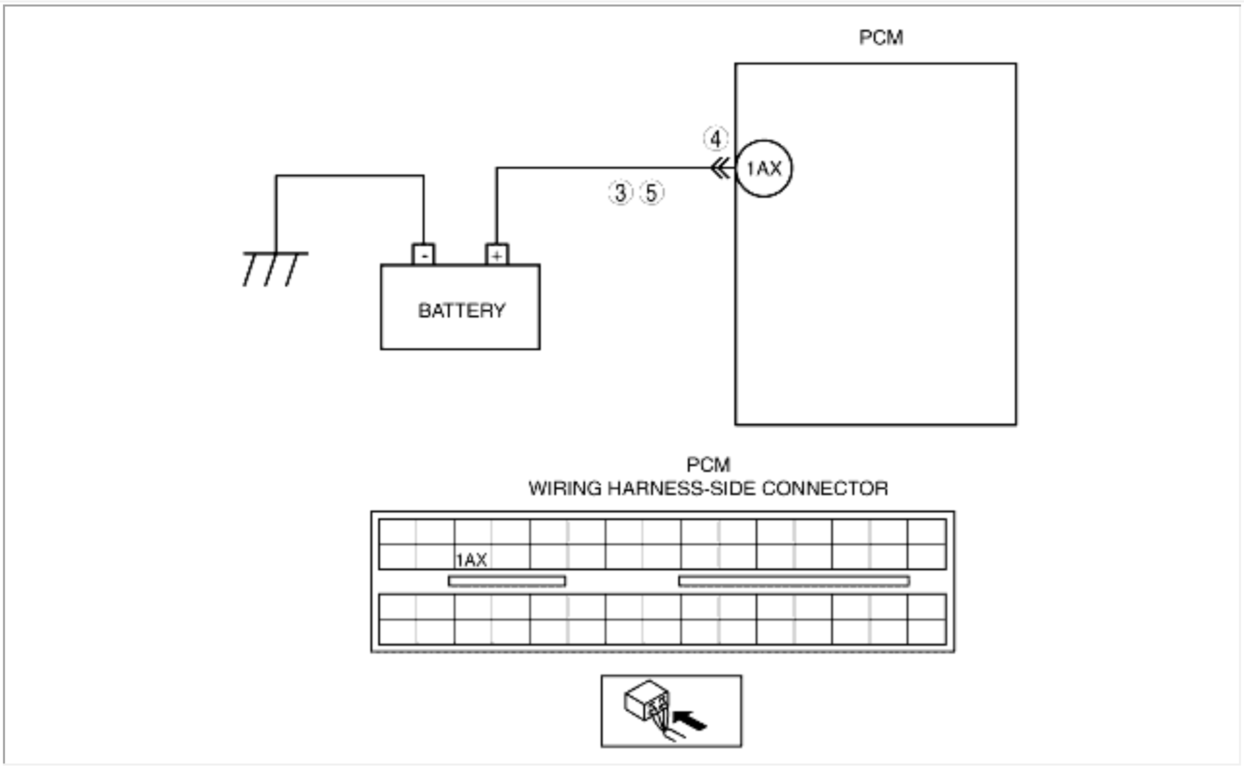
3	**INSPECT GENERATOR CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the generator connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT GENERATOR CONTROL TERMINAL FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between generator terminal D (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 7.
		No	Go to the next step.
5	**INSPECT GENERATOR** • Inspect the generator. (See GENERATOR INSPECTION.) • Is there any malfunction?	Yes	Replace the generator, then go to Step 7. (See GENERATOR REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P2504 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].)	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

	• Are any DTCs present?		

DTC P2507 [Z6]

B3E010202500W04

DTC P2507	PCM power input signal low
DETECTION CONDITION	• The PCM monitors the voltage of the backup battery positive at PCM terminal 1AX. If the PCM detects that the battery positive terminal voltage is **2.5 V or less** for **2 s**, the PCM determines that the backup voltage circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if PCM detects the above malfunction condition during the first drive cycle. • The PENDING CODE is available if the PCM detects the above malfunction condition. • The FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Connector or terminal malfunction • Open circuit in wiring harness between the battery positive terminal and PCM terminal 1AX • Short to GND in wiring harness between the battery positive terminal and PCM terminal 1AX • PCM malfunction



Diagnostic procedure

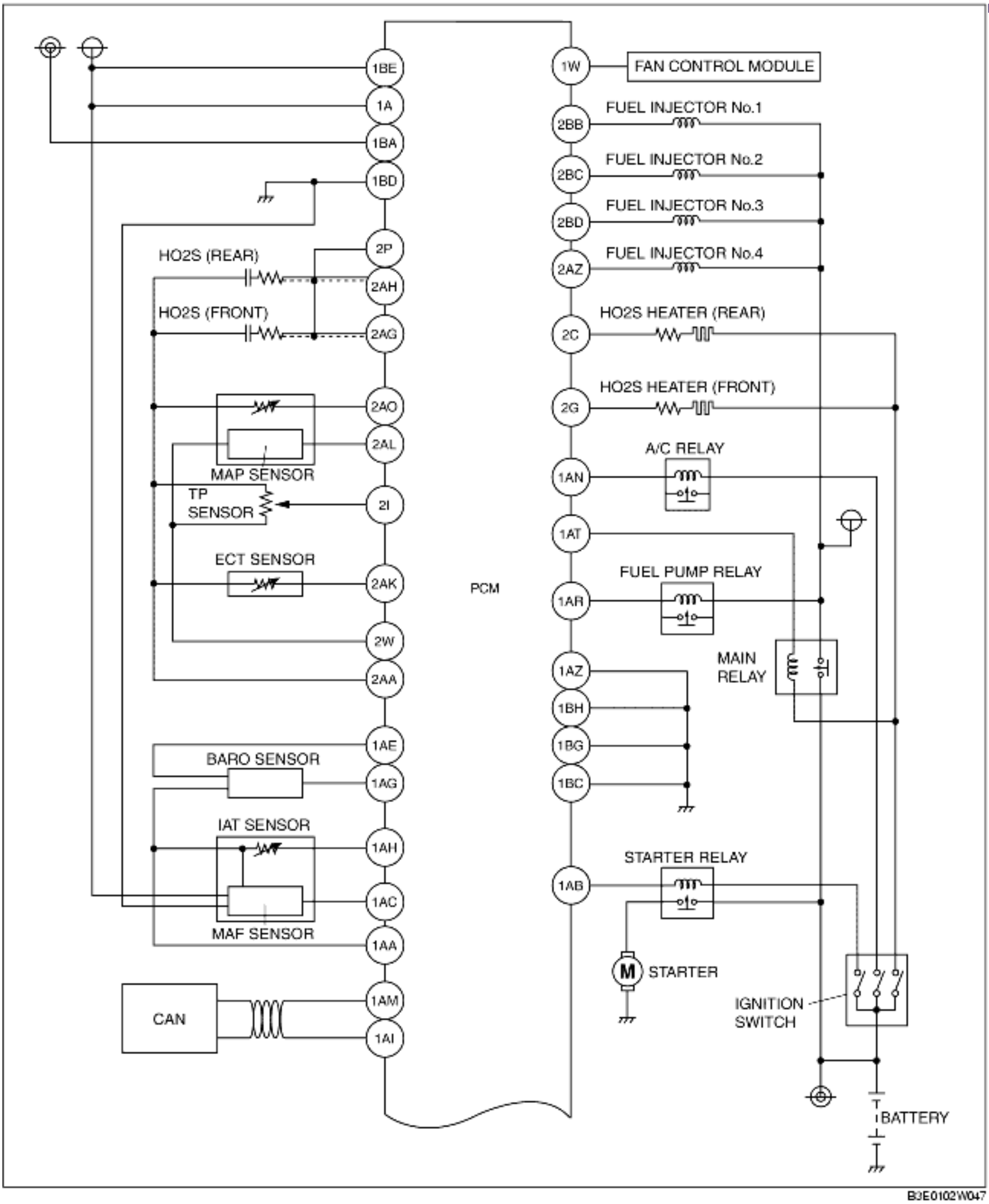
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT PCM POWER MONITOR CIRCUIT FOR SHORT TO GND** • Turn the ignition switch off. • Inspect for continuity between battery positive terminal (wiring harness-side) and body GND. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to GND, then go to Step 6.
		No	Go to the next step.
4	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector.	Yes	Repair or replace the terminal, then go to Step 6.
		No	Go to the next step.

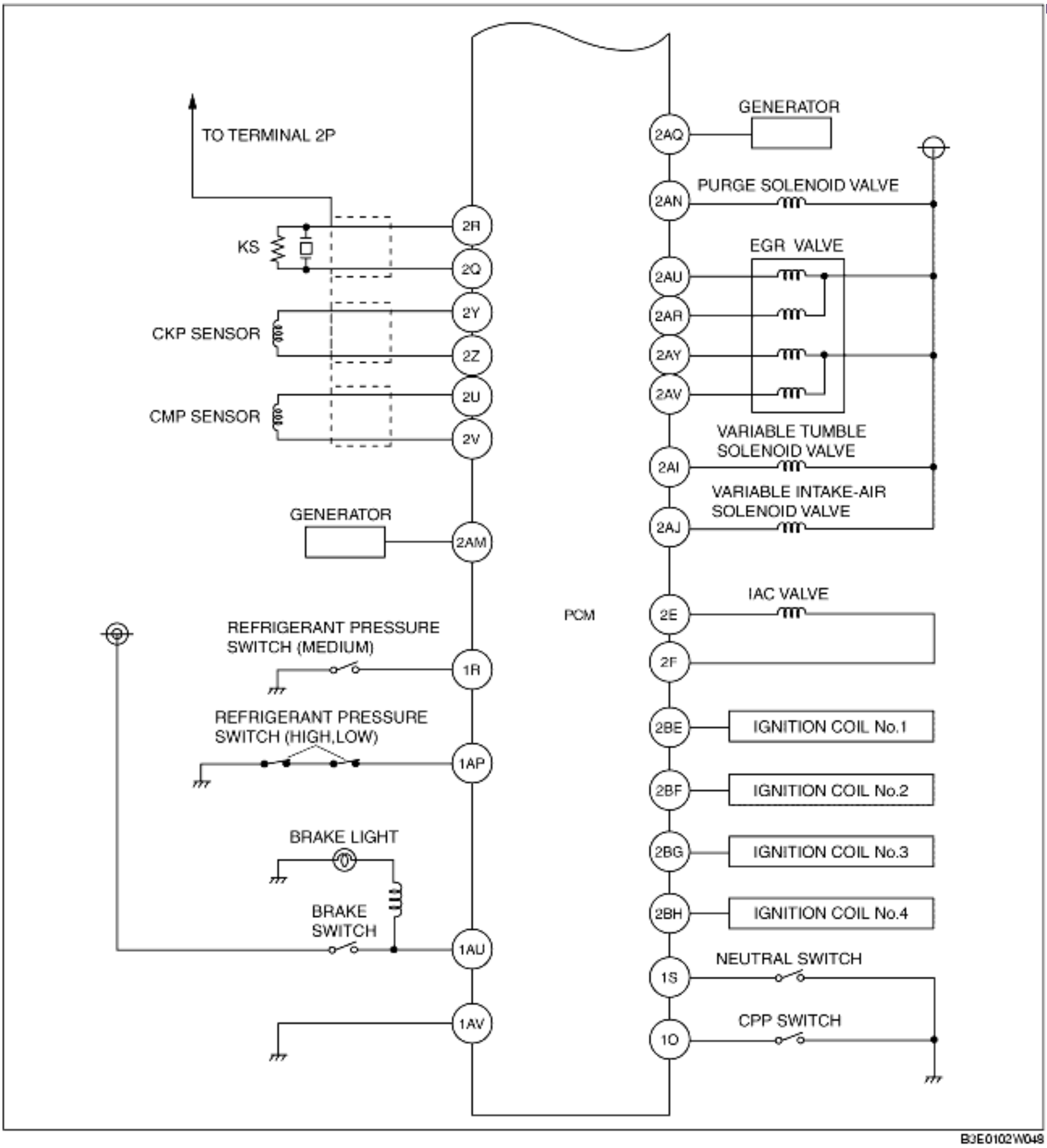
	• Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?		
5	**INSPECT PCM POWER MONITOR CIRCUIT FOR OPEN CIRCUIT** • Measure the voltage between PCM terminal 1AX (wiring harness-side) and body GND. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.
6	**VERIFY TROUBLESHOOTING OF DTC P2507 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
7	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [Z6].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [Z6].)
		No	DTC troubleshooting completed.

ON-BOARD DIAGNOSTIC[ENGINE CONTROL SYSTEM (LF)]

CONTROL SYSTEM WIRING DIAGRAM [LF]

B3E010200102W01


1BE
1A
1BA
1BD
2P
2AH
2AG
2AO
2AL
2I
2AK
2W
2AA
1AE
1AG
1AH
1AC
1AA
1AM
1AI
HO2S (REAR)
HO2S (FRONT)
MAP SENSOR
TP SENSOR
ECT SENSOR
BARO SENSOR
IAT SENSOR
MAF SENSOR
CAN
PCM
1W
FAN CONTROL MODULE
2BB
FUEL INJECTOR No.1
2BC
FUEL INJECTOR No.2
2BD
FUEL INJECTOR No.3
2AZ
FUEL INJECTOR No.4
2C
HO2S HEATER (REAR)
2G
HO2S HEATER (FRONT)
1AN
A/C RELAY
1AT
FUEL PUMP RELAY
1AR
MAIN RELAY
1AZ
1BH
1BG
1BC
STARTER RELAY
1AB
STARTER
IGNITION SWITCH
BATTERY
B3E0102W047



MONITORING SYSTEM AND CONTROL SYSTEM DEVICE RELATIONSHIP CHART [LF]

B3E010200102W02

x: Applicable

Component	Oxygen sensor monitor	Oxygen sensor heater monitor	Catalyst monitor	Misfire monitor	Fuel system monitor
Input					
A/C switch, refrigerant pressure switch (high, low pressure)				x	
TP sensor	x	x	x	x	x
ECT sensor	x	x	x	x	x
IAT sensor	x	x	x	x	x
MAF sensor	x	x	x	x	x
HO2S (front)	x		x		x
HO2S (rear)	x		x		x
BARO sensor	x	x	x	x	x
MAP sensor					
CMP sensor	x	x	x	x	x
CKP sensor	x	x	x	x	x
Output					
Fuel injector					x
EGR valve					
Purge solenoid valve					
MIL	x	x	x	x	x
DLC-2	x	x	x	x	x

OBD PENDING TROUBLE CODE [LF]

B3E010200102W03

• 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 problem is not found in a second drive cycle, the PCM judges that the system returned to normal or the problem was mistakenly detected, and deletes the pending code (1DC). If the problem is not found in a second drive cycle, the PCM judges that the system returned to normal or the problem was mistakenly detected, and deletes the pending code when the ignition switch is turned to the ON position in the next drive cycle

(2DC). 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 [LF]

B3E010200102W04

• 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 DTC is stored, with the exception of Fuel system or Misfire DTCs. Once freeze frame data for Fuel system or Misfire DTC is stored, it will overwrite any previous data and the freeze frame will not be overwritten again.

OBD ON-BOARD SYSTEM READINESS TEST [LF]

B3E010200102W05

• This shows the OBD systems operating status. If any monitor function is incomplete, WDS or equivalent 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 DTC cancellation procedure or disconnecting the negative battery cable.

OBD READ/CLEAR DIAGNOSTIC TEST RESULT [LF]

B3E010200102W06

• 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 [LF]

B3E010200102W07

• 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.

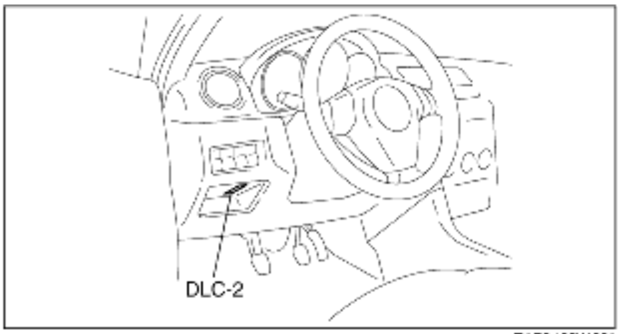
ON-BOARD DIAGNOSTIC TEST [LF]

B3E010200102W08

DTC Reading Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



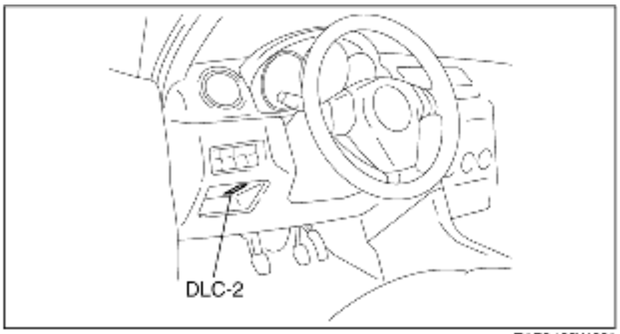
B3E0102W003

3. Retrieve the DTCs using the WDS or equivalent.

Pending Trouble Code Access Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



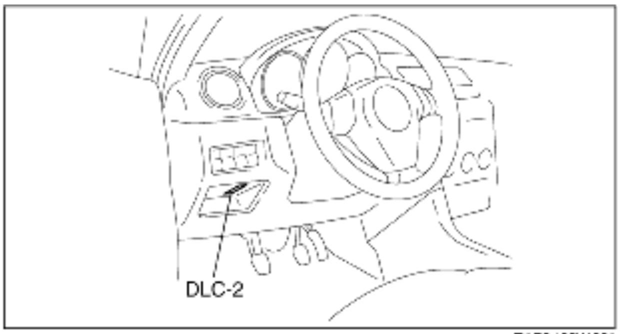
B3E0102W003

3. Retrieve the pending trouble codes using the WDS or equivalent.

Freeze Frame PID Data Access Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



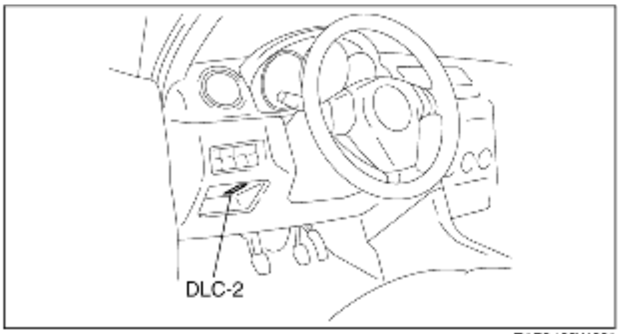
B3E0102W003

3. Record the freeze frame PID data using the WDS or equivalent.

On-Board System Readiness Tests Access Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



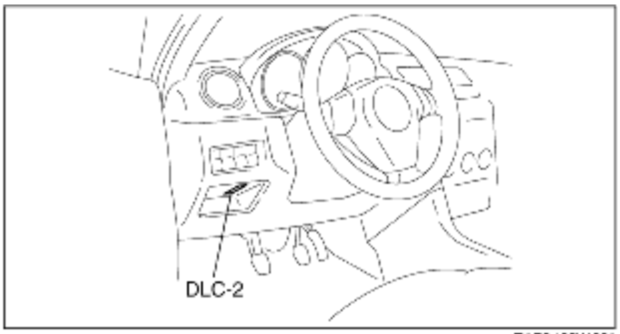
B3E0102W003

3. Monitor the OBD-II systems operating status using the WDS or equivalent.

PID/DATA Monitor and Record Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.



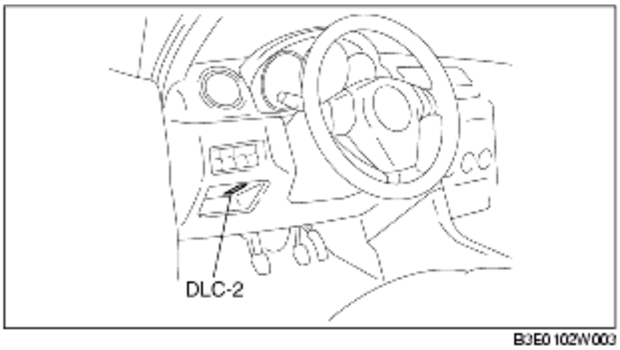
B3E0102W003

3. Access and monitor the PIDs using the WDS or equivalent.

Diagnostic Monitoring Test Results Access Procedure

1. Perform the necessary vehicle preparation and visual inspection.

2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.

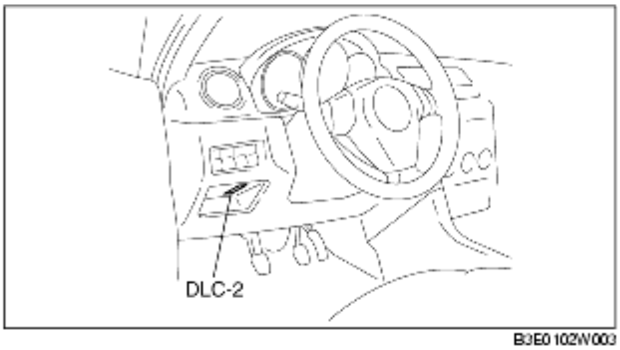


3. Access to the diagnostic monitoring test results and read the test results using the WDS or equivalent.

AFTER REPAIR PROCEDURE [LF]

B3E010200102W09

1. Connect the WDS or equivalent to the DLC-2.



2. Cycle the ignition switch off, then to the ON position (Engine off).

3. Record the DTC if retrieved.

4. Clear all diagnostic data using the WDS or equivalent.

OBD DRIVE MODE [LF]

B3E010200102W10

• Performing the Drive Mode inspects the OBD system for proper operation and must be performed to ensure that no additional DTCs are present.

• During the Drive Mode, the following systems are inspected:

- HO2S heater
- HO2S
- TWC
- Fuel system and Misfire

Caution

• While performing the Drive Mode, always operate the vehicle in a safe and lawful manner.

• When the WDS or equivalent is used to observe monitor system status while driving, be sure to have another technician with you, or record the data in the WDS or equivalent using the PID/DATA MONITOR AND RECORD function and inspect later.

Note

• Vehicle speed and engine speed detected by the PCM may differ from that indicated by the speedometer and tachometer. Use the WDS or equivalent to monitor vehicle speed.

• If the OBD system inspection is not completed during the Drive Mode, the following causes are considered:

- The OBD system detected a malfunction.

- The Drive Mode procedure was not completed correctly.

• Disconnecting the battery will reset the memory. Do not disconnect the battery during and after the Drive Mode.

• The WDS or equivalent can be used at anytime through the course of the Drive Mode to monitor the completion status. Monitoring can be done by viewing the ON BOARD SYSTEM READINESS menu.

Mode 1 (PCM Adaptive Memory Produce Drive Mode)

1. Start the engine and warm it up completely.

2. Verify the following conditions and correct if necessary:

    • All accessory loads (A/C, headlights, blower fan, rear window defroster) are off.

    • Initial ignition timing and idle speed are within specification.

3. Perform no load racing at the engine speed of **2,800-3,200 rpm** for **more than 30 s**.

4. Idle the engine for **more than 30 s** after the cooling fan stopped.

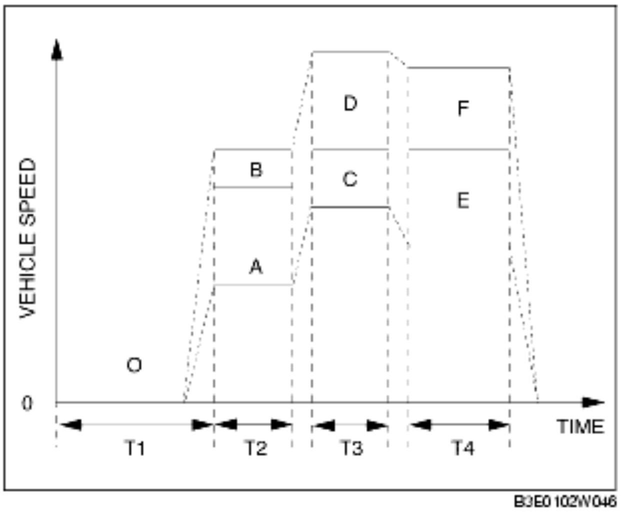
5. Turn the ignition switch off.

Mode 3 (HO2S heater, HO2S, and TWC Repair Verification Drive Mode)

1. Perform the Mode 1 first.

2. Verify that all accessory loads (A/C, headlights, blower fan, rear window defroster) are off.

3. Drive the vehicle as shown in the graph; first drive in zone O, then A or B, followed by C or D, finally E or F. The driving condition before driving at constant speed is not specified.



Zone	Shift Position	Vehicle Speed (km/h {mph})	Time (s)
O	Neutral	0 {0}	T1: above 455
A	2nd	40-50 {25-31}	T2: above 30
B	3rd	65-75 {41-46}	
C	2nd	60-75 {38-46}	T3: above 20
D	3rd	75-100 {47-62}	
E	4th	50-75 {32-46}	T4: above 120
F	5th	70-95 {44-59}	

4. Stop the vehicle and access the ON BOARD SYSTEM READINESS to inspect the Drive Mode completion status.

- If completed, RFC changes from No to Yes.
- If not completed, turn the ignition switch off, then go back to Step 3.

5. Verify that no DTCs are available.

DTC TABLE [LF]

B3E010200102W11

×: Applicable

-: Not applicable

DTC No.	Condition	MIL	DC	Monitor item	Memory function	Page
P0031	Front HO2S heater circuit low input	ON	2	HO2S heater	×	(See DTC P0031 [LF])

P0032	Front HO2S heater circuit high input	ON	2	HO2S heater	×	(See DTC P0032 [LF])
P0037	Rear HO2S heater circuit low input	ON	2	HO2S heater	×	(See DTC P0037 [LF])
P0038	Rear HO2S heater circuit high input	ON	2	HO2S heater	×	(See DTC P0038 [LF])
P0101	MAF sensor circuit range/performance problem	ON	2	CCM	×	(See DTC P0101 [LF])
P0102	MAF sensor circuit low input	ON	1	CCM	×	(See DTC P0102 [LF])
P0103	MAF sensor circuit high input	ON	1	CCM	×	(See DTC P0103 [LF])
P0107	MAP sensor circuit low input	ON	1	CCM	×	(See DTC P0107 [LF])
P0108	MAP sensor circuit high input	ON	1	CCM	×	(See DTC P0108 [LF])
P0111	IAT sensor circuit range/performance problem	ON	2	CCM	×	(See DTC P0111 [LF])
P0112	IAT sensor circuit low input	ON	1	CCM	×	(See DTC P0112 [LF])
P0113	IAT sensor circuit high input	ON	1	CCM	×	(See DTC P0113 [LF])
P0117	ECT sensor circuit low input	ON	1	CCM	×	(See DTC P0117 [LF])
P0118	ECT sensor circuit high input	ON	1	CCM	×	(See DTC P0118 [LF])
P0121	TP sensor stuck closed	ON	2	CCM	×	(See DTC P0121 [LF])
P0122	TP sensor circuit low input	ON	1	CCM	×	(See DTC P0122 [LF])
P0123	TP sensor circuit high input	ON	1	CCM	×	(See DTC P0123 [LF])
P0125	Excessive time to enter closed loop fuel control	ON	2	CCM	×	(See DTC P0125 [LF])
P0132	Front HO2S circuit high input	ON	2	HO2S	×	(See DTC P0132 [LF])
P0133	Front HO2S circuit problem	ON	2	HO2S	×	(See DTC P0133 [LF])
P0134	Front HO2S no activity detected	ON	2	HO2S	×	(See DTC P0134 [LF])
P0138	Rear HO2S circuit high input	ON	2	HO2S	×	(See DTC P0138 [LF])
P0140	Rear HO2S no activity detected	ON	2	HO2S	×	(See DTC P0140 [LF])
P0300	Random misfire detected	Flash/ON	1 or 2	Misfire	×	(See DTC P0300 [LF])
P0301	Cylinder No.1 misfire detected	Flash/ON	1 or 2	Misfire	×	

P0302	Cylinder No.2 misfire detected	Flash/ON	1 or 2	Misfire	×	(See DTC P0301, P0302, P0303, P0304 [LF])
P0303	Cylinder No.3 misfire detected	Flash/ON	1 or 2	Misfire	×	
P0304	Cylinder No.4 misfire detected	Flash/ON	1 or 2	Misfire	×	
P0327	KS circuit low input	ON	1	CCM	×	(See DTC P0327 [LF])
P0328	KS circuit high input	ON	1	CCM	×	(See DTC P0328 [LF])
P0335	CKP sensor circuit problem	ON	1	CCM	×	(See DTC P0335 [LF])
P0340	CMP sensor circuit problem	ON	1	CCM	×	(See DTC P0340 [LF])
P0403	EGR valve (stepper motor) circuit problem	ON	2	CCM	×	(See DTC P0403 [LF])
P0420	Catalyst system efficiency below threshold	ON	2	Catalyst	×	(See DTC P0420 [LF])
P0443	Purge solenoid valve circuit problem	ON	2	CCM	×	(See DTC P0443 [LF])
P0480	Cooling fan control circuit problem	OFF	1	Other	×	(See DTC P0480 [LF])
P0500	VSS circuit problem	ON	2	CCM	×	(See DTC P0500 [LF])
P0505	IAC system problem	OFF	-	Other	-	(See DTC P0505 [LF])
P0506	Idle control system RPM lower than expected	ON	2	CCM	×	(See DTC P0506 [LF])
P0507	Idle control system RPM higher than expected	ON	2	CCM	×	(See DTC P0507 [LF])
P0511	IAC valve circuit problem	ON	1	CCM	×	(See DTC P0511 [LF])
P0602	PCM programming error	ON	1	CCM	×	(See DTC P0602 [LF])
P0610	PCM vehicle options error	ON	1	CCM	×	(See DTC P0610 [LF])
P0661	Variable intake-air solenoid valve circuit low input	OFF	1	Other	×	(See DTC P0661 [LF])
P0662	Variable intake-air solenoid valve circuit high input	OFF	1	Other	×	(See DTC P0662 [LF])
P0703	Brake switch input circuit problem	ON	2	CCM	×	(See DTC P0703 [LF])
P0704	CPP switch input circuit problem	ON	2	CCM	×	(See DTC P0704 [LF])

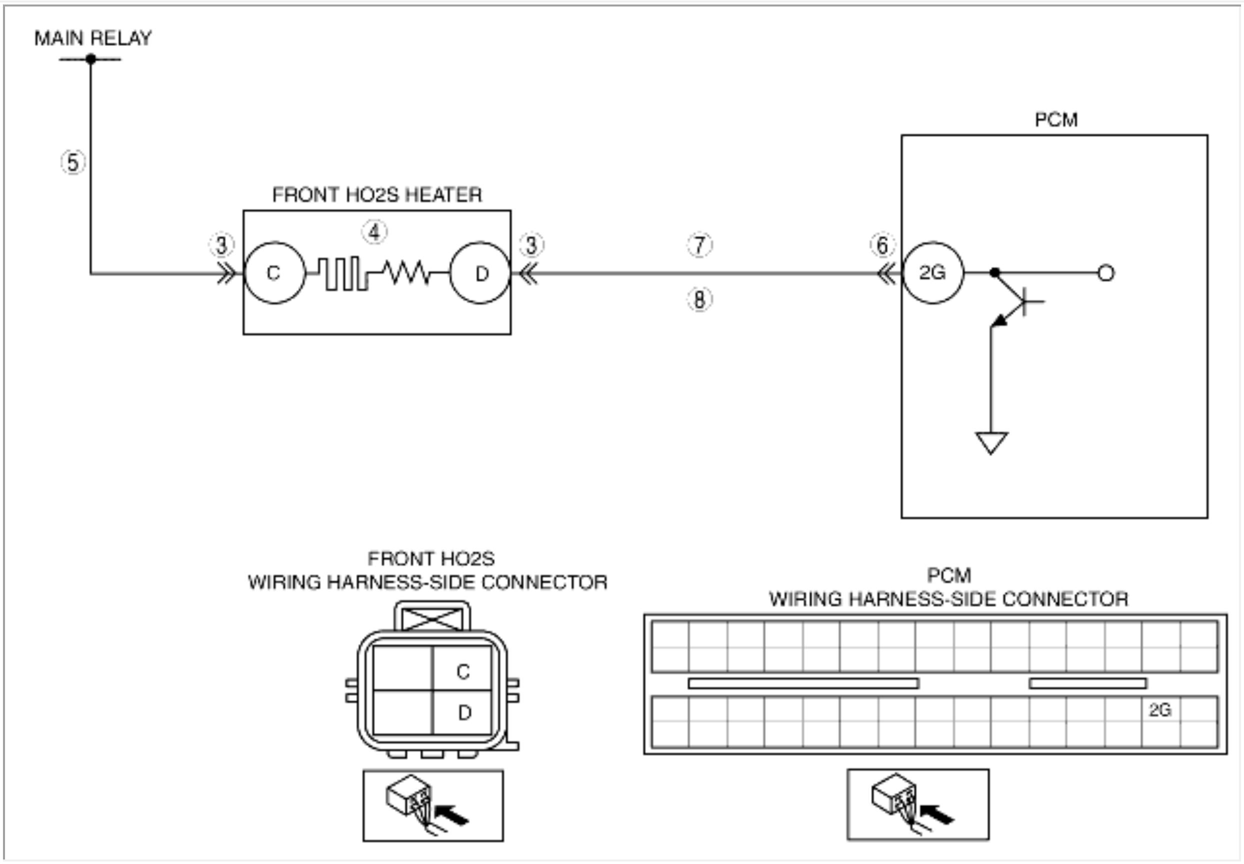
P0850	Neutral switch input circuit problem	ON	2	CCM	×	(See DTC P0850 [LF])
P1260	Immobilizer system problem	OFF	1	Other	×	(See DTC P1260 [LF])
P2006	Variable tumble shutter valve stuck closed	ON	2	CCM	×	(See DTC P2006 [LF])
P2009	Variable tumble solenoid valve circuit low input	ON	2	CCM	×	(See DTC P2009 [LF])
P2010	Variable tumble solenoid valve circuit high input	ON	2	CCM	×	(See DTC P2010 [LF])
P2096	Target A/F feedback system too lean	ON	2	Fuel system	×	(See DTC P2096 [LF])
P2097	Target A/F feedback system too rich	ON	2	Fuel system	×	(See DTC P2097 [LF])
P2177	Fuel system too lean at off idle	ON	2	Fuel system	×	(See DTC P2177 [LF])
P2178	Fuel system too rich at off idle	ON	2	Fuel system	×	(See DTC P2178 [LF])
P2187	Fuel system too lean at idle	ON	2	Fuel system	×	(See DTC P2187 [LF])
P2188	Fuel system too rich at idle	ON	2	Fuel system	×	(See DTC P2188 [LF])
P2195	Front HO2S signal stuck lean	ON	2	HO2S	×	(See DTC P2195 [LF])
P2196	Front HO2S signal stuck rich	ON	2	HO2S	×	(See DTC P2196 [LF])
P2228	BARO sensor circuit low input	ON	1	CCM	×	(See DTC P2228 [LF])
P2229	BARO sensor circuit high input	ON	1	CCM	×	(See DTC P2229 [LF])
P2502	Charging system voltage problem	OFF	1	Other	×	(See DTC P2502 [LF])
P2503	Charging system voltage low	OFF	1	Other	×	(See DTC P2503 [LF])
P2504	Charging system voltage high	OFF	1	Other	×	(See DTC P2504 [LF])
P2507	PCM B+ voltage low	ON	1	CCM	×	(See DTC P2507 [LF])
U0073	CAN system communication error	(See DTC TABLE [MULTIPLEX COMMUNICATION SYSTEM])				
U0121	Communication error to ABS HU/CM	(See DTC TABLE [MULTIPLEX COMMUNICATION SYSTEM])				

U0155	Communication error to instrument cluster	(See DTC TABLE [MULTIPLEX COMMUNICATION SYSTEM])

DTC P0031 [LF]

B3E010201084W01

DTC P0031	Front HO2S heater circuit low input
DETECTION CONDITION	• The PCM monitors the front HO2S heater control signal at PCM terminal 2G. If the PCM turns the front HO2S heater off but the front HO2S heater circuit has low voltage, the PCM determines that the front HO2S heater circuit has malfunction. **Note** • The front HO2S heater is controlled by duty signal. **Diagnostic support note** • This is a continuous monitor (HO2S heater). • The MIL illuminates if the PCM detects above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S malfunction • Open circuit in wiring harness between main relay and front HO2S terminal C • Open circuit in wiring harness between front HO2S terminal D and PCM terminal 2G • Short to ground in wiring harness between front HO2S terminal D and PCM terminal 2G • Poor connection at front HO2S or the PCM connector • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF FRONT HO2S CONNECTOR** • Turn the ignition switch off. • Disconnect front HO2S connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT FRONT HO2S HEATER**	Yes	Go to the next step.

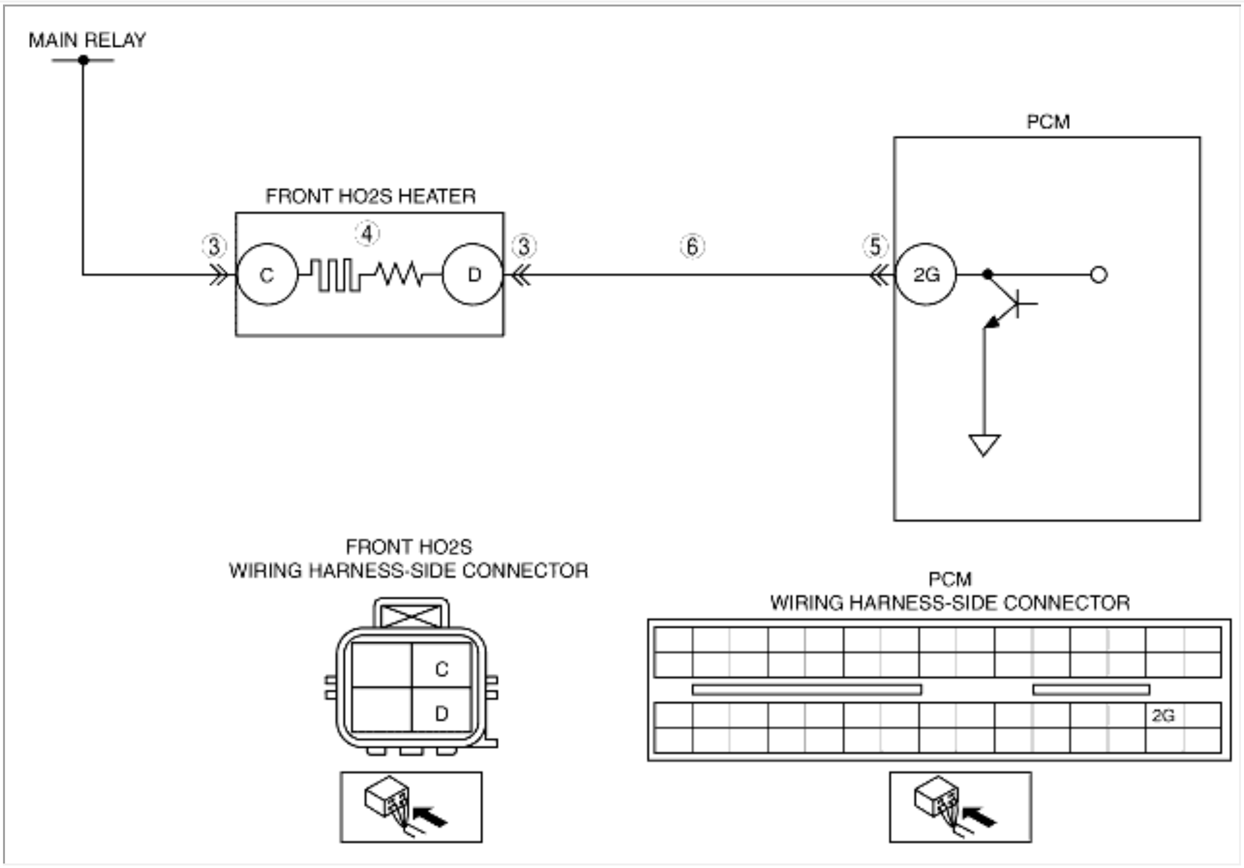
	• Inspect the front HO2S heater. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF].) • Is the front HO2S heater normal?	No	Replace the front HO2S, then go to Step 9.
5	**INSPECT POWER CIRCUIT OF FRONT HO2S HEATER FOR OPEN CIRCUIT** • Turn the ignition switch to the ON position (Engine off). • Measure voltage between front HO2S terminal C (harness-side) and body ground. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to Step 9.
6	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair terminal, then go to Step 9.
		No	Go to the next step.
7	**INSPECT CONTROL CIRCUIT OF FRONT HO2S HEATER FOR SHORT TO GROUND** • Inspect for continuity between front HO2S terminal D (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for short to ground, then go to Step 9.
		No	Go to the next step.
8	**INSPECT CONTROL CIRCUIT OF FRONT HO2S HEATER FOR OPEN CIRCUIT** • Inspect for continuity between front HO2S terminal D (wiring harness-side) and PCM terminal 2G. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to Step 9.
9	**VERIFY TROUBLESHOOTING OF DTC P0031 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.

10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0032 [LF]

B3E010201084W02

DTC P0032	Front HO2S heater circuit high input
DETECTION CONDITION	• The PCM monitors the front HO2S heater control signal at PCM terminal 2G. If the PCM turns the front HO2S heater on but the front HO2S heater circuit has high voltage, PCM determines that front HO2S heater circuit has malfunction. **Note** • Front HO2S heater is controlled by a duty signal. **Diagnostic support note** • This is a continuous monitor (HO2S heater). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Short to power supply in wiring harness between front HO2S terminal D and PCM terminal 2G • Short circuit in front HO2S or PCM terminal • Front HO2S heater malfunction • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT FRONT HO2S TERMINALS** • Turn the ignition switch off. • Disconnect the front HO2S connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT FRONT HO2S HEATER** • Inspect the front HO2S heater.	Yes	Go to the next step.
		No	Replace the front HO2S, then go to Step 7.

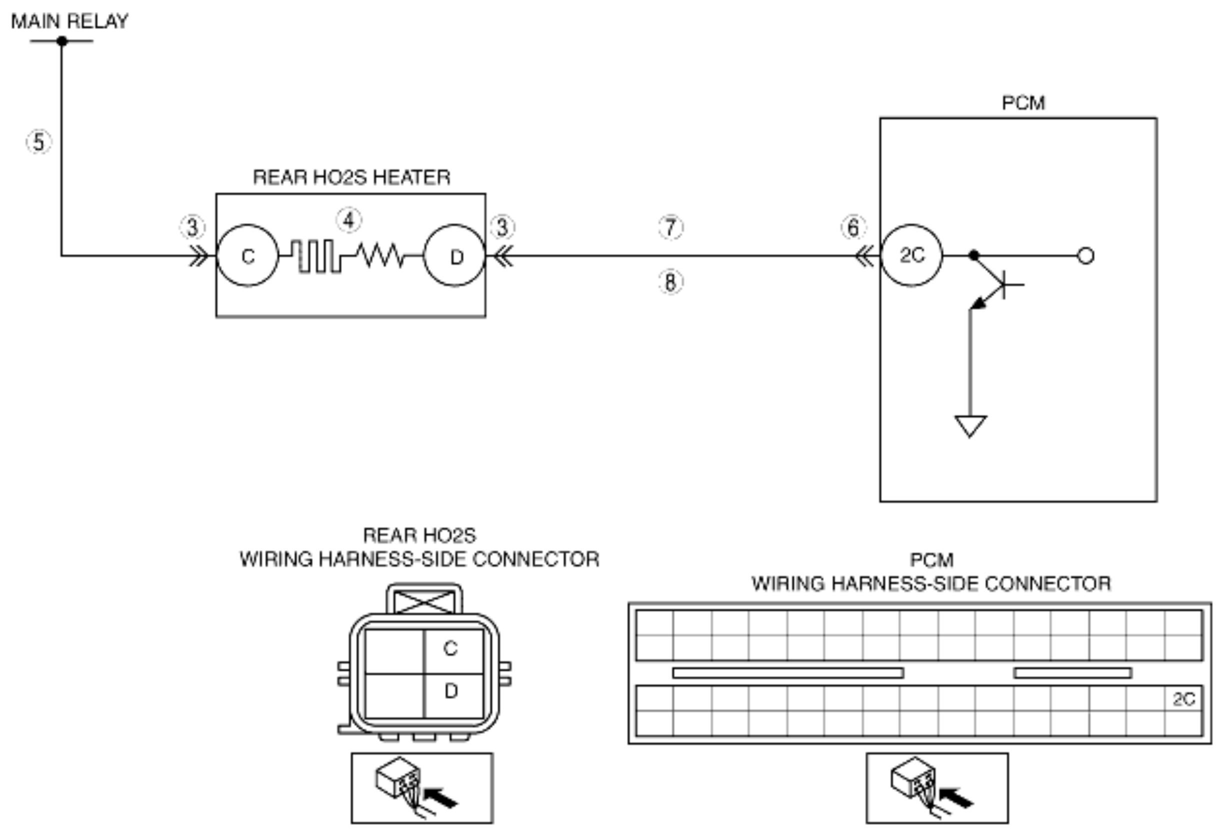
	(See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF].) • Is the front HO2S heater normal?		
5	**INSPECT PCM TERMINAL** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair the terminal, then go to Step 7.
		No	Go to the next step.
6	**INSPECT FRONT HO2S HEATER CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between front HO2S terminal D (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for shot to power circuit, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0032 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0037 [LF]

B3E010201084W03

DTC P0037	**Rear HO2S heater circuit low input**
DETECTION CONDITION	• The PCM monitors the rear HO2S heater control signal at PCM terminal 2C. If the PCM turns the rear HO2S heater off but the rear HO2S heater circuit has low voltage, the PCM determines that the rear HO2S heater circuit has malfunction.

	Diagnostic support note • This is a continuous monitor (HO2S heater). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Rear HO2S malfunction • Open circuit in wiring harness between the main relay and rear HO2S terminal C • Open circuit in wiring harness between rear HO2S terminal D and PCM terminal 2C • Short to ground in wiring harness between rear HO2S terminal D and PCM terminal 2C • Poor connection at the rear HO2S or the PCM connector • PCM malfunction



Diagnostic procedure

STEP	INSPECTION	ACTION

1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform the repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF REAR HO2S CONNECTOR** • Turn the ignition switch off. • Disconnect the rear HO2S connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT REAR HO2S HEATER** • Inspect the rear HO2S heater. (See REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF].) • Is rear HO2S heater normal?	Yes	Go to the next step.
		No	Replace the rear HO2S, then go to Step 9.
5	**INSPECT REAR HO2S HEATER POWER CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between rear HO2S terminal C (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to Step 9.
6	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair terminal, then go to Step 9.
		No	Go to the next step.
7	**INSPECT REAR HO2S HEATER CONTROL CIRCUIT FOR SHORT TO GROUND**	Yes	Repair or replace the wiring harness for short to ground, then go to Step 9.
		No	Go to the next step.

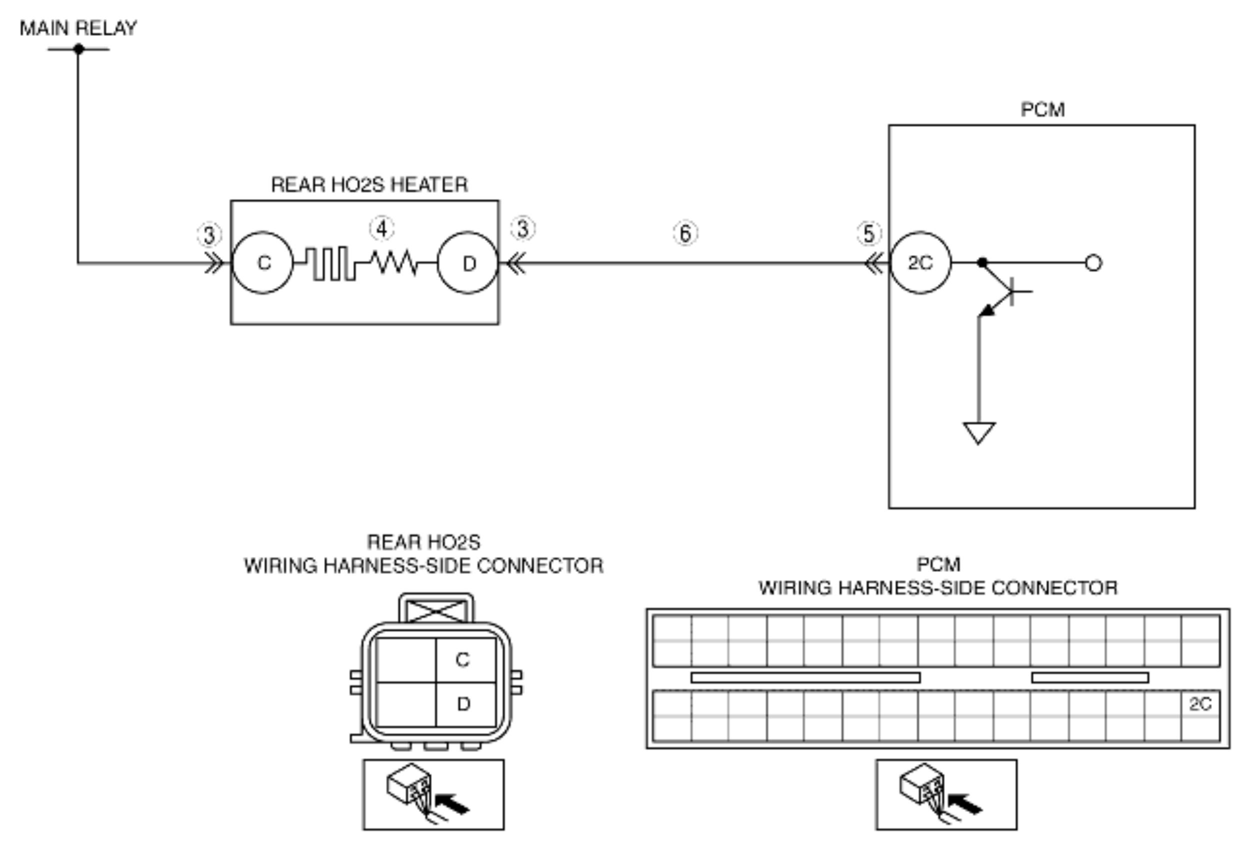
	• Inspect for continuity between rear HO2S terminal D (wiring harness-side) and body ground. • Is there continuity?		
8	**INSPECT HREAR HO2S HEATER CONTROL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between rear HO2S terminal D (wiring harness-side) and PCM terminal 2C. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to Step 9.
9	**VERIFY TROUBLESHOOTING OF DTC P0037 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0038 [LF]

B3E010201084W04

DTC P0038	Rear HO2S heater circuit high input
DETECTION CONDITION	• The PCM monitors the rear HO2S heater control signal at PCM terminal 2C. If the PCM turns the rear HO2S heater on but the rear HO2S heater circuit has high voltage, the PCM determines that the rear HO2S heater circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (HO2S heater). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle.

	• FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Short to power supply in wiring harness between rear HO2S terminal D and PCM terminal 2C • Short circuit in rear HO2S or PCM • Rear HO2S heater malfunction • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform the repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

3	**INSPECT REAR HO2S TERMINAL** • Turn the ignition switch off. • Disconnect the rear HO2S connector. • Inspect for poor connection (such as damaged/pulled out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT REAR HO2S HEATER** • Inspect rear HO2S heater. (See REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF].) • Is rear HO2S heater normal?	Yes	Go to the next step.
		No	Replace the rear HO2S, then go to Step 7.
5	**INSPECT PCM TERMINAL** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair the terminal, then go to Step 7.
		No	Go to the next step.
6	**INSPECT REAR HO2S HEATER CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between rear HO2S terminal D (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for shot to power circuit, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0038 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0101 [LF]

B3E010201084W05

DTC P0101	MAF sensor circuit range/performance problem
DETECTION CONDITION	• The PCM compares actual MAF amount with expected MAF amount when the engine is running. - If the mass intake air flow amount is **below 5.0 g/s {0.66 lb/min}** for **5 s** and throttle opening angle is **above 50%** with engine running, the PCM determines that detected mass intake air flow amount is too low. - If the mass intake air flow amount is **above 96.0 g/s {12.7 lb/min}** for **5 s** and the engine speed is **below 2,000 rpm** with the engine running, the PCM determines that detected mass intake air flow amount is too high. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• MAF sensor malfunction • TP sensor malfunction • Electrical corrosion in MAF signal circuit • Electrical corrosion in MAF RETURN circuit • Voltage drop in MAF signal circuit • Voltage drop in ground circuit

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability.	Yes	Perform repair or diagnosis according to the available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.

	• Is any related repair information available?		
3	**VERIFY CURRENT INPUT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Connect the WDS or equivalent to DLC-2. • Start the engine. • Access ECT, TP and MAF PIDs. • Warm up the engine until ECT PID is **above 80 °C {176 °F}**. • Drive the vehicle. • Read MAF PID when the TP PID is **above 50%**. • Is MAF PID **below 5.0 g/s {0.66 lb/min}**?	Yes	Make sure that the throttle position sensor resistance changes smoothly while gradually opening the throttle valve. • If not, replace the throttle position sensor and go to Step 7. • For others, go to the next step.
		No	Go to the next step.
4	**VERIFY CURRENT INPUT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Connect the WDS or equivalent to DLC-2. • Start the engine. • Access ECT, MAF and RPM PIDs. • Warm up the engine until ECT PID is **above 80°C {176 °F}**. • Read MAF PID when the RPM PID is **below 2,000 rpm**. • Is MAF PID **above 96.0 g/s {12.7 lb/min}**?	Yes	Go to Step 8.
		No	Intermittent concern exists. Go to INTERMITTENT CONCERNS TROUBLESHOOTING procedure. (See INTERMITTENT CONCERN TROUBLESHOOTING [LF].)
5	**INSPECT POOR CONNECTION OF MAF SENSOR CONNECTOR** • Turn the ignition switch off. • Disconnect MAF/IAT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion.) • Is there any malfunction?	Yes	Repair or replace the terminal or the MAF/IAT sensor, then go to Step 7.
		No	Go to the next step.
6	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Disconnect the PCM connector.	Yes	Repair the terminal, then go to the next step.
		No	Replace MAF/IAT sensor, then go to the next step.

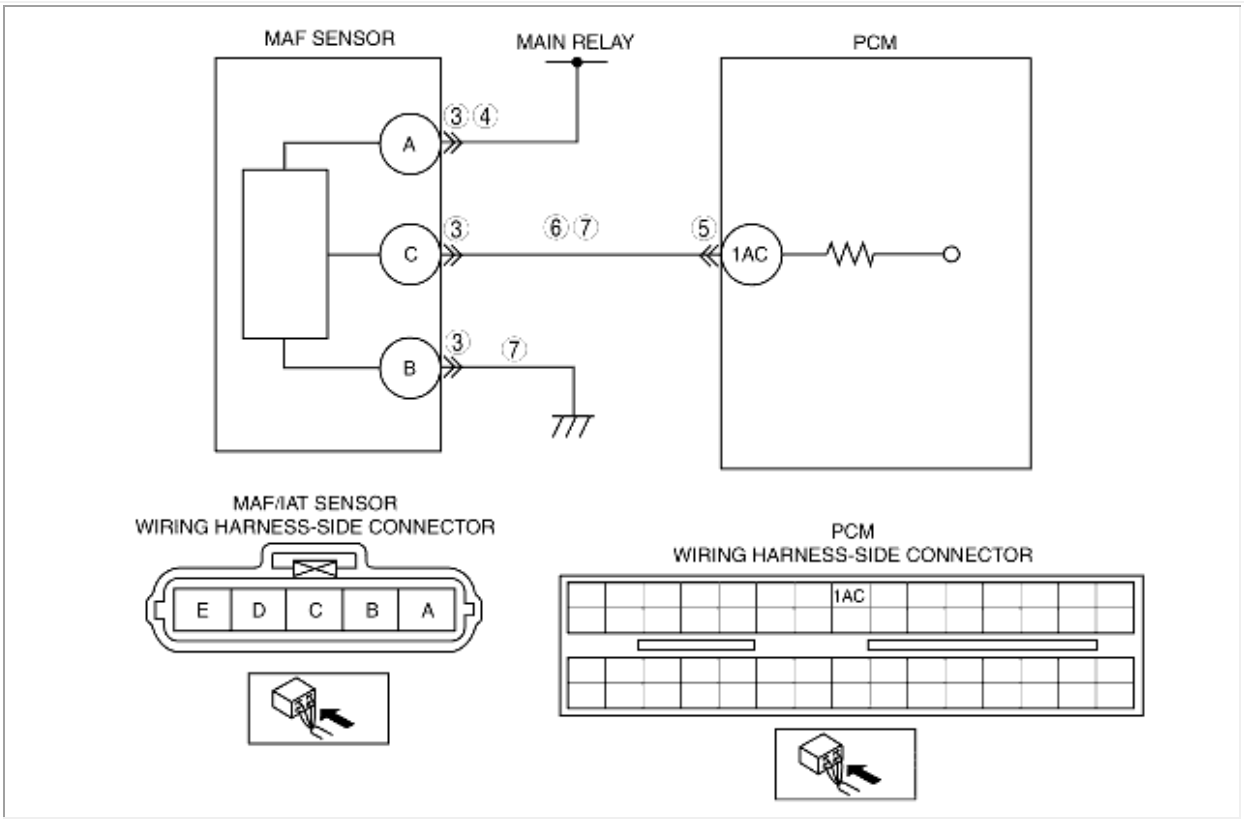
	• Inspect for poor connection (damaged/pulled-out pins, corrosion, etc.). • Is there any malfunction?		
7	**VERIFY TROUBLESHOOTING OF DTC P0101 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from memory using the WDS or equivalent. • Start the engine. • Access ECT, TP and RPM PIDs. • Warm up the engine until ECT PID is reading **above 80°C {176°F}**. • Drive the vehicle while TP PID **above 50%** for **50 s**. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to Step 11.
		No	Go to Step 11.
8	**INSPECT MAF SENSOR TERMINALS FOR ELECTRICAL CORROSION** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion.) • Is There corrosion?	Yes	Repair or replace the terminal or the MAF/IAT sensor, then go to Step 10.
		No	Go to the next step.
9	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion.) • Is there any malfunction?	Yes	Repair the terminal, then go to the next step.
		No	Go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P0101 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off).	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.

	• Clear the DTC from the memory using the WDS or equivalent. • Start the engine. • Warm up the engine until ECT PID is **above 80 °C {176 °F}**. • Drive the vehicle while RPM PID **2,000 rpm** for **50 s**. • Is the PENDING CODE for this DTC present?		
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0102 [LF]

B3E010201084W06

DTC P0102	MAF sensor circuit low input
DETECTION CONDITION	• The PCM monitors input voltage from the MAF sensor when the engine running. If the input voltage at PCM terminal 1AC is **below 0.21 V**, the PCM determines that the MAF circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• MAF sensor malfunction • Connector or terminal malfunction • Short to ground in wiring harness between MAF/IAT sensor terminal C and PCM terminal 1AC • Open circuit in wiring harness between MAF/IAT sensor terminal C and PCM terminal 1AC • Open circuit in wiring harness between main relay and MAF/IAT sensor terminal A



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF MAF SENSOR CONNECTOR** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion.) • Is there any malfunction?	Yes	Repair or replace the terminals, then go to Step 8.
		No	Go to the next step.
4		Yes	Go to the next step.

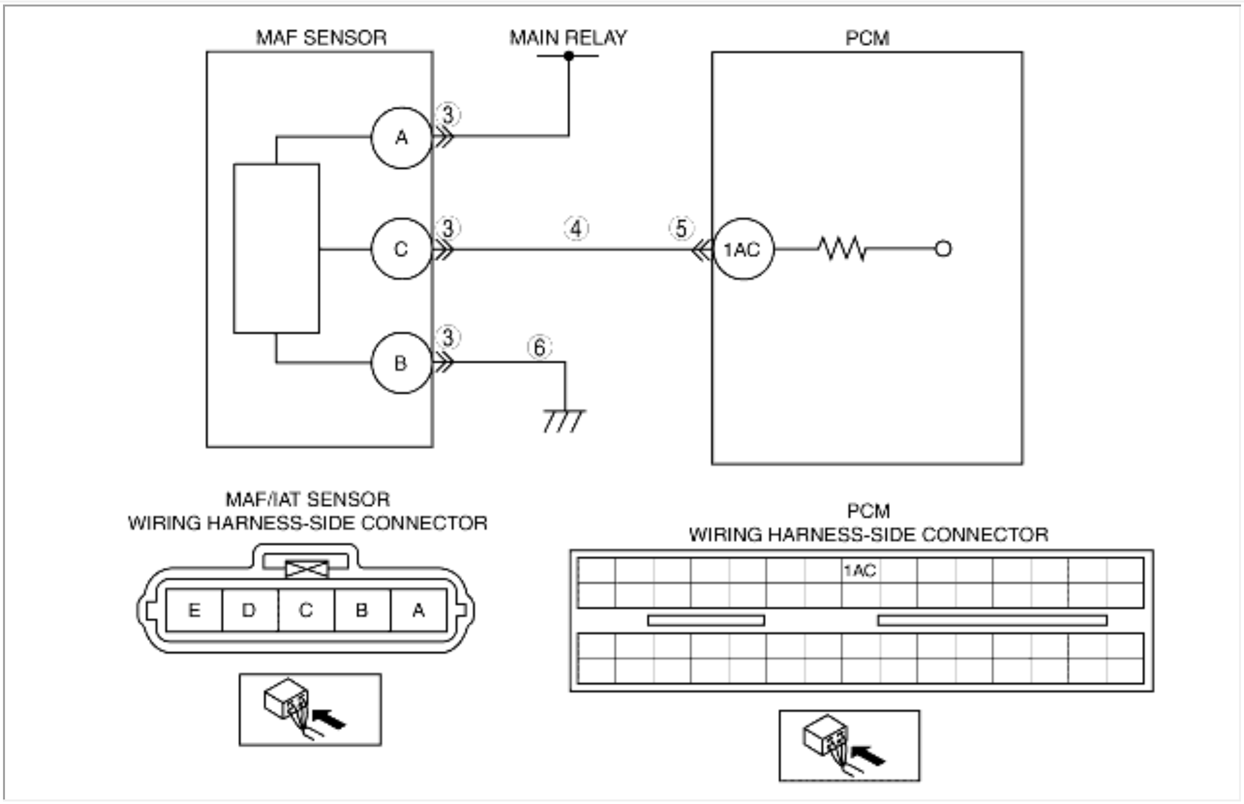
	INSPECT POWER SUPPLY CIRCUIT FOR OPEN CIRCUIT • Turn the ignition switch to the ON position (Engine off). • Inspect voltage at the MAF/IAT sensor terminal A (wiring harness-side). • Is the voltage **B+**?	No	Inspect for open circuit in wiring harness between MAF/IAT sensor terminal A (wiring harness-side) and main relay. Repair or replace wiring harness, then go to Step 8.
5	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion.) • Is there any malfunction?	Yes	Repair the terminal, then go to Step 8.
		No	Go to the next step.
6	**INSPECT MAF SENSOR SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between MAF/IAT sensor terminal C (wiring harness-side) and PCM terminal 1AC (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness, then go to Step 8.
7	**INSPECT MAF SENSOR SIGNAL CIRCUIT FOR SHORTS** • Inspect for continuity between following terminals: - MAF/IAT sensor terminal C (wiring harness-side) and body ground - MAF/IAT sensor connector terminal C (wiring harness-side) and B (wiring harness-side) • Is there continuity?	Yes	Repair or the wiring harness, then go to the next step.
		No	Replace the MAF/IAT sensor, then go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P0102 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure".	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)

	(See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	No	Troubleshooting completed.

DTC P0103 [LF]

B3E010201084W07

DTC P0103	MAF sensor circuit high input
DETECTION CONDITION	• The PCM monitors the input voltage from the MAF sensor when the engine running. If the input voltage at PCM terminal 1AC is **above 4.9 V**, the PCM determines that the MAF circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• MAF sensor malfunction • Connector or terminal malfunction • Short to power supply in wiring harness between MAF/IAT sensor terminal C and PCM terminal 1AC • Open circuit in MAF/IAT sensor ground circuit



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF MAF SENSOR CONNECTOR** • Turn the ignition switch to off. • Disconnect the MAF/IAT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion.) • Is there any malfunction?	Yes	Repair or replace the terminals, then go to Step 7.
		No	Go to the next step.
4	**INSPECT MAF SIGNAL CIRCUIT FOR SHORT TO POWER CIRCUIT** • Turn the ignition switch to the ON position (Engine off).	Yes	Go to the next step.
		No	Repair or replace the wiring harness, then go to Step 7.

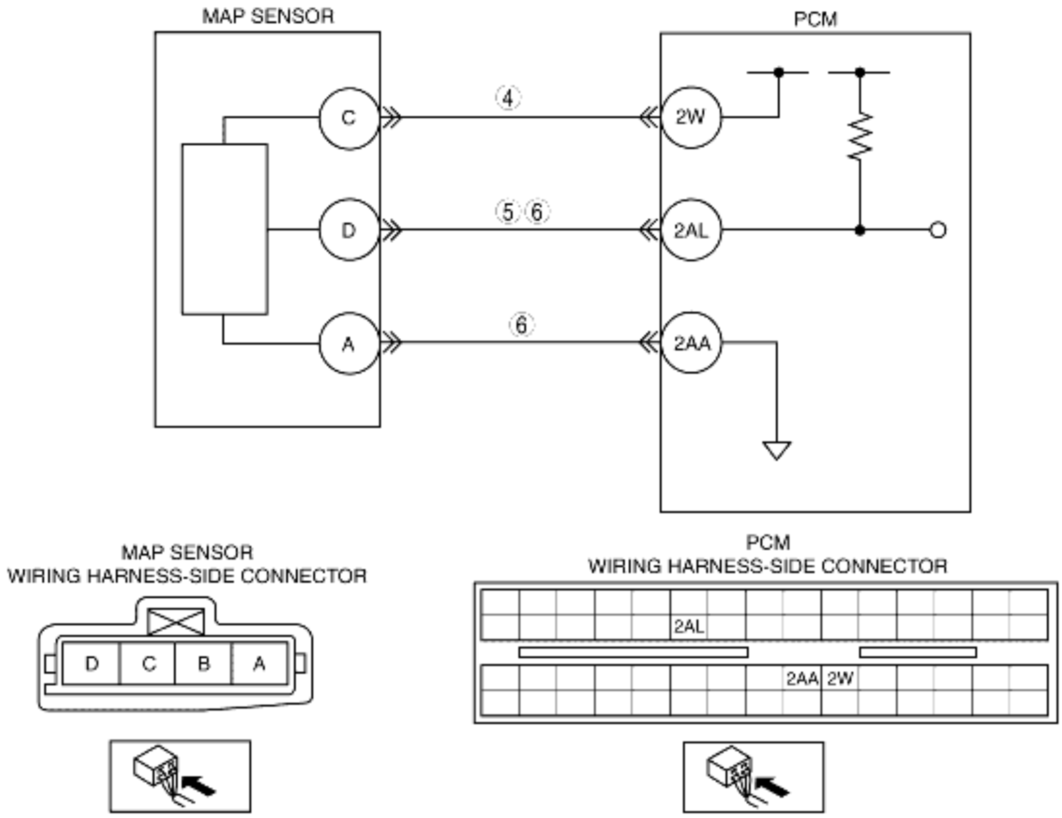
	• Measure the voltage between MAF/IAT sensor terminal C (wiring harness-side) and body ground. • Is the voltage **0 V**?		
5	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair the terminal, then go to Step 7.
		No	Go to the next step.
6	**INSPECT MAF SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between MAF/IAT sensor terminal B (wiring harness-side) and body ground. • Is there continuity?	Yes	Replace MAF/IAT sensor, then go to the next step.
		No	Repair or replace the wiring harness, then go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0103 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0107 [LF]

B3E010201084W08

DTC P0107	MAP sensor circuit low input
DETECTION CONDITION	• The PCM monitors the input voltage from the MAP sensor when the intake air temperature is **above 10 °C {50 °F}**. If the input voltage at PCM terminal 2AL is **below 0.1V**, the PCM determines that the MAP sensor circuit has a malfunction. **Diagnostic support note**

	• This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• MAP sensor malfunction • Connector or terminal malfunction • Short to ground in wiring harness between MAP sensor terminal D and PCM terminal 2AL • Open circuit in wiring harness between MAP sensor terminal C and PCM terminal 2W • MAP sensor signal circuit and MAP sensor ground circuit are shorted each other • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1		Yes	Go to the next step.

	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY MAP PID WHEN MAP SENSOR CONNECTOR IS DISCONNECTED** • Disconnect the MAP sensor connector. • Connect the WDS or equivalent to DLC-2. • Access MAP PID. • Is the voltage **above 4.9 V**?	Yes	Go to the next step.
		No	Go to Step 5.
4	**INSPECT POWER SUPPLY CIRCUIT VOLTAGE AT MAP SENSOR CONNECTOR** **Note** • If DTC P0122 and P2228 are also retrieved with P0107, go to CONSTANT VOLTAGE troubleshooting procedure. • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between MAP sensor terminal C (wiring harness-side) and body ground. • Is the voltage **within 4.5- 5.5 V?**	Yes	Inspect for poor connection at MAP sensor terminal C (wiring harness-side). • Repair or replace the terminal if necessary. • If there is no malfunction, replace the MAP sensor. Then go to Step 7.
		No	Inspect for open circuit in wiring harness between PCM terminal 2W (wiring harness-side) and MAP sensor terminal C (wiring harness-side). Repair or replace suspected wiring harness, then go to Step 7.
5	**INSPECT MAP SENSOR SIGNAL CIRCUIT FOR SHORT TO GROUND** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect continuity between MAP sensor terminal D (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness, then go to Step 7.
		No	Go to the next step.
6		Yes	Repair or replace the wiring harness, then go to the next step.

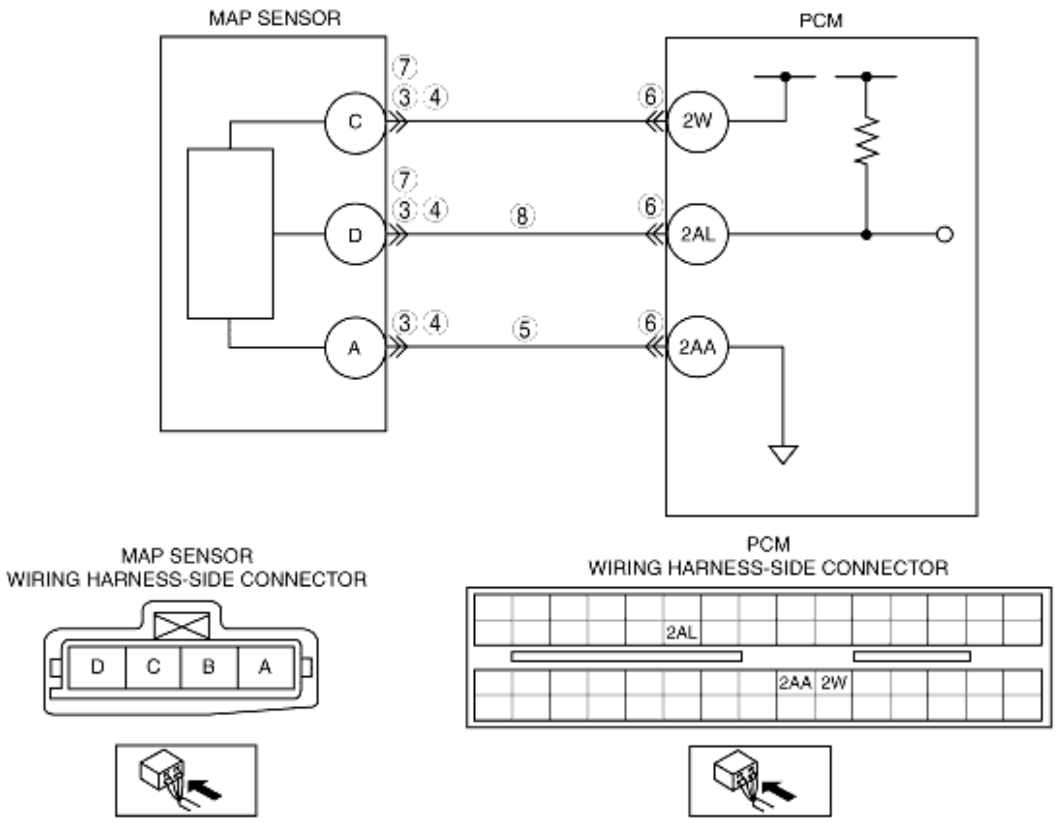
	INSPECT MAP SENSOR SIGNAL AND GROUND CIRCUIT FOR SHORT EACH OTHER • Inspect for continuity between MAP sensor terminals D and A (wiring harness-side). • Is there continuity?	No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0107 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0108 [LF]

B3E010201084W09

DTC P0108	MAP sensor circuit high input
DETECTION CONDITION	• The PCM monitors the input voltage from the MAP sensor when the intake air temperature is **above 10 °C {50 °F}**. If input the voltage at PCM terminal 2AL is **above 4.9V**, the PCM determines that the MAP sensor circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.

POSSIBLE CAUSE	• MAP sensor malfunction • Connector or terminal malfunction • Open circuit in wiring harness between MAP sensor terminal A and PCM terminal 2AA • Open circuit in wiring harness between MAP sensor terminal D and PCM terminal 2AL • MAP sensor signal circuit shorts to constant voltage supply circuit • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

3	**INSPECT CONNECTION OF MAP SENSOR CONNECTOR** • Turn the ignition switch off. • Verify that the MAP sensor connector is connected securely. • Is connection normal?	Yes	Go to the next step.
		No	Reconnect the connector, then go to Step 9.
4	**INSPECT POOR CONNECTION OF MAP SENSOR CONNECTOR** • Disconnect the MAP sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
5	**VERIFY MAP SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between the MAP sensor terminal A (wiring harness-side) and body ground. • Is there continuity?	Yes	Go to the next step.
		No	Inspect for open circuit in wiring harness between PCM terminal 2AA (wiring harness-side) and MAP sensor terminal A (wiring harness-side). Repair or replace suspected harness, then go to Step 9.
6	**INSPECT PCM CONNECTOR** • Disconnect the PCM connector. • Inspect for poor connection at terminals (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair the terminal, then go to Step 9.
		No	Go to the next step.
7	**VERIFY MAP SENSOR SIGNAL CIRCUIT FOR SHORT TO CONSTANT VOLTAGE CIRCUIT** • Inspect for continuity between MAP sensor terminal D and C (wiring harness-side). • Is there continuity?	Yes	Repair or replace the wiring harness, then go to Step 9.
		No	Go to the next step.
8	**VERIFY MAP SENSOR SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between MAP sensor terminal D (wiring harness-side) and PCM terminal 2AL (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0108 COMPLETED**	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)

	• Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0111 [LF]

B3E010201084W10

DTC P0111	IAT circuit range/performance problem
DETECTION CONDITION	• If the intake air temperature is higher than the engine coolant temperature by **40 °C {104 °F}** with key on, the PCM determines that there is a IAT sensor performance problem. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in PCM memory.
POSSIBLE CAUSE	• IAT sensor malfunction • Poor connection at MAF/IAT sensor or PCM connector • PCM malfunction

Diagnostic procedure

STEP	INSPECTION	ACTION

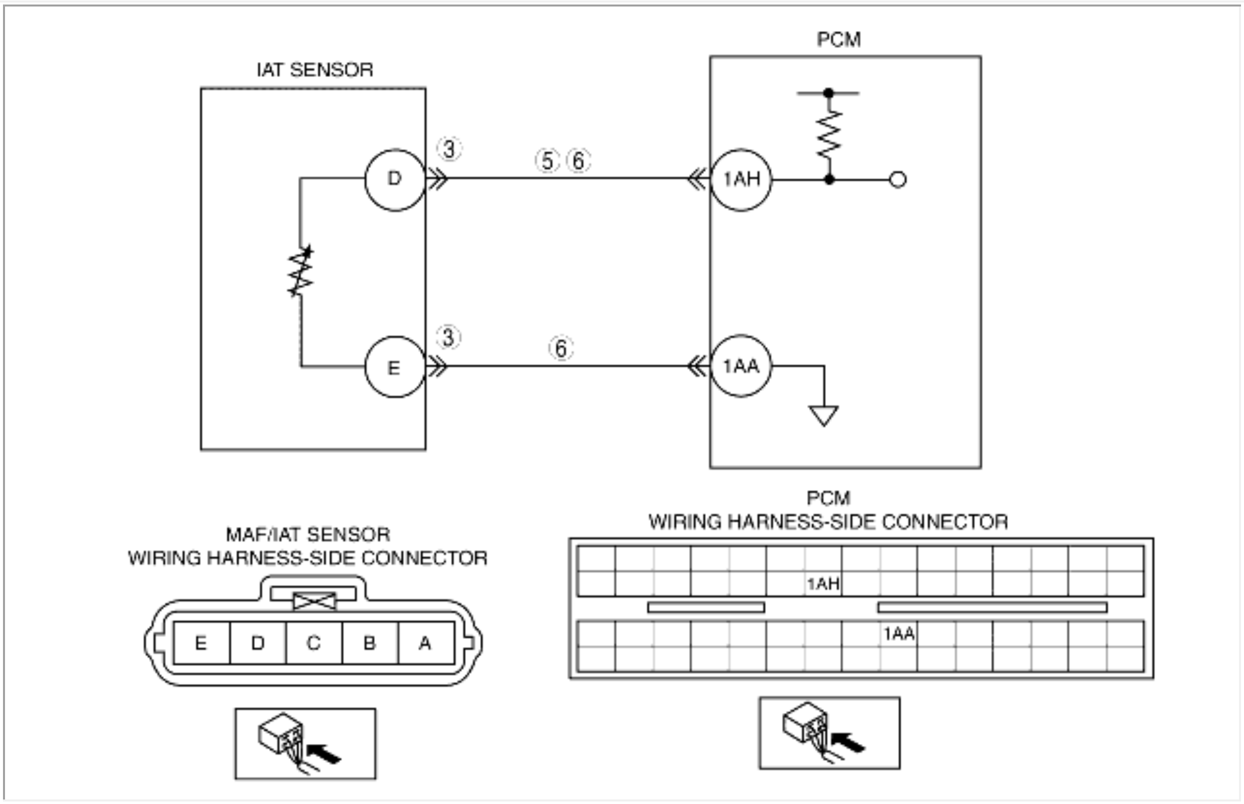
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify for related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF MAF/IAT SENSOR CONNECTOR** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 6.
		No	Go to the next step.
4	**INSPECT IAT SENSOR** • Inspect the IAT sensor. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [LF]) • Is the IAT sensor normal?	Yes	Replace the MAF/IAT sensor, then go to Step 6.
		No	Go to the next step.
5	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 6.
		No	Go to the next step.
6	**VERIFY TROUBLESHOOTING OF DTC P0111 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine and run the engine under FREEZE FRAME DATA condition. • Is THE PENDING code for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
7	**VERIFY AFTER REPAIR PROCEDURE**	Yes	Go to the applicable DTC troubleshooting.

	• Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?		(See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0112 [LF]

B3E010201084W11

DTC P0112	IAT sensor circuit low input
DETECTION CONDITION	• The PCM monitors the IAT sensor signal at PCM terminal 1AH. If the PCM detects the IAT sensor voltage **below 0.16 V**, the PCM determines that the IAT sensor circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAT sensor malfunction • Short to ground in wiring harness between MAF/IAT sensor terminal D and PCM terminal 1AH • Short each wiring harness IAT signal circuit and IAT ground circuit • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT IAT SENSOR TERMINAL** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector. • Inspect for bent terminal of MAF/IAT sensor terminals D and E (part-side). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**CLASSIFY IAT SENSOR MALFUNCTION OR WIRING HARNESS MALFUNCTION** • Connect the WDS or equivalent to DLC-2. • Access IAT PID.	Yes	Replace the MAF/IAT sensor, then go to Step 7.
		No	Go to the next step.

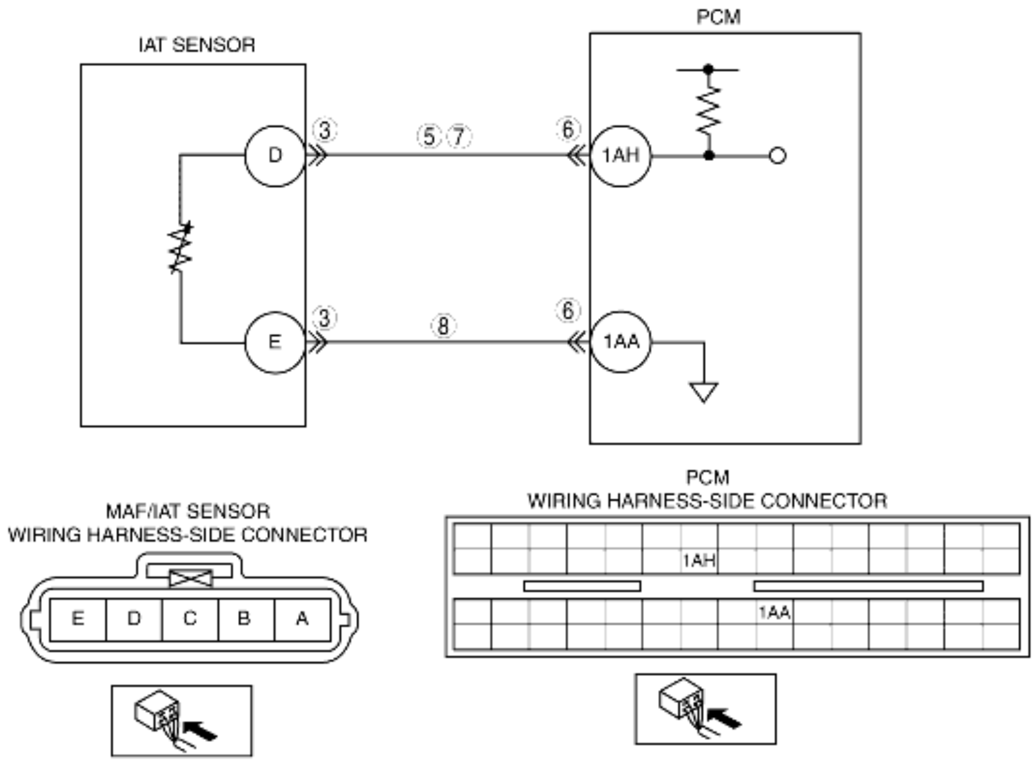
	• Verify IAT value when disconnecting the MAF/IAT sensor connector. • Does IAT value change?		
5	**INSPECT IAT SIGNAL CIRCUIT FOR SHORT TO GROUND** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for continuity between MAF/IAT sensor terminal D (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for short to ground, then go to Step 7.
		No	Go to the next step.
6	**INSPECT IAT CIRCUITS FOR SHORT** • Inspect for continuity between MAF/IAT sensor terminals D and E (wiring harness-side). • Is there continuity?	Yes	Repair or replace the wiring harness for short, then go to Step 7.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0112 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0113 [LF]

B3E010201084W12

DTC P0113	IAT sensor circuit high input
DETECTION CONDITION	• The PCM monitors the input voltage from the IAT sensor if input voltage at PCM terminal 1AH is **above 4.8 V**, the PCM determines that IAT sensor circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM).

	• The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAT sensor malfunction • Open circuit in wiring harness between MAF/IAT sensor terminal D and PCM terminal 1AH • Short to power supply in wiring harness between MAF/IAT sensor terminal D and PCM terminal 1AH • Open circuit in wiring harness between MAF/IAT sensor terminal E and PCM terminal 1AA • Poor connection at MAF/IAT sensor or PCM connector • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.

2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF IAT SENSOR CONNECTOR** • Turn the ignition switch off. • Disconnect the MAF/IAT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the replace the wiring terminal, then go to Step 9.
		No	Go to the next step.
4	**CLASSIFY IAT SENSOR MALFUNCTION OR WIRING HARNESS MALFUNCTION** • Connect the WDS or equivalent to DLC-2. • Access IAT PID. • Connect a jumper wire between MAF/IAT sensor terminals D and E. • Verify IAT value • Is the voltage **below 4.8 V**?	Yes	Replace the MAF/IAT sensor, then go to Step 9.
		No	Go to the next step.
5	**INSPECT IAT SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between MAF/IAT sensor terminal D (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect PCM terminals 1AH and 1AA (wiring harness-side) for tightness using feeler tool. • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 10.
		No	Go to the next step.
7	**INSPECT IAT SENSOR SIGNAL CIRCUIT FOR OPEN CIRCUIT**	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to Step 10.

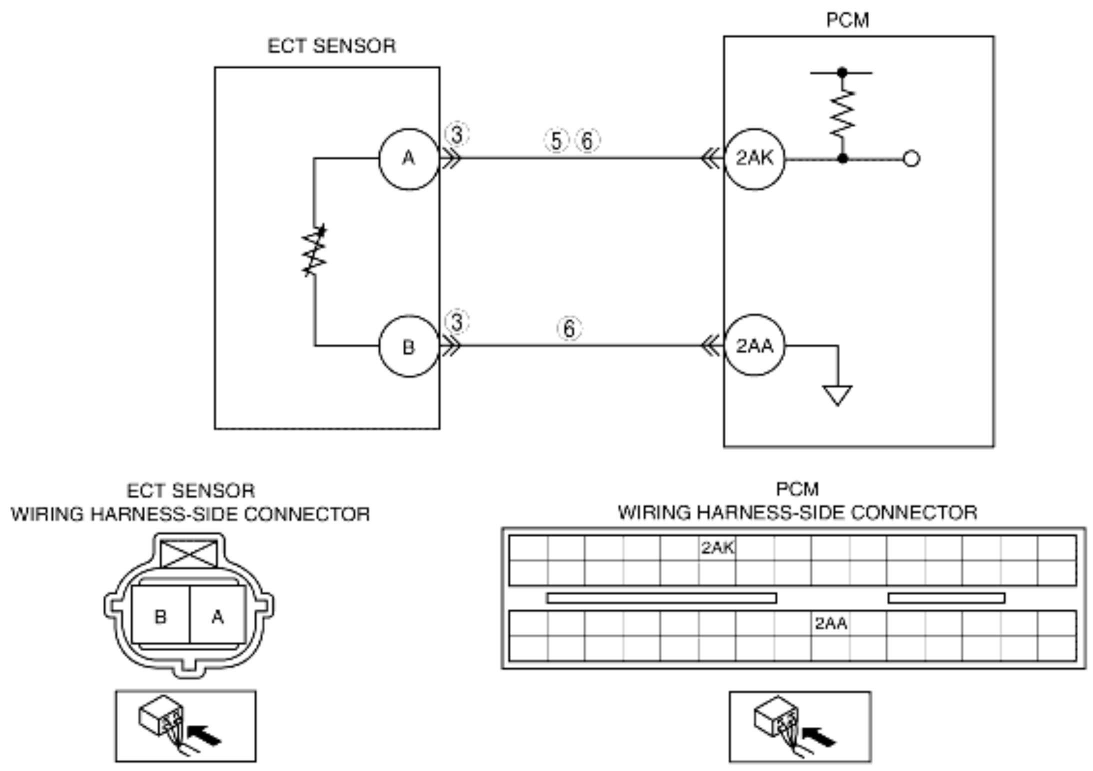
	• Inspect for continuity between MAF/IAT sensor terminal D (wiring harness-side) and PCM terminal 1AH. • Is there continuity?		
8	**INSPECT IAT SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between MAF/IAT sensor terminal E (harness-side) and PCM terminal 1AA. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0113 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0117 [LF]

B3E010201084W13

DTC P0117	**ECT sensor circuit low input**
DETECTION CONDITION	• The PCM monitors the ECT sensor signal at PCM terminal 2AK. If the PCM detects the ECT sensor voltage **below 0.2 V**, the PCM determines that the ECT sensor circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.

POSSIBLE CAUSE	• ECT sensor malfunction • Connect or terminal malfunction • Short to ground in wiring harness between ECT sensor terminal A and PCM connector terminal 2AK • Short each wiring harness ECT signal circuit and ECT ground circuit • PCM malfunction



Diagnostic procedure

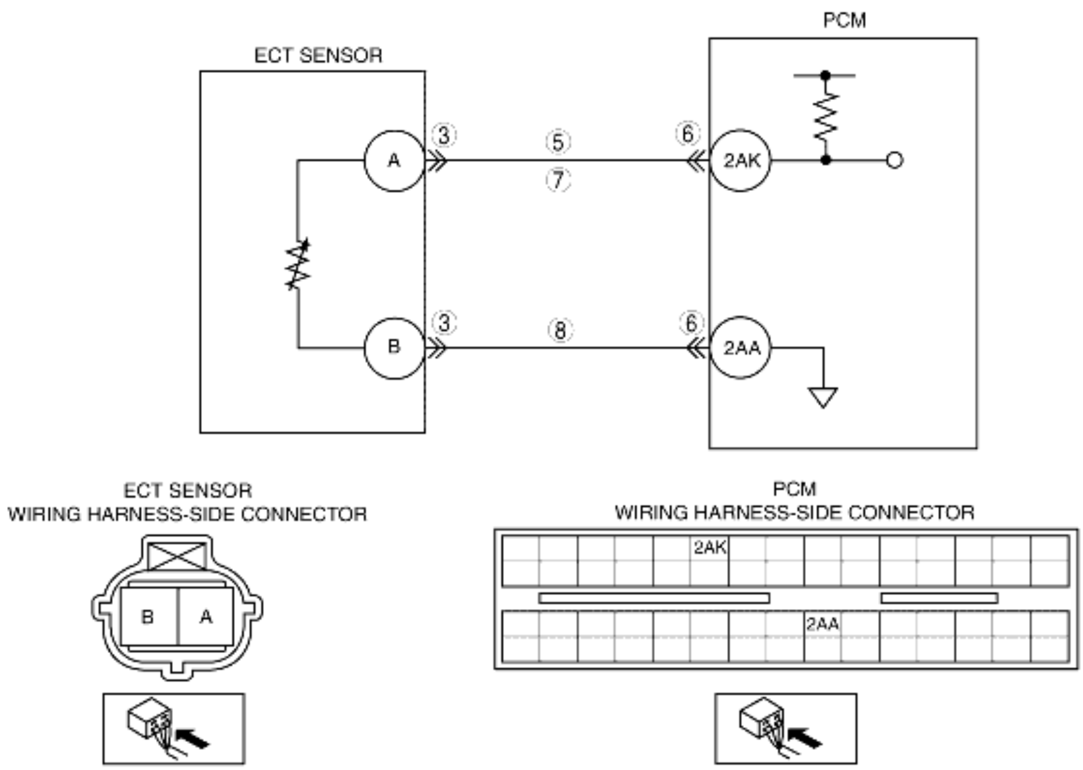
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT TERMINAL BENT** • Turn the ignition switch off. • Disconnect the ECT sensor connector.	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.

	• Inspect for bent of ECT sensor terminals A and B (part-side). • Is there any malfunction?		
4	**CLASSIFY ECT SENSOR MALFUNCTION OR WIRING HARNESS MALFUNCTION** • Connect the WDS or equivalent to DLC-2. • Access ECT PID. • Verify ECT value when disconnecting ECT sensor connector. • Does the ECT value change?	Yes	Replace the ECT sensor, then go to Step 7.
		No	Go to the next step.
5	**INSPECT ECT SIGNAL CIRCUIT FOR SHORT TO GROUND** • Turn the ignition switch off. • Inspect continuity between ECT sensor terminal A (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for short to ground, then go to Step 7.
		No	Go to the next step.
6	**INSPECT IAT CIRCUIT FOR SHORT WIRING HARNESSES** • Inspect for continuity between ECT sensor terminal A and B (wiring harness-side). • Is there continuity?	Yes	Repair or replace the wiring harness for short, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0117 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0118 [LF]

B3E010201084W14

DTC P0118	ECT sensor circuit high input
DETECTION CONDITION	• The PCM monitors the ECT sensor signal at PCM terminal 2AK. If the PCM detects the ECT sensor voltage is **above 4.6 V**, the PCM determines that the ECT sensor circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• ECT sensor malfunction • Open circuit in wiring harness between ECT sensor terminal A and PCM terminal 2AK • Short to power supply in wiring harness between ECT sensor terminal A and PCM terminal 2AK • Open circuit in wiring harness between ECT sensor terminal B and PCM terminal 2AA • Poor connection of ECT sensor or PCM connectors • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF ECT SENSOR CONNECTOR** • Turn the ignition switch off. • Disconnect ECT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**CLASSIFY ECT SENSOR MALFUNCTION OR WIRING HARNESS MALFUNCTION** • Connect the WDS or equivalent to the DLC-2. • Access ECT PID. • Connect a jumper wire between ECT sensor terminals A and B. • Verify the ECT value. • Is the voltage **4.6 V or below**?	Yes	Replace the ECT sensor, then go to Step 9.
		No	Go to the next step.
5	**INSPECT ECT SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between ECT sensor terminal A (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.

7	**INSPECT ECT SENSOR SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Inspect the continuity between ECT sensor terminal A (wiring harness-side) and PCM terminal 2AK. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to Step 9.
8	**INSPECT ECT SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between ECT sensor terminal B (wiring harness-side) and PCM terminal 2AA. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0118 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0121 [LF]

B3E010201084W15

DTC P0121	TP sensor stuck closed
DETECTION CONDITION	• If the PCM detects that the throttle valve opening angle is **below 12.5%** for **5 s** after following conditions are met, the PCM determines that the TP is stuck closed: **MONITORING CONDITION** - Engine coolant temperature is **above 70 °C {158 °F}**. - MAF sensor signal is **above 32.0 g/s {4.2 lb/min.}**. • If PCM detects that throttle valve opening angle is **above 50%** for **5 s** after following conditions are met, the PCM determines that TP is stuck open: **MONITORING CONDITION** - Engine speed **above 500 rpm**

	- MAF sensor signal **below 5 g/s {0.7 lb/min.}** **Diagnostic support note** • This is a continuous monitor (CCM). • MIL illuminates if PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TP sensor malfunction • Electrical corrosion in TP signal circuit • Voltage drop in constant voltage supply circuit • Voltage drop in ground circuit • MAF sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch to the ON position (Engine off). • Retrieve the pending or stored DTC using the WDS or equivalent. • Is DTC P0101 also retrieved?	Yes	Go to DTC P0101 troubleshooting procedure.
		No	Go to the next step.
3	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
4	**VERIFY CURRENT INPUT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Start the engine.	Yes	Go to Step 7.
		No	Go to the next step.

	• Access ECT, TP and MAF PIDs using the WDS or equivalent. • Warm up the engine until ECT PID is **above 70 °C {158 °F}** • Drive the vehicle. • Read TP PID while MAF PID is **above 32.0 g/s {4.2 lb/min.}**. • Is TP PID **above 12.5%**?		
5	**VERIFY TP PID** • Start the engine. • Access TP, MAF and RPM PIDs using the WDS or equivalent. • Read TP PID while MAF PID is **below 5 g/s {0.7 lb/min}** and RPM PID is **above 500 rpm**. • Is TP PID **above 50%**?	Yes	Go to Step 12.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Drive the vehicle and read MAF PID. • Does MAF PID change according to driving condition?	Yes	Intermittent concern exists. Go to INTERMITTENT CONCERNS troubleshooting procedure.
		No	Inspect the mass airflow sensor, elated circuits and terminals. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [LF].) Repair or replace if necessary, then go to Step 16.
7	**INSPECT TP SENSOR TERMINALS FOR ELECTRICAL CORROSION** • Turn the ignition switch off. • Disconnect the TP sensor connector. • Inspect male and female the TP sensor terminals for electrical corrosion. • Is any electrical corrosion found?	Yes	Repair or replace the terminal or TP sensor, then go to Step 11.
		No	Go to the next step.
8	**VERIFY TP SENSOR** • Does the TP sensor resistance smoothly change while gradually opening throttle valve?	Yes	Go to the next step.
		No	Replace the TP sensor, then go to Step 11.
9	**INSPECT PCM TERMINALS FOR ELECTRICAL CORROSION** • Disconnect the PCM connector. • Inspect the PCM male and female terminals for electrical corrosion on.	Yes	Repair the terminal, then go to Step 11.
		No	Go to the next step.

	• Is any electrical corrosion?		
10	**INSPECT CONSTANT VOLTAGE SUPPLY AND TP SIGNAL CIRCUITS FOR VOLTAGE DROP** • Turn the ignition switch to the ON position (Engine off). • Inspect the voltage between following terminals: - TP sensor terminal C (wiring harness-side) and PCM terminal 2W - TP sensor terminal B (wiring harness-side) and PCM terminal 2I • Is the voltage **approx. 0 V**?	Yes	Go to the next step.
		No	Inspect the PCM terminals 2I and 2W (wiring harness-side) for rust or corrosion on. • Repair or replace the terminal then go to the next step.
11	**VERIFY TROUBLESHOOTING OF DTC P0121 COMPLETED** • Make sure to reconnect all disconnected connectors. • Start the engine. • Clear the DTC from the PCM memory using the WDS or equivalent. • Access ECT, TP and MAF PIDs using WDS or equivalent. • Warm up the engine until ECT PID is **above 70 °C {158°F}**. • Drive the vehicle and read TP and MAF PIDs. • Verify PID readings are within specifications MAF PID: **above 32.0 g/s {4.2 lb/min}** TP PID: **above 12.5% above 5 s** • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to Step 17.
		No	Go to Step 17.
12	**INSPECT TP SENSOR TERMINALS FOR ELECTRICAL CORROSION** • Turn the ignition switch off. • Disconnect TP sensor connector. • Inspect for electrical corrosion on male and female TP sensor terminals. • Is any electrical corrosion found?	Yes	Repair or replace the terminal or TP sensor, then go to Step 16.
		No	Go to the next step.
13	**INSPECT GROUND CIRCUIT FOR VOLTAGE DROP**	Yes	Go to the next step.
		No	Inspect the PCM terminal 2AA (wiring harness-side) for rust or corrosion.

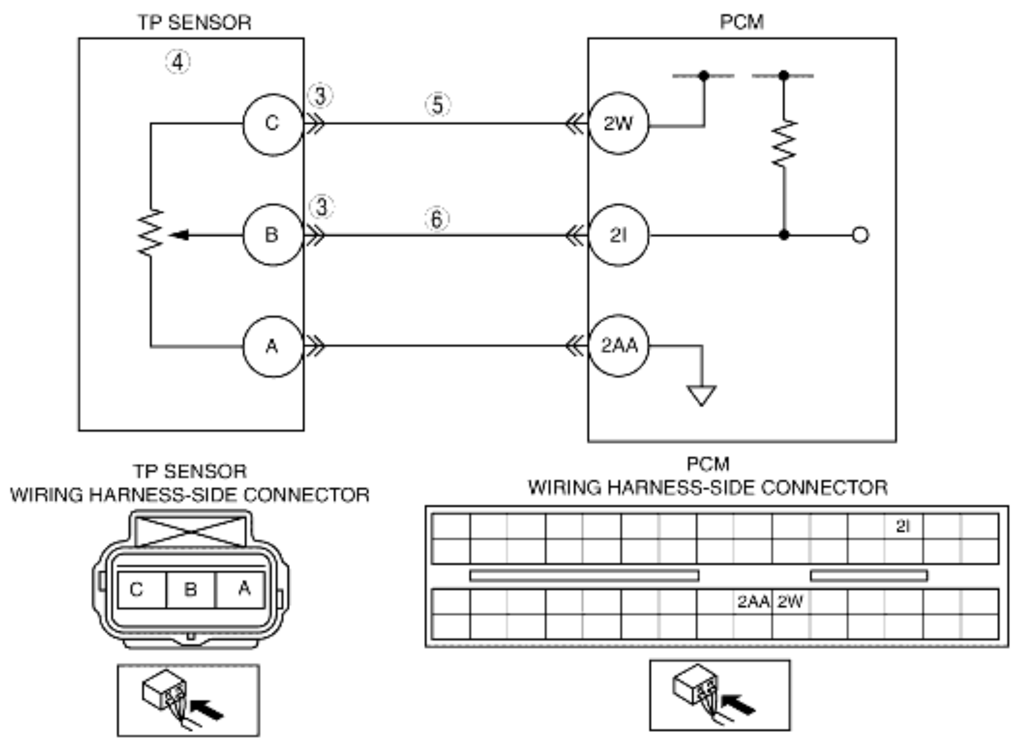
	• Inspect the resistance between TP sensor terminal A (wiring harness-side) and body ground. • Is the resistance **approx. 0 ohm** ?		• Repair or replace the terminal. Go to Step 16.
14	**VERIFY TP SENSOR** • Does resistance smoothly change while gradually opening throttle valve?	Yes	Go to the next step.
		No	Replace the TP sensor, then go to Step 16.
15	**INSPECT PCM TERMINALS FOR ELECTRICAL CORROSION** • Disconnect the PCM connector. • Inspect the PCM and PCM connector male and female terminals for electrical corrosion. • Is any electrical corrosion found?	Yes	Repair the terminal, then go to the next step.
		No	Go to the next step.
16	**VERIFY TROUBLESHOOTING OF DTC P0121 COMPLETED** • Make sure to reconnect all disconnected connectors. • Start the engine. • Clear the DTC from the PCM memory using the WDS or equivalent. • Access RPM, TP and MAF PIDs using WDS or equivalent. • Verify TP PID reading is **below 50%** while MAF PID is **below 4.8 g/s {0.6 lb/min}** and RPM PID is **above 500 rpm**. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
17	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0122 [LF]

B3E010201084W16

DTC P0122	TP sensor circuit low input
DETECTION CONDITION	• If the PCM detects the TP sensor voltage at PCM terminal 2I is **below 0.1 V** while the engine running to on, the PCM determines that the TP circuit has malfunction. **Diagnostic support note**

	• This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction conditions in first drive cycles. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TP sensor malfunction • Connector or terminal malfunction • Open circuit in wiring harness between TP sensor terminal B and PCM terminal 2I • Short to ground in wiring harness between TP sensor terminal B and PCM terminal 2I • Open circuit in wiring harness between TP sensor terminal C and PCM terminal 2W



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.

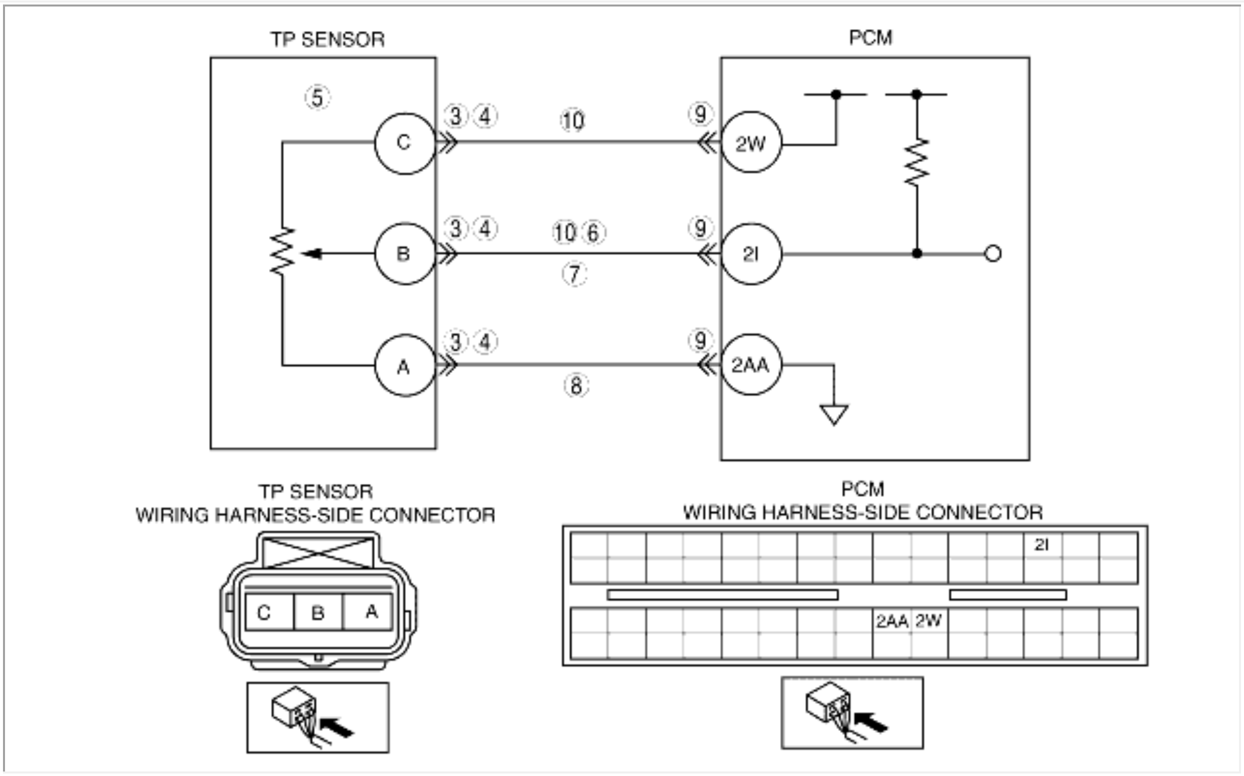
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**CLASSIFY TP SENSOR OR WIRING HARNESS MALFUNCTION** • Connect the WDS or equivalent. • Access the TP PID. • Disconnect the TP sensor connector. • Connect a jumper wire between TP sensor terminals B and C (wiring harness-side). • Is the voltage **above 4.9 V**?	Yes	Go to the next step.
		No	Go to step 5.
4	**INSPECT TP SENSOR** • Perform TP sensor inspection. (See THROTTLE POSITION (TP) SENSOR INSPECTION [LF].) • Is TP sensor normal?	Yes	Inspect TP sensor terminal C for poor connection. Repair or replace if necessary, then go to Step 7.
		No	Replace the TP sensor, then go to Step 7.
5	**INSPECT POWER SUPPLY CIRCUIT VOLTAGE AT TP SENSOR CONNECTOR** **Note** • If DTC P0107 and P2228 are also retrieved with P0122, go to CONSTANT VOLTAGE troubleshooting procedure. • Turn the ignition switch to the ON position (Engine off). • Inspect the voltage at TP sensor terminal C (wiring harness-side). • Is the voltage **within 4.5- 5.5 V**?	Yes	Go to the next step.
		No	Repair or replace open circuit in wiring harness between TP sensor connector terminal C and PCM terminal 2W (wiring harness-side). Then, go to Step 7.
6	**VERIFY TP SIGNAL CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between TP sensor terminal B (harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness, then go to Step 7.
		No	Go to the next step.
7		Yes	Replace the PCM, then go to the next step.

	VERIFY TROUBLESHOOTING OF DTC P0122 COMPLETED • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?		(See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0123 [LF]

B3E010201084W17

DTC P0123	TP sensor circuit high input
DETECTION CONDITION	• If the PCM detects the TP sensor voltage at PCM terminal 2I is **above 4.9 V** while the engine is running, the PCM determines that the TP circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • MIL illuminates if the PCM detects the above malfunction condition in first drive cycles. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TP sensor malfunction • Connector or terminal malfunction • Open circuit in wiring harness between TP sensor terminal A and PCM terminal 2AA • Short to constant voltage supply circuit in wiring harness between TP sensor terminal B and PCM terminal 2I



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT TP SENSOR CONNECTOR** • Turn the ignition switch off. • Verify that the TP sensor connector is connected securely. • Is connector normal?	Yes	Go to the next step.
		No	Connect the connector securely, then go to Step 11.
4	**INSPECT POOR CONNECTION OF TP SENSOR CONNECTOR** • Disconnect the TP sensor connector.	Yes	Repair or replace the terminal, then go to Step 11.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?		
5	**INSPECT TP SENSOR** • Perform TP sensor inspection. (See THROTTLE POSITION (TP) SENSOR INSPECTION [LF]) • Is TP sensor normal?	Yes	Go to the next step.
		No	Replace the TP sensor, then go to Step 11.
6	**INSPECT TP SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between terminal B and body ground. • Is the voltage **above 4.9 V**?	Yes	Repair or replace short to power supply. Then, go to Step 11.
		No	Go to the next step.
7	**VERIFY TP SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch off. • Inspect for continuity between TP sensor terminal B (wiring harness-side) and PCM terminal 2I. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness, then go to Step 11.
8	**VERIFY TP SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between TP sensor terminal A and body ground. • Is there continuity?	Yes	Repair or replace open circuit in wiring harness between TP sensor terminal A (wiring harness-side) and PCM terminal 2AA (wiring harness-side). Then, go to Step 11.
		No	Go to the next step.
9	**INSPECT PCM CONNECTOR** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair terminal, then go to Step 11.
		No	Go to Step 11.
10	**VERIFY TP SIGNAL CIRCUIT FOR SHORT TO CONSTANT VOLTAGE CIRCUIT** • Inspect the continuity between TP sensor terminals B and C.	Yes	Repair or replace the wiring harness, then go to the next step.
		No	Go to the next step.

	• Is there continuity?		
11	**VERIFY TROUBLESHOOTING OF DTC P0123 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0125 [LF]

B3E010201084W18

DTC P0125	Excessive time to enter closed loop fuel control
DETECTION CONDITION	• The PCM monitors the ECT sensor signal at PCM terminal 2AK after engine is started while the engine is cold. If the engine coolant temperature does not reach the expected temperature for specified period, the PCM determines that it has taken an excessive amount of time for the engine coolant temperature to reach the temperature necessary to start closed-loop fuel control. **Diagnostic support note** • This is a continuous monitor (CCM). • MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• ECT sensor malfunction • Poor connection of connectors • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY CURRENT INPUT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT** • Start the engine. • Warm up the engine completely. • Access ECT PID using the WDS or equivalent. • Is ECT PID **above 60 °C {140 °F}**?	Yes	Intermittent concern exists. Go to INTERMITTENT CONCERNS TROUBLESHOOTING procedure. (See INTERMITTENT CONCERN TROUBLESHOOTING [LF].)
		No	Go to the next step.
4	**INSPECT POOR CONNECTION OF ECT SENSOR CONNECTOR** • Turn the ignition switch off. • Disconnect the ECT sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
5	**INSPECT ECT SENSOR** • Inspect the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [LF].) • Is it normal?	Yes	Go to the next step.
		No	Replace the ECT sensor, then go to Step 7.
6	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to the next step.
		No	Go to the next step.
7		Yes	Replace the PCM, then go to the next step.

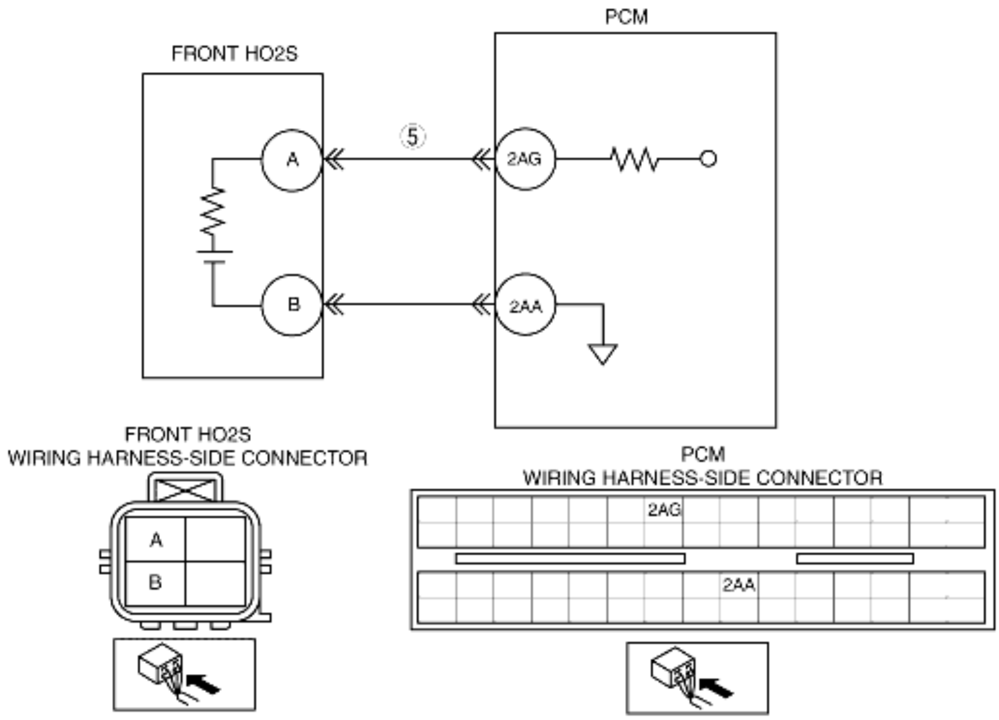
	VERIFY TROUBLESHOOTING OF DTC P0125 COMPLETED • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Turn the ignition switch to the ON position (Engine off). • Access ECT PID using the WDS or equivalent. • Wait until ECT PID **below 20 °C {68 °F}**. • Start the engine and warm it up completely. • Is the PENDING CODE for this DTC present?		(See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0132 [LF]

B3E010201084W19

DTC P0132	Front HO2S circuit high input
DETECTION CONDITION	• The PCM monitors the input voltage from the front HO2S. If the input voltage from the front HO2S sensor is **above 1.2 V** for **0.8 s**, the PCM determines that circuit input is high. **Diagnostic support note** • This is a continuous monitor (HO2S). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S malfunction • Short to power in wiring harness between front HO2S terminal A and PCM terminal 2AG

	• Front HO2S or PCM terminal shorted • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify pending code or stored DTCs using the WDS or equivalent. • Is other DTC present?	Yes	Go to the appropriate DTC troubleshooting procedures. (See DTC TABLE [LF].)
		No	Go to the next step.
4		Yes	Go to the next step.

	IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA • Is DTC P0132 on FREEZE FRAME DATA?	No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA. (See DTC TABLE [LF].)
5	**INSPECT FRONT HO2S SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch off. • Disconnect the front HO2S connector. • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between front HO2S terminal A (wiring harness-side) and body ground. • Is any voltage reading?	Yes	Replace the wiring harness short to power supply, then go to Step 7.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS** • Start the engine. • Access O2S12 PID using the WDS or equivalent. • Verify PID while racing the engine at least **10 times** in NEUTRAL. • Does PID remain **above 0.45 V**?	Yes	Repair or replace the sensor, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0132 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the memory using the WDS or equivalent. • Run HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0133 [LF]

B3E010201084W20

DTC P0133	Front HO2S circuit problem
DETECTION CONDITION	• The PCM monitors inversion cycle period, lean-to-rich response time and rich-to-lean response time of the sensor. The PCM calculates the average of the inversion cycle period-specified inversion cycles, average response time from lean-to-rich, and from rich-to-lean when following conditions are met. If any exceeds threshold, the PCM determines that circuit has malfunction. **MONITORING CONDITIONS** - HO2S heater, HO2S, and TWC Repair Verification Drive Mode - Following conditions are met: • Calculation load is **14.8-59.4 %** (at **2,000 rpm**). • Engine speed is **1,410- 4,000 rpm**. • Vehicle speed is above **3.76 km/h {2.33 mph}**. • Engine coolant temperature is **above -10 °C {14 °F}**. • Front HO2S signal inversion cycle is **above 10 cycles**. **Diagnostic support note** • This is an intermittent monitor. (OXYGEN SENSOR) • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • DIAGNOSTIC MONITORING TEST RESULTS is available. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S deterioration • Front HO2S malfunction • Looseness front HO2S • Pressure regulator (built-in fuel pump unit) malfunction • Fuel pump malfunction • Fuel filter (built-in fuel pump unit) clogged or restricted • Fuel leakage on fuel line from fuel distribution pipe and fuel pump • Leakage exhaust system • Purge solenoid valve malfunction • Purge solenoid hoses improper connection • Insufficient compression • Engine malfunction (Leakage engine coolant)

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING AND STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify pending and /or stored DTCs using the WDS or equivalent. • Is DTC P0443 also present?	Yes	Go to DTC P0443 troubleshooting procedures, then go to Step 13.
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P0133 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA. (See DTC TABLE [LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Warm up the engine. • Access O2S11 PID using WDS or equivalent. • Inspect PID under following accelerator pedal conditions in NEUTRAL. • Is PID normal? - **More than 0.55 V** when suddenly depress accelerator pedal (rich condition). - **Less than 0.55 V** just after release of accelerator pedal (lean condition).	Yes	Go to step 8.
		No	Go to the next step.
6	**INSPECT INSTALLATION OF FRONT HO2S** • Inspect if the front HO2S is loosely installed.	Yes	Go to the next step.
		No	Retighten the sensor, then go to Step 13.

	• Is the sensor installed securely?		
7	**INSPECT GAS LEAKAGE FROM EXHAUST SYSTEM** • Visually inspect if there is any gas leakage is found between the exhaust manifold and front HO2S. • Is there gas leakage?	Yes	Repair or replace malfunctioning faulty exhaust part, then go to Step 13.
		No	Replace sensor, then go to Step 13.
8	**INSPECT LONG TERM FUEL TRIM** • Access LONGFT1 PIDs • Compare it with FREEZE FRAME DATA recorded at Step 1. • Is it below FFD value?	Yes	Engine is driven under rich condition. Go to the next step.
		No	Engine is driven under lean condition. Go to step 10.
9	**INSPECT FUEL LINE PRESSURE (Excessive fuel line pressure)** • Turn the ignition switch off. • Inspect fuel line pressure. (See FUEL LINE PRESSURE INSPECTION.) • Is the fuel line pressure normal?	Yes	Go to step 12.
		No	Inspect fuel pump maximum pressure and fuel return pipe for clogging. (See FUEL PUMP UNIT INSPECTION.) • If there is any problem, repair or replace the parts. • If all items above are normal, replace fuel pump unit. Then go to Step 13.
10	**INSPECT FUEL LINE PRESSURE (Low fuel line pressure)** • Turn the ignition switch off. • Inspect fuel line pressure. (See FUEL LINE PRESSURE INSPECTION.) • Is fuel line pressure normal?	Yes	Go to step 12.
		No	Go to the next step.
11	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect the fuel line for any leakage. • Is there any fuel leakage?	Yes	Replace the fuel line, then go to Step 13.
		No	Inspect the fuel filters for the following: • Foreign materials or stain inside fuel filter (low-pressure side) Perform the following actions according to the result. • If foreign material or stain is found inside fuel filter (low-pressure side), clean the fuel tank and filter. • If normal, replace fuel pump unit.

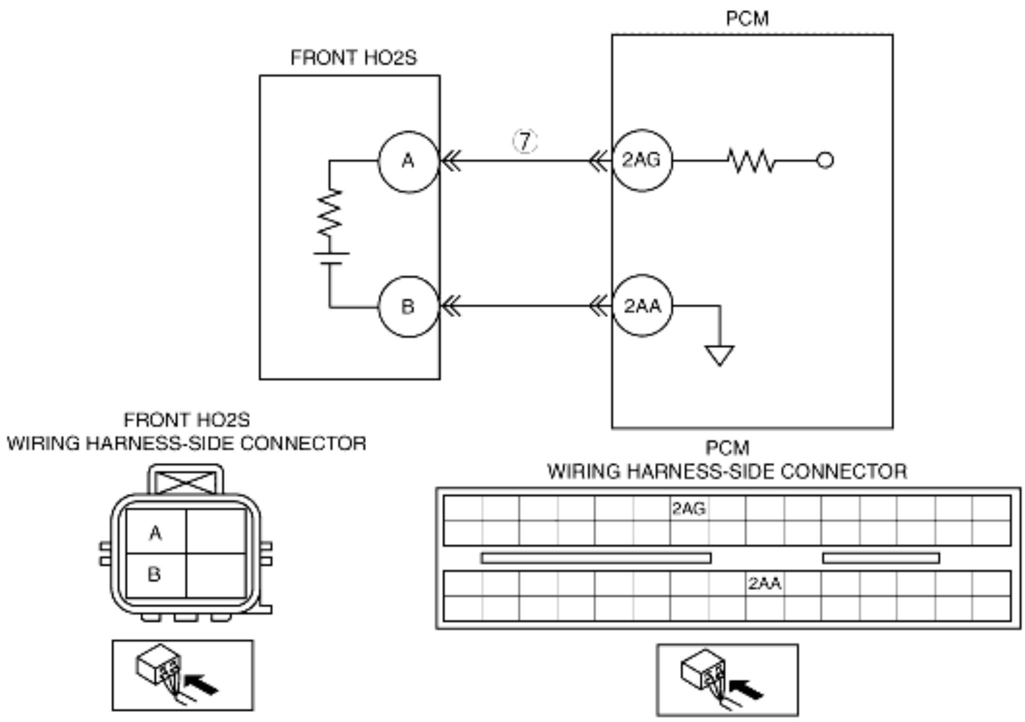
			Then go to Step 13.
12	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** • Perform inspection engine coolant leakage. (See ENGINE COOLANT LEAKAGE INSPECTION.) • Is there any malfunction?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to inspection result. Then go to the next step.
13	**VERIFY TROUBLESHOOTING OF DTC P0133 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the memory using WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0134 [LF]

B3E010201084W21

DTC P0134	Front HO2S no activity detected
DETECTION CONDITION	• The PCM monitors the input voltage from the front HO2S when the following conditions are met. If the input voltage from the sensor never **exceeds 0.55 V** for **83.2 s**, the PCM determines that sensor circuit is not activated. **MONITORING CONDITIONS** - HO2S, HO2S heater and TWC Repair Verification Drive Mode - Following conditions are met • Engine speed is **above 1,500 rpm**. • Engine coolant temperature is **above 70 °C {158 °F}**. **Diagnostic support note**

	• This is a continuous monitor (HO2S). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S deterioration • Front HO2S heater malfunction • Leakage exhaust system • Open circuit or short to ground in wiring harness t between front HO2S terminal A and PCM terminal 2AG • Insufficient compression • Engine malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.

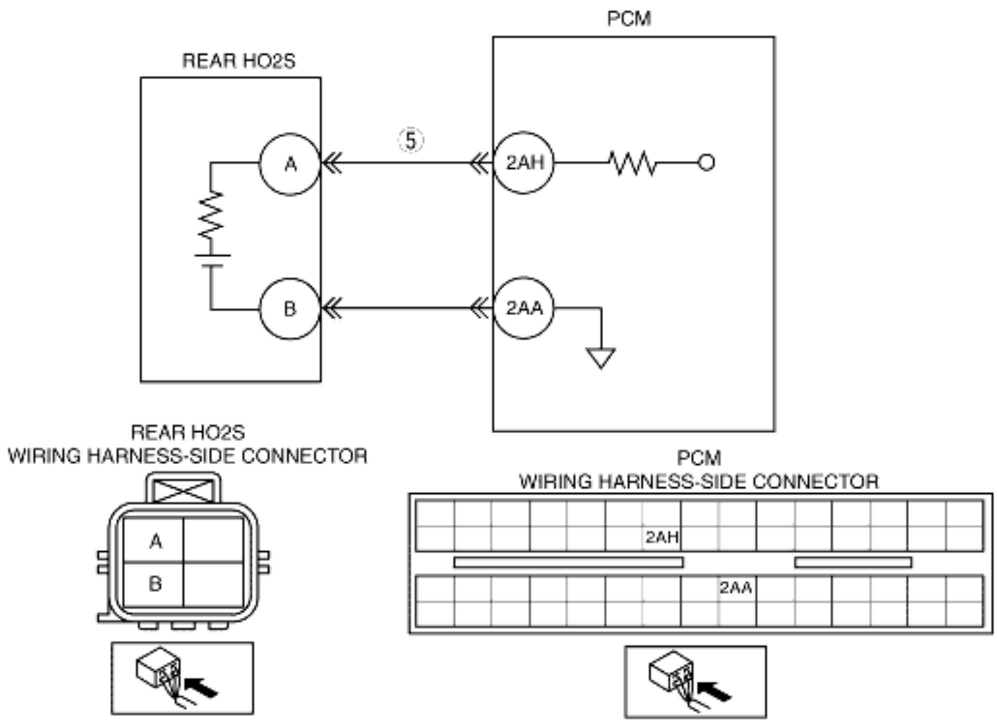
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING AND STORED DTC** **Note** • If fuel monitor DTC, DTC P0132 is retrieved, ignore it until P0134 is fixed. • Turn the ignition switch off, then to the ON position (Engine off). • Verify pending and stored DTCs using the WDS or equivalent. • Is other DTC present?	Yes	Go to the appropriate DTC troubleshooting procedures.
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P0134 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA. (See DTC TABLE [LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Warm up engine. • Access O2S11 PID using WDS or equivalent. • Verify PID while racing engine in NEUTRAL. • Is PID normal? - **More than 0.55 V** when suddenly depressing accelerator pedal (rich condition) - **Less than 0.55 V** just after releasing the of accelerator pedal (lean condition)	Yes	Go to step 8.
		No	Go to the next step.
6	**INSPECT INSTALLATION OF FRONT HO2S** • Inspect if the front HO2S is loosely installed. • Is the sensor installed securely?	Yes	Go to the next step.
		No	Install sensor securely, then go to Step 10.

7	**INSPECT GAS LEAKAGE FROM EXHAUST SYSTEM** • Visually inspect if the re is any gas leakage between the exhaust manifold and front HO2S. • Is there gas leakage?	Yes	Repair or replace any malfunctioning exhaust part, then go to Step 10.
		No	• Inspect the following harnesses for open circuit or short to ground, repair or replace wiring harness if necessary. - Front HO2S terminal A (wiring harness-side) to PCM terminal 2AG (wiring harness-side) • Repair or replace wiring harness if necessary. • If all items above are normal, replace malfunctioning sensor. Then go to Step 10.
8	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** • Perform the ENGINE COOLANT LEAKAGE INSPECTION. (See ENGINE COOLANT LEAKAGE INSPECTION.) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to inspection results, then go to Step 10.
		No	Go to the next step.
9	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [LF].) • Is it normal?	Yes	Go to the next step.
		No	Perform engine overhaul for repairs, then go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P0134 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from memory using the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0138 [LF]

B3E010201084W22

DTC P0138	Rear HO2S circuit high input
DETECTION CONDITION	• The PCM monitors input voltage from rear HO2S. If the input voltage from the rear HO2S sensor is **above 1.2 V** for **0.8 s**, the PCM determines that circuit input is high. **Diagnostic support note** • This is a continuous monitor (HO2S). • MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Rear HO2S malfunction • Short to power supply in wiring harness between rear HO2S terminal A and PCM terminal 2AH • Rear HO2S or PCM terminal shorted • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify pending code or stored DTCs using WDS or equivalent. • Is other DTC present?	Yes	Go to the appropriate DTC troubleshooting procedures. (See DTC TABLE [LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P0138 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA. (See DTC TABLE [LF].)
5	**INSPECT REAR HO2S SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch off. • Disconnect rear HO2S connector. • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between rear HO2S terminal A (wiring harness-side) and body ground. • Is any voltage reading?	Yes	Replace short to power supply, then go to Step 7.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS** • Start engine. • Access O2S12 PID using WDS or equivalent. • Verify PID while racing engine at least **10 times** in NEUTRAL. • Does PID stay **above 0.55 V**?	Yes	Repair or replace sensor, then go to the next step.
		No	Go to the next step.
7		Yes	Replace the PCM, then go to the next step.

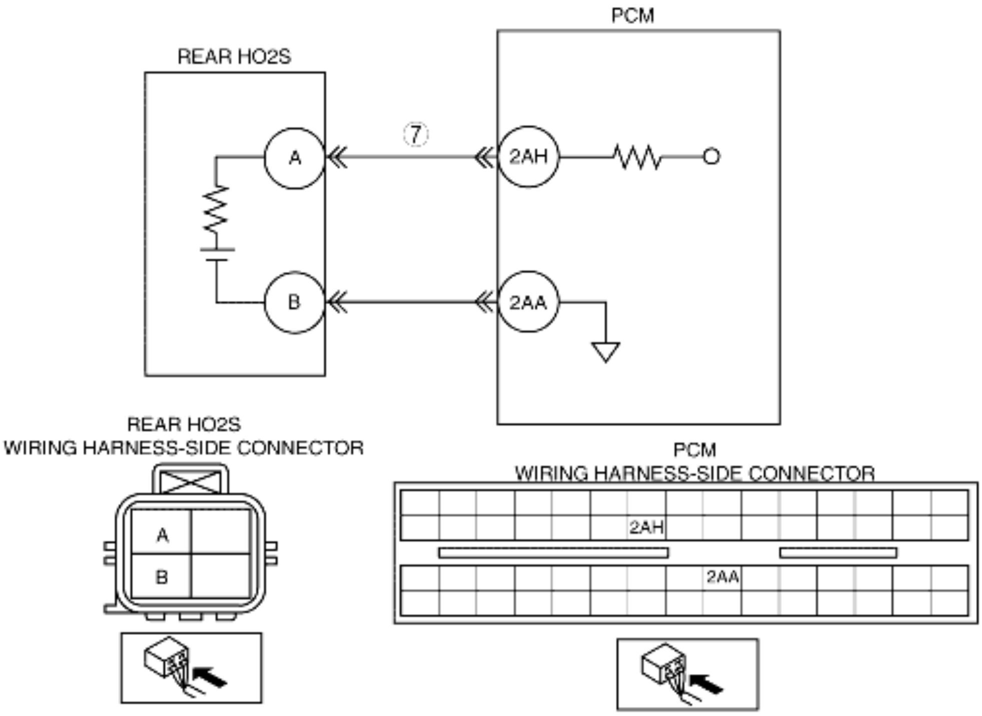
	VERIFY TROUBLESHOOTING OF DTC P0138 COMPLETED • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the memory using the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?		(See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0140 [LF]

B3E010201084W23

DTC P0140	Rear HO2S no activity detected
DETECTION CONDITION	• The PCM monitors the input voltage from the rear HO2S when the following conditions are met. If the input voltage from the sensor never **exceeds 0.55 V** for **30.4 s**, the PCM determines that the sensor circuit is not activated. **MONITORING CONDITIONS** - HO2S, HO2S heater and TWC Repair Verification Drive Mode - Following conditions are met: • Engine speed is **above 1,500 rpm**. • Engine coolant temperature is **above 70 °C {158 °F}**. **Diagnostic support note** • This is a continuous monitor (HO2S). • MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.

POSSIBLE CAUSE	• Rear HO2S deterioration • Rear HO2S heater malfunction • Leakage exhaust system • Open circuit or short to ground in wiring harness between rear HO2S terminal A and PCM terminal 2AH • Insufficient compression • Engine malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING AND STORED DTC**	Yes	Go to the appropriate DTC troubleshooting procedures. (See DTC TABLE [LF].)

	Note • If fuel monitor DTC, DTC P0132 is retrieved, ignore it until P0140 is fixed. • Turn the ignition switch off, then to the ON position (Engine off). • Verify pending and stored DTCs using WDS or equivalent. • Is other DTC present?	No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P0140 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA. (See DTC TABLE [LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Warm up the engine. • Access O2S12 for P0140 PID using the WDS or equivalent. • Verify PID while racing the engine at least **10 times** in NEUTRAL. • Is PID reading normal? - **More than 0.55 V** at least once during engine racing	Yes	Go to step 8.
		No	Go to the next step.
6	**INSPECT INSTALLATION OF REAR HO2S** • Check if rear HO2S is loosely installed. • Is sensor installed securely?	Yes	Go to the next step.
		No	Install sensor securely, then go to Step 10.
7	**INSPECT GAS LEAKAGE FROM EXHAUST SYSTEM** • Visually check if any gas leakage is found between exhaust pipe and rear HO2S. • Is there any gas leakage?	Yes	Repair or replace any malfunctioning exhaust part, then go to Step 10.
		No	• Inspect the following wiring harnesses for open or short to ground circuit, repair or replace wiring harness if necessary. - Rear HO2S terminal A (wiring harness-side) to PCM terminal 2AH (wiring harness-side) • Repair or replace wiring harness if necessary. • If all items above are normal, replace malfunctioning sensor. Then go to Step 10.

8	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** **Warning** • Removing the radiator cap when the radiator is hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. • When removing the radiator cap, wrap a thick cloth around and turn it slowly. • Remove radiator cap. • Perform procedure to bleed air from the engine coolant, then run the engine at idle. • Is there any small bubble, which makes the engine coolant white at filling opening? **Note** • Large bubbles are normal since they are remaining air coming out from the engine coolant passage.	Yes	Air gets in from poor sealing on head gasket or other areas between combustion chamber and engine coolant passage. Repair or replace the malfunctioning part, then go to Step 10.
		No	Go to the next step.
9	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [LF].) • Is it normal?	Yes	Go to the next step.
		No	Perform engine overhaul for repairs, then go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P0140 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the memory using the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0300 [LF]

B3E010201085W01

DTC P0300	Random misfire detected
DETECTION CONDITION	• The PCM monitors CKP sensor input signal interval time. The PCM calculates change of interval time for each cylinder. If change of interval time exceeds preprogrammed criteria, the PCM detects misfire in the corresponding cylinder. While the engine is running, the PCM counts number of misfires that occurred at **200 crankshaft revolutions** and **1,000 crankshaft revolutions** and calculates misfire ratio for each crankshaft revolution. If the ratio exceeds the preprogrammed criteria, the PCM determines that a misfire, which can damage catalytic converter or affect emission performance, has occurred. **Diagnostic support note** • This is a continuous monitor (MISFIRE). • MIL illuminates if the PCM detects the misfire which affects emission performance in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • The MIL flashes if the PCM detects the misfire which can damage the catalytic converter during first drive cycle. Therefore, PENDING CODE is not available while the MIL flashes. • PENDING CODE is available if the PCM detects the misfire which affects emission performance during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• CKP sensor malfunction • CMP sensor malfunction • Ignition coil malfunction • Erratic signal to ignition coil • Spark plug malfunction • MAF sensor contamination • Excess air suction in intake air system (between MAF sensor and intake manifold) • Fuel pump malfunction • Fuel pressure regulator (built-in fuel pump unit) malfunction • Fuel line clogged • Fuel filter clogged • Fuel leakage in fuel line • Fuel runout • Poor quality fuel • Purge control solenoid valve malfunction

	• PCV valve malfunction • EGR valve malfunction • Vacuum hoses damages or improper connection • Related connector and terminal malfunction • Related wiring harness malfunction • Insufficient compression

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify related pending code or stored DTCs. • Are other DTCs present?	Yes	Go to the appropriate DTC troubleshooting. (See DTC TABLE [LF].)
		No	Go to the next step.
4	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access BOO, ECT, IAT, MAF, RPM, TP, and VSS PIDs using WDS or equivalent. (See PCM INSPECTION [LF].) • Is there any signal that is far out of specification when the ignition switch is turned to the ON position and the engine idles?	Yes	Inspect suspected circuit and/or part according to inspection results. (See PCM INSPECTION [LF].) Then go to Step 21.
		No	Go to the next step.
5	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION**	Yes	Inspect suspected circuit and/or part according to inspection results. (See PCM INSPECTION [LF].)

	• Inspect the same PIDs as in Step 4 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?		Then go to Step 21.
		No	Go to the next step.
6	**INSPECT CMP SENSOR** • Inspect CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [LF].) • Is CMP sensor normal?	Yes	Go to the next step.
		No	Inspect installation condition and damages on timing belt and gears, repair the malfunctioning part. • If it is normal, replace the CMP sensor. Then go to Step 21.
7	**VERIFY CKP SENSOR INSTALLATION CONDITION** • Inspect for CKP sensor looseness. • Is CKP sensor loosen?	Yes	Retighten the CKP sensor, then go to Step 21.
		No	Go to the next step.
8	**INSPECT IGNITION COIL WIRING HARNESSES** • 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, then go to Step 21.
9	**INSPECT IGNITION SYSTEM OPERATION** • Turn the ignition switch off. • Perform spark test. (See Spark Test.) • 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. Then go to Step 21.
10	**INSPECT POWER SUPPLY TERMINAL AT IGNITION COIL CONNECTOR** • Disconnect the ignition coil connector. • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between ignition coil terminal A (wiring harness-side) and body ground. • Is the voltage reading **B+**?	Yes	Go to the next step.
		No	Inspect for open circuit in wiring harness between ignition coil terminal A and ignition switch. Repair or replace the wiring harness, then go to Step 21.
11	**INSPECT IGNITION COIL RESISTANCE** • Inspect ignition coil resistance.	Yes	Go to step 21.
		No	Replace the ignition coil, then go to Step 21.

	(See IGNITION COIL INSPECTION [LF].) • Is coil resistance normal?		
12	**INSPECT MAF PID** • Start the engine. • Access MAF PID using the WDS or equivalent. • Race the engine and verify that MAF PID changes quickly according to change in the engine speed. • Is MAF PID response normal?	Yes	Go to the next step.
		No	Replace the MAF sensor, then go to Step 21.
13	**INSPECT EXCESSIVE AIR SUCTION IN INTAKE AIR SYSTEM** • Inspect for air leakage at following: - Between the MAF sensor and throttle body - Between throttle body and intake manifold • Is there any malfunction?	Yes	Repair or replace suspected part, then go to Step 21.
		No	Go to the next step.
14	**INSPECT FUEL LINE PRESSURE** • Inspect fuel line pressure. (See FUEL LINE PRESSURE INSPECTION.) • Is fuel line pressure normal?	Yes	Go to step 16.
		No	If the fuel line pressure is too low, go to the next step. If the fuel line pressure is excess high, replace the fuel pump unit, then go to Step 21.
15	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect fuel line for fuel leakage. • Is there any fuel leakage?	Yes	Replace suspected fuel line, then go to Step 21.
		No	Inspect fuel filters for following: • Foreign materials or stain inside fuel filter (low-pressure side) Perform following actions depend on the result above. • If foreign materials or stain is found inside fuel filter (low-pressure side), clean the fuel tank and filter (low-pressure side). • If normal, replace the fuel pump unit. Then, go to Step 21.
16	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [LF].)	Yes	Go to the next step.
		No	Perform engine overhaul for repairs, then go to Step 21.

	• Is it normal?		
17	**INSPECT OPERATION OF PURGE CONTROL SOLENOID VALVE** • Turn the ignition switch off. • Connect the vacuum pump to purge control solenoid valve and apply vacuum to solenoid. • Verify that solenoid holds vacuum. • Turn the ignition switch to the ON position (Engine off). • Access EVAPCP PID in SIMULATION TEST using the WDS or equivalent. • Set duty value to **100%** for EVAPCP PID. • Apply vacuum while turning solenoid from OFF to ON and simulating EVAPCP PID with **100%** duty value. • Verify that solenoid releases vacuum while solenoid is turned ON. • Is purge control solenoid valve operation normal?	Yes	Go to the next step.
		No	Replace the purge control solenoid valve, then go to Step 21.
18	**INSPECT PCV VALVE OPERATION** • Turn the ignition switch off. • Remove PCV valve and inspect valve operation. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION.) • Is PCV valve operation normal?	Yes	Replace the PCV valve, then go to Step 21.
		No	Go to the next step.
19	**INSPECT OPERATION OF EGR VALVE** • Remove the EGR valve. • Visually inspect the EGR valve for stuck to open. • Is EGR valve stuck to open?	Yes	Repair or replace the EGR valve, then go to Step 21.
		No	Go to the next step.
20	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** • Perform engine coolant leakage inspection. (See ENGINE COOLANT LEAKAGE INSPECTION.) • Is there any malfunction?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to inspection result. Then go to the next step.

21	**VERIFY TROUBLESHOOTING OF MISFIRE DTC COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the memory using the WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
22	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0301, P0302, P0303, P0304 [LF]

B3E010201085W02

DTC P0301 **DTC P0302** **DTC P0303** **DTC P0304**	**Cylinder No.1 misfire detected** **Cylinder No.2 misfire detected** **Cylinder No.3 misfire detected** **Cylinder No.4 misfire detected**
DETECTION CONDITION	• The PCM monitors CKP sensor input signal interval time. The PCM calculates the change of interval time for each cylinder. If the change of interval time exceeds the preprogrammed criteria, the PCM detects a misfire in the corresponding cylinder. While the engine is running, the PCM counts number of misfires that occurred at **200 crankshaft revolutions** and **1,000 crankshaft revolutions** and calculates misfire ratio for each crankshaft revolution. If the ratio exceeds the preprogrammed criteria, the PCM determines that a misfire, which can damage catalytic converter or affect emission performance, has occurred. **Diagnostic support note** • This is a continuous monitor (MISFIRE). • The MIL illuminates if the PCM detects the misfire which affects emission performance in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • The MIL flashes if the PCM detects the misfire which can damage the catalytic converter during first drive cycle. Therefore, PENDING CODE is not available while the MIL flashes.

	• PENDING CODE is available if the PCM detects the misfire which affects emission performance during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Spark plug malfunction • Erratic signal to ignition coil • Fuel injector malfunction • Air suction in intake air system (between dynamic chamber and cylinder head) • Inadequate engine compression due to engine internal malfunction • Related connector or terminal malfunction • Related wiring harness malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify related pending code or stored DTCs. • Is other DTCs present?	Yes	Go to the appropriate DTC troubleshooting. (See DTC TABLE [LF].)
		No	Go to the next step.
4	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON /IDLE)** • Access BOO, ECT, IAT, MAF, RPM, TP and VSS PIDs using WDS or equivalent. (See PCM INSPECTION [LF].) • Is there any signal that is far out of specification when ignition switch is turned to the ON position and engine idles?	Yes	Inspect suspected circuit and/or part according to inspection results. Then go to Step 13. (See PCM INSPECTION [LF].)
		No	Go to the next step.

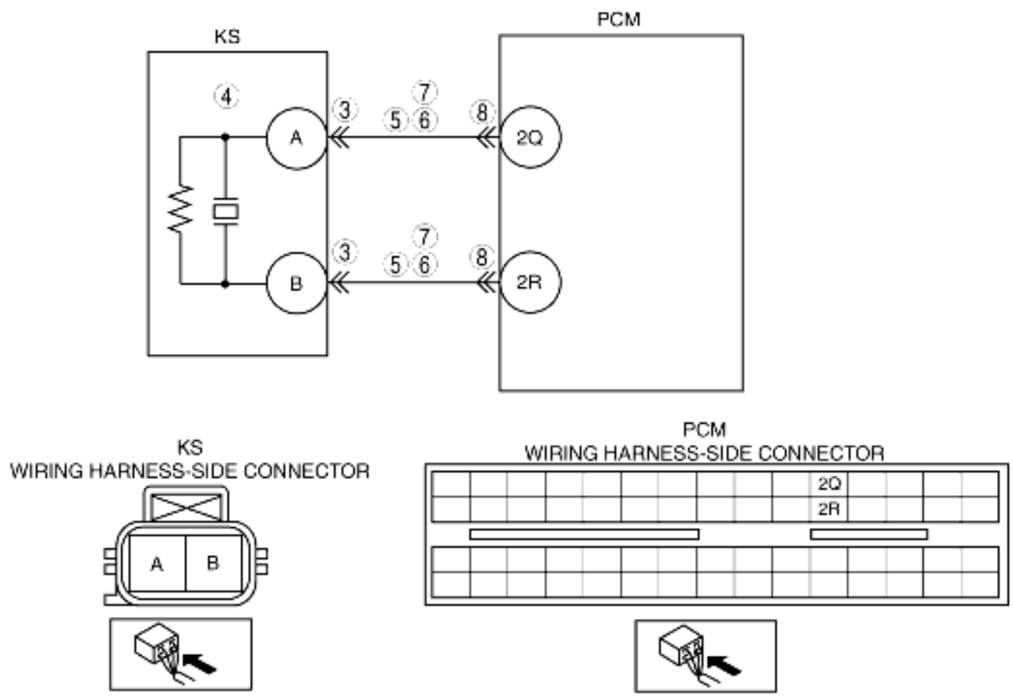
5	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect same PIDs as in Step 4 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect suspected circuit and/or part according to inspection results. Then go to Step 13. (See PCM INSPECTION [LF].)
		No	Go to the next step.
6	**INSPECT SPARK PLUG CONDITION** • Turn the ignition switch off. • Remove spark plug from suspected cylinder. • Inspect spark plug condition: - Cracks - Excess wear - Gap - Wet • Is any problem found on spark plug?	Yes	• If spark plug is wet, fuel flooding is suspected. Go to step 13. • If spark plug has a cracks, excessive wear or improper gap, replace the malfunctioning spark plug. Then go to Step 13.
		No	Go to the next step.
7	**INSPECT IGNITION COIL WIRING HARNESSES** • 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, then go to Step 13.
8	**INSPECT FOR AIR SUCTION AT INTAKE-AIR SYSTEM** • Inspect for air leakage at following: - Around connection of dynamic chamber and intake manifold - Around connection of intake manifold and cylinder head • Is air leakage found?	Yes	Repair or replace suspected part, then go to Step 13.
		No	Go to the next step.
9	**INSPECT FUEL INJECTOR WIRING HARNESS** • Remove intake air system parts. • Disconnect the fuel injector connector on suspected cylinder. • Connect NOID LIGHT to fuel injector terminals. • Inspect dim of light during cranking. • Does noid light illuminate?	Yes	Go to the next step.
		No	Inspect for fuel injector wiring harnesses. Repair or replace it if necessary, then go to Step 13.

10	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** • Perform ENGINE COOLANT LEAKAGE INSPECTION. (See ENGINE COOLANT LEAKAGE INSPECTION.) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to inspection result. Then go to Step 13.
		No	Go to the next step.
11	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [LF].) • Is engine compression normal?	Yes	Go to the next step.
		No	Overhaul the engine, then go to Step 13.
12	**INSPECT FUEL INJECTOR OPERATION** • Remove the fuel injector from suspected cylinder. • Switch the injector with the injector on other cylinder. • Start the engine and idle it. • Is misfire DTC for cylinder which has a suspected fuel injector?	Yes	Replace the injector, then go to the next step.
		No	Go to the next step.
13	**VERIFY TROUBLESHOOTING OF MISFIRE DTC COMPLETED** • Make sure to reconnect all disconnected connectors. • Start the engine. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0327 [LF]

B3E010201085W03

DTC P0327	KS circuit low input
DETECTION CONDITION	• The PCM monitors input signal from the KS when the engine is running. If the input voltage at PCM terminals between 2Q and 2R is **below 0.9 V**, the PCM determines that the KS circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• KS malfunction • Connector or terminal malfunction • Open circuit or short to ground in wiring harness between KS connector terminal A and PCM terminal 2Q • Open circuit or short to ground in wiring harness between KS connector terminal B and PCM terminal 2R • Short KS two wires



Diagnostic procedure

STEP	INSPECTION		ACTION
1		Yes	Go to the next step.

	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT KS CONNECTOR TERMINAL** • Turn the ignition switch off. • Disconnect the KS connector. • Inspect for poor connection at terminals A and B (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT KS** • Perform KS inspection. (See KNOCK SENSOR (KS) INSPECTION [LF]) • Is KS normal?	Yes	Go to the next step.
		No	Replace the KS, then go to Step 9.
5	**INSPECT KS CIRCUITS FOR OPEN CIRCUIT** • Disconnect the PCM connector. • Inspect for continuity between the following terminals: - KS female terminal A (wiring harness-side) and PCM terminal 2Q (wiring harness-side) - KS female terminal B (wiring harness-side) and PCM terminal 2R (wiring harness-side) • Are there continuities?	Yes	Go to the next step.
		No	Repair or replace the wiring harness, then go to Step 9.
6	**INSPECT KS CIRCUITS FOR SHORT TO GROUND** • Inspect the continuity between following terminals: - KS female terminal A (wiring harness-side) and body ground - KS female terminal B (wiring harness-side) and body ground	Yes	Repair or replace suspected wiring harness, then go to Step 9.
		No	Go to the next step.

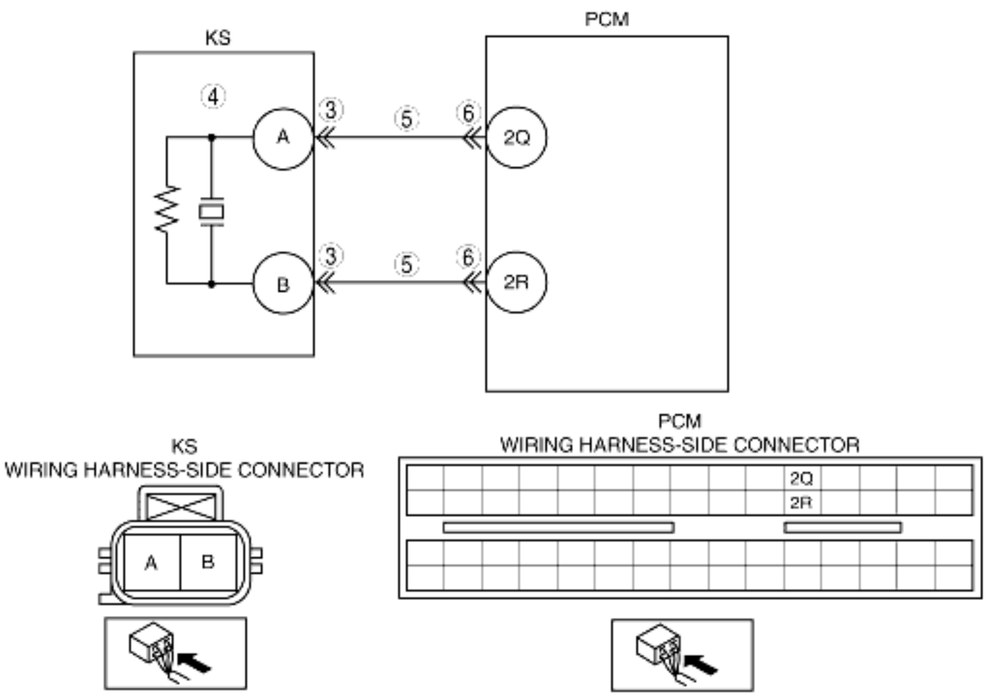
	• Are there continuities?		
7	**INSPECT FOR SHORT CIRCUITS** • Inspect for continuity between KS female terminals A and B (wiring harness-side). • Is there continuity?	Yes	Repair or replace the wiring harness, then go to Step 9.
		No	Go to the next step.
8	**INSPECT PCM CONNECTOR TERMINAL** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection at terminals 2Q and 2R (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair terminal, then go to Step 9.
		No	Go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0327 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0328 [LF]

B3E010201085W04

DTC P0328	KS circuit high input
DETECTION CONDITION	• The PCM monitors the input signal from the KS when the engine is running. If the input voltage at PCM terminals between 2Q and 2R is **above 4.9 V**, the PCM determines that KS circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • MIL illuminates if the PCM detects the above malfunction conditions during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition.

	• FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• KS malfunction • Connector or terminal malfunction • Short to power supply in wiring harness between KS terminal A and PCM terminal 2Q • Short to power supply in wiring harness between KS terminal B and PCM terminal 2R



Diagnostic procedure

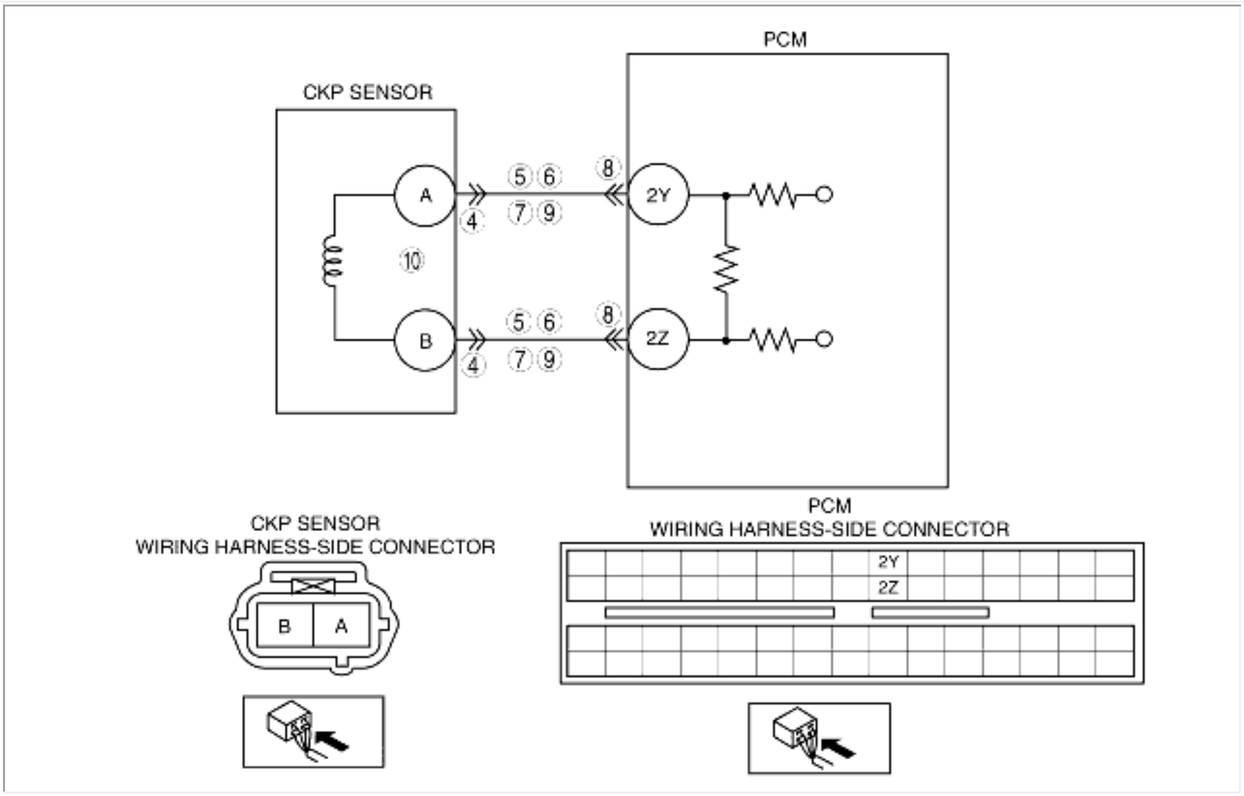
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT KS CONNECTOR TERMINAL** • Turn the ignition switch off.	Yes	Repair the terminal, then go to step 7.
		No	Go to the next step.

	• Disconnect KS connector. • Inspect for poor connection at terminals A and B (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?		
4	**INSPECT KS** • Perform KS inspection. (See KNOCK SENSOR (KS) INSPECTION [LF]) • Is the KS normal?	Yes	Go to the next step.
		No	Replace the KS, then go to step 7.
5	**INSPECT KNOCK SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between KS terminal A (wiring harness-side) and body GND and KS terminal B (wiring harness-side) and body GND? • Is any voltage reading?	Yes	Repair or replace wiring harness for short to power supply, then go to step 7.
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR** • Disconnect PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0328 COMPLETED** • Make sure to connect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0335 [LF]

B3E010201085W05

DTC P0335	CKP sensor circuit problem
DETECTION CONDITION	• If the PCM does not receive input voltage from the CKP sensor for **4.2 s** while MAF is **2.0 g/s {0.26 lb/min} or above**, the PCM determines that the CKP sensor circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • MIL illuminates if PCM detects the above malfunction conditions during first drive cycle. • PENDING CODE is available if PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• CKP sensor malfunction • Connector or terminal malfunction • CKP sensor is dirty • Short to power supply in wiring harness between CKP sensor terminal A to PCM terminal 2Y • Short to power supply in wiring harness between CKP sensor terminal B to PCM terminal 2Z • Short to ground in wiring harness between CKP sensor terminal A to PCM terminal 2Y • Short to ground in wiring harness between CKP sensor terminal B to PCM terminal 2Z • Open circuit in wiring harness between CKP sensor terminal A to PCM terminal 2Y • Open circuit in wiring harness between CKP sensor terminal B to PCM terminal 2Z • CKP sensor pulse wheel malfunction • Both CKP sensor wires are shorted each other



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY CKP SENSOR VOLTAGE** • Disconnect the CKP sensor connector. • Connect voltmeter between CKP sensor terminals A and B (sensor-side). • Inspect the voltage in AC range while cranking the engine. • Is any voltage reading?	Yes	Go to the next step.
		No	Go to Step 10.
4	**INSPECT POOR CONNECTION OF CKP SENSOR CONNECTOR**	Yes	Go to the next step.
		No	Reconnect the connector, then go to Step 11.

	• Verify that the CKP sensor connector is connected securely. • Is the connector normal?		
5	**INSPECT CKP CIRCUIT FOR SHORT TO POWER** • Turn the ignition switch to off. • Disconnect the CKP sensor connector. • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between following terminals - CKP sensor terminal A - CKP sensor terminal B • Is any voltage reading?	Yes	Repair or replace the wiring harness, then go to Step 11.
		No	Go to the next step.
6	**INSPECT CKP CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between following terminal and body ground: - CKP sensor terminal A (wiring harness-side) - CKP sensor terminal B (wiring harness-side) • Is there continuity?	Yes	Repair or replace the wiring harness, then go to Step 11.
		No	Go to the next step.
7	**INSPECT CKP CIRCUITS FOR SHORTS** • Inspect for continuity between CKP sensor terminals A and B (wiring harness-side). • Is there continuity?	Yes	Repair or replace the wiring harness, then go to Step 11.
		No	Go to the next step.
8	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair the terminal, then go to Step 11.
		No	Go to the next step.
9	**INSPECT CKP CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between following terminals:	Yes	Go to Step 11.
		No	Repair or replace the suspected wiring harness, then go to Step 11.

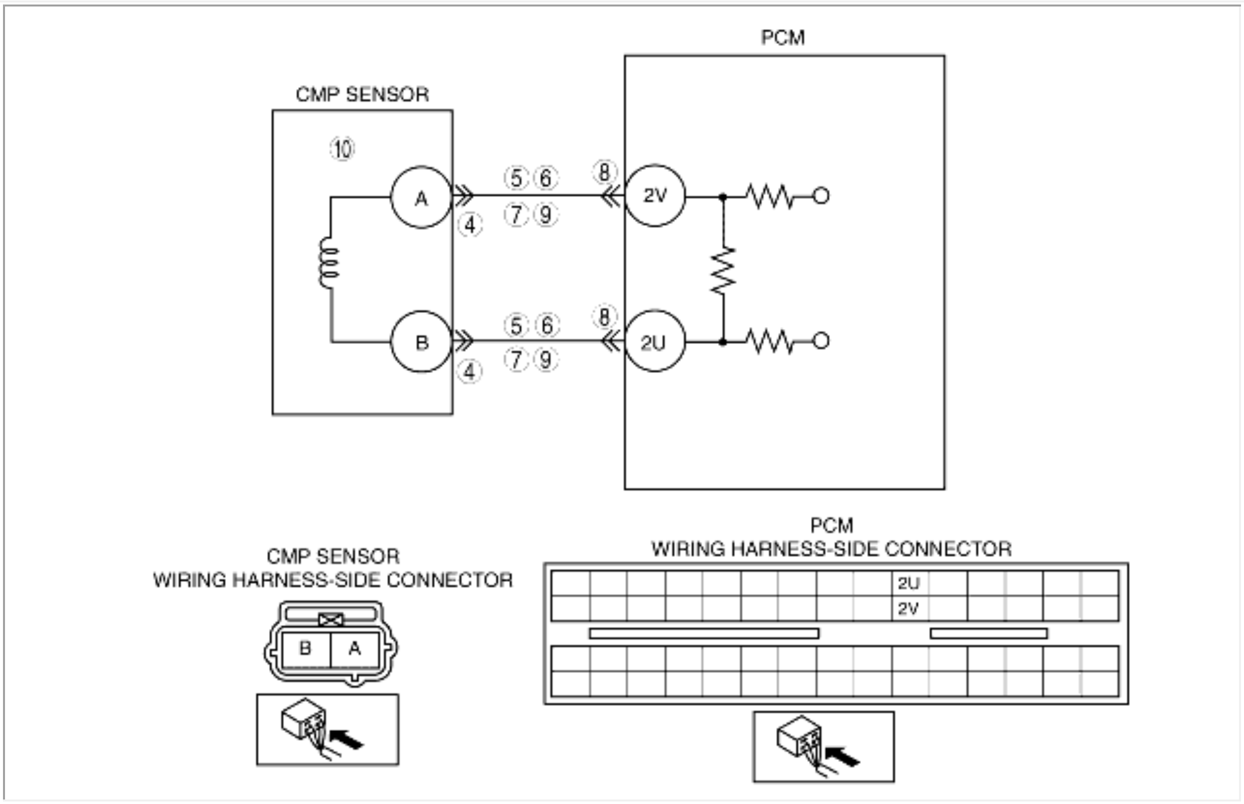
	- CKP sensor terminal A (wiring harness-side) and PCM terminal 2Y (wiring harness-side) - CKP sensor terminal B (wiring harness-side) and PCM terminal 2Z (wiring harness-side) • Is there continuity?		
10	**INSPECT CKP SENSOR** • Turn the ignition switch off. • Perform CKP sensor inspection. (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [LF]) • Is CKP sensor normal?	Yes	Go to the next step.
		No	Inspect the CKP sensor pulse wheel for damage. Replace the CKP sensor pulse wheel and go to the next step.
11	**VERIFY TROUBLESHOOTING OF DTC P0335 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the PCM memory using the WDS or equivalent. • Start engine. • Access MAF PID using the WDS or equivalent. **Note** • MAF PID should indicate **2.0 g/s {0.26 lb/min} or above** during this test • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0340 [LF]

B3E010201085W06

DTC P0340	**CMP sensor circuit problem**

DETECTION CONDITION	• The PCM monitors input voltage from CMP sensor when engine is running. If the PCM does not receive input voltage from CMP sensor while the PCM receives input signal from CKP sensor, PCM determines that CMP circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• CMP sensor malfunction • Connector or terminal malfunction • CMP sensor is dirty • Short to power supply in wiring harness between CMP sensor terminal A and PCM terminal 2V • Short to power supply in wiring harness between CMP sensor terminal B and PCM terminal 2U • Short to ground in wiring harness between CMP sensor terminal A and PCM terminal 2V • Short to ground in wiring harness between CMP sensor terminal B and PCM terminal 2U • Open circuit in wiring harness between CMP sensor terminal A and PCM terminal 2V • Open circuit in wiring harness between CMP sensor terminal B and PCM terminal 2U • CKP sensor pulse wheel malfunction • Both CMP sensor wires are shorted each other



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY CMP SENSOR VOLTAGE** • Disconnect the CMP sensor connector. • Connect voltmeter between CMP sensor terminals A and B (sensor-side). • Inspect the voltage in AC range while cranking the engine. • Is any voltage reading?	Yes	Go to the next step.
		No	Go to step 10.
4	**INSPECT POOR CONNECTION OF CMP SENSOR CONNECTOR**	Yes	Go to the next step.
		No	Reconnect the connector, then go to Step 11.

	• Verify that the CMP sensor connector is connected securely. • Is the connector normal?		
5	**INSPECT CMP CIRCUIT FOR SHORT TO POWER** • Turn the ignition switch to off. • Disconnect the CMP sensor connector. • Turn the ignition switch to the ON position (Engine off). • Measure the voltage at CMP sensor terminals A and B. • Is any voltage reading?	Yes	Repair or replace the wiring harness, then go to Step 11.
		No	Go to the next step.
6	**INSPECT CMP CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between following terminal and body ground: - CMP sensor terminal A (wiring harness-side) - CMP sensor terminal B (wiring harness-side) • Is there continuity?	Yes	Repair or replace the suspected wiring harness, then go to Step 11.
		No	Go to the next step.
7	**INSPECT CMP CIRCUIT FOR SHORT** • Inspect continuity between CMP sensor terminals A and B (wiring harness-side). • Is there continuity?	Yes	Repair or replace the wiring harness, then go to Step 11.
		No	Go to the next step.
8	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair the terminal, then go to Step 11.
		No	Go to the next step.
9	**INSPECT CMP CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between following terminals: - CMP sensor terminal A (wiring harness-side) and PCM terminal 2V (wiring harness-side)	Yes	Go to Step 11.
		No	Repair or replace the suspected wiring harness, then go to Step 11.

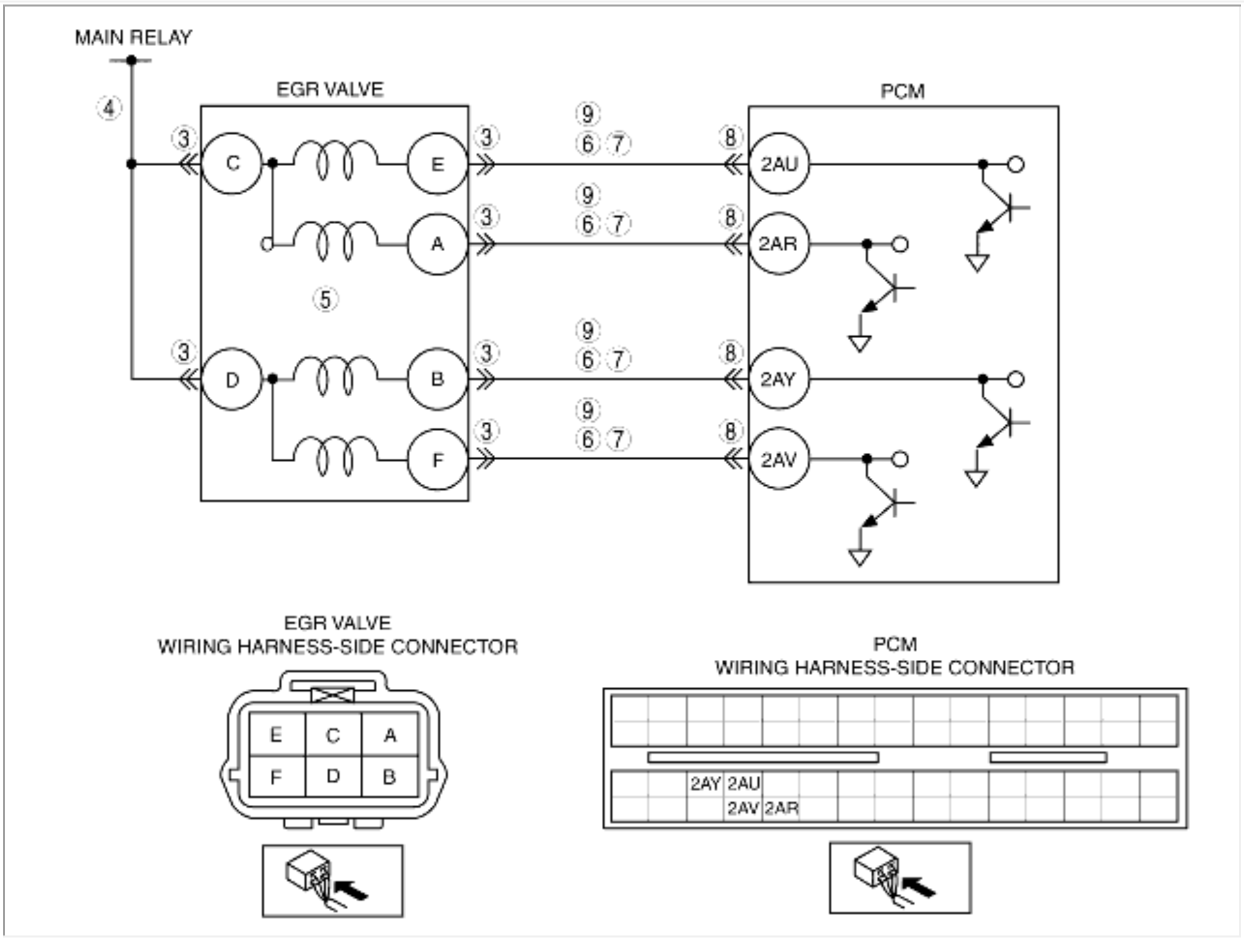
	- CMP sensor terminal B (wiring harness-side) and PCM terminal 2U (wiring harness-side) • Is there continuity?		
10	**INSPECT CMP SENSOR** • Turn the ignition switch off. • Perform CMP sensor inspection. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [LF].) • Is the CMP sensor normal?	Yes	Go to the next step.
		No	Inspect the CMP sensor pulse wheel for damage. Replace CMP sensor pulse wheel and go to step 10.
11	**VERIFY TROUBLESHOOTING OF DTC P0340 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the PCM memory using the WDS or equivalent. • Start engine. • Access MAF PID using the WDS or equivalent. **Note** • MAF PID should indicate **1.95 g/s {0.25 lb/min} or above** during this test. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0403 [LF]

B3E010201086W01

DTC P0403	EGR valve (stepper motor) circuit problem
DETECTION CONDITION	• The PCM monitors the input voltage from EGR valve. If voltage at PCM terminals 2AU, 2AR, 2AY and/or 2AV remain low or high, the PCM determines that the EGR valve circuit has malfunction. **Diagnostic support note**

	• This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction conditions in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• EGR valve malfunction • Connector or terminal malfunction • Short to power supply in wiring harness between EGR valve terminal E and PCM terminal 2AU • Short to power supply in wiring harness between EGR valve terminal A and PCM terminal 2AR • Short to power supply in wiring harness between EGR valve terminal B and PCM terminal 2AY • Short to power supply in wiring harness between EGR valve terminal F and PCM terminal 2AV • Short to ground circuit in wiring harness between EGR valve terminal E and PCM terminal 2AU • Short to ground circuit in wiring harness between EGR valve terminal A and PCM terminal 2AR • Short to ground circuit in wiring harness between EGR valve terminal B and PCM terminal 2AY • Short to ground circuit in wiring harness between EGR valve terminal F and PCM terminal 2AV • Open circuit in wiring harness between EGR valve terminal E and PCM terminal 2AU • Open circuit in wiring harness between EGR valve terminal A and PCM terminal 2AR • Open circuit in wiring harness between EGR valve terminal B and PCM terminal 2AY • Open circuit in wiring harness between EGR valve terminal F and PCM terminal 2AV • Open circuit in wiring harness between main relay terminal D and EGR valve terminal C • Open circuit in wiring harness between main relay terminal D and EGR valve terminal D • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF EGR VALVE** • Turn the ignition switch off. • Disconnect EGR valve connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminals and/or connector, then go to Step 10.
		No	Go to the next step.

4	**INSPECT POWER CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage following terminal and body ground. - EGR valve terminal C - EGR valve terminal D • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace harness for open circuit then go to Step 10.
5	**INSPECT EGR VALVE** • Perform EGR valve inspection. (See EGR VALVE INSPECTION.) • Is EGR valve normal?	Yes	Go to the next step.
		No	Replace the EGR valve, then go to Step 10.
6	**INSPECT FOR CONTROL CIRCUIT FOR SHORT TO GROUND** • Turn the ignition switch off. • Inspect for continuity following terminal and body ground: - EGR valve terminal E - EGR valve terminal A - EGR valve terminal B - EGR valve terminal F • is there continuity?	Yes	Repair or replace wiring harness for short to ground, then go to Step 10.
		No	Go to the next step.
7	**INSPECT FOR CONTROL CIRCUIT FOR SHORT TO POWER** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage following terminal and body ground: - EGR valve terminal E - EGR valve terminal A - EGR valve terminal B - EGR valve terminal F • Is the voltage **B+**?	Yes	Repair or replace wiring harness for short to power supply, then go to Step 10.
		No	Go to the next step.
8	**INSPECT POOR CONNECTION OF PCM** • Turn the ignition switch off. • Disconnect the PCM connector.	Yes	Repair or replace the terminals and/or connector, then go to Step 10.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?		
9	**INSPECT CONTROL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity following terminals: - Between EGR valve terminal E and PCM terminal 2AU - Between EGR valve terminal A and PCM terminal 2AR - Between EGR valve terminal B and PCM terminal 2AY - Between EGR valve terminal F and PCM terminal 2AV • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit then go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P0403 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear The DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0420 [LF]

B3E010201086W02

P0420	Catalyst system efficiency below threshold
DETECTION CONDITION	• The PCM compares the number of front HO2S and rear HO2S inversions for a predetermined time. The PCM monitors number of inversions rear HO2S performs while front HO2S inverts for a specified number of times when the following monitoring conditions are met. The PCM detects inversion ratio. If the inversion ratio is below threshold, the PCM determine that catalyst system has deteriorated. **MONITORING CONDITION**

	- Engine speed is **1,410- 3,100 rpm**. - Calculated TWC temperature in PCM is above **574 °C {1065 °F}**. - Calculated load is **15- 50%** (at **2,000 rpm**) **Diagnostic support note** • This is a intermittent monitor. (CATALYST) • The MIL illuminates if the PCM detects the above malfunction conditions in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • DIAGNOSTIC MONITORING TEST RESULTS and PENDING CODE are stored if PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TWC deterioration or malfunction • Exhaust gas leakage • Loose front HO2S • Loose rear HO2S

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off then to the ON position (Engine off). • Verify related pending code or stored DTCs. • Are other DTCs present?	Yes	Go to appropriate DTC troubleshooting.
		No	Go to the next step.
4	**INSPECT GAS LEAKAGE OF EXHAUST SYSTEM** • Visually inspect exhaust gas leakage in the exhaust system.	Yes	Repair or replace the malfunctioning exhaust part, then go to Step 7.
		No	Go to the next step.

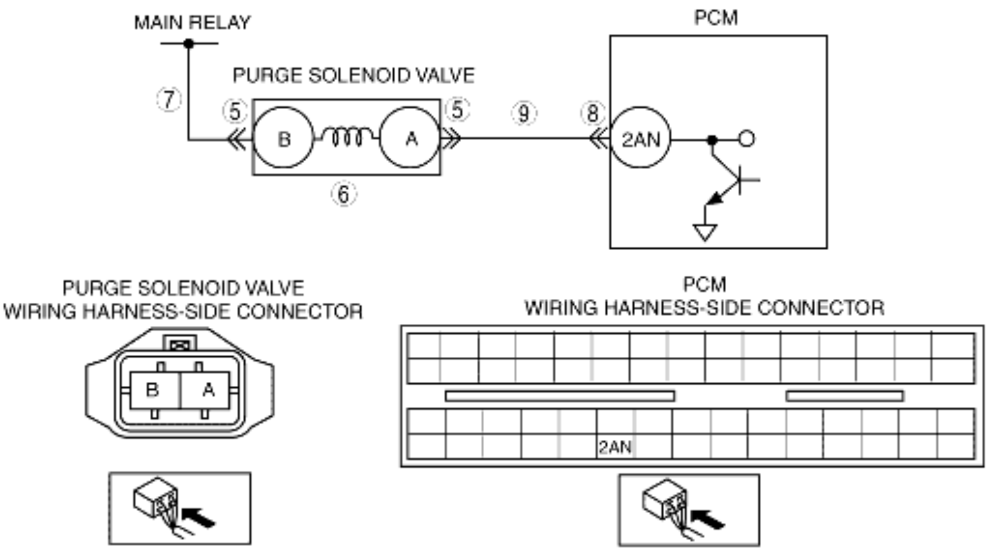
	• Is there gas leakage?		
5	**INSPECT INSTALLATION OF FRONT AND REAR OXYGEN SENSORS** • Inspect for looseness of front and rear oxygen sensors. • Is it normal?	Yes	Go to the next step.
		No	Retighten the sensor, then go to Step 7.
6	**INSPECT TWC** • Clear the DTC using the WDS or equivalent generic OBD function. • Turn the ignition switch off then back to the ON position. • Inspect the TWC. (See EXHAUST SYSTEM INSPECTION [LF].) • Is it normal?	Yes	Replace the heated oxygen sensor, then go to the next step.
		No	Replace the TWC, then go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0420 OR P0431 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the memory using the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0443 [LF]

B3E010201086W03

DTC P0443	Purge solenoid valve circuit problem
DETECTION CONDITION	• The PCM monitors the input voltages from the purge solenoid valve. If the voltage at PCM terminal 2AN remains low or high, the PCM determines that the purge solenoid valve circuit has malfunction.

	Diagnostic support note • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Purge solenoid valve malfunction • Connector or terminal malfunction • Short to ground in wiring harness between purge solenoid valve terminal A and PCM terminal 2AN • Open circuit in wiring harness between main relay and purge solenoid valve terminal B • Open circuit in wiring harness between purge solenoid valve terminal A and PCM terminal 2AN • Short to power supply in wiring harness between purge solenoid valve terminal A and PCM terminal 2AN • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.

2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**CLASSIFY OPEN CIRCUIT OR SHORT TO GROUND MALFUNCTION** • Disconnect purge solenoid valve tube that is connected to intake manifold. • Connect vacuum pump to purge solenoid valve. • Pump vacuum pump several times and stop. • Wait **a few seconds**. • Is vacuum maintained?	Yes	Go to Step 5.
		No	Go to the next step.
4	**INSPECT PASSAGE CONTROL OF PURGE SOLENOID VALVE** • Turn the ignition switch off. • Disconnect purge solenoid valve connector. • Pump vacuum pump several times and wait **a few seconds**. • Is vacuum maintained?	Yes	Repair or replace wiring harness for short to ground, then go to Step 10.
		No	Replace the purge solenoid valve, then go to Step 10.
5	**INSPECT PURGE SOLENOID VALVE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 10.
		No	Go to the next step.
6	**INSPECT PURGE SOLENOID VALVE** • Perform purge solenoid valve inspection. (See PURGE SOLENOID VALVE INSPECTION) • Is purge solenoid valve normal?	Yes	Go to the next step.
		No	Replace the purge solenoid valve, then go to Step 10.
7	**INSPECT PURGE SOLENOID VALVE POWER SUPPLY CIRCUIT FOR OPEN CIRCUIT**	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to Step 10.

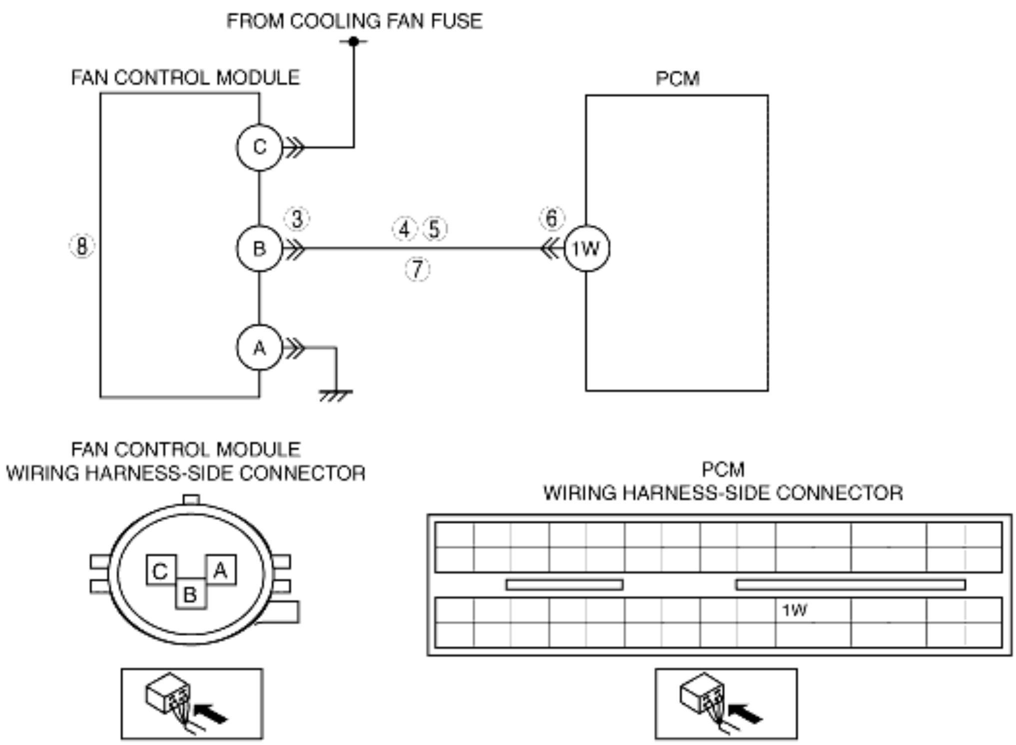
	• Turn the ignition switch to the ON position (Engine off). • Measure the voltage between purge solenoid valve terminal B and body ground. • Is the voltage **B+**?		
8	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 10.
		No	Go to the next step.
9	**INSPECT PURGE SOLENOID VALVE CONTROL CIRCUIT** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between purge solenoid valve terminal A (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for short to power supply, then go to the next step.
		No	Inspect for continuity between purge solenoid valve terminal A (wiring harness-side) and PCM terminal 2AN (wiring harness-side). • If there is continuity, go to the next step. • If there is no continuity, repair or replace wiring harness for open circuit, then go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P0443 COMPLETED** • Make sure to reconnect all disconnected connectors. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0480 [LF]

B3E010201086W04

DTC P0480	Fan control circuit problem

DETECTION CONDITION	• The PCM monitors the input voltages from the fan control module. If the voltage at PCM terminal 1W remains low or high, the PCM determines that fan control circuit has malfunction. **Diagnostic support note** • This is an continuous monitor (other). • The MIL does not illuminate. • FREEZE FRAME DATA is not available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Connector or terminal malfunction • Short to power supply in wiring harness between fan control module terminal B and PCM terminal 1W • Short to ground in wiring harness between fan control module terminal B and PCM terminal 1W • Open circuit in wiring harness between fan control module terminal B and PCM terminal 1W • Fan control module malfunction • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1		Yes	Go to the next step.

	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT FAN CONTROL MODULE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect fan control module connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT FAN CONTROL MODULE SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between fan control module terminal B (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for open circuit, then go to Step 9.
		No	Go to the next step.
5	**INSPECT FAN CONTROL MODULE SIGNAL CIRCUIT FOR SHORT TO GROUND** • Turn the ignition switch off. • Inspect for continuity between fan control module terminal B (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for open circuit, then go to Step 9.
		No	Go to the next step.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
7	**INSPECT FAN CONTROL MODULE SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between fan control module terminal B (wiring harness-side) and PCM terminal 1W.	Yes	Go to the next step.
		No	Repair or replace wiring harness for open circuit, then go to Step 9.

	• Is there continuity?		
8	**INSPECT FAN CONTROL MODULE** • Perform fan control module inspection. • Is fan control module normal?	Yes	Go to the next step.
		No	Replace the fan control module, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0480 COMPLETED** • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Turn A/C switch to ON. • Is same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0500 [LF]

B3E010201087W01

DTC P0500	VSS circuit problem
DETECTION CONDITION	• The PCM monitors the vehicle speed from the ABS HU/CM or DSC HU/CM. If the PCM dose not receive the input vehicle speed signal, the PCM determines that the VSS circuit problem. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• VSS circuit malfunction

Diagnostic procedure

STEP	INSPECTION	ACTION

1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY STORED DTC IN ABS HU/CM OR DSC HU/CM** • Turn the ignition switch to the ON position (Engine off). • Verify stored DTCs in ABS HU/CM or DSC HU/CM. (See ON-BOARD DIAGNOSIS [ABS].) (See ON-BOARD DIAGNOSIS [DSC (DYNAMIC STABILITY CONTROL)]) • Are DTCs stored?	Yes	Go to the appropriate DTC inspection. (See DTC Table) (See DTC Table.)
		No	Go to the next step.
4	**VERIFY TROUBLESHOOTING OF DTC P0500 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the PENDING CODE same as the DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	DTC troubleshooting completed.

DTC P0505 [LF]

B3E010201087W02

DTC P0505	**IAC system problem**

DETECTION CONDITION	• The PCM cannot control idle speed toward target idle speed while KOER self test.
POSSIBLE CAUSE	• IAC valve circuit malfunction • Air cleaner element clogged • Air intake passage clogged • A/C relay control circuit malfunction • Generator control circuit malfunction • Low engine compression (Over capacity of blow-by gas) • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
2	**VERIFY RELATED PENDING OR STORED DTC** • Turn the ignition switch off then to the ON position (Engine off). • Verify pending code or stored DTCs using the WDS or equivalent. • Does DTC P0511, P2502, P2503 or P2504 present?	Yes	Perform the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Go to the next step.
3	**INSPECT IAC VALVE MALFUNCTION** • Start engine. • Disconnect IAC valve connector. • Is engine speed decreased?.	Yes	Go to the next step.
		No	Repair IAC valve, then go to Step 9.
4	**INSPECT A/C MAGNETIC CLUTCH OPERATION** **Note** • The following test should be performed for the A/C. Go to the next step for vehicles without A/C • Turn the fan switch off.	Yes	Go to "A/C ALWAYS ON / A/C COMPRESSOR RUNS CONTINUOUSLY." of ENGINE SYMPTOM TROUBLESHOOTING then go to step 9. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].)
		No	Go to the next step.

	• Is the magnetic clutch still on?		
5	**INSPECT GENERATOR CONTROL CIRCUIT MALFUNCTION** • Apply electrical load. • Is engine speed increased?	Yes	Go to the next step.
		No	Repair short to power supply in generator control circuit, then go to Step 9.
6	**INSPECT AIR CLEANER ELEMENT** • Remove air cleaner element with the engine running. • Is the engine speed increased?	Yes	Clean or replace the air cleaner element, then go to Step 9.
		No	Go to the next step.
7	**INSPECT THROTTLE BODY PASSAGE** • Is throttle body clogged?	Yes	Clean or replace the throttle body passage, then go to Step 9.
		No	Go to the next step.
8	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [LF].) • Is engine compression normal?	Yes	Go to the next step.
		No	Overhaul the engine, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0505 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC using the WDS or equivalent. • Perform the KOER Self-Test. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0506 [LF]

B3E010201087W03

DTC P0506	**Idle control system RPM lower than expected**

DETECTION CONDITION	• Actual idle speed is lower than expected by **100 rpm** for **14 s**, when brake pedal is depressed (brake switch is on) and steering wheel is held straight ahead (power steering pressure switch is off). **Note** • If atmospheric pressure is **less than 72.3 kPa {542 mmHg, 21.3 inHg}** or intake air temperature is **below -10 °C {14 °F}**, the PCM cancels diagnosis of P0506. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction conditions in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAC valve malfunction • Air cleaner element clogged • Air intake passage clogged • A/C relay control circuit malfunction • Generator malfunction • Purge solenoid valve malfunction • Low engine compression (Over capacity of blow-by gas) • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3		Yes	Repair the applicable DTCs.

	VERIFY RELATED PENDING OR STORED DTC • Turn the ignition switch to off then to the ON position (Engine off). • Verify pending code or stored DTCs using the WDS or equivalent. • Is other DTC present?		(See DTC TABLE [LF].)
		No	Go to the next step.
4	**INSPECT IAC VALVE MALFUNCTION** • Perform IAC valve inspection. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [LF].) • Is IAC valve normal?	Yes	Go to the next step.
		No	Replace the IAC valve, then go to Step 11.
5	**INSPECT A/C MAGNET CLUTCH OPERATION** • Turn the fan switch off. • Is the magnet clutch still on?	Yes	Refer to "A/C is always on or A/C compressor runs continuously." of ENGINE SYMPTOM TROUBLESHOOTING, then go to Step 11. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].)
		No	Go to the next step.
6	**INSPECT PURGE SOLENOID VALVE MALFUNCTION** • Perform the purge solenoid valve inspection. (See PURGE SOLENOID VALVE INSPECTION.) • Is the purge solenoid valve normal?	Yes	Go to the next step.
		No	Replace the purge solenoid valve, then go to Step 11.
7	**INSPECT AIR CLEANER ELEMENT** • Remove the air cleaner element with the engine running. • Is the engine speed increased?	Yes	Replace air cleaner the element, then go to Step 11.
		No	Go to the next step.
8	**INSPECT THROTTLE BODY PASSAGE** • Is the throttle body clogged?	Yes	Clean or replace the throttle body passage, then go to Step 11.
		No	Go to the next step.
9	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [LF].)	Yes	Go to the next step.
		No	Overhaul the engine, then go to Step 11.

	• Is engine compression normal?		
10	**INSPECT GENERATOR** • Perform generator inspection. (See GENERATOR INSPECTION.) • Is generator normal?	Yes	Go to the next step.
		No	Repair or replace the related part, then go to the next step.
11	**VERIFY TROUBLESHOOTING OF DTC P0506 COMPLETED** • Make sure to reconnect all disconnected connectors. • Start engine. • Clear the DTC from the PCM memory using the WDS or equivalent. • Depress the brake pedal for **14 s or more**. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0507 [LF]

B3E010201087W04

DTC P0507	**Idle control system RPM higher than expected**
DETECTION CONDITION	• Actual idle speed is higher than expected by **200 rpm** for **14 s**, when the brake pedal is depressed (brake switch is on) and the steering wheel is held straight ahead (power steering pressure switch is off). **Note** • If atmospheric pressure is **less than 72.3 kPa {542 mmHg, 21.3 inHg}** or intake air temperature is **below -10 °C {14 °F}**, the PCM cancels diagnosis of P0507. **Diagnostic support note** • This is a continuous monitor (CCM).

	• The MIL illuminates if the PCM detects the above malfunction conditions in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAC valve malfunction • Accelerator cable misadjusting • Actuator cable misadjusting • Throttle valve malfunction • Vacuum hose misconnection • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING OR STORED DTC** • Turn the ignition switch off then to the ON position (Engine off). • Verify pending code or stored DTCs using the WDS or equivalent. • Is other DTC present?	Yes	Repair the applicable DTCs. (See DTC TABLE [LF].)
		No	Go to the next step.
4	**INSPECT IAC VALVE MALFUNCTION** • Perform IAC valve inspection. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [LF].) • Is IAC valve normal?	Yes	Go to the next step.
		No	Replace the IAC valve, then go to Step 9.

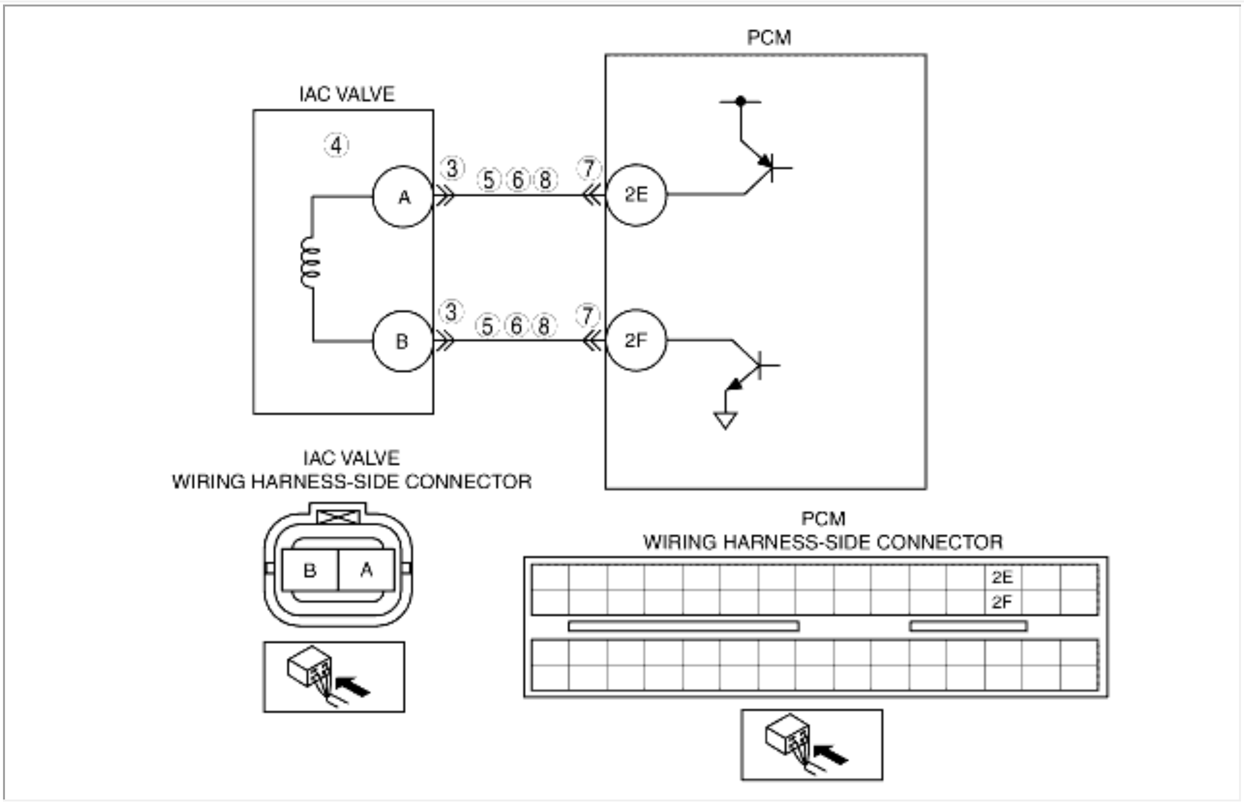
5	**INSPECT ACCELERATOR CABLE FREE PLAY** • Turn the ignition switch off. • Is accelerator cable free play normal? (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [LF].)	Yes	Go to the next step.
		No	Adjust accelerator cable free play, then go to Step 9. (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [LF].)
6	**INSPECT ACTUATOR CABLE FREE PLAY** • Is actuator cable adjustments normal?	Yes	Go to the next step.
		No	Adjust actuator cable free play, then go to Step 9.
7	**INSPECT VACUUM HOSE CONNECTION** • Are vacuum hoses connected completely? (See INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [LF].)	Yes	Go to the next step.
		No	Reconnect the vacuum hose accurately, then go to step 9.
8	**VISUAL INSPECT THROTTLE VALVE** • Remove throttle body. • Is throttle valve fully closed?	Yes	Go to the next step.
		No	Clean or replace the throttle body, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0507 COMPLETED** • Make sure to reconnect all disconnected connectors. • Start engine. • Clear the DTC from the PCM memory using the WDS or equivalent. • Depress brake pedal for **14 s or more**. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0511 [LF]

B3E010201087W05

DTC P0511	IAC valve circuit problem

DETECTION CONDITION	• If the PCM detects that PCM terminal 2E voltage is above or below threshold* when the IAC control duty target is **within 16-30%**, the PCM determines that the IAC valve circuit has malfunction. *: Detected threshold value depends on battery voltage and IAC control signal duty value. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction conditions in first consecutive drive cycles. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• IAC valve circuit malfunction • Short to ground in wiring harness between IAC valve terminal A and PCM terminal 2E • Short to ground in wiring harness between IAC valve terminal B and PCM terminal 2F • Open circuit in wiring harness between IAC valve terminal A and PCM terminal 2E • Open circuit in wiring harness between IAC valve terminal B and PCM terminal 2F • Short to power supply in wiring harness between IAC valve terminal A and PCM terminal 2E • Short to power supply in wiring harness between IAC valve terminal B and PCM terminal 2F • Poor connection of IAC valve connector or PCM connector • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF IAC VALVE CONNECTOR** • Turn the ignition switch off. • Disconnect IAC valve connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT IAC VALVE ELECTRICAL MALFUNCTION** • Inspect the IAC valve.	Yes	Go to the next step.
		No	Replace IAC valve, then go to Step 9.

	(See IDLE AIR CONTROL (IAC) VALVE INSPECTION [LF].) • Is IAC valve normal?		
5	**INSPECT CONTROL CIRCUIT FOR SHORT TO POWER** • Turn the ignition switch to the ON position (Engine off). • Measure voltage between following terminal (wiring harness-side) and body ground: - IAC valve terminal A - IAC valve terminal B • Is the voltage **B+**?	Yes	Repair or replace wiring harness, then go to Step 9.
		No	Go to the next step.
6	**INSPECT CONTROL CIRCUIT FOR SHORT TO GROUND** • Turn the ignition switch off. • Inspect for continuity between following terminals (wiring harness-side) and body ground: - IAC valve terminal A - IAC valve terminal B • Is there continuity?	Yes	Repair or replace the wiring harness, then go to Step 9.
		No	Go to the next step.
7	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT CONTROL CIRCUIT MALFUNCTION FOR OPEN CIRCUIT** • Inspect for continuity following terminals (wiring harness-side): - Between IAC valve terminal A and PCM terminal 2E - Between IAC valve terminal B and PCM terminal 2F • Is there continuity?	Yes	Repair or replace the wiring harness, then go to the next step.
		No	Go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0511 COMPLETED**	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)

	• Make sure to reconnect all disconnected connectors. • Clear the DTC using the WDS or equivalent. • Start the engine. • Is the same DTC present?	No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0602 [LF]

B3E010201088W01

DTC P0602	PCM programming error
DETECTION CONDITION	• No configuration data in the PCM **Note** • If "PCM CONFIGURATION" is successful, the PCM stored DTC P0602 and illuminates the MIL (System is normal). Clear the DTC P0602 using the WDS or equivalent after "PCM CONFIGURATION". • The MIL goes out after three drive cycles with no failure (DTCs remain in PCM).
POSSIBLE CAUSE	• Complete configuration has not been completed • PCM malfunction

Diagnostic procedure

STEP	INSPECTION	ACTION	
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

3	**VERIFY TROUBLESHOOTING OF DTC P0602 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
4	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0610 [LF]

B3E010201088W02

DTC P0610	**PCM vehicle options error**
DETECTION CONDITION	• PCM data configuration error
POSSIBLE CAUSE	• Configuration procedure has not been completed • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

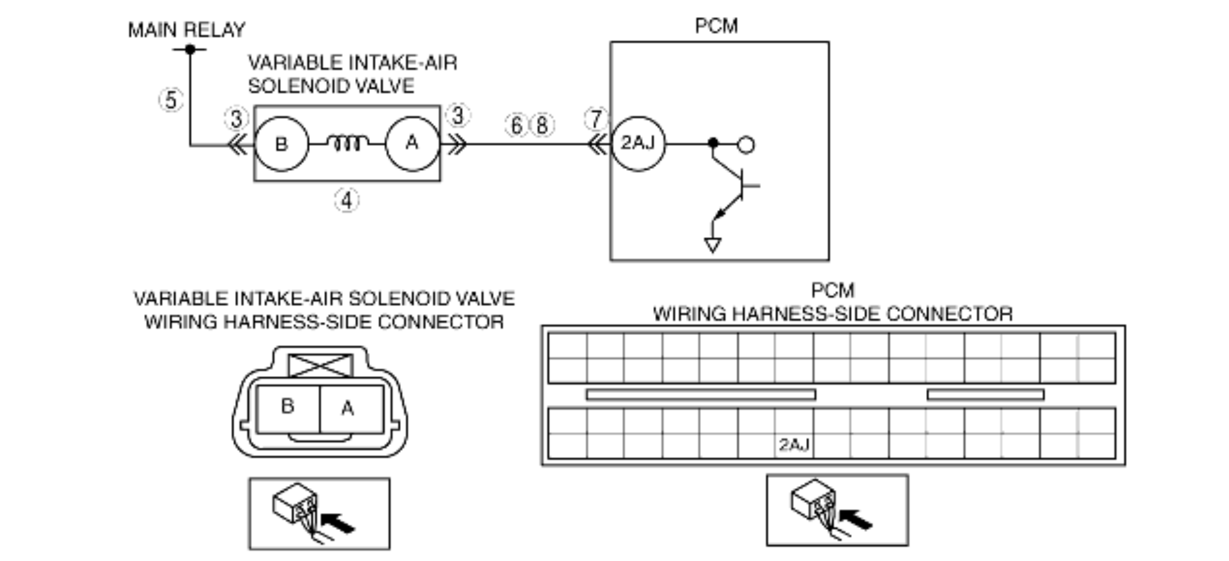
3	**VERIFY TROUBLESHOOTING OF DTC P0610 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
4	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0661 [LF]

B3E010201088W03

DTC P0661	Variable intake-air solenoid valve circuit low input
DETECTION CONDITION	• The PCM monitors the variable intake-air solenoid valve control signal at PCM terminal 2AJ. If the PCM turns variable intake-air solenoid valve off but voltage at PCM terminal 2AJ still remains low, the PCM determines that variable intake-air solenoid valve circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (other). • The MIL does not illuminate. • PENDING CODE is available if the PCM detects the above malfunction condition. • The FREEZE FRAME DATA is not available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Variable intake-air solenoid valve malfunction • Open circuit in wiring harness between main relay and variable intake-air solenoid valve terminal B • Open circuit in wiring harness between variable intake-air solenoid valve terminal A and PCM terminal 2AJ • Short to ground in wiring harness between variable intake-air solenoid valve terminal A and PCM terminal 2AJ • Connector or terminal malfunction

	• PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT VARIABLE INTAKE-AIR SOLENOID VALVE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the variable intake-air solenoid valve connector. • Inspect for poor connection (damaged/pulled-out pins, corrosion, etc.). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT VARIABLE INTAKE-AIR SOLENOID VALVE MALFUNCTION** • Perform variable intake-air solenoid valve inspection.	Yes	Go to the next step.
		No	Replace the variable intake-air solenoid valve, then go to step 9.

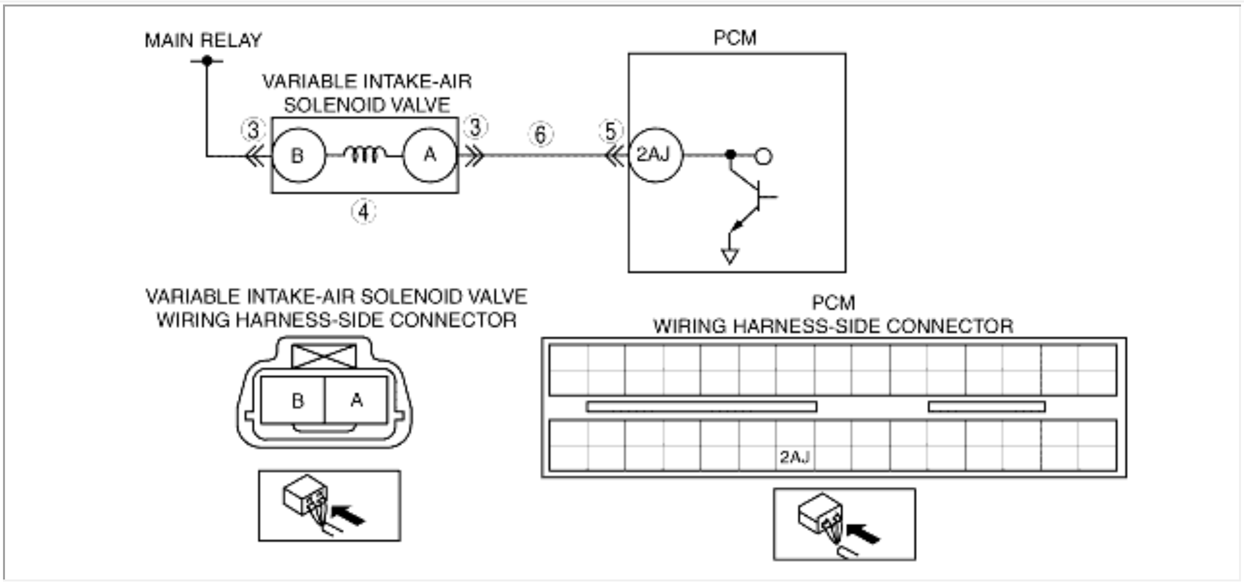
	(See VARIABLE INTAKE-AIR SOLENOID VALVE INSPECTION [LF].) • Is variable intake-air solenoid valve normal?		
5	**INSPECT VARIABLE INTAKE-AIR SOLENOID VALVE POWER SUPPLY CIRCUIT FOR OPEN CIRCUIT** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between variable intake-air solenoid valve terminal B (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open, then go to Step 9.
6	**INSPECT VARIABLE INTAKE-AIR SOLENOID VALVE CONTROL CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between variable intake-air solenoid valve terminal A (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for short to ground, then go to Step 9.
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Disconnect the PCM connector. • Inspect for poor connection at terminal 2AJ. (damaged/pulled-out pins, corrosion, etc.). • Is there malfunction?	Yes	Repair the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT VARIABLE INTAKE-AIR SOLENOID VALVE CONTROL CIRCUIT FOR OPEN** • Inspect for continuity between variable intake-air solenoid valve terminal B (wiring harness-side) and PCM terminal 2AJ (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P0661 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the PCM memory using the WDS or equivalent. • Access RPM PID. • Increase the engine speed **4,750 rpm or more** for 10 times.	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.

	• Is the same DTC present?		
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0662 [LF]

B3E010201088W04

DTC P0662	Variable intake-air solenoid valve circuit high input
DETECTION CONDITION	• The PCM monitors the variable intake-air solenoid valve control signal at PCM terminal 2AJ. If the PCM turns variable intake-air solenoid valve on but voltage at PCM terminal 2AJ still remains high, the PCM determines that the variable intake-air solenoid valve circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (other). • The MIL does not illuminate. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is not available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Variable intake-air solenoid valve malfunction • Short to power supply in wiring harness between variable intake-air solenoid valve terminal B and PCM terminal 2AJ • Shorted variable intake-air solenoid valve or PCM connector • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT VARIABLE INTAKE-AIR SOLENOID VALVE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the variable intake-air solenoid valve connector. • Inspect for poor connection (damaged/pulled-out pins, corrosion, etc.). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT VARIABLE INTAKE-AIR SOLENOID VALVE MALFUNCTION** • Perform variable intake-air solenoid valve inspection. (See VARIABLE INTAKE-AIR SOLENOID VALVE INSPECTION [LF].)	Yes	Go to the next step.
		No	Replace the variable intake-air solenoid valve, then go to Step 7.

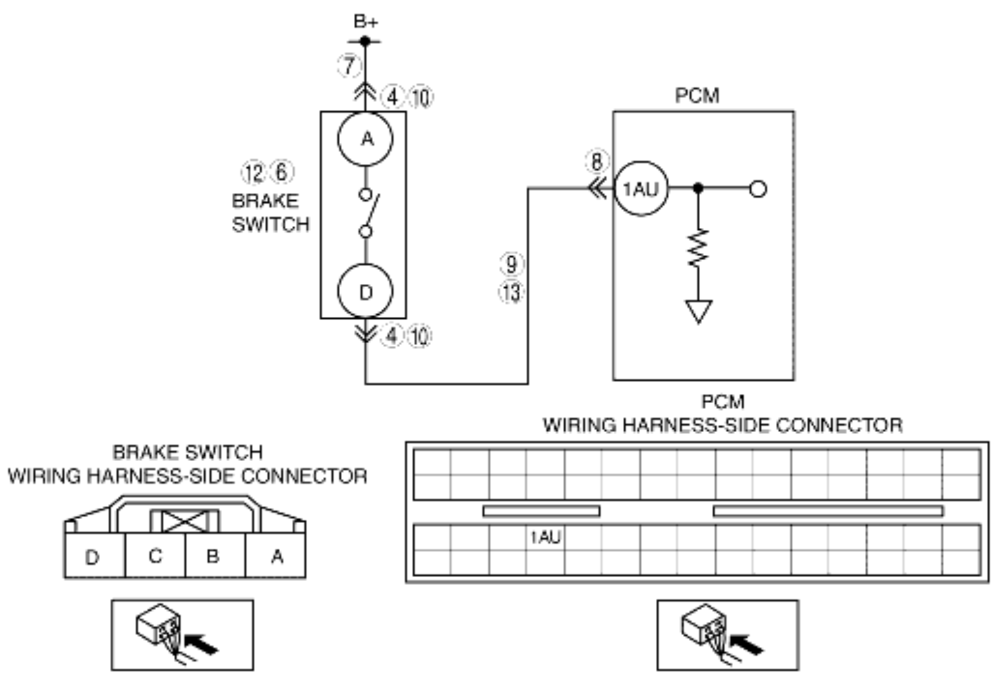
	• Is the variable intake-air solenoid valve normal?		
5	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection at terminal 2AJ. (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair the terminal, then go to Step 7.
		No	Go to the next step.
6	**INSPECT VARIABLE INTAKE-AIR SOLENOID VALVE CONTROL CIRCUIT SHORT TO POWER SUPPLY** • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between variable intake-air solenoid valve terminal A (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for short to power supply, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P0662 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the PCM memory using the WDS or equivalent. • Access RPM PID. • Increase the engine speed **4,750 rpm or more** for 10 times. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0703 [LF]

B3E010201089W01

DTC P0703	**Brake switch input circuit problem**

DETECTION CONDITION	• The PCM monitors changes in input voltage from the brake switch. If the PCM does not detect PCM terminal 1AU voltage changes while alternately accelerating and decelerating **8 times**, the PCM determines that brake switch circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Brake switch malfunction • Poor connection of brake switch connector or PCM connector • Short to power supply in wiring harness between brake switch terminal D and PCM connector terminal 1AU • Open circuit in wiring harness between brake switch terminal D and PCM connector terminal 1AU • Open circuit in wiring harness between battery positive terminal and brake switch terminal A • PCM malfunction



Diagnostic procedure

STEP	INSPECTION	ACTION

1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**CLASSIFY HIGH INPUT OR LOW INPUT** • Connect the WDS or equivalent to DLC-2. • Access BOO PID. • Verify BOO PID during brake pedal operation. • Is BOO PID always OFF?	Yes	Go to the next step.
		No	Go to Step 10.
4	**INSPECT BRAKE SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the brake switch connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.
5	**CLASSIFY BRAKE SWITCH OR CIRCUIT** • Connect the WDS or equivalent to DLC-2. • Access BOO PID. • Connect a jumper wire between brake switch terminal A and D. • Is BOO PID on?	Yes	Go to the next step.
		No	Go to Step 7.
6	**INSPECT BRAKE SWITCH** • Perform brake switch inspection. (See BRAKE SWITCH INSPECTION.) • Is brake switch normal?	Yes	Go to Step 14.
		No	Replace brake switch, then go to Step 14.
7	**INSPECT BRAKE SWITCH POWER CIRCUIT FOR OPEN CIRCUIT** • Measure the voltage between brake switch terminal A and body ground. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace brake switch power circuit for open, then Go to Step 14.

8	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.
9	**INSPECT BRAKE SWITCH SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between brake switch terminal D and PCM terminal 1AU. • Is there continuity?	Yes	Repair or replace wiring harness for open circuit, then go to Step 14.
		No	Go to Step 14.
10	**INSPECT BRAKE SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the brake switch connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.
11	**CLASSIFY BRAKE SWITCH OR CIRCUIT** • Connect the WDS or equivalent to DLC-2. • Access BOO PID. • Verify that BOO PID changes from ON to OFF when brake switch connector disconnected. • Does BOO PID change from ON to OFF?	Yes	Go to the next step.
		No	Go to Step 13.
12	**INSPECT BRAKE SWITCH** • Perform brake switch inspection. (See BRAKE SWITCH INSPECTION.) • Is brake switch normal?	Yes	Go to Step 14.
		No	Replace the brake switch, then go to Step 14.
13	**INSPECT BRAKE SWITCH SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Measure the voltage between brake switch terminal D and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for short to power supply, then go to the next step.
		No	Go to the next step.
14	**VERIFY TROUBLESHOOTING OF DTC P0703 COMPLETED**	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)

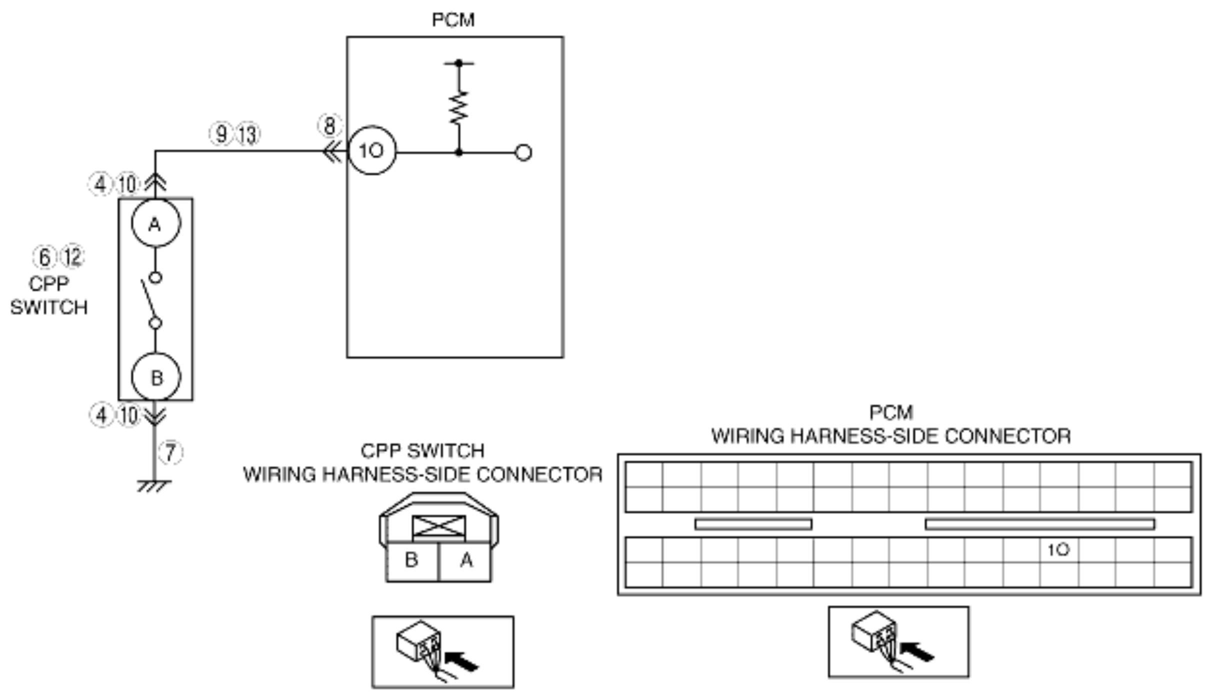
	• Make sure to reconnect all disconnected connectors. • Clear the DTC from the memory using the WDS or equivalent. • Drive the vehicle **30 km/h {18.6 mph} or more**. • Depress and release the brake pedal **more than 8 times** while driving vehicle. • Is the PENDING CODE for this DTC present?	No	Go to the next step.
15	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P0704 [LF]

B3E010201089W02

DTC P0704	CPP switch input circuit problem
DETECTION CONDITION	• The PCM monitors changes in input voltage from the CPP switch. If the PCM does not detect PCM terminal 1O voltage changes while the vehicle runs and stops **8 times** alternately, the PCM determines that the CPP switch circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• CPP switch malfunction • Poor connection of CPP switch connector or PCM connector • Short to ground in wiring harness between CPP switch terminal A and PCM terminal 1O • Open circuit in wiring harness between CPP switch terminal A and PCM terminal 1O • Open circuit in wiring harness between ground and CPP switch terminal B

	• PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**CLASSIFY HIGH INPUT OR LOW INPUT** • Connect the WDS or equivalent to DLC-2. • Access CPP PID. • Verify CPP PID during clutch pedal operation. • Is CPP PID always OFF?.	Yes	Go to the next step.
		No	Go to Step 10.
4	**INSPECT CPP SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the CPP switch connector.	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.

	• Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?		
5	**CLASSIFY CPP SWITCH OR CIRCUIT** • Connect the WDS or equivalent to DLC-2. • Access CPP PID. • Connect a jumper wire between CPP switch terminal A and B. • Is CPP PID on?	Yes	Go to the next step.
		No	Go to Step 7.
6	**INSPECT CPP SWITCH** • Perform CPP switch inspection. (See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF].) • Is CPP switch normal?	Yes	Go to Step 14.
		No	Replace CPP switch, then go to Step 14.
7	**INSPECT CPP SWITCH GROUND CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between CPP switch terminal B and ground. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the CPP switch power circuit for open circuit, then Go to Step 14.
8	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.
9	**INSPECT CPP SWITCH SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between CPP switch terminal A and PCM terminal 1O. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace wiring harness for open circuit, then go to Step 14.
10	**INSPECT CPP SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the CPP switch connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.

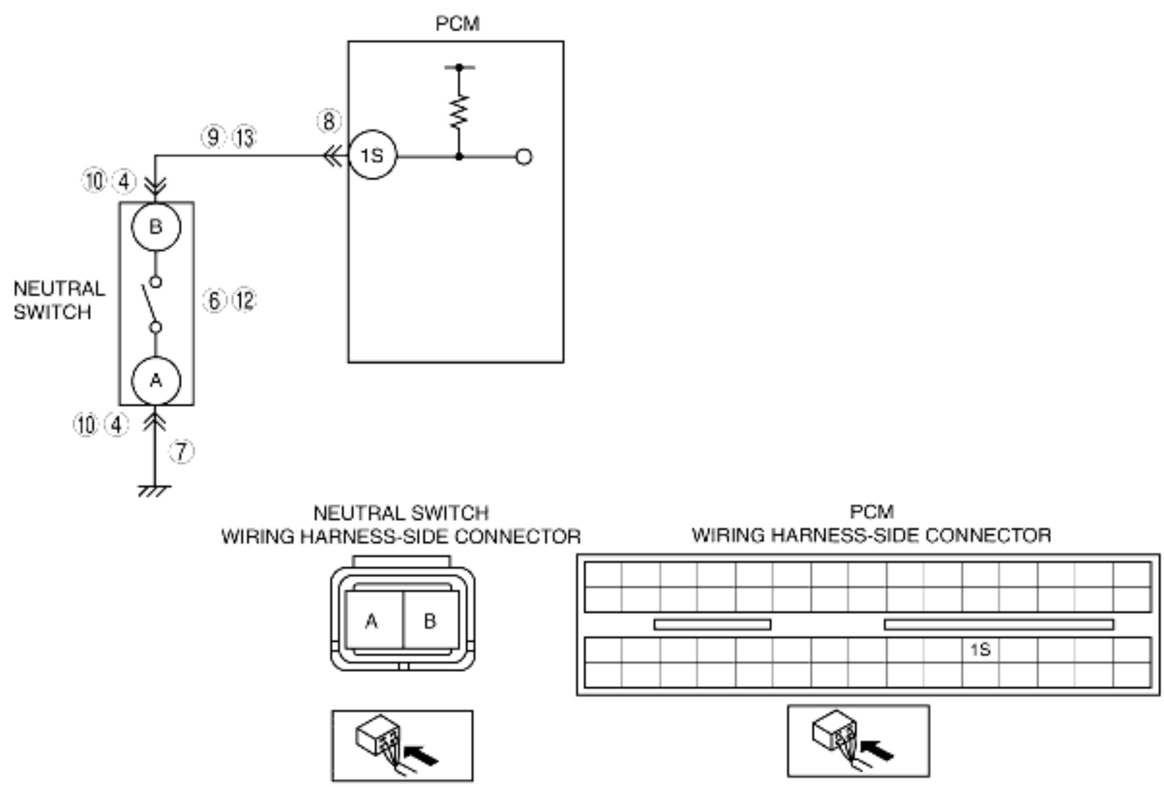
<table>
<tr><td rowspan="2">11</td><td rowspan="2">CLASSIFY CPP SWITCH OR CIRCUIT
• Connect the WDS or equivalent to DLC-2.
• Access CPP PID.
• Verify that CPP PID changes from ON to OFF when CPP switch connector disconnected.
• Does CPP PID change from ON to OFF?</td><td>Yes</td><td>Go to the next step.</td></tr>
<tr><td>No</td><td>Go to Step 13.</td></tr>
<tr><td rowspan="2">12</td><td rowspan="2">INSPECT CPP SWITCH
• Perform CPP switch inspection.
(See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF].)
• Is CPP switch normal?</td><td>Yes</td><td>Go to Step 14.</td></tr>
<tr><td>No</td><td>Replace CPP switch, then go to Step 14.</td></tr>
<tr><td rowspan="2">13</td><td rowspan="2">INSPECT CPP SWITCH SIGNAL CIRCUIT FOR SHORT TO GROUND
• Inspect for continuity between CPP switch terminal A and ground.
• Is there continuity?</td><td>Yes</td><td>Repair or replace wiring harness for short to ground, then go to Step 14.</td></tr>
<tr><td>No</td><td>Go to the next step.</td></tr>
<tr><td rowspan="2">14</td><td rowspan="2">VERIFY TROUBLESHOOTING OF DTC P0704 COMPLETED
• Make sure to reconnect all disconnected connectors.
• Start the engine.
• Clear the DTC from the PCM memory using the WDS or equivalent.
• Operate the clutch pedal while the vehicle runs and stops 8 times alternately.
• Is the PENDING CODE for this DTC present?</td><td>Yes</td><td>Replace the PCM, then go to the next step.
(See PCM REMOVAL/INSTALLATION [LF].)</td></tr>
<tr><td>No</td><td>Go to the next step.</td></tr>
<tr><td rowspan="2">15</td><td rowspan="2">VERIFY AFTER REPAIR PROCEDURE
• Perform the "After Repair Procedure".
(See AFTER REPAIR PROCEDURE [LF].)
• Are any DTC present?</td><td>Yes</td><td>Go to the applicable DTC troubleshooting.
(See DTC TABLE [LF].)</td></tr>
<tr><td>No</td><td>Troubleshooting completed.</td></tr>
</table>

DTC P0850 [LF]

B3E010201089W03

DTC P0850	Neutral switch input circuit problem

DETECTION CONDITION	• The PCM monitors changes in input voltage from the neutral switch. If the PCM does not detect PCM terminal 1S voltage changes while running vehicle with vehicle speed **above 30 km/h {19 mph}** and clutch pedal turns press and depress **10 times** repeatedly, the PCM determines that the neutral switch circuit has malfunction **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Neutral switch malfunction • Poor connection of neutral switch connector or PCM connector • Short to ground in wiring harness between neutral switch terminal B and PCM terminal 1S • Open circuit in wiring harness between neutral switch terminal B and PCM terminal 1S • Open circuit in wiring harness between ground and neutral switch terminal A • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**CLASSIFY HIGH INPUT OR LOW INPUT** • Connect the WDS or equivalent to DLC-2. • Access CPP PID. • Verify CPP PID when gear is neutral position. • Is CPP PID always OFF?.	Yes	Go to the next step.
		No	Go to Step 10.
4	**INSPECT NEUTRAL SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect neutral switch connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.
5	**CLASSIFY NEUTRAL SWITCH OR CIRCUIT** • Connect the WDS or equivalent to the DLC-2. • Access CPP PID. • Connect a jumper wire between neutral switch terminal A and B. • Is CPP PID on?	Yes	Go to the next step.
		No	Go to Step 7.
6	**INSPECT NEUTRAL SWITCH** • Perform the neutral switch inspection. (See NEUTRAL SWITCH INSPECTION [LF].) • Is neutral switch normal?	Yes	Go to Step 14.
		No	Replace the neutral switch, then go to Step 14.
7	**INSPECT NEUTRAL SWITCH GROUND CIRCUIT FOR OPEN CIRCUIT**	Yes	Go to the next step.
		No	Repair or replace neutral switch ground circuit for open circuit, then Go to Step 14.

	• Inspect for continuity between neutral switch terminal A and ground. • Is there continuity?		
8	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.
9	**INSPECT NEUTRAL SWITCH SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between neutral switch terminal B and PCM terminal 1S. • Is there continuity?	Yes	Repair or replace the wiring harness for open circuit, then go to Step 14.
		No	Go to Step 14.
10	**INSPECT NEUTRAL SWITCH CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the neutral switch connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 14.
		No	Go to the next step.
11	**CLASSIFY NEUTRAL SWITCH OR CIRCUIT** • Connect the WDS or equivalent to DLC-2. • Access CPP PID. • Verify that CPP PID changes from ON to OFF when the neutral switch connector disconnected. • Does CPP PID change from ON to OFF?	Yes	Go to the next step.
		No	Go to Step 13.
12	**INSPECT NEUTRAL SWITCH** • Perform neutral switch inspection. (See NEUTRAL SWITCH INSPECTION [LF].) • Is neutral switch normal?	Yes	Go to Step 14.
		No	Replace the neutral switch, then go to Step 14.
13	**INSPECT NEUTRAL SWITCH SIGNAL CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between neutral switch terminal B and ground. • Is there continuity?	Yes	Repair or replace wiring harness for short to ground, then go to Step 14.
		No	Go to the next step.

14	**VERIFY TROUBLESHOOTING OF DTC P0850 COMPLETED** • Make sure to reconnect all disconnected connectors. • Start the engine. • Clear the DTC from the PCM memory using the WDS or equivalent. • Drive the vehicle **above 30 km/h {19 mph}** and stop vehicle. • Depress and release the clutch pedal **more than 10 times** during drive cycle. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
15	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P1260 [LF]

B3E010201200W01

DTC P1260	Immobilizer system problem
DETECTION CONDITION	• The instrument cluster detects an immobilizer system malfunction. **Diagnostic support note** • This is a continuous monitor (Other). • The MIL does not illuminate. • PENDING CODE is available if the PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • The DTC is not stored in the PCM memory.
POSSIBLE CAUSE	• Immobilizer system malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1		Yes	Go to the next step.

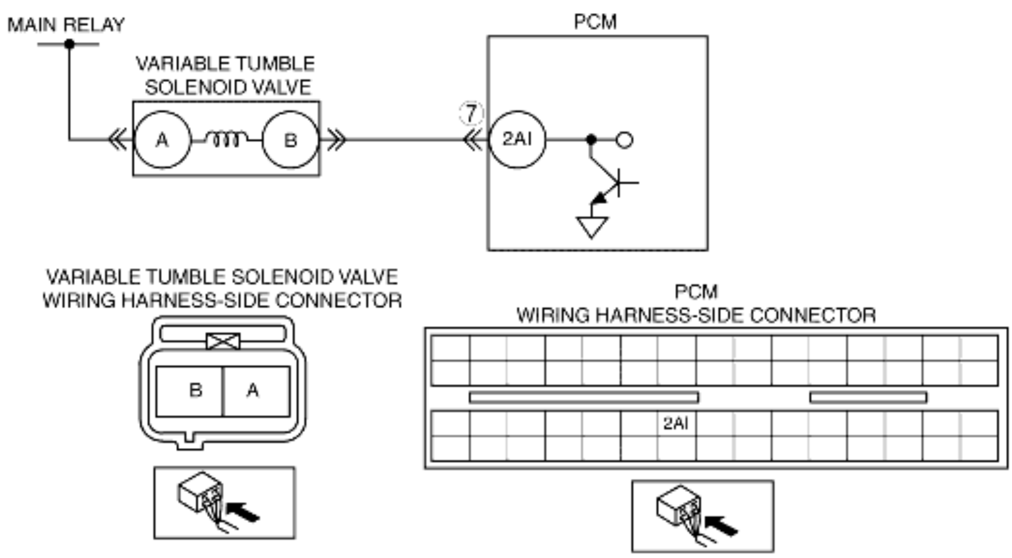
	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY STORED DTC IN INSTRUMENT CLUSTER** • Turn the ignition switch to the ON position (Engine off). • Verify stored DTCs in instrument cluster. (See DTC INSPECTION [IMMOBILIZER SYSTEM].) • Are DTCs stored?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [IMMOBILIZER SYSTEM].)
		No	Go to the next step.
4	**VERIFY TROUBLESHOOTING OF DTC P1260 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	DTC troubleshooting completed.

DTC P2006 [LF]

B3E010202000W01

DTC P2006	Variable tumble shutter valve stuck closed
DETECTION CONDITION	• The PCM monitors mass air amount. If the actual air flow amount is below estimated air flow amount when the following monitoring conditions are met.

	The PCM determines that the variable tumble shutter valve has been stuck closed. **MONITORING CONDITIONS** - Engine coolant temperature is **above 70 °C {158 °F}**. - Engine speed is **3,500 rpm or more**. - Throttle valve opening angle is **above 75 %**. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• ECT sensor malfunction • TP sensor malfunction • CKP sensor malfunction • Variable tumble solenoid valve malfunction • Variable tumble shutter valve malfunction (stuck closed) • Variable tumble shutter valve actuator malfunction (stuck closed) • Short to ground in wiring harness between variable tumble solenoid valve terminal B and PCM terminal 2AI • PCM malfunction



Diagnostic procedure

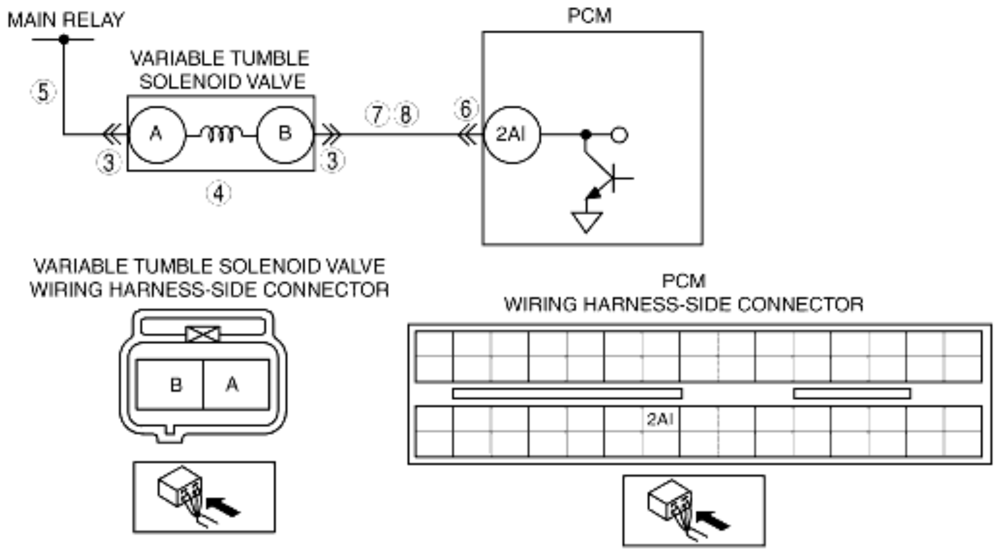
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**CLASSIFY INTERMITTENT CONCERN OR CONTINUOUS CONCERN** • Clear the DTC from the PCM memory using the WDS or equivalent. • Drive vehicle under following conditions: - Engine coolant temperature is **above 70 °C {158 °F}**. - Engine speed: **3,500 rpm or more** - Throttle opening angle is below as following • Engine speed **below 1,500 rpm**: **above 35 %** • Engine speed **between 1,500-2,500 rpm**: **between 25-35%** • Engine speed **above 2,500**: **below 25 %** • Is the PENDING CODE for this DTC present?	Yes	Go to the next step.
		No	Intermittent concern exists. Go to INTERMITTENT CONCERN TROUBLESHOOTING procedure. (See INTERMITTENT CONCERN TROUBLESHOOTING [LF].)
4	**VERIFY STORED OTHER DTCS** • Verify the stored DTCs using the WDS or equivalent. • Is other DTC present except P0117, P0118, P0121, P0122, P0123 and/or P0335?	Yes	Go to the appropriate DTC troubleshooting procedures.
		No	Go to the next step.
5	**INSPECT VARIABLE TUMBLE SHUTTER VALVE ACTUATOR** • Perform "VTCS operation inspection". (See Variable Tumble Control Operation Inspection.)	Yes	Go to the next step.
		No	Replace the variable tumble shutter valve actuator, then go to Step 8.

	• Is the variable tumble shutter valve actuator normal?		
6	**INSPECT VTCS SOLENOID VALVE** • Perform "VTCS solenoid valve airflow inspection". (See VARIABLE TUMBLE SOLENOID VALVE INSPECTION [LF].) • Is variable tumble solenoid valve normal?	Yes	Go to the next step.
		No	Replace the variable tumble solenoid valve, then go to Step 8.
7	**INSPECT PCM FOR POOR CONNECTION** • Inspect for poor connection at PCM terminal 2AI (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair the terminal, then go to the next step.
		No	Go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P2006 COMPLETED** • Make sure to reconnect all disconnected connectors. • Start engine. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Drive the vehicle under following conditions: - Engine coolant temperature is **above 70 °C {158 °F}**. - Engine speed: **3,500 rpm or more** - Throttle opening angle is below as following • Engine speed **below 1,500 rpm**: **above 35 %** • Engine speed **between 1,500-2,500 rpm**: **between 25-35%** • Engine speed **above 2,500**: **below 25 %** • Is PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2009 [LF]

B3E010202000W02

DTC P2009	Variable tumble solenoid valve circuit low input
DETECTION CONDITION	• The PCM monitors variable tumble solenoid valve control signal at PCM terminal 2AI. If the PCM turns variable tumble solenoid valve off but voltage at PCM terminal 2AI still remains low, the PCM determines that variable tumble solenoid valve circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Poor connection of connectors at PCM and/or variable tumble solenoid valve • Short to ground in wiring harness between variable tumble solenoid valve terminal B and PCM terminal 2AI • Open circuit in wiring harness between main relay and variable tumble solenoid valve terminal A • Open circuit in wiring harness between variable tumble solenoid valve terminal B and PCM terminal 2AI • Variable tumble solenoid valve malfunction • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT VARIABLE TUMBLE SOLENOID VALVE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
4	**INSPECT VARIABLE TUMBLE SOLENOID VALVE** • Perform the variable tumble solenoid valve inspection. (See VARIABLE TUMBLE SOLENOID VALVE INSPECTION [LF].) • Is variable tumble solenoid valve normal?	Yes	Go to the next step.
		No	Replace the variable tumble solenoid valve, then go to Step 9.
5	**INSPECT VARIABLE TUMBLE SOLENOID VALVE POWER SUPPLY CIRCUIT FOR OPEN CIRCUIT** • Disconnect the variable tumble solenoid valve connector. • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between variable tumble solenoid valve terminal A (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit, then go to Step 9.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector.	Yes	Repair the terminal, then go to Step 9.
		No	Go to the next step.

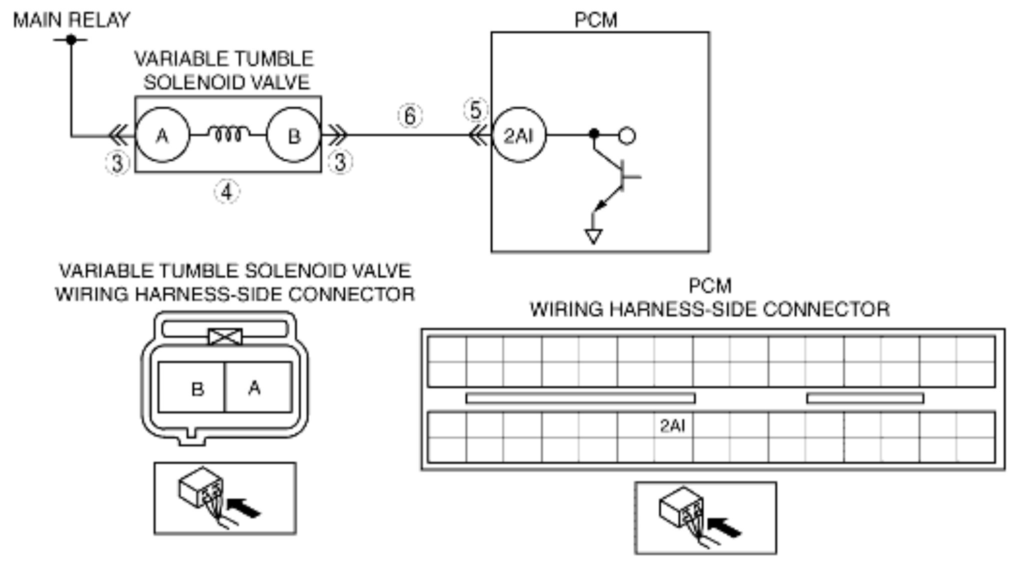
	• Inspect for poor connection at PCM terminal 2AI. (such as damaged/pulled-out pins, corrosion). • Is there malfunction?		
7	**INSPECT VARIABLE TUMBLE SOLENOID VALVE CONTROL CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between variable tumble solenoid valve terminal B (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for short to ground, then go to Step 9.
		No	Go to the next step.
8	**INSPECT VARIABLE TUMBLE SOLENOID VALVE CONTROL CIRCUIT FOR OPEN CIRCUIT** • Connect variable tumble solenoid valve connector. • Turn the ignition switch to the ON position (Engine off). • Measure voltage between PCM terminal 2AI (wiring harness side) and body ground. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace wiring harness for open circuit, then go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P2009 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2010 [LF]

B3E010202000W03

DTC P2010	Variable tumble solenoid valve circuit high input
DETECTION CONDITION	• The PCM monitors the variable tumble solenoid valve control signal at PCM terminal 2AI. If the PCM turns variable tumble solenoid valve on but the

	voltage at PCM terminal 2AI still remains high, the PCM determines that the variable tumble solenoid valve circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Poor connection of connectors at PCM and/or variable tumble solenoid valve • Short to power supply in wiring harness between variable tumble solenoid valve terminal B and PCM terminal 2AI • Variable tumble solenoid valve malfunction • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY**	Yes	Perform repair or diagnosis according to the available repair information.

	• Verify related service repair information availability. • Is any related repair information available?		• If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF VARIABLE TUMBLE SOLENOID VALVE CONNECTOR** • Turn the ignition switch off. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 7.
		No	Go to the next step.
4	**INSPECT VARIABLE TUMBLE SOLENOID VALVE** • Perform variable tumble solenoid valve inspection. (See VARIABLE TUMBLE SOLENOID VALVE INSPECTION [LF].) • Is variable tumble solenoid valve normal?	Yes	Go to the next step.
		No	Replace the variable tumble solenoid valve, then go to Step 7.
5	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the PCM connector. • Inspect for poor connection at PCM terminal 2AI. (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair terminal, then go to Step 7.
		No	Go to the next step.
6	**INSPECT VARIABLE TUMBLE SOLENOID VALVE CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Remove the variable tumble solenoid valve. • Turn the ignition switch to the ON position (Engine off). • Measure the voltage between PCM terminal 2AI and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for short to power supply, then go to the next step.
		No	Go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P2010 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent.	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.

	• Start the engine. • Is the PENDING CODE for this DTC present?		
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2096 [LF]

B3E010202000W04

DTC P2096	Target A/F feedback system too lean
DETECTION CONDITION	• The PCM monitors the target A/F fuel trim when under the target A/F feedback control. If the fuel trim is more than the specification, the PCM determines that the target A/F feedback system is too lean. **Diagnostic support note** • This is a continuous monitor (FUEL SYSTEM). • The MIL illuminates if the PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Leakage exhaust gas • Rear HO2S malfunction • IAT sensor malfunction • ECT sensor malfunction • Air suction in intake-air system • Front HO2S malfunction • MAF sensor malfunction • Insufficient fuel line pressure • Fuel pump unit malfunction • Leakage fuel • Improper operation ignition system • Insufficient engine compression • Fuel injector malfunction

	• PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Is the DTC P2177 or P2187 also present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2096 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to FREEZE FRAME DATA DTC inspection. (See DTC TABLE [LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS OF REAR HO2S** • Connect the WDS or equivalent to the DLC-2. • Start the engine and warm it up completely. • Access O2S12 PID. • Read O2S12 PID under following accelerator pedal condition (in NEUTRAL). - **More than 0.45 V** when accelerator pedal is suddenly depressed (rich condition). - **Less than 0.45 V** just after release of accelerator pedal (lean condition) • Is the PID normal?	Yes	Go to the next step.
		No	Visually inspect for the exhaust gas leakage between the TWC and rear HO2S. • If there is no leakage, replace the rear HO2S. (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF].) Then go to Step 17.

6	**VERIFY CURRENT INPUT SIGNAL STATUS** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See PCM INSPECTION [LF].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 17.
7	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER FREEZE FRAME DATA CONDITION** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs under the FREEZE FRAME DATA condition. (See PCM INSPECTION [LF].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 17.
8	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Connect the WDS or equivalent to the DLC-2. • Start the engine and warm it up completely. • Access O2S11 PID. • Read O2S11 PID under following accelerator pedal condition (in NEUTRAL). - **More than 0.45 V** when accelerator pedal is suddenly depressed (rich condition). - **Less than 0.45 V** just after release of accelerator pedal (lean condition) • Is the PID normal?	Yes	Go to the next step.
		No	Visually inspect for the exhaust gas leakage between the exhaust manifold and front HO2S. • If there is no leakage, replace front HO2S. (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF].) Then go to Step 17.
9		Yes	Go to the next step.

	VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR • Connect the WDS or equivalent to the DLC-2. • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed. • Is the PID normal?	No	Replace the MAF/IAT sensor, then go to Step 17.
10	**INSPECT INTAKE-AIR SYSTEM FOR EXCESSIVE AIR SUCTION** • Visually inspect the hose in intake-air system for looseness, cracks or damages. • Is there any malfunction?	Yes	Repair or replace the malfunctioning part, then go to Step 17.
		No	Go to the next step.
11	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See FUEL LINE PRESSURE INSPECTION.) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 13.
12	**INSPECT FUEL SYSTEM FOR FUEL LEAKAGE** • Visually inspect fuel leakage in the fuel system. • Is there fuel leakage?	Yes	Repair or replace the malfunctioning part, then go to Step 17.
		No	Replace the fuel pump unit, then go to Step 17. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
13	**INSPECT IGNITION COIL WIRING HARNESSES** • 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, then go to Step 17.
14	**INSPECT IGNITION SYSTEM OPERATION** • Perform spark test. (See Spark Test.) • Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to spark test result. Then go to Step 17.
15	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression.	Yes	Go to the next step.
		No	Overhaul engine, then go to Step 17.

	(See COMPRESSION INSPECTION [LF].) • Is there any malfunction?		
16	**INSPECT FUEL INJECTOR** • Inspect fuel injector. (See FUEL INJECTOR INSPECTION.) • Is there any malfunction?	Yes	Replace suspected fuel injector, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
17	**VERIFY TROUBLESHOOTING OF DTC P2096 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
18	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2097 [LF]

B3E010202000W05

DTC P2097	Target A/F feedback system too rich
DETECTION CONDITION	• The PCM monitors the target A/F fuel trim when under the target A/F feedback control. If the fuel trim is less than specification, the PCM determines that the target A/F feedback system is too rich. **Diagnostic support note** • This is a continuous monitor. (FUEL SYSTEM) • The MIL illuminates if the PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available.

	• The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Leakage exhaust gas • Rear HO2S malfunction • IAT sensor malfunction • ECT sensor malfunction • Front HO2S malfunction • Excessive fuel line pressure • Fuel pump unit malfunction • Purge valve malfunction • Insufficient engine compression • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Is the DTC P2178 or P2188 also present?	Yes	Go to the applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2097 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to FREEZE FRAME DATA DTC inspection. (See DTC TABLE [LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS OF REAR HO2S**	Yes	Go to the next step.
		No	Visually inspect for the exhaust gas leakage between TWC and rear HO2S.

	• Connect the WDS or equivalent to the DLC-2. • Start the engine and warm it up completely. • Access O2S12 PID. • Read O2S12 PID under following accelerator pedal condition (in NEUTRAL). - **More than 0.45 V** when accelerator pedal is suddenly depressed (rich condition). - **Less than 0.45 V** just after release of accelerator pedal (lean condition) • Is the PID normal?		• If there is no leakage, replace rear HO2S. (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF].) Then go to Step 11.
6	**VERIFY CURRENT INPUT SIGNAL STATUS** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See PCM INSPECTION [LF].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 11.
7	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER FREEZE FRAME DATA CONDITION** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs under FREEZE FRAME DATA condition. (See PCM INSPECTION [LF].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 11.
8		Yes	Go to the next step.

	VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S • Connect the WDS or equivalent to the DLC-2. • Start the engine and warm it up completely. • Access O2S11 PID. • Read O2S11 PID under following accelerator pedal condition (in NEUTRAL). - **More than 0.45 V** when accelerator pedal is suddenly depressed (rich condition). - **Less than 0.45 V** just after release of accelerator pedal (lean condition) • Is the PID normal?	No	Visually inspect for exhaust gas leakage between the exhaust manifold and front HO2S. • If there is no leakage, replace front HO2S. (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF].) Then go to Step 11.
9	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See FUEL LINE PRESSURE INSPECTION.) • Is there any malfunction?	Yes	Replace the fuel pump unit, then go to Step 11. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
		No	Go to the next step.
10	**INSPECT LONG TERM FUEL TRIM** • Connect the WDS or equivalent to the DLC-2. • Access LONGFT1 PID. • Compare the LONGFT1 PID with recorded FREEZE FRAME DATA at Step 1. • Is the LONGFT1 PID above FREEZE FRAME DATA?	Yes	Inspect the purge valve. (See PURGE SOLENOID VALVE INSPECTION.) • If there is any malfunction, replace the purge valve. (See INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [LF].) Then go to Step 11.
		No	Go to the next step.
11	**VERIFY TROUBLESHOOTING OF DTC P2097 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See OBD DRIVE MODE [LF].)	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.

	• Is the PENDING CODE for this DTC present?		
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After repair procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2177 [LF]

B3E010202100W01

DTC P2177	Fuel system too lean at off idle
DETECTION CONDITION	• PCM monitors short term fuel trim (SHRTFT), long term fuel trim (LONGFT) during closed loop fuel control at off-idle. If the LONGFT or the sum total of these fuel trims exceed preprogrammed criteria. PCM determines that fuel system is too lean at off-idle. **Diagnostic support note** • This is a continuous monitor. (FUEL SYSTEM) • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Misfire • Front HO2S deterioration • Front HO2S heater malfunction • MAF sensor malfunction • Pressure regulator (built-in fuel injection pump) malfunction • Fuel pump malfunction • Fuel filter clogged or restricted • Fuel leakage on fuel line from fuel delivery pipe and fuel pump • Leakage exhaust system • Purge solenoid valve improper operation • Purge solenoid valve malfunction (stuck open) • Purge solenoid hoses improper connection • Air suction in intake-air system

	• Insufficient engine compression

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTCS** • Turn ignition switch to off, then the ON position (Engine off). • Verify related pending code or stored DTCs. • Is other DTC present?	Yes	If misfire DTC is present, go to Step 8. If other DTC is present, go to appropriate DTC troubleshooting procedure. (See DTC TABLE [LF].)
		No	If drivability concern is present, go to Step 8. If not, go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2177 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA.
5	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access ECT, MAF, TP and VSS PIDs using WDS or equivalent. • Is there any signal that is far out of specification when key is ON and engine runs?	Yes	Inspect suspected sensor and excessive resistance in related wiring harnesses. Repair or if necessary. Then go to Step 16.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGANL STATUS UNDER TROUBLE CONDITION** • Inspect same PIDs as Step 5 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect suspected sensor and related wiring harnesses repair or replace it. Then go to Step 16.
		No	Go to the next step.
7		Yes	Go to the next step.

	VERIFY CURRENT INUPUT SIGNAL STATUS OF FRONT HO2S • Access O2S11 for P2177 PID using WDS or equivalent. • Check PID under following accelerator pedal condition (in NEUTRAL). • Is PID reading normal? - **Above 0.45 V** when accelerator pedal is suddenly depressed (rich condition). - **Below 0.45 V** just after release of accelerator pedal (lean condition).	No	Visually inspect for any gas leakage between exhaust manifold and front HO2S. Then go to Step 16.
8	**VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR** • Connect the WDS or equivalent to the DLC-2. • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace MAF/IAT sensor, then go to Step 16.
9	**INSPECT FOR EXCESSIVE AIR SUCTION OF INTAKE AIR SYSTEM** • Visually inspect for loosen, cracks or damages hoses on intake-air system. • Is there any malfunction?	Yes	Repair or replace source of air suction, then go to Step 16.
		No	Go to the next step.
10	**INSPECT PURGE SOLENOID OPERATION** • Carry out Purge Control System Inspection. (See Purge Control System Inspection.) • Does purge control system work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection result, then go to Step 16.
11	**INSPECT FUEL LINE PRESSURE** • Turn ignition switch to off. • Inspect fuel line pressure. (See FUEL LINE PRESSURE INSPECTION.) • Is fuel line pressure normal?	Yes	Go to Step 12.
		No	If fuel pressure is too high, replace fuel pump nit, then go to Step 16. If fuel line pressure is low, go to the next step.

12	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace suspected fuel line, then go to Step 16.
		No	Inspect for foreign materials or stain inside fuel filter (low-pressure). If for foreign materials or stain inside fuel filter (low-pressure), clean of fuel tank and filter. Then go to Step 16.
13	**INSPECT IGNITION SYSTEM** • Carry out spark test. (See Spark Test.) • Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to spark test result, then go to Step 16.
14	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [LF].) • Is it normal?	Yes	Go to the next step.
		No	Implement engine overhaul for repairs, then go to Step 16.
15	**INSPECT FUEL INJECTOR OPERATION** • Remove fuel injector. • Inspect fuel injector (resistance, injection amount). (See FUEL INJECTOR INSPECTION.) • Is fuel injector normal?	Yes	Go to the next step.
		No	Replace suspected fuel injector, then go to the next step.
16	**VERIFY TROUBLESHOOTING OF DTC P2177 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear DTC from PCM memory using WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
17	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2178 [LF]

B3E010202100W02

DTC P2178	Fuel system too rich at off idle
DETECTION CONDITION	• PCM monitors short term fuel trim (SHRTFT), long term fuel trim (LONGFT) during closed loop fuel control at off-idle. If the LONGFT or the sum total of these fuel trims exceed preprogrammed criteria. PCM determines that fuel system is too rich at off-idle. **Diagnostic support note** • This is a continuous monitor. (FUEL SYSTEM) • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Misfire • Front HO2S deterioration • Front HO2S heater malfunction • MAF sensor malfunction • Pressure regulator (built-in fuel injection pump) malfunction • Fuel pump malfunction • EGR valve improper operation • VTCS improper operation • Purge solenoid valve improper operation • Purge solenoid valve malfunction (stuck open) • Purge solenoid hoses improper connection • PCV valve malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.

2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTCS** • Turn ignition switch to off, then the ON position (Engine off). • Verify related pending code or stored DTCs. • Is other DTC present?	Yes	If misfire DTC is present, go to Step 8. If other DTC is present, go to appropriate DTC troubleshooting procedure. (See DTC TABLE [LF].)
		No	If drivability concern is present, go to Step 8. If not, go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2178 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA.
5	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access ECT, MAF, TP and VSS PIDs using WDS or equivalent.) • Is there any signal that is far out of specification when key is ON and engine runs?	Yes	Inspect suspected sensor and excessive resistance in related wiring harnesses. Repair or if necessary. Then go to Step 15.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGANL STATUS UNDER TROUBLE CONDITION** • Inspect same PIDs as Step 5 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect suspected sensor and related wiring harnesses, repair or replace it. Then go to Step 15.
		No	Go to the next step.
7	**VERIFY CURRENT INUPUT SIGNAL STATUS OF FRONT HO2S** • Access O2S11 for P2177 PID using WDS or equivalent. • Check PID under following accelerator pedal condition (in NEUTRAL). • Is PID reading normal? - **Above 0.45 V** when accelerator pedal is suddenly depressed (rich condition).	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between exhaust manifold and front HO2S. Then go to Step 15.

	- **Below 0.45 V** just after release of accelerator pedal (lean condition)		
8	**VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR** • Connect the WDS or equivalent to the DLC-2 • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace MAF/IAT sensor, then go to Step 15.
9	**INSPECT PURGE SOLENOID OPERATION** • Carry out Purge Control System Inspection. (See Purge Control System Inspection.) • Does purge control system work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection result, then go to Step 15.
10	**INSPECT PCV VALVE OPERATION** • Inspect PCV valve operation. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION.) • Is PCV valve normal?	Yes	Go to the next step.
		No	Replace PCV valve, then go to Step 15.
11	**INSPECT EGR VALVE OPERATION** • Carry out EGR Control System Inspection. (See EGR Control System Inspection.) • Does EGR control system work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection result, then go to Step 15.
12	**INSPECT VTCS OPERATION** • Carry out Variable Tumble Control System (VTCS) Operation Inspection. (See Variable Tumble Control Operation Inspection.) • Does VTCS work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection result, then go to Step 15.
13	**INSPECT FUEL LINE PRESSURE** • Turn ignition switch to off. • Inspect fuel line pressure.	Yes	Go to the next step.
		No	If fuel pressure is too high, replace fuel pump nit, then go to Step 15.

	(See FUEL LINE PRESSURE INSPECTION.) • Is fuel line pressure normal?		If fuel line pressure is low, go to the next step.
14	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace suspected fuel line, then go to the next step.
		No	Inspect for foreign materials or stain inside fuel filter (low-pressure). If for foreign materials or stain inside fuel filter (low-pressure), clean of fuel tank and filter. Then go to the next step.
15	**VERIFY TROUBLESHOOTING OF DTC P2178 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear DTC from PCM memory using WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
16	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2187 [LF]

B3E010202100W03

DTC P2187	Fuel system too lean at idle
DETECTION CONDITION	• PCM monitors short term fuel trim (SHRTFT) and long term fuel trim (LONGFT) during closed loop fuel control at idle. If the LONGFT or the sum total of these fuel terms exceed preprogrammed criteria. PCM determines that fuel system is too lean at idle. **Diagnostic support note** • This is a continuous monitor. (FUEL SYSTEM) • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM.

	• PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Misfire • Front HO2S deterioration • Front HO2S heater malfunction • MAF sensor malfunction • Pressure regulator (built-in fuel injection pump) malfunction • Fuel pump malfunction • Fuel filter clogged or restricted • Fuel leakage on fuel line from fuel delivery pipe and fuel pump • Leakage exhaust system • Purge solenoid valve malfunction • Purge solenoid hoses improper connection • Air suction in intake-air system • Insufficient engine compression

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTCS** • Turn ignition switch to off, then the ON position (Engine off). • Verify related pending code or stored DTCs. • Is other DTC present?	Yes	If misfire DTC is present, go to Step 8. If other DTC is present, go to appropriate DTC troubleshooting procedure. (See DTC TABLE [LF].)
		No	If drivability concern is present, go to Step 8. If not, go to the next step.

4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2177 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA.
5	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access ECT, MAF and TP PIDs using WDS or equivalent.) • Is there any signal that is far out of specification when key is ON and engine runs?	Yes	Inspect suspected sensor and excessive resistance in related wiring harnesses. Repair or if necessary. Then go to Step 16.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGANL STATUS UNDER TROUBLE CONDITION** • Inspect same PIDs as Step 4 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect suspected sensor and related wiring harnesses, repair or replace it. Then go to Step 16.
		No	Go to the next step.
7	**VERIFY CURRENT INUPUT SIGNAL STATUS OF FRONT HO2S** • Access O2S11 for P2177 PID using WDS or equivalent. • Check PID under following accelerator pedal condition (in NEUTRAL). • Is PID reading normal? - **Above 0.45 V** when accelerator pedal is suddenly depressed (rich condition). - **Below 0.45 V** just after release of accelerator pedal (lean condition)	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between exhaust manifold and front HO2S. Then go to Step 16.
8	**VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR** • Connect the WDS or equivalent to the DLC-2. • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace MAF/IAT sensor, then go to Step 16.
9	**INSPECT FOR EXCESSIVE AIR SUCTION OF INTAKE AIR SYSTEM**	Yes	Repair or replace source of air suction, then go to Step 16.

	• Visually inspect for loosen, cracks or damages hoses on intake-air system. • Is there any malfunction?	No	Go to the next step.
10	**INSPECT PURGE SOLENOID VALVE STUCK OPEN** • Turn ignition switch to off. • Disconnect both hoses from purge solenoid valve. • Blow air through purge solenoid valve. • Does air blow through?	Yes	Replace purge solenoid valve. Then go to Step 16.
		No	Go to the next step.
11	**INSPECT FUEL LINE PRESSURE** • Turn ignition switch to off. • Inspect fuel line pressure. (See FUEL LINE PRESSURE INSPECTION.) • Is fuel line pressure normal?	Yes	Go to Step 13.
		No	If fuel pressure is too high, replace fuel pump unit, then go to Step 16. If fuel line pressure is low, go to the next step.
12	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace suspected fuel line, then go to Step 16.
		No	Inspect for foreign materials or stain inside fuel filter (low-pressure). If for foreign materials or stain inside fuel filter (low-pressure), clean of fuel tank and filter. Then go to Step 16.
13	**INSPECT IGNITION SYSTEM** • Carry out spark test. (See Spark Test.) • Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to spark test results, then go to Step 16.
14	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See COMPRESSION INSPECTION [LF].) • Is it normal?	Yes	Go to the next step.
		No	Implement engine overhaul for repairs, then go to Step 16.
15	**INSPECT FUEL INJECTOR OPERATION** • Remove fuel injector. • Inspect fuel injector (resistance, injection amount). (See FUEL INJECTOR INSPECTION.)	Yes	Go to the next step.
		No	Replace suspected fuel injector, then go to the next step.

	• Is fuel injector normal?		
16	**VERIFY TROUBLESHOOTING OF DTC P2187 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear DTC from PCM memory using WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
17	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2188 [LF]

B3E010202100W04

DTC P2188	Fuel system too rich at idle
DETECTION CONDITION	• PCM monitors short term fuel trim (SHRTFT), long term fuel trim (LONGFT) during closed loop fuel control at idle. If the LONGFT or the sum total of these fuel terms exceed preprogrammed criteria. PCM determines that fuel system is too rich at idle. **Diagnostic support note** • This is a continuous monitor. (FUEL SYSTEM) • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Misfire • Front HO2S deterioration • Front HO2S heater malfunction • MAF sensor malfunction • Pressure regulator (built-in fuel injection pump) malfunction

	• Fuel pump malfunction • EGR valve stuck open • VTCS improper operation • Purge solenoid valve improper operation • Purge solenoid valve malfunction (stuck open) • Purge solenoid hoses improper connection • PCV valve malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTCS** • Turn ignition switch to off, then the ON position (Engine off). • Verify related pending code or stored DTCs. • Is other DTC present?	Yes	If misfire DTC is present, go to Step 8. If other DTC is present, go to appropriate DTC troubleshooting procedure. (See DTC TABLE [LF].)
		No	If drivability concern is present, go to Step 8. If not, go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2178 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA.
5	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access ECT, MAF, TP and VSS PIDs using WDS or equivalent. • Is there any signal that is far out of specification when key is ON and engine runs?	Yes	Inspect suspected sensor and excessive resistance in related wiring harnesses. Repair or if necessary. Then go to Step 15.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGANL STATUS UNDER TROUBLE CONDITION**	Yes	Inspect suspected sensor and related wiring harnesses, repair or replace it.

	• Inspect same PIDs as Step 5 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?		Then go to Step 15.
		No	Go to the next step.
7	**VERIFY CURRENT INUPUT SIGNAL STATUS OF FRONT HO2S** • Access O2S11 for P2177 PID using WDS or equivalent. • Check PID under following accelerator pedal condition (in NEUTRAL). • Is PID reading normal? - **Above 0.45 V** when accelerator pedal is suddenly depressed (rich condition). - **Below 0.45 V** just after release of accelerator pedal (lean condition).	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between exhaust manifold and front HO2S. Then go to Step 15.
8	**VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR** • Connect the WDS or equivalent to the DLC-2. • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace MAF/IAT sensor, then go to Step 15.
9	**INSPECT PURGE SOLENOID OPERATION** • Carry out Purge Control System Inspection. (See Purge Control System Inspection.) • Does purge control system work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to inspection result, then go to Step 15.
10	**INSPECT PCV VALVE OPERATION** • Inspect PCV valve operation. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION.) • Is PCV valve normal?	Yes	Go to the next step.
		No	Replace PCV valve, then go to Step 15.
11	**INSPECT VTCS OPERATION**	Yes	Go to the next step.

	• Carry out Variable Tumble Control System (VTCS) Operation Inspection. (See Variable Tumble Control Operation Inspection.) • Does VTCS work properly?	No	Repair or replace malfunctioning part according to inspection result, then go to Step 15.
12	**INSPECT FUEL LINE PRESSURE** • Turn ignition switch to off. • Inspect fuel line pressure. (See FUEL LINE PRESSURE INSPECTION.) • Is fuel line pressure normal?	Yes	Go to the next step.
		No	If fuel pressure is too high, replace fuel pump nit, then go to Step 15. If fuel line pressure is low, go to the next step.
13	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace suspected fuel line, then go to Step 15.
		No	Inspect for foreign materials or stain inside fuel filter (low-pressure). If for foreign materials or stain inside fuel filter (low-pressure), clean of fuel tank and filter. Then go to Step 15.
14	**INSPECT EGR VALVE STUCK OPEN** • Remove EGR valve. • Does EGR valve stuck open?	Yes	Clean or replace EGR valve, then go to the next step.
		No	Go to the next step.
15	**VERIFY TROUBLESHOOTING OF DTC P2188 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear DTC from PCM memory using WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
16	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2195 [LF]

B3E010202100W05

DTC P2195	Front HO2S signal stuck lean
DETECTION CONDITION	• The PCM monitors the front HO2S output voltage when the following conditions are met. If output voltage is less than **0.45 V** for **41 s**, the PCM determines that the front HO2S signal remains lean. **MONITORING CONDITION** - Fuel injection control system status: feedback zone - ECT: **more than 70 °C {158 °F}** - Engine speed: **more than 1,500 rpm** **Diagnostic support note** • This is a continuous monitor. (HO2S) • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S malfunction • Fuel injector malfunction • Insufficient fuel line pressure • Leakage exhaust gas • Air suction at intake-air system • Leakage fuel • MAF sensor malfunction • ECT sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability.	Yes	Perform repair or diagnosis according to the available repair information. If the vehicle is not repaired, go to the next step.

	• Is any related repair information available?	No	Go to the next step.
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Is the DTC P2177 or P2187 also present?	Yes	Go to applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2195 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to FREEZE FRAME DATA DTC inspection. (See DTC TABLE [LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See PCM INSPECTION [LF].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 14.
6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER FREEZE FRAME DATA CONDITION** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs under FREEZE FRAME DATA condition. (See PCM INSPECTION [LF].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 14.
7	**INSPECT INTAKE-AIR SYSTEM FOR EXCESSIVE AIR SUCTION** • Visually inspect for loosen, cracks or damages hose in intake-air system. • Is there any malfunction?	Yes	Repair or replace the malfunctioning part, then go to Step 14.
		No	Go to the next step.

8	**VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR** • Connect the WDS or equivalent to the DLC-2. • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace MAF/IAT sensor, then go to Step 14.
9	**INSPECT FRONT HO2S** • Inspect front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF].) • Is there any malfunction?	Yes	Replace front HO2S, then go to Step 14. (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
10	**INSPECT FUEL INJECTOR** • Inspect fuel injector. (See FUEL INJECTOR INSPECTION.) • Is there any malfunction?	Yes	Replace suspected fuel injector, then go to Step 14. (See FUEL INJECTOR REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
11	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See FUEL LINE PRESSURE INSPECTION.) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 13.
12	**INSPECT FUEL SYSTEM FOR FUEL LEAKAGE** • Visually inspect fuel leakage in the fuel system. • Is there fuel leakage?	Yes	Repair or replace the malfunctioning part, then go to the next step.
		No	Replace the fuel pump unit, then go to the next step. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
13	**VERIFY TROUBLESHOOTING OF DTC P2195 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the PCM Adopted Memory Produce Drive Mode and HO2S heater, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].)	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.

	• Is the PENDING CODE for this DTC present?		
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2196 [LF]

B3E010202100W06

DTC P2196	Front HO2S signal stuck rich
DETECTION CONDITION	• The PCM monitors the front HO2S output voltage when the following conditions are met. If output voltage is more than **0.45 V** for **41 s**, the PCM determines that the front HO2S signal remains rich. **MONITORING CONDITION** - Fuel injection control system status: feedback zone - ECT: **more than 70 °C {158 °F}** - Engine speed: **more than 1,500 rpm** **Diagnostic support note** • This is a continuous monitor (HO2S). • MIL illuminates if PCM detects the above malfunctioning condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if PCM detects the above malfunction conditions during first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S malfunction • Fuel injector malfunction • Excessive fuel pressure • Restriction in intake-air system • MAF sensor malfunction • ECT sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION	ACTION

1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. If the vehicle is not repaired, go to the next step.
		No	Go to applicable DTC troubleshooting. (See DTC TABLE [LF].)
3	**VERIFY RELATED PENDING CODE OR STORED DTC** • Turn the ignition switch off, then ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Is the DTC P2177 or P2187 also present?	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2196 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to FREEZE FRAME DATA DTC inspection. (See DTC TABLE [LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See PCM INSPECTION [LF].) - ECT - MAF - TP - VSS • Are the PIDs normal?	Yes	Go to the next step.
		No	Inspect the malfunctioning part according to the inspection results. Then go to Step 10.
6	**VERIFY CURRENT INPUT SIGNAL STATUS OF MAF SENSOR** • Connect the WDS or equivalent to the DLC-2. • Start the engine. • Access the MAF PID. • Verify that the MAF PID changes quickly according to engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace MAF/IAT sensor, then go to Step 10.

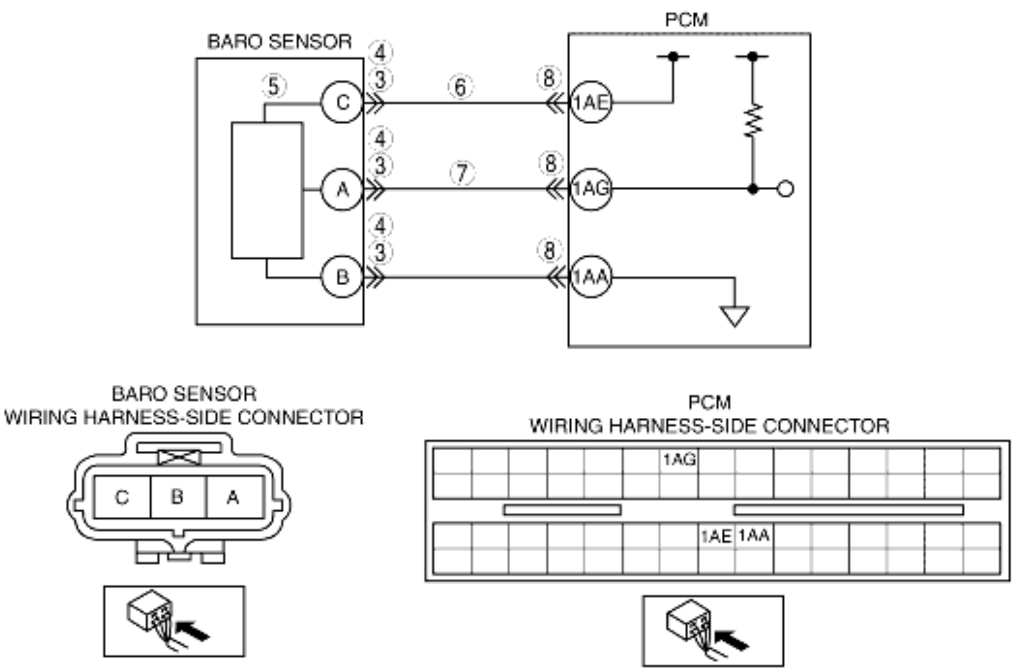
7	**INSPECT FRONT HO2S** • Inspect the front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF].) • Is there any malfunction?	Yes	Replace front HO2S, then go to Step 10. (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**INSPECT FUEL INJECTOR** • Inspect fuel injector. (See FUEL INJECTOR INSPECTION.) • Is there any malfunction?	Yes	Replace suspected fuel injector, then go to Step 10. (See FUEL INJECTOR REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
9	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See FUEL LINE PRESSURE INSPECTION.) • Is there any malfunction?	Yes	Replace the fuel pump unit, then go to the next step. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
		No	Go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P2196 COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the WDS or equivalent. • Perform the PCM Adopted Memory Produce Drive Mode and HO2S heater, and TWC Repair Verification Drive Mode. (See OBD DRIVE MODE [LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2228 [LF]

B3E010201083W01

DTC P2228	BARO sensor circuit low input
DETECTION CONDITION	• PCM monitors input voltage from BARO sensor. If input voltage at PCM terminal 1AG is **below 1.99 V**, PCM determines that BARO sensor circuit has malfunction.

	Diagnostic support note • This is a continuous monitor (CCM). • MIL illuminates if PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in PCM memory.
POSSIBLE CAUSE	• BARO sensor malfunction • Connector or terminal malfunction • Short to ground in wiring between BARO sensor terminal A and PCM terminal 1AG • Open circuit in wiring between BARO sensor terminal C and PCM terminal 1AE • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY**	Yes	Perform repair or diagnosis according to the available repair information.

	• Verify related service repair information availability. • Is any related repair information available?		• If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT CONNECTION OF BARO SENSOR CONNECTOR** • Turn the ignition switch to off. • Verify that BARO sensor connector is connected securely. • Is connection normal?	Yes	Go to the next step.
		No	Reconnect the connector, then go to Step 9.
4	**INSPECT BARO SENSOR CONNECTOR FOR POOR CONNECTION** • Disconnect the BARO sensor connector. • Inspect for poor connection (damaged/pulled-out pins, corrosion, etc.). • Is there malfunction?	Yes	Repair or replace suspected terminal, then go to Step 8.
		No	Go to the next step.
5	**INSPECT BARO SENSOR MALFUNCTION** • Perform BARO sensor inspection. (See BAROMETRIC PRESSURE (BARO) SENSOR INSPECTION [LF].) • Is BARO sensor normal?	Yes	Go to the next step.
		No	Replace BARO sensor, then go to Step 9.
6	**INSPECT POWER SUPPLY CIRCUIT VOLTAGE AT BARO SENSOR CONNECTOR** **Note** • If DTCs P0107 and P0122 are also retrieved with P2228, go to REFERENCE VOLTAGE troubleshooting procedure. • Measure voltage between BARO sensor terminal C (harness-side) and body ground. • Is voltage **within 4.5-5.5 V?**	Yes	Go to the next step.
		No	Inspect for open circuit between PCM terminal 1AE (harness-side) and BARO sensor terminal C (harness-side). Repair or replace suspected harness, then go to Step 9.
7	**INSPECT BARO SENSOR SIGNAL CIRCUIT FOR SHORT TO GROUND** • Turn the ignition switch to off. • Disconnect PCM connector. • Inspect for continuity between BARO sensor terminal B (harness-side) and body ground. • Is there continuity?	Yes	Repair or replace suspected harness, then go to Step 9.
		No	Go to the next step.

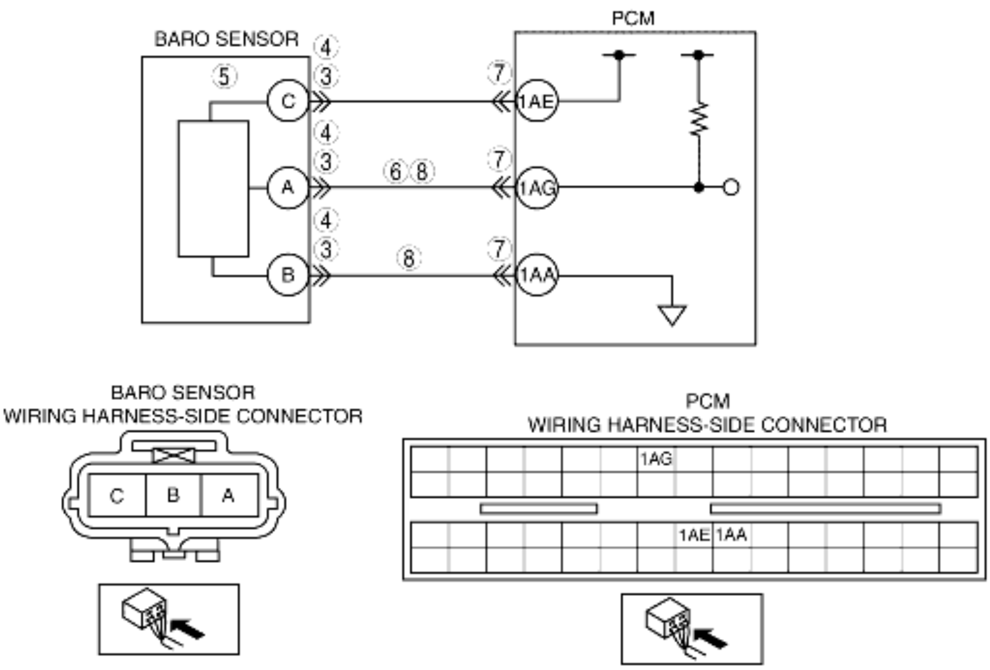
8	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Disconnect PCM connector. • Inspect for poor connection at terminals (damaged/pulled-out pins, corrosion, etc.). • Is there malfunction?	Yes	Repair terminal, then go to Step 9.
		No	Go to the next step.
9	**VERIFY TROUBLESHOOTING OF DTC P2228 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear DTC from memory using WDS or equivalent. • Start the engine. • Is same DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	No concern is detected. Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2229 [LF]

B3E010201083W02

DTC P2229	BARO sensor circuit high input
DETECTION CONDITION	• PCM monitors input voltage from BARO sensor. If input voltage at PCM terminal 1AG is **above 4.43 V**, PCM determines that BARO sensor circuit has malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • MIL illuminates if PCM detects the above malfunction condition during first drive cycle. • PENDING CODE is available if PCM detects the above malfunction condition. • FREEZE FRAME DATA is available. • DTC is stored in PCM memory.
POSSIBLE CAUSE	• BARO sensor malfunction • Connector or terminal malfunction

	• Open circuit in wiring between BARO sensor terminal A and PCM terminal 1AG • Open circuit in wiring between BARO sensor terminal B and PCM terminal 1AA • Short to power circuit in wiring between BARO sensor terminal A and PCM terminal 1AG • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT CONNECTION OF BARO SENSOR CONNECTOR** • Turn the ignition switch to off. • Verify that BARO sensor connector is connected securely. • Is connection normal?	Yes	Go to the next step.
		No	Reconnect the connector, then go to Step 9.

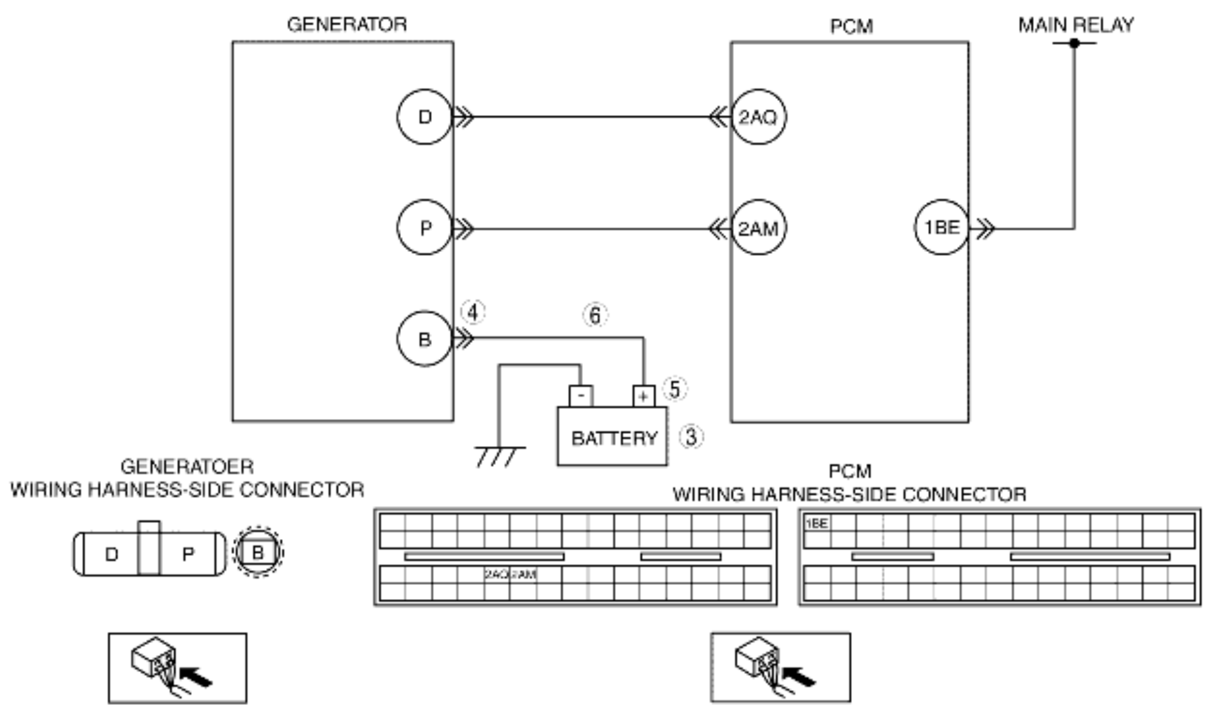
4	**INSPECT BARO SENSOR CONNECTOR FOR POOR CONNECTION** • Disconnect the BARO sensor connector. • Inspect for poor connection (damaged/pulled-out pins, corrosion, etc.). • Is there malfunction?	Yes	Repair or replace suspected terminal, then go to Step 9.
		No	Go to the next step.
5	**INSPECT BARO SENSOR MALFUNCTiON** • Perform BARO sensor inspection. (See BAROMETRIC PRESSURE (BARO) SENSOR INSPECTION [LF].) • Is BARO sensor normal?	Yes	Go to the next step.
		No	Replace BARO sensor, then go to Step 9.
6	**VERIFY BARO SENSOR SIGNAL CIRCUIT FOR SHORT TO REFERENCE VOLTAGE CIRCUIT** • Measure voltage between BARO sensor terminal A and body ground. • Is voltage **above 4.43 V?**	Yes	Repair or replace short to power supply harness, then go to Step 9.
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Disconnect PCM connector. • Inspect for poor connection at terminals (damaged/pulled-out pins, corrosion, etc.). • Is there malfunction?	Yes	Repair terminal, then go to Step 9.
		No	Go to the next step.
8	**VERIFY BARO SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity following terminals: - Between BARO sensor terminal A and PCM terminal 1AG - Between BARO sensor terminal B and PCM terminal 1AA • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace open harness, then go to Step 9.
9	**VERIFY TROUBLESHOOTING OF DTC P2229 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear DTC from memory using WDS or equivalent. • Start the engine.	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	No concern is detected. Go to the next step.

	• Is same DTC present?		
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2502 [LF]

B3E010201083W03

DTC P2502	Charging system voltage problem
DETECTION CONDITION	• PCM judges generator output voltage is **above 17 V** or battery voltage is **below 11 V** during engine running.
POSSIBLE CAUSE	• Open circuit between generator terminal B and battery positive terminal • Battery malfunction • Generator malfunction • PCM is poorly connected • PCM, generator and/or battery are poorly connected



Diagnostic procedure

STEP	INSPECTION	ACTION

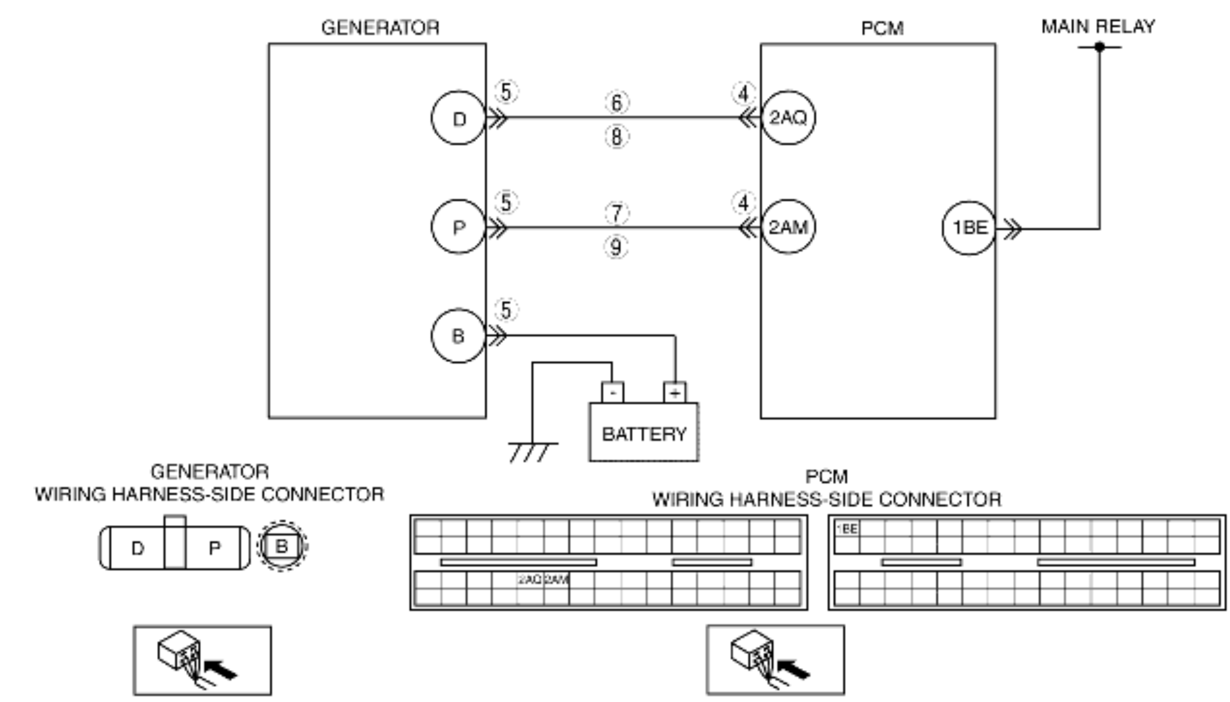
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT BATTERY** • Turn the ignition switch to off. • Inspect battery. • Is battery normal?	Yes	Go to the next step.
		No	Replace battery, then go to Step 7.
4	**INSPECT POOR INSTALLATION OF GENERATOR TERMINAL** • Turn the ignition switch to off. • Inspect for looseness of generator terminal B installation nut. • Is the nut loose?	Yes	Tighten generator terminal B installation nut, then go to Step 7.
		No	Go to the next step.
5	**INSPECT POOR INSTALLATION OF BATTERY POSITIVE TERMINAL** • Inspect for looseness of battery positive terminal. • Is the terminal loose?	Yes	Connect battery positive terminal correctly, then go to Step 7.
		No	Go to the next step.
6	**INSPECT BATTERY CHARGING CIRCUIT** • Disconnect the generator terminal B. • Measure the voltage between the generator terminal B (wiring harness-side) and the body ground. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace wiring harness between the generator terminal B and the battery positive terminal, then go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P2502 COMPLETED** • Make sure to reconnect all connectors. • Clear DTC from memory using WDS or equivalent. • Start the engine. • Is same DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.

8	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2503 [LF]

B3E010201083W04

DTC P2503	**Charging system voltage low**
DETECTION CONDITION	• PCM needs **more than 20 A** from generator, and judges generator output voltage to be **below 8.5 V** during engine running.
POSSIBLE CAUSE	• Generator malfunction • PCM and/or generator are poorly connected • Open and/or short to GND in wiring from between generator terminal P and PCM terminal 2AM • Open and/or short to GND in wiring from between generator terminal D and PCM terminal 2AQ • Drive belt misadjustment



Diagnostic procedure

STEP	INSPECTION	ACTION

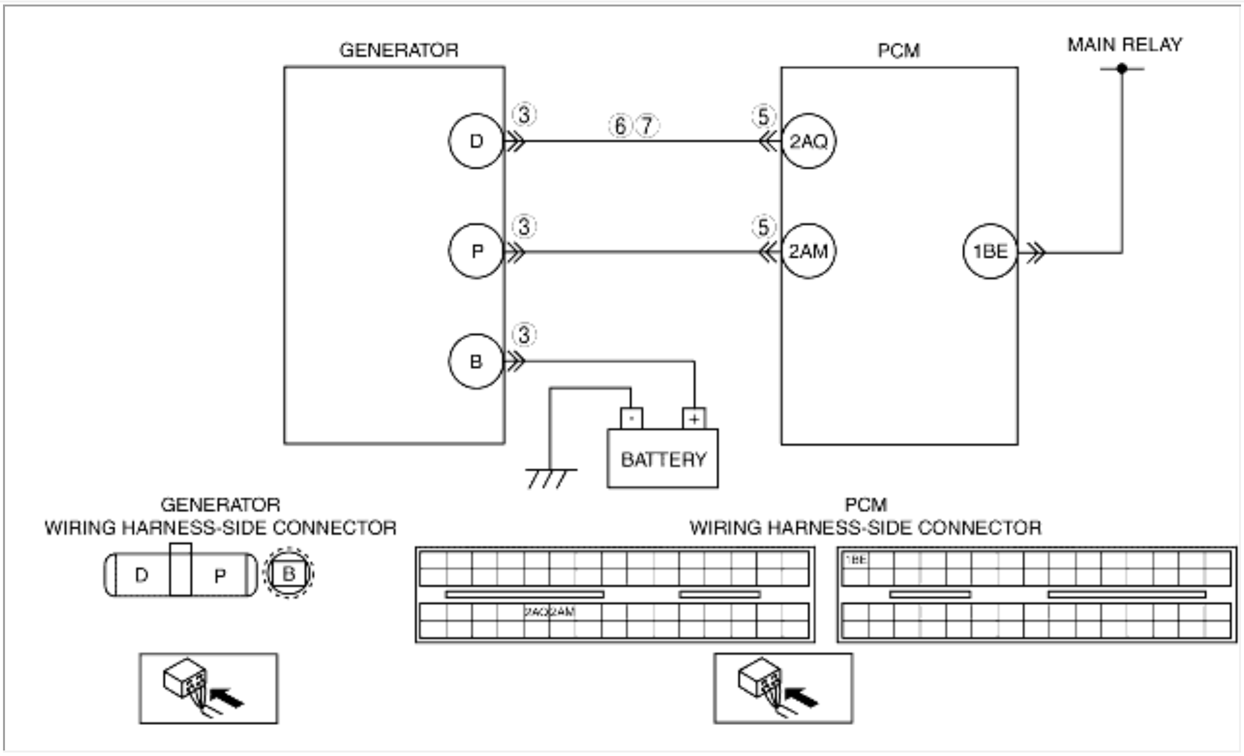
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT DRIVE BELT CONDITION** • Verify that drive belt auto tensioner indicator mark does not exceed limit. • Is front drive belt normal?	Yes	Go to the next step.
		No	Replace and/or adjust drive belt, then go to Step 10.
4	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Turn the ignition switch to off. • Disconnect PCM connector. • Inspect for poor connection (damaged, pulled-out terminals, corrosion, etc.). • Is there a malfunction?	Yes	Repair terminals, then go to Step 10.
		No	Go to the next step.
5	**INSPECT POOR CONNECTION OF GENERATOR CONNECTOR** • Disconnect generator connector. • Inspect for poor connection (damaged, pulled-out terminals, corrosion, etc.). • Is there a malfunction?	Yes	Repair or replace terminals, then go to Step 10.
		No	Go to the next step.
6	**INSPECT GENERATOR CONTROL CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between generator terminal D (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace wiring harness for short to ground, then go to Step 10.
		No	Go to the next step.
7	**INSPECT GENERATOR OUTPUT VOLTAGE MONITOR CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between generator terminal P (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace wiring harness for short to ground, then go to Step 10.
		No	Go to the next step.
8		Yes	Go to the next step.

	INSPECT GENERATOR CONTROL CIRCUIT FOR OPEN • Inspect for continuity between generator terminal D (wiring harness-side) and PCM terminal 2AQ (wiring harness-side). • Is there continuity?	No	Repair or replace wiring harness for open circuit, then go to Step 10.
9	**INSPECT GENERATOR OUTPUT VOLTAGE MONITOR CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between generator terminal P (wiring harness-side) and PCM terminal 2AM (wiring harness-side). • Is there continuity?	Yes	Repair or replace generator, then go to the next step.
		No	Repair or replace wiring harness for open circuit, then go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P2503 COMPLETED** • Make sure to reconnect all connectors. • Clear DTC from PCM memory using WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2504 [LF]

B3E010201083W05

DTC P2504	Charging system voltage high
DETECTION CONDITION	• PCM judges generator output voltage is **above 18.5 V** or battery voltage is **above 16.0 V** during engine running.
POSSIBLE CAUSE	• Short to power circuit between generator connector terminal D and PCM connector terminal 2AQ • Generator malfunction • PCM and/or generator are poorly connected



Diagnostic procedure

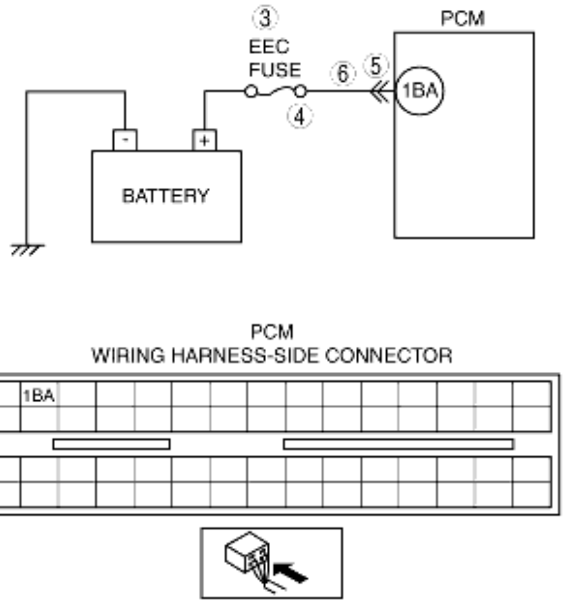
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT POOR CONNECTION OF GENERATOR CONNECTOR** • Turn the ignition switch to off. • Disconnect generator connector. • Inspect for poor connection (damaged, pulled-out terminals, corrosion, etc.). • Is there a malfunction?	Yes	Repair or replace terminals, then go to Step 8.
		No	Go to the next step.
4	**CLASSIFY GENERATOR MALFUNCTION OR OTHER MALFUNCTION** • Turn the ignition switch to the ON position (Engine off).	Yes	Go to the next step.
		No	Malfunction at generator. Go to Step 7.

	• Measure voltage between generator terminal D (wiring harness-side) and body ground. • Is the voltage **B+**?		
5	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Turn the ignition switch to off. • Disconnect PCM connector. • Inspect for poor connection (damaged, pulled-out terminals, corrosion, etc.). • Is there a malfunction?	Yes	Repair or replace pins, then go to Step 8.
		No	Go to the next step.
6	**INSPECT GENERATOR CONTROL CIRCUIT FOR SHORT TO POWER** • Turn the ignition switch to the ON position (Engine off). • Measure voltage between generator terminal D (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace wiring harness for short to power supply, then go to Step 8.
		No	Go to Step 8.
7	**INSPECT GENERATOR CONTROL TERMINAL FOR SHORT TO POWER** • Measure voltage between generator terminal D (part-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace generator, then go to the next step.
		No	Go to the next step.
8	**VERIFY TROUBLESHOOTING OF DTC P2504 COMPLETED** • Make sure to reconnect all connectors. • Clear DTC from PCM memory using WDS or equivalent. • Perform KOER self-test. Start the engine. • Is same DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Is there any DTC present?	Yes	Go to applicable DTC troubleshooting. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

DTC P2507 [LF]

B3E010201083W06

DTC P2507	PCM B+ voltage low
DETECTION CONDITION	• The PCM monitors the voltage of back-up battery positive terminal at PCM terminal 1BA. If the PCM detected battery positive terminal voltage **below 2.5 V** for **2 s**, the PCM determines that the backup voltage circuit has malfunction.
POSSIBLE CAUSE	• Melt down EEC fuse • Open circuit in wiring between EEC fuse and PCM terminal 1BA • Short to ground between EEC fuse and PCM terminal 1BA • Poor connection of PCM connector • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME PID DATA been recorded?	Yes	Go to the next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Check for related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to available repair information. • If vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT EEC FUSE**	Yes	Go to step 6.

	• Turn the ignition switch to off. • Inspect EEC fuse for failure and proper. • Is it normal?	No	• If EEC fuse has been melt down, then go to the next step. • If EEC fuse is not installed correctly, install it correctly then go to Step 7.
4	**INSPECT MONITOR CIRCUIT FOR SHORT TO GROUND** • Disconnect battery cables. • Inspect continuity between EEC fuse terminal and body ground. • Is there continuity?	Yes	Repair or replace wiring harness for short to ground and install new fuse, then go to Step 7.
		No	Go to step 7.
5	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Disconnect PCM connector. • Inspect for poor connection (such as damaged, pulled-out terminals, corrosion). • Is there any malfunction?	Yes	Repair terminals, then go to Step 7.
		No	Go to the next step.
6	**INSPECT MONITOR CIRCUIT FOR OPEN CIRCUIT** • Disconnect battery cables. • Inspect continuity between EEC fuse terminal and PCM terminal 1BA (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace wiring harness for open circuit, then go to the next step.
7	**VERIFY TROUBLESHOOTING OF DTC P2507 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear DTC from PCM memory using WDS or equivalent. • Start engine and warm it up completely. • Is same DTC present?	Yes	Replace PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See AFTER REPAIR PROCEDURE [LF].) • Are any DTC present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [LF].)
		No	Troubleshooting completed.

SYMPTOM TROUBLESHOOTING[ENGINE CONTROL SYSTEM (Z6)]

ENGINE SYMPTOM TROUBLESHOOTING [Z6]

B3E010318881W32

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

Diagnostic Index

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.
6	Cranks normally but will not start		The starter cranks the 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 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 beginning of deceleration or recovery from deceleration.

11	Engine stalls/quits.	Acceleration/cruise	The engine stops unexpectedly at 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	Momentary pause at beginning of acceleration or during acceleration
	Surges	Acceleration/cruise	Momentary minor irregularity in engine output
12	Lack/loss of power	Acceleration/cruise	Performance is poor under load. (e.g. power down when climbing hills)
13	Knocking/pinging	Acceleration/cruise	Sound is produced when air/fuel mixture is ignited by something other than spark plug. (e.g. hot spot in combustion chamber)
14	Poor fuel economy		Fuel economy is unsatisfactory.
15	Emission compliance		Fails emissions test.
16	High oil consumption/leakage		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 the 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 WOT.
26	Exhaust sulphur smell		Rotten egg smell (sulphur) from exhaust
27	Spark plug condition		Incorrect spark plug condition

28	ATX concerns	Upshift/downshift/ engagement	ATX concerns not related to engine performance

QUICK DIAGNOSIS CHART [Z6]

B3E010318881W33

X: Applicable

No.	Troubleshooting item		Starter motor malfunction (Mechanical or electrical)	Starter circuit including ignition switch is open	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 system, thermostat, etc.)	Cooling fan system malfunction	Engine or transaxle mounts are improperly installed.	Cooling fan seat is improper.	Accelerator cable free play misadjustment	Fuel quality
1	Melting of main or other fuses																						
2	MIL illuminates		x	x		x	x			x				x									
3	Will not crank																						
4	Hard to start/long crank/erratic start/erratic crank																						x
5	Engine stalls.	After start/at idle						x	x	x													x
6	Cranks normally but will not start							x	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																						
11	Engine stalls/quits.	Acceleration/cruise						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				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					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.																						
26	Exhaust sulfur smell																						x
27	Spark plug condition							x					x										
28	ATX concerns	Upshift/downshift engagement	See 0503, TROUBLESHOOTING																				

B3E0103W001

X: Applicable

No.	Troubleshooting item		Variable valve timing system malfunction	Variable tumble control malfunction	Engine overheating	Air cleaner element clogging or restriction	Air leakage from intake-air system (Loose tubes, cracks gaskets brakage)	Intake-air temperature is too hot	IAC valve improper operation	Idle learning of IAC system is not completed	Throttle body malfunction	Variable intake-air control malfunction	Vacuum leakage (Vacuum hose damage, misrouting)	Ignition coil malfunction (e.g.open, short or cracks)	Initial ignition timing misadjustment (CKP sensor & crankshaft pulley misadjustment)	Spark plug malfunction	Ignition coil malfunction	CKP sensor is damaged. (e.g.open or short circuits)	Crankshaft pulley is damaged	Improper gap between CKP sensor and pulse wheel	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/erratic crank					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
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												
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
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	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				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	x
27	Spark plug condition					x										x		x			x	x	x
28	ATX concerns	Upshift/downshift engagement	See 0503, TROUBLESHOOTING																				

B3E0103W002

X: Applicable

No.	Troubleshooting item		Injectors malfunction (Leakage or clogging, inoperative)	Fuel leakage from fuel system (including insulator, injector 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 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 (Front and/or Rear) and related circuit
1	Melting of main or other fuses																							
2	MIL illuminates					x		x			x								x	x		x	x	x
3	Will not crank																				x			
4	Hard to start/long crank/erratic start/erratic crank				x			x	x		x	x			x			x						x
5	Engine stalls.	After start/at idle	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				x					
13	Knocking/pinging	Acceleration/cruise				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									
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	Spark plug condition		x	x				x											x					
28	ATX concerns	Upshift/downshift engagement	See 0503, TROUBLESHOOTING																					

B3E0103W003

X: Applicable

No.	Troubleshooting item		IAT sensor and related circuit malfunction	Barometric pressure sensor malfunction	Neutral or clutch switch and related circuit malfunction (MTX)	MAF sensor and related circuit malfunction	Knock sensor and related circuit malfunction	TP sensor and related circuit malfunction	TP sensor misadjustment (including looseness)	P/S pressure switch and related circuit malfunction	Improper refrigerant charging amount	A/C relay (A/C control signal circuit malfunction)	A/C compressor magnetic clutch malfunction	Improper load signal input	Clutch slippage (MTX)	ATX related parts malfunction	VSS and related circuit malfunction	Improper ATF level	Improper P/S fluid level	Brake dragging	Loose parts	Improper balance of wheels and tires	Drive line malfunction	Suspension malfunction	Immobilizer system operating (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
4	Hard to start/long crank/erratic start/erratic crank					x																			
5	Engine stalls.	After start/at idle		x							x	x													x
6	Cranks normally but will not start																								x
7	Slow return to idle																								
8	Engine runs rough/rolling idle			x						x	x	x		x											
9	Fast idle/runs on													x											
10	Low idle/stalls during deceleration			x	x	x		x	x			x									x				
11	Engine stalls/quits.	Acceleration/cruise		x		x		x	x		x	x			x	x	x								
	Engine runs rough.	Acceleration/cruise		x		x		x	x		x	x			x	x	x								
	Misses	Acceleration/cruise				x		x	x		x	x			x	x	x								
	Buck/jerk	Acceleration/cruise/deceleration				x		x	x		x	x			x	x	x								
	Hesitation/stumble	Acceleration		x		x		x	x		x	x			x	x	x								
	Surges	Acceleration/cruise				x		x	x		x	x			x	x	x								
12	Lack/loss of power	Acceleration/cruise	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					
15	Emission compliance			x																					
16	High oil consumption/leakage																								
17	Cooling system concerns	Overheating									x	x													
18	Cooling system concerns	Runs cold																							
19	Exhaust smoke																								
20	Fuel odor (in engine compartment)																								
21	Engine noise																		x		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	x																
26	Exhaust sulfur smell																								
27	Spark plug condition				x	x																			
28	ATX concerns	Upshift/downshift engagement	See 0503, TROUBLESHOOTING																						

B3E0103W004

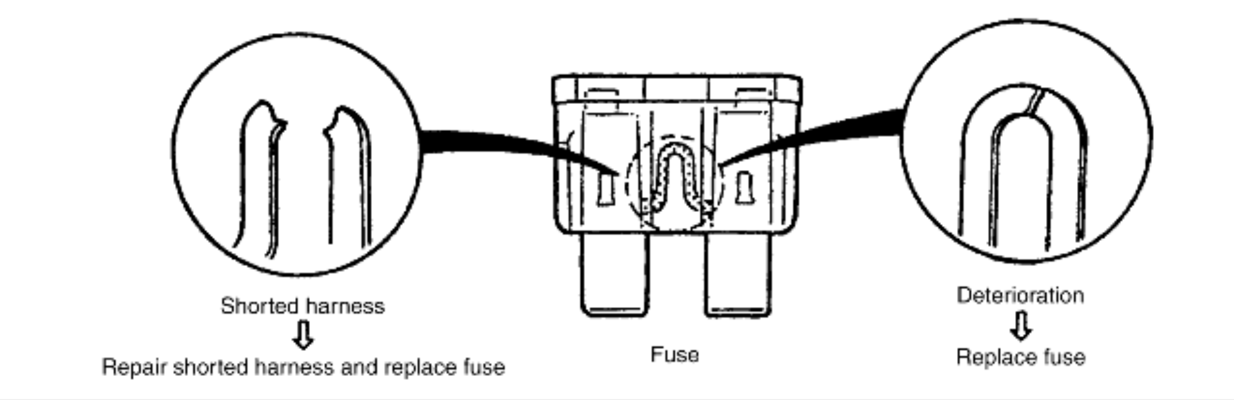
NO.1 MELTING OF MAIN OR OTHER FUSES [Z6]

B3E010318881W34

1	MELTING OF MAIN OR OTHER FUSES

[TROUBLESHOOTING HINTS]

Inspect condition of fuse.



Damaged fuse	Related wiring harness
IG KEY1 (30 A)	**IG KEY1 fuse** • Ignition switch - ENGINE fuse
ENGINE (20 A)	**ENGINE fuse** • Main relay
IG KEY2 (30 A)	**IG KEY2 fuse** • Ignition switch - BACK fuse
BACK (10 A)	**BACK fuse** • TR switch
ENG +B (10 A)	**ENG +B** • PCM
ENGINE (30 A)	**ENGINE fuse** • Main relay - EGI INJ1 fuse - EGI INJ2 fuse - EGI BAR1 fuse
EGI INJ1 (10 A)	**EGI INJ1 fuse** • PCM
EGI INJ2 (10 A)	**EGI INJ2 fuse** • PCM
ENG BAR1	**ENG BAR1 fuse**

(10 A)	• PCM • Fuel pump relay
FUEL PUMP (15 A)	**FUEL PUMP fuse** • Fuel pump relay
FAN (40 A)	**FAN fuse** • FAN control module
BTN (40 A)	**BTN fuse** • OBD fuse
OBD (10 A)	**OBD fuse** • DLC-2

NO.2 MIL ILLUMINATES [Z6]

B3E010318881W35

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

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Connect WDS or equivalent to DLC-2. Retrieve any DTC. Are there any DTCs displayed?	Yes	**DTC is displayed:** • Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** • Inspect the instrument cluster operation. (See INSTRUMENT CLUSTER INSPECTION.)
2	Verify test results.		

	• If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

NO.3 WILL NOT CRANK [Z6]

B3E010318881W36

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 malfunction • Seized/hydrolocked engine, flywheel or drive plate • Immobilizer system and/or circuit malfunction (if equipped) • Immobilizer system operating properly. (Ignition key is not registered.)

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 WDS or equivalent 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 connector securely connected to the coil?	Yes	Go to the next step.
		No	Connect the coil connector securely. Return to Step 1.
3	Does the security light illuminate?	Yes	Go to the next step.
		No	Inspect the instrument cluster. (See INSTRUMENT CLUSTER INSPECTION.)
4	Connect the WDS or equivalent to the DLC-2 and retrieve DTC. **DTC** **B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2141, B2431, U2510**	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	Go to the next step.
5	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 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 1W and instrument cluster terminal 1O • Between PCM terminal 1S and instrument cluster terminal 1M Is there any malfunction?	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step.
7	Change the selector lever in the P or N position. (ATX) Is there continuity between the PCM terminal 1AB and the starter relay?	Yes	Go to the next step.
		No	Repair or replace the wiring harness.
8	Inspect following: • Battery connection • Battery condition • Transaxle is in Park or Neutral. (ATX) • Fuses Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 8.
9		Yes	Go to the next step.

	Is clicking sound heard from the starter when the ignition switch is turned to START position?	No	Go to Step 11.
10	Inspect the starting system. (See STARTER INSPECTION.) Is starting system normal?	Yes	Inspect for seized/hydrolocked the engine, flywheel or drive plate. (See FLYWHEEL INSPECTION.)
		No	Repair or replace the components as required.
11	Do any other electrical accessories work?	Yes	Go to the next step.
		No	Inspect the charging system. (See BATTERY INSPECTION.) (See GENERATOR INSPECTION.)
12	**Note** • The Following test should be performed on ATX only. For MTX, go to the next step. Connect the WDS or equivalent to the DLC-2. Access TR PID. Turn the ignition switch to the ON position. Is TR PID indicated P/N when selecting the P or N position?	Yes	Go to the next step.
		No	Inspect the TR switch adjustment. (See TRANSAXLE RANGE (TR) SWITCH INSPECTION.) • If the TR switch is adjusted properly, inspect for open circuit between the TR switch and the PCM terminal 1X or starter.
13	Connect the WDS or equivalent 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 [Z6].) **Communication error message is displayed:** Inspect for following: • Open circuit in wiring harness between main relay and PCM terminal 1BF, or 1BG (ATX) • Open circuit in wiring harness between main relay terminal B and PCM terminal 1AW • The main relay is stuck open. • Open or poor GND circuit (PCM terminal 2BH, 2AZ or 2BD) • Poor connection of vehicle body GND

		No	**No DTC is displayed:** Inspect following: • START circuit in ignition switch • Open circuit in wiring harness between ignition switch and starter
14	Retrieve any KOEO DTCs using WDS or equivalent. Are there DTCs displayed during KOEO inspection?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Inspect following: • START circuit in ignition switch • Open circuit in wiring harness between ignition switch and starter
15	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [Z6]

B3E010318881W37

4	HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK
DESCRIPTION	• The starter cranks the engine at normal speed but the 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 • IAC valve malfunction • 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 **Warning** The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: • Vacuum leakage	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.

	• Proper fuel quality (such as proper octane, contamination, winter/summer blend) • Loose bands on intake-air system • Cracks on intake-air system parts • Air cleaner restriction Are all items normal?		
2	Connect the WDS or equivalent to the DLC-2. Retrieve any KOEO and KOER DTCs using WDS or equivalent. Is any KOEO or KOER DTC displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		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	Inspect the ignition coil related wiring harnesses 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.
5	Inspect the spark plug conditions. 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 the fuel injector. **Spark plug is grayish white:** Inspect for clogged the fuel injector.
		No	Install spark plugs on original cylinders. Go to the next step.
6	Visually inspect the CKP sensor and teeth of the crankshaft pulley. Are the CKP sensor and teeth of the crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
7	Measure gap between the CKP sensor and teeth of the crankshaft pulley. **Specification** **0.5-1.5 mm {0.02-0.05 in}**	Yes	Go to the next step.
		No	Replace the crankshaft pulley.

	Is the gap within specification?		
8	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
9	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Connect WDS or equivalent to DLC-2. Turn ON fuel pump using FP PID in output state control of datalogger function. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and the fuel pump unit related circuits. Inspect the fuel line for clogging. • If normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
10	Is fuel line pressure held after FP PID is turned OFF? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Inspect the pressure regulator diaphragm condition. • If condition is normal, inspect the fuel injector. • If condition is not normal, replace the pressure regulator.
11	Disconnect a vacuum hose from the purge solenoid valve and plug opening end of the vacuum hose. Start the 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 the following: • Contamination • MAF sensor terminal B voltage (GND circuit) Is there any contamination?	Yes	Replace the MAF sensor.
		No	Go to the next step.
13	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the part.
		No	Go to the next step.

14	Inspect engine condition while tapping the EGR valve housing. Does the engine condition improve?	Yes	Replace EGR valve.
		No	Go to the next step.
15	Inspect the starting system. (See STARTER INSPECTION.) Is the starting system normal?	Yes	Inspect for loose connectors or poor terminal contact. • If normal, remove the EGR valve and visually inspect for mechanically stuck EGR valve.
		No	Repair or replace the components as required.
16	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.5 ENGINE STALLS-AFTER START/AT IDLE [Z6]

B3E010318881W38

5	ENGINE STALLS-AFTER START/AT IDLE
DESCRIPTION	• The engine stops unexpectedly.
POSSIBLE CAUSE	• Improper A/C system operation • Air leakage from intake-air system parts • Purge solenoid valve malfunction • Improper IAC valve operation • EGR valve malfunction • No signal from the 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 (if equipped) • Immobilizer system operating properly. (Ignition key is not registered.) • Pressure regulator malfunction **Warning** The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**Note**	Yes	**Both conditions appear:** Go to Step 3.

	• The following test should be performed for vehicles with immobilizer system. Go to Step 8 for vehicles without immobilizer system. Connect the WDS or equivalent to the DLC-2. Do the following conditions appear? • The engine is not completely started. • DTC P1260 is displayed.	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	The 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	Does the security light illuminate?	Yes	Go to the next step.
		No	Inspect the instrument cluster and wiring harness.
5	Connect the WDS or equivalent to the DLC-2 and retrieve the DTC. Are any of following DTCs displayed? **DTC** **B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2141, B2431, U2510**	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		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 Is there any malfunction?	Yes	Repair or replace the wiring harness and connector.
		No	Go to the next step.
7	Inspect for the following wiring harnesses and connectors: • Between PCM terminal 1W and instrument cluster terminal 1O • Between PCM terminal 1S and instrument cluster terminal 1M Is there any malfunction?	Yes	Repair or replace the 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: IAC valve, 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. If the engine stalls, retrieve continuous memory and KOEO DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].) **Communication error message is displayed:** Inspect for the following: • Open circuit in wiring harness between main relay and PCM terminal 1BF, or 1BG (ATX) • Open circuit in wiring harness between main relay terminal B and PCM terminal 1AW. • The main relay is stuck open. • Open or poor GND circuit (PCM terminal 2BH, 2AZ or 2BD) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.
10	Attempt to start the engine at part throttle. Does the engine run smoothly at part throttle?	Yes	Inspect the IAC valve and wiring harness. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [Z6].)
		No	Go to the next step.

11	Connect the WDS or equivalent to the DLC-2. Access RPM PID. Is RPM PID indicating the engine speed while the engine is cranking?	Yes	Go to the next step.
		No	Inspect for the following: • Open or short circuit in CKP sensor • Open or short circuit between CKP sensor terminal A and PCM terminal 2T • Open or short circuit between CKP sensor terminal B and PCM terminal 2P • Open or short circuit between CKP sensor terminal C and PCM terminal 2BF • Open or short circuit in CKP sensor wiring harnesses If the CKP sensor and wiring harness are normal, go to the next step.
12	Visually inspect the CKP sensor and teeth of the crankshaft pulley. Are the CKP sensor and teeth of the crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
13	Measure gap between the CKP sensor and teeth of crankshaft pulley. **Specification** **0.5-1.5 mm {0.02-0.05 in}** Is the gap within specification?	Yes	Go to the next step.
		No	Replace the crankshaft pulley.
14	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.
15	Perform the spark test. (See Spark Test.) Is strong blue spark visible at each cylinder?	Yes	Go to the next step. If symptom occurs with the A/C on, go to Step 21.
		No	Repair or replace the malfunctioning part according to spark test result.
16	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 the fuel injector. **Spark plug is grayish white:** Inspect for clogged the fuel injector.

		No	Install the spark plugs on original cylinders. Go to the next step.
17	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
18	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
19	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Connect the WDS or equivalent to the DLC-2. Turn the fuel pump on using FP PID in output state control of datalogger function. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and the fuel pump related circuit. Inspect the fuel line for clogging. • If there is no malfunction, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
20	Visually inspect for fuel leakage at the fuel injector O-ring and fuel line. Service if necessary. Is the fuel line pressure held after FP PID is turned off? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Inspect the fuel the injector. (See FUEL INJECTOR INSPECTION.) • If the fuel injector is normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
21	**Note** • Following test is for stall concerns with the A/C on. If other symptoms exist, go to the next step. Connect pressure gauges to the A/C low and high pressure side lines. Turn the A/C on and measure low side and high side pressures. Are pressures within specifications?	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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [Z6].) For other symptoms, inspect the following: • Refrigerant charging amount

	(See REFRIGERANT PRESSURE CHECK.)		• Condenser fan operation
22	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from the purge solenoid side. Plug the opening end of vacuum hose. Start the engine. Is the engine stall now eliminated?	Yes	Inspect if the purge solenoid valve is stuck open mechanically. Inspect EVAP control system. (See Purge Control System Inspection.)
		No	Go to the next step.
23	Is air leakage felt or heard at the intake-air system components while racing the engine to higher speed?	Yes	Repair or replace malfunctioning part.
		No	Go to the next step.
24	Inspect engine condition while tapping the EGR valve housing. Does the engine condition improve?	Yes	Replace EGR valve.
		No	Go to the next step.
25	Inspect variable valve timing control system operation. (See Variable Valve Timing Control System Operation Inspection.) Does the variable valve timing control work properly?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part.
26	Is the engine compression correct? (See COMPRESSION INSPECTION [Z6].)	Yes	Remove EGR valve and visually inspect for mechanically stuck EGR valve. • If there is no malfunction, inspect valve timing. (See Timing Chain Installation Note.)
		No	Inspect for cause.
27	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.6 CRANKS NORMALLY BUT WILL NOT START [Z6]

B3E010318881W39

6	CRANKS NORMALLY BUT WILL NOT START
DESCRIPTION	• The starter cranks the engine at normal speed but the engine will not run. • Refer to symptom troubleshooting "No.5 Engine stalls" if this symptom appears after the engine stall. • Fuel is in the tank. • The 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 IAC valve • 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.)

	• Pressure regulator malfunction **Warning** The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**Note** • Following test should be performed for vehicles with immobilizer system. Go to Step 8 for vehicles without immobilizer system. Connect the WDS or equivalent to the DLC-2. Do any of 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	The immobilizer system is normal. Go to Step 10.
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	Does the security light illuminate?	Yes	Go to the next step.

		No	Inspect the instrument cluster and wiring harness. (See INSTRUMENT CLUSTER INSPECTION.)
5	Connect the WDS equivalent to the DLC-2 and retrieve DTC. Are any of following DTCs displayed? **DTC** **B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2141, B2431, U2510**	Yes	Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		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 Is there any malfunction?	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 1W and instrument cluster terminal 1O • Between PCM terminal 1S and instrument cluster terminal 1M 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 etc.) • 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 dust) • Proper sealing of the intake manifold and components attached to intake manifold: IAC valve, EGR valve • Ignition wiring • Electrical connections • Fuses • Smooth operation of throttle valve	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 8.

	Are all items normal?		
9	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory and KOEO DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].) **Communication error message is displayed:** Inspect for following: • Open circuit in wiring harness between main relay and PCM terminal 1BF or 1BG (ATX) • Open circuit in wiring harness between main relay terminal B and PCM terminal 1AW. • Main relay is stuck open. • Open or poor GND circuit (PCM terminal 2BH, 2AZ or 2BD) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.
10	Does engine start with the throttle valve closed?	Yes	Go to Step 27.
		No	Go to the next step.
11	Does the engine start and run smoothly at part throttle?	Yes	Inspect the IAC valve and wiring harness. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [Z6].)
		No	Go to the next step.
12	Connect WDS or equivalent to DLC-2. Access RPM PID. Is RPM PID indicating the engine speed when cranking engine?	Yes	Go to the next step.
		No	Inspect for the following: • Open or short circuit in CKP sensor • Open or short circuit between CKP sensor terminal A and PCM terminal 2T • Open or short circuit between CKP sensor terminal B and PCM terminal 2P • Open or short circuit between CKP sensor terminal C and PCM terminal 2BF

			• Open or short circuit in CKP sensor wiring harnesses If the CKP sensor and wiring harness are normal, go to the next step.
13	Visually inspect the CKP sensor and teeth of the crankshaft pulley. Are the CKP sensor and teeth of the crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning crankshaft pulley.
14	Measure the gap between the CKP sensor and teeth of the crankshaft pulley. **Specification** **0.5-1.5 mm {0.02-0.05 in}** Is the gap within specification?	Yes	Go to the next step.
		No	Replace the crankshaft pulley.
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 Spark Test.) 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.
17	Inspect the spark plug conditions. 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 the fuel injector. **Spark plug is grayish white:** Inspect for clogged the fuel injector.
		No	Install the 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.
20		Yes	Go to the next step.

	Install fuel pressure gauge between fuel pipe and the fuel distributor. Connect the WDS or equivalent to the DLC-2. Turn ON and/or OFF using FP PID in output state control of datalogger function. Is fuel line pressure correct when FP PID is turned ON/OFF **five times**? (See FUEL LINE PRESSURE INSPECTION.)	No	**Zero or low:** Inspect the fuel pump relay and the fuel pump related circuit. (See FUEL PUMP UNIT INSPECTION.) Inspect the main fuel line for clogging. • If there is no malfunction, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
21	Visually inspect for fuel leakage at the fuel injector O-ring and fuel line. Service if necessary. Turn OFF from ON using FP PID in output state control of datalogger function. Is fuel line pressure held after FP PID is turned OFF? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Inspect the pressure regulator diaphragm condition. • If condition is normal, inspect the fuel injector. (See FUEL INJECTOR INSPECTION.) • If condition is not normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
22	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from the purge solenoid valve side. Plug the opening end of vacuum hose. Attempt to start 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.
23	Is air leakage felt or heard at intake-air system components while the racing the engine to higher speed?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
24	Inspect engine condition while tapping the EGR valve housing. Does engine condition improve?	Yes	Replace the EGR valve.
		No	Go to the next step.
25		Yes	Go to the next step.

	Inspect variable valve timing control system operation. (See Variable Valve Timing Control System Operation Inspection.) Does variable valve timing control work properly?	No	Repair or replace the malfunctioning part.
26	Is engine compression correct? (See COMPRESSION INSPECTION [Z6].)	Yes	Remove the EGR valve and visually inspect for mechanically stuck EGR valve. • If normal, inspect valve timing. (See Timing Chain Installation Note.)
		No	Inspect for cause.
27	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.7 SLOW RETURN TO IDLE [Z6]

B3E010318881W40

7	SLOW RETURN TO IDLE
DESCRIPTION	The engine takes more time than normal to return to the 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 WDS or equivalent to the DLC-2.	Yes	**DTC is displayed:** Go to the appropriate DTC inspection.

	Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there DTCs displayed?		(See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.
2	Remove the thermostat and inspect operation. (See THERMOSTAT REMOVAL/INSTALLATION [Z6].) (See THERMOSTAT INSPECTION [Z6].) Is the thermostat normal?	Yes	The ECT sensor and thermostat are normal. Go to the next step.
		No	Access ECT PID on WDS or equivalent. Inspect for both ECT PID and temperature gauge on the instrument cluster readings. • If the temperature gauge on the instrument cluster indicates normal range but ECT PID is not 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 the heat gauge unit.
3	Is the throttle body free of contaminations?	Yes	Inspect for air leakage from intake-air system components while racing the engine to higher speed.
		No	Clean or replace the throttle body.
4	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [Z6]

B3E010318881W41

8	ENGINE RUNS ROUGH/ROLLING IDLE
DESCRIPTION	• The engine speed fluctuates between the specified idle speed and lower speed and the engine shakes excessively. • The idle speed is too slow and the 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 • IAC valve improper operation • Idle learning of IAC 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 from MAF sensor, front HO2S or rear 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 the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

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 IAC system is not completed.)
		No	Go to the next step.
2	Verify the following: • External fuel shut off or accessory (kill switch, alarm etc.) • 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: IAC valve, EGR valve • Ignition wiring • Electrical connections • Fuses • Smooth operation of throttle valve • PCM GND circuit (PCM terminal 1AZ, 1BC, 1BD, 1BG and/or 1BH) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 2.
3	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		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". (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [Z6].)
		No	Go to the next step.
5	Connect WDS or equivalent to DLC-2. Access MAF PID. Drive vehicle with monitoring PID. Is MAF PID within specification? (See PCM INSPECTION [Z6].)	Yes	Go to the next step.
		No	Inspect for open or short circuit of MAF sensor and related wiring harness.
6	**Note** • Following test is for engine running rough idle with the A/C on concerns. If other symptoms exist, go to the next step. Connect pressure gauge to the A/C low and high pressure side lines. Start the 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". (See NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [Z6].) For other symptoms, inspect following: • Refrigerant charging amount • Condenser fan operation
7	**Note** • Following test is for engine running rough with the P/S on. If other symptoms exist, go to the next step. Connect WDS or equivalent to DLC-2. Start the engine and idle it. Access PSP PID. Inspect if PSP PID is On while turning steering wheel right to left. Is PSP PID normal?	Yes	Inspect the PSP switch operation and wiring harness between the PSP switch connector and the PCM connector terminal 2AC.
		No	Go to the next step.
8	Visually inspect the CKP sensor and teeth of the crankshaft pulley. Are the CKP sensor and teeth of the crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.

9	Measure gap between the CKP sensor and teeth of crankshaft pulley. **Specification** **0.5-1.5 mm {0.02-0.05 in}** Is gap within specification?	Yes	Go to the next step.
		No	Replace the crankshaft pulley.
10	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.
11	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 the fuel injector. **Spark plug is grayish white:** Inspect for clogged the fuel injector.
		No	Install spark plugs on original cylinders. Go to the next step.
12	Start the engine and disconnect the IAC valve connector. Does engine speed drop or the engine stall?	Yes	Go to the next step.
		No	Inspect the IAC valve and wiring harness. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [Z6].)
13	Install 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.)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. • If there is no malfunction, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
14	Visually inspect the fuel injector, O-ring, and fuel line for fuel leakage. Service if necessary.	Yes	Go to the next step.
		No	Inspect the pressure regulator diaphragm condition.

	Does fuel line pressure hold after the ignition switch is turned off? (See FUEL LINE PRESSURE INSPECTION.)		• If condition is normal, inspect the fuel injector. (See FUEL INJECTOR INSPECTION.) • If condition is not normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
15	Connect the WDS or equivalent to the DLC-2. Start the engine and idle it. Access O2S11 PID. Is O2S11 PID normal? • **More than 0.45 V** when accelerator pedal is suddenly depressed: rich condition • **Less than 0.45 V** during fuel cut: lean condition	Yes	Go to the next step.
		No	Inspect and repair or replace the front HO2S, wiring harness, connector or terminal, then go to the next step. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].)
16	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from the purge solenoid valve side. Plug the opening end of vacuum hose. Start the engine. Does engine condition improve?	Yes	Inspect if the purge solenoid valve is stuck open mechanically. Inspect EVAP control system. (See Purge Control System Inspection.)
		No	Go to the next step.
17	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
18	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
19	Visually inspect the CMP sensor and teeth of camshaft pulley. Are the CMP sensor and teeth of the camshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
20	Inspect engine condition while tapping the EGR valve housing. Does engine condition improve?	Yes	Replace the EGR valve. (See EGR VALVE REMOVAL/INSTALLATION [Z6].)
		No	Go to the next step.
21		Yes	Go to the next step.

	Inspect variable valve timing control system operation. (See Variable Valve Timing Control System Operation Inspection.) Does variable valve timing control system work properly?	No	Repair or replace the malfunctioning part.
22	Is engine compression correct? (See COMPRESSION INSPECTION [Z6].)	Yes	Remove EGR valve and visually inspect for mechanically stuck EGR valve. If there is no malfunction, inspect valve timing. (See Timing Chain Installation Note.)
		No	Inspect for cause.
23	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.9 FAST IDLE/RUNS ON [Z6]

B3E010318881W42

9	FAST IDLE/RUNS ON
DESCRIPTION	• The engine speed continues during at fast idle after warm-up. • The engine runs after the ignition switch is off.
POSSIBLE CAUSE	• ECT sensor malfunction • Air leakage from intake-air system • Throttle body malfunction • Accelerator cable free play misadjustment • Improper load signal input

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION

1	Connect the WDS or equivalent to the DLC-2. Access ECT PID. Start and warm-up the 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 more than 112°C {234°F}:** Go to symptom troubleshooting "No.17 Cooling system concerns - Overheating". (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [Z6].) **ECT PID is less than 82°C {180°F}:** Go to symptom troubleshooting "No.18 Cooling system concerns - Runs cold". (See NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [Z6].)
2	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.
3	Connect the WDS or equivalent to the DLC-2. Access AC_REQ, CPP, CPP/PNP, TR and PSP PIDs. Monitor each PID. (See PCM INSPECTION [Z6].) Are PIDs normal?	Yes	Go to the next step.
		No	**AC_REQ PID**: Inspect the A/C switch, refrigerant pressure switch and fan switch. (See REFRIGERANT PRESSURE SWITCH INSPECTION.) **CPP PID**: Inspect the clutch pedal position switch (MTX). (See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [Z6].) **CPP/PNP PID**: Inspect the neutral switch (MTX). (See NEUTRAL SWITCH INSPECTION [Z6].) **TR PID**: Inspect the TR switch (ATX). (See TRANSAXLE RANGE (TR) SWITCH INSPECTION.)

			PSP PID: Inspect the PSP switch. (See POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [Z6].)
4	Is there air leakage felt or heard at the intake-air system components while racing the engine to higher speed?	Yes	Repair or replace part if necessary.
		No	Verify accelerator cable free play. (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [Z6].)
5	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.10 LOW IDLE/STALLS DURING DECELERATION [Z6]

B3E010318881W43

10	LOW IDLE/STALLS DURING DECELERATION
DESCRIPTION	• The engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.
POSSIBLE CAUSE	• Vacuum leakage • IAC valve malfunction • Air leakage from intake-air system • Improper air/fuel mixture ratio control • Evaporative emission control system malfunction • TP 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 rough?	Yes	Go to symptom troubleshooting "No.8 Engine runs rough/rolling idle". (See NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [Z6].)
		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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [Z6].)
		No	Go to the next step.
3	Verify the following: • Proper routing and no damage of vacuum lines • IAC valve is connected properly. • 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 WDS or equivalent to DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.
5	Does the idle speed drop or stall when disconnecting the IAC valve?	Yes	Go to the next step.
		No	Inspect the following: • Circuit from IAC valve to PCM terminal 2X or 2AB for open and short • IAC valve for sticking If normal, go to the next step.
6	Disconnect the vacuum hose between the purge solenoid valve and the intake	Yes	Inspect EVAP control system. (See Purge Control System Inspection.)

	manifold from the purge solenoid valve side. Plug the opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	No	Go to the next step.
7	Connect the WDS or equivalent to DLC-2. Access TP, MAF, VSS, BOO, CPP, CPP/PNP and TR PIDs. Monitor each PID while driving the vehicle. (See PCM INSPECTION [Z6].) Are PIDs normal?	Yes	Intermittent concern exists. (See INTERMITTENT CONCERN TROUBLESHOOTING [Z6].)
		No	**TP PID:** Inspect the TP sensor. (See THROTTLE POSITION (TP) SENSOR INSPECTION [Z6].) **MAF PID:** Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [Z6].) **VSS PID:** Inspect the VSS. (See DTC TABLE [Z6].) **BOO PID:** Inspect the brake switch. (See BRAKE SWITCH INSPECTION.) **CPP PID:** Inspect the clutch pedal position switch (MTX). (See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [Z6].) **CPP/PNP PID:** Inspect the neutral switch (MTX). (See NEUTRAL SWITCH INSPECTION [Z6].) **TR PID:** Inspect the TR switch (ATX).

			(See TRANSAXLE RANGE (TR) SWITCH INSPECTION.)
8	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.11 ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES [Z6]

B3E010318881W44

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	• The engine stops unexpectedly at beginning of acceleration or during acceleration. • The engine stops unexpectedly while cruising. • The engine speed fluctuates during acceleration or cruising. • The engine misses during acceleration or cruising. • The vehicle bucks/jerks during acceleration, cruising, or deceleration. • Momentary pause at beginning of acceleration or during acceleration • Momentary minor irregularity in engine output
POSSIBLE CAUSE	• A/C system operation is improper. • Erratic signal or no signal from CMP sensor • Air leakage from intake-air system parts • Purge solenoid valve malfunction • IAC valve improper operation • Improper EGR valve operation

	• 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 belt • 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) • TP sensor misadjustment • Intermittent open or short circuit of MAF sensor, TP sensor and VSS • ATX malfunction (ATX) • Clutch slippage (MTX) • 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 performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Verify the following: • Vacuum connection • Air cleaner element • No air leakage from the intake-air system • No restriction of the intake-air system • Proper sealing of the intake manifold and components attached to the intake manifold: such as the IAC valve, 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs. If the engine stall, condition exists retrieve continuous memory and KOEO DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		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". (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [Z6].)

		No	Go to the next step.
4	Connect the WDS or equivalent to the DLC-2. Access RPM, VPWR, MAF, TP and VSS PIDs. Drive vehicle with monitoring PIDs. Are PIDs within specifications? (See PCM INSPECTION [Z6].)	Yes	Go to the next step.
		No	**RPM PID:** Inspect the CKP sensor and related harness for such as vibration, intermittent open/short circuit. **VPWR PID:** Inspect for open circuit intermittently. **MAF PID:** Inspect for open circuit of the MAF sensor and related wire harness intermittently. **TP PID:** Inspect if output signal from the TP sensor changes smoothly. **VSS PID:** Inspect for open circuit of the VSS and related wire harness intermittently. (except MTX with ABS) Inspect the ABS or DSC system . (MTX with ABS)
5	Visually inspect the CKP sensor and teeth of the crankshaft pulley. Are the CKP sensor and teeth of the crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
6	Measure gap between the CKP sensor and teeth of the crankshaft pulley. **Specification** **0.5-1.5 mm {0.02-0.05 in}** Is gap within specification?	Yes	Go to the next step.
		No	Replace the crankshaft pulley.
7	Inspect the spark plug conditions. 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 the fuel injector. **Spark plug is grayish white:** Inspect for clogged the fuel injector.

		No	Install spark plugs on original cylinders. Go to the next step.
8	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
9	Verify that the throttle lever is resting on the throttle valve stop screw and/or the throttle valve orifice plug. Is lever in correct position?	Yes	Go to the next step.
		No	Adjust if necessary.
10	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
11	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Connect the WDS or equivalent to the DLC-2. Turn the fuel pump on using FP PID in output state control of datalogger function. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and the fuel pump related circuit. Inspect the fuel line for clogging. • if there is no malfunction, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
12	Visually inspect for fuel leakage at the fuel injector O-ring and fuel line. Service if necessary. Is fuel line pressure held after FP PID is turned Off? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Inspect the pressure regulator diaphragm condition. • If the condition is normal, inspect the fuel injector. (See FUEL INJECTOR INSPECTION.) • If the condition is not normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
13		Yes	Go to the next step.

	Note • Following test is for engine stalling with the A/C on. If other symptom exists, go to the next step. Connect a pressure gauge to the A/C low and high pressure side lines. Turn the A/C on and measure low side and high side pressure. Are pressure within specifications? (See REFRIGERANT PRESSURE CHECK.)	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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [Z6].) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
14	Connect the WDS or equivalent to the DLC-2. Warm up engine and idle it. Access O2S11 PID Is O2S11 PID normal? • **More than 0.45 V** when the accelerator pedal is suddenly depressed: rich condition. • **Less than 0.45 V** during fuel cut: lean condition	Yes	Go to the next step.
		No	Inspect and repair or replace the front HO2S, wiring harness, connector or terminal, then go to the next step.
15	Inspect the evaporative purge hose between the fuel tank and purge valve. Does fuel flow into the evaporative purge hose?	Yes	Inspect the check valve (two-way). (SeeFUEL TANK INSPECTION).
		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 the opening end of the vacuum hose. Drive the vehicle. Does engine condition improve?	Yes	Go to the next step. Inspect if the purge solenoid valve is stuck open mechanically. Inspect the EVAP control system. (See Purge Control System Inspection.)
		No	Go to the next step.
17	Visually inspect the CMP sensor and projections of the camshaft pulley. Are the CMP sensor and projections of the camshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
18	Inspect variable tumble control operation. (See Variable Tumble Control Operation Inspection.) Is the variable tumble control normal?	Yes	Go to the next step.
		No	Replace or replace the malfunctioning part.

19	Inspect the EGR system. (SeeEGR Control System Inspection.) Is the EGR system normal?	Yes	Go to the next step.
		No	Replace or replace the malfunctioning parts.
20	Is engine compression correct? (See COMPRESSION INSPECTION [Z6].)	Yes	Inspect the following: • Valve timing. (See Timing Chain Installation Note.) • Engine mounts • Check valve (two-way) • Internal transaxle part (ATX) • Clutch (MTX)
		No	Inspect for cause.
21	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE [Z6]

B3E010318881W45

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 • Purge control solenoid malfunction

	• 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 • Air cleaner restriction • PCV valve malfunction • Improper valve timing due to jumping out of timing belt • Improper variable valve timing control operation • Restriction in exhaust system • Intermittent open or short circuit 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 • Intermittent open or short circuit of MAF 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 performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution**

	• If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Verify the following: • Vacuum connection • Restriction in intake-air system (such as air cleaner element, fresh duct) • No air leakage from the intake-air system • No restriction of the intake-air system • Proper sealing of the intake manifold and components attached to intake manifold; such as IAC valve, 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.
2	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs. If engine stall condition exists, retrieve continuous memory and KOEO DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		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". (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [Z6].)
		No	Go to the next step.
4	Connect the WDS or equivalent to the DLC-2. Access RPM, MAF, TP, IAT and VSS PIDs. Drive vehicle while monitoring PIDs. Are PIDs within specifications? (See PCM INSPECTION [Z6].)	Yes	Go to the next step.
		No	**RPM PID:** Inspect the CKP sensor and related wiring harness for vibration and/or intermittent open/short circuit. **MAF PID:**

			Inspect for intermittent open circuit of the MAF sensor and related wiring harness. **TP PID:** Inspect if the TP sensor output increases smoothly. **IAT PID:** Inspect for air suction in the intake-air system. If normal, inspect intermittent short circuit of IAT sensor and, related wiring harness. **VSS PID:** Inspect for intermittent open circuit of the VSS and related wiring harness.
5	Visually inspect the CKP sensor and teeth of the crankshaft pulley. Are the CKP sensor and teeth of the crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning crankshaft pulley.
6	Measure gap between the CKP sensor and teeth of the crankshaft pulley. **Specification** **0.5-1.5 mm {0.02-0.05 in}** Is gap within specification?	Yes	Go to the next step.
		No	Replace the crankshaft pulley.
7	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 the fuel injector for fuel leakage. **Spark plug is grayish white:** Inspect for clogged the fuel injector.
		No	Install the spark plugs on original cylinders. Go to the next step.
8	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
9	Visually inspect the exhaust system part.	Yes	Replace the suspected part.
		No	Go to the next step.

	Is there any deformed exhaust system part?		
10	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Connect the WDS or equivalent to the DLC-2. Turn the fuel pump on using FP PID in output state control of datalogger function. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and the fuel pump relay related circuit. Inspect the fuel line for clogging. • If normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
11	Inspect variable tumble control operation. (See Variable Tumble Control Operation Inspection.) Does the variable tumble control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
12	Inspect variable intake-air control operation. (See Variable Intake-air Control Operation Inspection.) Does the variable intake-air control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
13	**Note** • Following test is for the 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 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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [Z6].) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
14	Inspect A/C cut-off operation.	Yes	Go to the next step.

	(See A/C Cut-off Control System Inspection.) Does A/C cut-off function properly?	No	Inspect the A/C cut-off system components. (See A/C Cut-off Control System Inspection.)
15	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	Inspect if the purge solenoid valve is stuck open mechanically. Inspect EVAP control system. (See Purge Control System Inspection.)
		No	Go to the next step.
16	Visually inspect the CMP sensor and projections of the camshaft pulley. Are the CMP sensor and projections of the camshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
17	Inspect the EGR system. (SeeEGR Control System Inspection.) Is EGR system normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to inspection result.
18	Inspect variable valve timing control system operation. (See Variable Valve Timing Control System Operation Inspection.) Does variable valve timing control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
19	Is engine compression correct? (See COMPRESSION INSPECTION [Z6].)	Yes	Inspect the following: • Valve timing. (See Timing Chain Installation Note.) • Shift point (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 ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM.		

	(See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [Z6]

B3E010318881W46

13	KNOCKING/PINGING - ACCELERATION/CRUISE
DESCRIPTION	Sound is produced when air/fuel mixture is ignited by something other than spark plug (e.g. 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 performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1		Yes	Go to the next step.

	Connect the WDS or equivalent 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?	No	Inspect cooling system for cause of overheating. (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [Z6].)
2	Connect the WDS or equivalent to the DLC-2. Access IAT, MAF and SPARKADV PIDs. Monitor each PID. (See PCM INSPECTION [Z6].) Are PIDs normal?	Yes	Go to the next step.
		No	**IAT PID**: Inspect the IAT sensor. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [Z6].) **MAF PID**: Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [Z6].) **SPARKADV PID**: Inspect the CMP sensor and the knock sensor. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [Z6].) (See KNOCK SENSOR (KS) INSPECTION [Z6].)
3	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.
4	Is engine compression correct? (See COMPRESSION INSPECTION [Z6].)	Yes	Go to the next step.
		No	Inspect for cause.
5	Install 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	Inspect ignition timing.
		No	**Low:** Inspect the fuel line for clogging. • If normal, replace fuel pump unit.

	(See FUEL LINE PRESSURE INSPECTION.)		(See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)

6	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

NO.14 POOR FUEL ECONOMY [Z6]

B3E010318881W47

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 belt • Contaminated MAF sensor • Improper engine compression • Exhaust system clogging **Warning** The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for following: • Air cleaner element for contamination • ATF level • Fuel quality • Coolant level • Brake dragging • Clutch slippage Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.

3	Access ECT PID. Drive vehicle while monitoring PID. (See PCM INSPECTION [Z6].) Is PID within specification?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan operations or thermostat operation.
4	Perform the spark test. (See Spark Test.) 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 results.
5	Install 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.)	Yes	Go to the next step.
		No	**Low:** Inspect for clogged fuel line. • If normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
6	Inspect for variable tumble control operation. (See Variable Tumble Control Operation Inspection.) Does 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 Variable Valve Timing Control System Operation Inspection.) 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 variable intake-air control operation. (See Variable Intake-air Control Operation Inspection.) Does the variable control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
9	Remove and shake the PCV valve.	Yes	Go to the next step.

	Does the PCV valve rattle?	No	Replace the PCV valve.
10	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
11	Inspect for contaminated the 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 the MAF sensor.
		No	Go to the next step.
13	Is engine compression correct? (See COMPRESSION INSPECTION [Z6].)	Yes	Inspect valve timing. (See Timing Chain Installation Note.)
		No	Inspect for cause.
14	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.15 EMISSION COMPLIANCE [Z6]

B3E010318881W48

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 • Charcoal canister damage • Air cleaner element clogging or restriction • Throttle body malfunction • Spark leakage from high-tension leads • Improper air/fuel mixture ratio control operation • Bend or open circuit front HO2S or rear 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 the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for following: • Vacuum lines for leakage or blockage • Electrical connections • Proper maintenance schedule followed	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.

	• Intake-air system and air cleaner element concerns: obstructions, leakage or dirtiness Are all items normal?		
2	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.
3	Is any other drivability concern present?	Yes	Go to appropriate symptom troubleshooting.
		No	Go to the next step.
4	Connect the WDS or equivalent to the DLC-2. Access ECT PID. Warm-up the engine and idle it. Verify ECT PID is correct. (See PCM INSPECTION [Z6].) Is ECT PID correct?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan and thermostat operation.
5	Connect the WDS or equivalent to DLC-2. Warm up the engine and idle it. Access O2S11 PID. Is O2S11 PID normal? • **More than 0.45 V** when accelerator pedal is suddenly depressed: rich condition. • **Less than 0.45 V** during fuel cut: lean condition	Yes	Go to the next step.
		No	Inspect and repair or replace front HO2S, wiring harness, connector or terminal, then go to the next step. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6].)
6	Perform the spark test. (See Spark Test.) 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 results.
7	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it.	Yes	Go to the next step.
		No	**Low:** Inspect for clogged fuel line.

	Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See FUEL LINE PRESSURE INSPECTION.)		• If normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
8	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
9	Inspect inside charcoal canister for fuel saturation. Is excess amount of liquid fuel present in the charcoal canister?	Yes	Replace the charcoal canister.
		No	Inspect fuel tank vent system. (See FUEL TANK INSPECTION.) Then, go to the next step.
10	Visually inspect the exhaust system part. Is there any defective exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
11	Inspect the three way catalytic converter. (See EXHAUST SYSTEM INSPECTION [Z6].) Is the three way catalytic converter normal?	Yes	Inspect the EGR system. (See EGR Control System Inspection.)
		No	Replace the three way catalytic converter.
12	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.16 HIGH OIL CONSUMPTION/LEAKAGE [Z6]

B3E010318881W49

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 the 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 ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [Z6]

B3E010318881W50

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 hose damage • Improper or damaged radiator cap • Cooling fan is inoperative. • Coolant overflow system malfunction • Improper tension of drive belt • 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.
3	Start the engine and idle it.	Yes	Go to Step 5.

	Turn the A/C switch on. Does A/C compressor engage?	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 1AL • Seized A/C magnetic clutch • A/C magnetic clutch malfunction If all items are normal, go to the next step.
4	Connect the WDS or equivalent to the DLC-2. Access AC_REQ PID. Start the engine and idle it. Turn the A/C switch on. Does AC_REQ PID read On?	Yes	Go to the next step.
		No	Inspect the following: • Refrigerant pressure switch operation • A/C switch is stuck open. • Open or short circuit between refrigerant pressure switch and PCM terminal 1Q • Open circuit of blower motor fan switch and resistor (if blower motor does not operate) • Evaporator temperature sensor and A/C amplifier
5	Inspect cooling fan control system operation. (See Cooling Fan Motor Operation Inspection.) 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. (See DRIVE BELT REPLACEMENT [Z6].)
7	Is there leakage around heater unit in passenger compartment?	Yes	Inspect and service heater for leakage.
		No	Go to the next step.
8	Is there leakage at coolant hoses and/or radiator?	Yes	Replace the malfunctioning part.
		No	Go to the next step.
9	Cool down the engine. Remove the thermostat and inspect operation. (See THERMOSTAT REMOVAL/INSTALLATION [Z6].)	Yes	Engine coolant temperature sensor and the thermostat are normal, inspect the engine block for leakage or blockage.
		No	Access ECT PID. Inspect for both ECT PID and the temperature gauge readings.

	(See THERMOSTAT INSPECTION [Z6].) Is the thermostat normal?		• If the temperature gauge on the instrument cluster indicates normal range but ECT PID is not same as the temperature gauge reading, inspect the ECT sensor. • If the temperature gauge on the instrument cluster indicates overheating but ECT PID is normal, inspect the temperature gauge and the heat gauge unit.
10	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [Z6]

B3E010318881W51

18	COOLING SYSTEM CONCERNS - RUNS COLD
DESCRIPTION	Engine takes excessive period for reaching normal operating temperature.
POSSIBLE CAUSE	• Thermostat malfunction • Condenser fan system 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 engine speed continue at fast idle?	Yes	Go to symptom troubleshooting "No.9 Fast idle/runs on". (See NO.9 FAST IDLE/RUNS ON [Z6].)
		No	Go to the next step.
3		Yes	Go to the next step.

	Remove the thermostat and inspect operation. (See THERMOSTAT REMOVAL/INSTALLATION [Z6].) (See THERMOSTAT INSPECTION [Z6].) Is the thermostat normal?	No	Replace the thermostat. (See THERMOSTAT REMOVAL/INSTALLATION [Z6].)
4	Inspect cooling fan control system operation. (See Cooling Fan Motor Operation Inspection.) Does cooling fan control system work properly?	Yes	Access ECT PID. Inspect for both ECT PID and the temperature gauge on the instrument cluster readings. • If the temperature gauge on instrument cluster indicates normal range but ECT PID is not same as the 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 the 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 ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.19 EXHAUST SMOKE [Z6]

B3E010318881W52

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 the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

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		Yes	Inspect for the following:

	Remove and shake the PCV valve. Does the PCV valve rattle?		• 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.
5	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.
6	Install 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.)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. • If there is no malfunction, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:**

			Replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
7	Perform the spark test. (See Spark Test.) Is strong blue spark visible at each cylinder?	Yes	Inspect the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [Z6].)
		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 ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) [Z6]

B3E010318881W53

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 the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.)

	(See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Visually inspect for fuel leakage at the fuel injector O-ring and fuel line. Service if necessary. Install fuel pressure gauge between fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure at idle. Is fuel line pressure correct at idle? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
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 fault indicated?	Yes	Replace the vacuum hose.
		No	Go to the next step.
3	Inspect the purge solenoid valve. (See PURGE SOLENOID VALVE INSPECTION.) Is the solenoid operating properly?	Yes	Go to the next step.
		No	Replace the purge solenoid valve.
4	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Inspect the 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 ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

NO.21 ENGINE NOISE [Z6]

B3E010318881W54

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 belt) **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 sound noise:** • Dynamic damper 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 following: • Engine oil • Drive belt tension • Splash shield or under cover looseness • Generator installation (alignment)
		No	Go to the next step.
2	Is a rumbling or grinding sound present?	Yes	Inspect drive belts.
		No	Go to the next step.
3	Is a rattling sound present?	Yes	Inspect rattling location for loose parts.
		No	Go to the next step.
4	Is a hissing sound 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 roaring sound present?	Yes	Inspect the following for looseness: • Dynamic chamber • Intake-air system • Exhaust system
		No	Go to the next step.
6	Is a knocking sound present?	Yes	Go to symptom troubleshooting "No.11 Knocking/pinging". (See NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [Z6].)
		No	If noise comes from 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 ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

NO.22 VIBRATION CONCERNS (ENGINE) [Z6]

B3E010318881W55

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 following components for loose attaching bolts or worn parts: • Cooling fan • Generator • Drive belt and pulleys • Exhaust system mounting • Engine mounting All the items normal?	Yes	Inspect the following systems: • Wheels • ATX • Driveline • Suspension
		No	Readjust or retighten engine mounting installation position. Service if necessary for other parts.
2	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.23 A/C DOES NOT WORK SUFFICIENTLY [Z6]

B3E010318881W56

23	A/C DOES NOT WORK SUFFICIENTLY.
DESCRIPTION	The A/C compressor magnetic clutch does not engage when the A/C switch is turned on.
POSSIBLE CAUSE	• Improper refrigerant charging amount • Open 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.
2	Disconnect the A/C compressor connector. Start the engine and turn the A/C switch on. Is there correct voltage at the A/C compressor magnetic clutch terminal? **Specification** **0.5-1.5 mm {0.02-0.05 in}**	Yes	Inspect for GND condition of the magnetic clutch on the A/C compressor. • If GND condition is normal, inspect for open circuit magnetic clutch coil.
		No	Go to the next step.
3	Disconnect the refrigerant pressure switch connector. Connect jumper wire between A/C high-pressure switch terminals. Connect jumper wires between refrigerant pressure switch terminals. Connect WDS or equivalent to DLC-2.	Yes	Inspect the refrigerant pressure switch operation. • If the switch is normal, go to the next step.
		No	Inspect for following: • A/C switch is stuck open.

	Access AC_REQ PID. Turn the ignition switch to the ON position position. Turn the A/C switch on and set the blower fan at any speed. Does AC_REQ PID read On?		• Open circuit in wiring harness between refrigerant pressure switch and PCM terminal 1Q • Open circuit of blower motor fan switch and resistor (if blower motor does not operate) • Evaporator temperature sensor and A/C amplifier
4	Remove jumper wire from the switch connector. Reconnect connector to the refrigerant pressure switch. Start the engine and turn the A/C switch on. Does the fan operate?	Yes	Inspect for stuck open the A/C relay. Replace if necessary.
		No	Inspect following and repair or replace if necessary: • Refrigerant charging amount • A/C compressor for being seized
5	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [Z6]

B3E010318881W57

24	A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY.
DESCRIPTION	The A/C compressor magnetic clutch does not disengage.
POSSIBLE CAUSE	• Stuck engagement A/C compressor magnetic clutch • 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 to battery power in A/C relay to magnetic clutch circuit shorted to battery power

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		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 1AL. If both items normal, go to the next step.
		No	Inspect if circuit between the A/C relay and the magnetic clutch shorts to battery power circuit. • If circuit is normal, inspect the magnetic clutch stuck engagement or clearance.
3	Connect the WDS or equivalent to the DLC-2. Access AC_REQ PID. Start the engine and turn the A/C switch on. Read AC_REQ PID while disconnecting the refrigerant pressure switch connector. **Note** • AC_REQ PID should read Off when disconnecting connector. If AC_REQ PID remains On, short to GND may be present. Does AC_REQ PID remain On?	Yes	Inspect for short to GND in wiring harness between the refrigerant pressure switch and the PCM terminal 1Q.
		No	Go to the next step.
4	Reconnect the refrigerant pressure switch connector. Read AC_REQ PID while turning off the A/C switch. **Note**	Yes	Inspect following: • Short to GND in wiring harness between A/C switch and A/C amplifier • Short to GND in wiring harness between A/C amplifier and refrigerant pressure switch

	• AC_REQ PID should read Off when turning A/C switch off. If AC_REQ PID remains On, short to GND may be present. Does AC_REQ PID remain On?	No	Inspect for stuck closed the A/C switch.
5	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.25 A/C IS NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS [Z6]

B3E010318881W58

25	A/C IS NOT CUT OFF UNDER WOT CONDITIONS.
DESCRIPTION	The A/C compressor magnetic clutch does not disengage under WOT.
POSSIBLE CAUSE	• TP sensor malfunction • TP sensor misadjustment • Loosely installed TP sensor

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Does the 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". (See NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [Z6].)
2	Connect WDS or equivalent to DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent.	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)

	Are there any DTCs displayed?	No	**No DTC is displayed:** Inspect the TP sensor for proper adjustment.
3	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)		

NO.26 EXHAUST SULPHUR SMELL [Z6]

B3E010318881W59

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 the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Are any drive ability or exhaust smoke concerns present?	Yes	Go to appropriate flow chart.
		No	Go to the next step.
2	Inspect 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 WDS or equivalent to DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [Z6].)
		No	**No DTC is displayed:** Go to the next step.
4	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Is fuel line pressure correct during idle? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. • If normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
5	Inspect the charcoal canister for fuel saturation. Is excess amount of liquid fuel present in the charcoal canister?	Yes	Replace the charcoal canister.
		No	Inspect fuel tank vent system. • If 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 ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

NO.27 SPARK PLUG CONDITION [Z6]

B3E010318881W60

27	SPARK PLUG CONDITION
DESCRIPTION	Incorrect spark plug condition
POSSIBLE CAUSE	**Note** • Inspecting spark plug condition can determine whether problem is related to a specific cylinder 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 • Malfunctioning spark plug **Grayish white with specific plug:** • Air/fuel mixture-Insufficient fuel injection volume • Malfunctioning 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 performing the fuel system services: • 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 the "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION " described in this manual. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Remove all the spark plugs. Inspect the spark plug condition. Is the 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 10. **All plugs look grayish white:** Go to Step 16.
2	Are the spark plugs wet/covered with carbon by 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. (See SPARK PLUG REMOVAL/INSTALLATION [Z6].)
4		Yes	Go to the next step.

	Inspect compression pressure at suspected malfunctioning cylinder. Is compression pressure correct? (See COMPRESSION INSPECTION [Z6].)	No	Repair or replace the malfunctioning part.
5	Install all spark plugs. Perform the spark test at suspected malfunctioning cylinder. Is strong blue spark visible? (See Spark Test.) (Compare with normal cylinder.)	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
6	Perform the fuel line pressure inspection. (See FUEL LINE PRESSURE INSPECTION.) Is fuel line pressure correct?	Yes	Inspect the fuel injector for following: • Open or short circuit in injector • Leakage • Injection volume
		No	**Zero or low:** Inspect fuel pump and the fuel pump relay related circuit. Inspect the main fuel line for clogging. • If normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
7	Inspect the spark plug for following. • Heat range • Air gap Is spark plug normal?	Yes	Go to the next step.
		No	Replace the spark plug.
8	Turn the ignition switch off. Disconnect suspected fuel injector connector. Turn the ignition switch to the ON position. Measure terminal voltage for the fuel injector terminal A. Is voltage **B+**?	Yes	Go to the next step.
		No	Repair open or short fuel injector power supply circuit.

9	Turn the ignition switch off. Disconnect the PCM connector. Measure resistance between suspected the fuel injector terminal B and the PCM connector following terminal: • For No.1 cylinder: 2B • For No.2 cylinder: 2C • For No.3 cylinder: 2D • For No.4 cylinder: 2H Is resistance **less than 5.0 ohms**?	Yes	Inspect the fuel injector for following: (See FUEL INJECTOR INSPECTION.) • Resistance • Fuel injection volume
		No	Repair open the fuel injector control circuit.
10	Is the air cleaner element free of restrictions?	Yes	Go to the next step.
		No	Replace the air cleaner element.
11	Perform the spark test. Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
12	Perform the fuel line pressure inspection. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump and fuel pump relay related circuit. Inspect the main fuel line for clogging. • If normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
13	Inspect the following PIDs. • ECT • O2S11 (When engine can be started) • MAF (See PCM INSPECTION [Z6].) Are PIDs normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
14		Yes	Go to the next step.

	Perform the purge control inspection. (When engine can be started) (See Purge Control System Inspection.) Is purge control correct?	No	Repair or replace the malfunctioning part.
15	Perform the compression inspection. Is compression correct?	Yes	Inspect for deformed exhaust system part.
		No	Repair or replace the malfunctioning part.
16	When the engine cannot be started, inspect the intake-air system for air leakage. When the engine can be started, perform the 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.
17	Perform the fuel line pressure inspection. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Inspect following PIDs: • ECT • O2S11 • O2S12 • MAF (See PCM INSPECTION [Z6].) Inspect PCM GND condition.
		No	**Zero or low:** Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
18	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [Z6].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed.		

	- If vehicle not repaired or additional diagnostic information not available, replace PCM. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

INTERMITTENT CONCERN TROUBLESHOOTING [Z6]

B3E010318881W61

Vibration Method

1. If malfunction occurs or becomes worse while driving on a rough road or when engine is vibrating, perform the steps below.

Note

• There are several reasons vehicle or engine vibration could cause an electrical malfunction. Some of the things to inspect for are:

- Connectors not fully seated

- Wiring harnesses not having full play

- Wiring harnesses laying across brackets or moving parts

- Wiring harnesses routed too close to hot parts

• An improperly routed, improperly clamped, or loose wiring harness can cause wiring to become pinched between parts.

• The connector joints, points of vibration, and places where wiring harnesses pass through the fire wall, body panels, etc. are the major areas to be inspected.

Inspection Method for Switch Connectors or Wiring Harnesses

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position. (Engine off).

Note

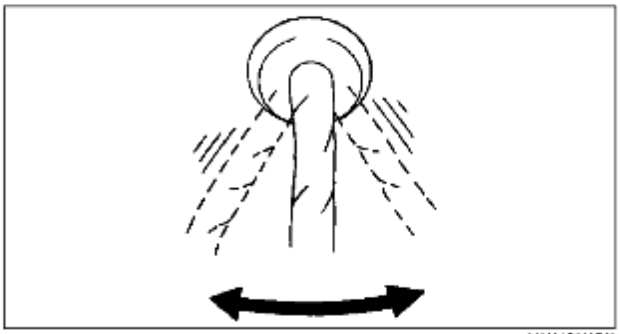
• If engine starts and runs, perform the following steps during idle.

3. Access PIDs for the switch you are inspecting.

4. Turn the switch on manually.

5. Slightly shake each connector or wiring harness vertically and horizontally while monitoring the PID.

• If PID value is unstable, inspect for poor connection.



Y3U103WN3

Inspection Method for Sensor Connectors or Wiring Harnesses

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position (Engine off).

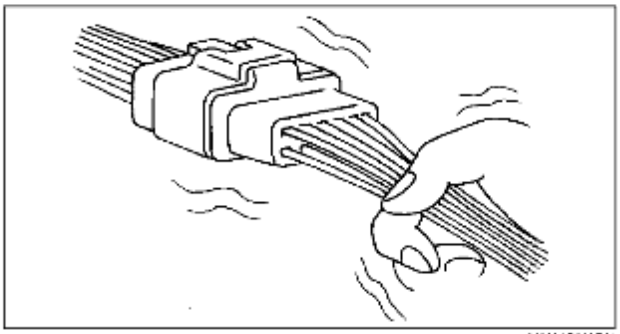
Note

• If engine starts and runs, perform the following steps during idle.

3. Access PIDs for the switch you are inspecting.

4. Slightly shake each connector or wiring harness vertically and horizontally while monitoring the PID.

• If PID value is unstable, inspect for poor connection.



Y3U103WN4

Inspection Method for Sensors

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position (Engine off).

Note

• If engine starts and runs, perform the following steps at idle.

3. Access PIDs for the switch you are inspecting.

4. Vibrate the sensor slightly with your finger.

• If PID value is unstable or malfunction occurs, check for poor connection and/or poorly mounted sensor.

Inspection Method for Actuators or Relays

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position (Engine off).

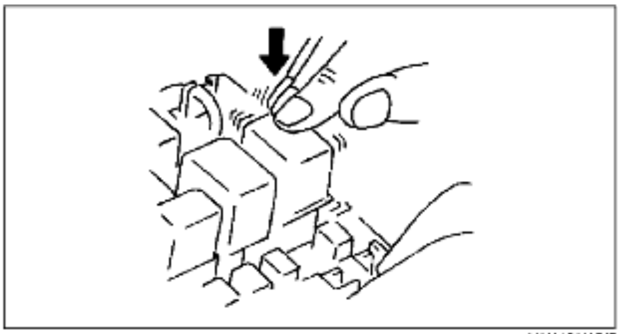
Note

• If engine starts and runs, perform the following steps during idle.

3. Prepare the Output State Control for actuators or relays that you are inspecting.

4. Vibrate the actuator or relay with your finger for **3 s** are Output State Control is activated.

• If variable click sound is heard, inspect for poor connection and/or poorly mounted actuator or relay.



Y3U103WN5

Note

• Vibrating relays excessively may result in open relays.

Water Sprinkling Method

Caution

• Indirectly change the temperature and humidity by spraying water onto the front of the radiator.

• If a vehicle is subject to water leakage, the leakage may damage the control module. When testing a vehicle with a water leakage problem, special caution must be used.

If malfunction occurs only during high humidity or rainy/snowy weather, perform the following steps.

1. Connect WDS or equivalent to DLC-2 if inspecting sensors or switches.

2. Turn the ignition switch to the ON position (Engine off).

Note

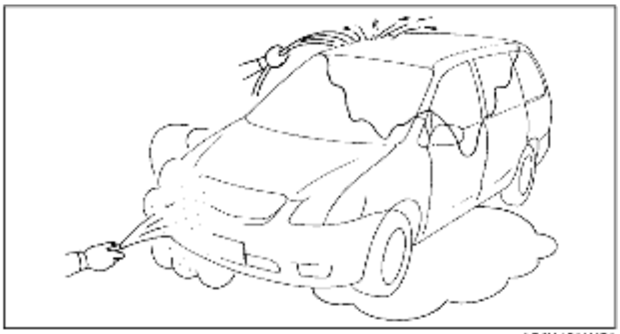
• If the engine starts and runs, perform the following steps during idle.

3. Access PIDs for sensor or switch if inspecting sensors or switches.

4. If you are inspecting the switch, turn it on manually.

5. Spray water onto the vehicle or run it through a car wash.

• If PID value is unstable or malfunction occurs, repair or replace part.



YMU103WC3

ENGINE CONTROL SYSTEM OPERATION INSPECTION [Z6]

B3E010318881W62

Main Relay Operation Inspection

1. Verify that the main relay clicks when the ignition switch turned to the ON position and off.

• If there is no operation sound, inspect the following.

- Main relay (See RELAY INSPECTION.)

- Wiring harness and connector between ignition switch and main relay terminal A

- Wiring harness and connector between PCM terminal 1AW and main relay terminal B

Intake Manifold Vacuum Inspection

1. Verify the air intake hoses are installed properly.

2. Start the engine and idle it.

3. Disconnect the vacuum hose between the intake manifold and purge solenoid valve from the intake manifold side.

4. Connect a vacuum gauge to the intake manifold and measure the intake manifold vacuum.

• If not as specified, inspect the following.

Specification (ATX)

More than 71 kPa {533 mmHg, 21 inHg}

Specification (MTX)

More than 72 kPa {541 mmHg, 22 inHg}

Note

• Air suction can be located by engine speed change when lubricant is sprayed on the area where suction is occurring.

- Air suction at throttle body, intake manifold and PCV valve installation points

- Accelerator cable free play

- Fuel injector insulator

- Engine compression (See COMPRESSION INSPECTION [Z6].)

Idle Air Control System Inspection

Engine coolant temperature compensation inspection

1. Connect the WDS or equivalent to the DLC-2.

2. Access the following PIDs.

- ECT
- IAT
- RPM

3. Verify that the engine is in cold condition, then start the engine.

4. Verify that the engine speed decreases as the engine warms up.

- If the engine speed does not decrease or decreases slowly, inspect the following.

- ECT sensor and related wiring harness (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6].)

- IAC valve and related wiring harness (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [Z6].)

Load compensation inspection

1. Start the engine and run is during idle.

2. Connect the WDS or equivalent to the DLC-2.

3. Verify that P0511 not displayed.

- If P0511 shown, perform the DTC inspection. (See DTC P0511 [Z6].)

4. Change the duty value of the IAC valve to **100%** using the IAC PID.

5. Verify that the idle speed increases.

- If the idle speed does not change, inspect the following.

- IAC valve air passage

- Open or short circuit in wiring harness between IAC valve terminals and PCM terminals 2X and 2AB

6. Access the following PIDs.

- AC_REQ
- IAC
- PSP
- RPM

Note

• Excludes temporary idle speed drop just after the loads are turned on.

7. Verify that the engine speed is within the specification under each load condition.

• If not as specified under each load condition, inspect the following.

- Refrigerant pressure switch (low, high) and related wiring harness (See REFRIGERANT PRESSURE SWITCH INSPECTION.)

- Fan switch and related wiring harness (See FAN SWITCH INSPECTION.)

- PSP switch and related wiring harness (See POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [Z6].)

Engine speed

Load condition		**Engine speed (rpm)**[*1]	
		MTX	**ATX**
No load		640-740	700-800
E/L operating[*2]	34-42 A	650-750	700-800
	more than 42 A	700-800	
P/S operating		700-800	
A/C operating[*3]	Refrigerant pressure low[*4]	650-750	700-800
	Refrigerant pressure high[*5]	700-800	

*1 :

Neutral or P position

*2 :

Generator generating current value

*3 :

A/C switch and fan switch are on.

*4 :

Refrigerant pressure switch (middle pressure) is off.

*5 :

Refrigerant pressure switch (middle pressure) is on.

Variable Intake-air Control Operation Inspection

1. Connect the WDS or equivalent to DLC-2.

2. Perform the KOEO self-test using WDS or equivalent.

3. Verify that DTC P0660 is not displayed.

• If DTC P0660 is shown, perform the DTC inspection. (See DTC P0660 [Z6].)

4. Turn the ignition switch to the ON position (Engine off).

5. Turn variable intake-air shutter valve actuator from on to off and from off to on using the IMTV PID and verify that operation sound of the actuator is heard.

• If operation sound is not head, inspect the following.

- Variable intake-air shutter valve actuator (See VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR INSPECTION [Z6].)

- Variable intake shutter valve actuator stuck open or close

Variable Tumble Control Operation Inspection

1. Connect the WDS or equivalent to DLC-2.

2. Perform the KOEO self-test using WDS or equivalent.

3. Verify that DTC P2006 and P2008 are not displayed.

• If DTC P2006 or P2008 is shown, perform the DTC inspection. (See DTC TABLE [Z6].)

4. Turn the ignition switch to the ON position (Engine off).

5. Monitor ECT, RPM and IMRC PIDs.

6. Verify that ECT PID is **60 °C {140 °F} or less**.

7. Start engine.

8. Verify that IMRC PID is following while ECT PID is **60 °C {140 °F} or less**.

• If the IMRC PID is not specified, inspect TP sensor (misadjustment).

Engine speed

Engine speed	**3,250 rpm**	
	Less than	**More than**
IMRC PID	On	Off

9. Turn variable tumble shutter valve actuator from on to off and from off to on using IMRC PID and verify that operation sound of the actuator is heard.

• If operation sound is not heard, inspect the following.

- Variable tumble shutter valve actuator (See VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [Z6].)

- Variable tumble shutter valve actuator stuck open or close

Fuel Injector Operation Inspection

STEP	INSPECTION	RESULTS	ACTION
1		Yes	Fuel injector operation is normal.

	While cranking engine, inspect for fuel injector operation sound at each cylinder using a soundscope. Is operation sound heard?	No	**All cylinders no heard:** Go to the next step. **Some cylinders no heard:** Go to Step 3.
2	Perform the main relay operation inspection. Is main relay operation normal?	Yes	Inspect the following: • Fuel injector power system related wiring harness and connectors • PCM connectors • Fuel injector GND and related wiring harness and connectors
		No	Repair or replace the malfunctioning part.
3	Change fuel injector connector of not operating fuel injector and operating fuel injector. Is operation sound heard?	Yes	Go to the next step.
		No	Replace fuel injector. Fuel pump relay (See FUEL INJECTOR INSPECTION.)
4	Are wiring harness and connectors of not operation fuel injector normal? (Open or short circuit)	Yes	Inspect the PCM terminal voltage of fuel injector signal.
		No	Repair or replace the malfunctioning part.

Fuel Cut Control System Inspection

1. Warm-up engine and idle it.

2. Turn off the electrical loads and A/C switch.

3. Connect WDS or equivalent to the DLC-2.

4. Access RPM and FUELPW PIDs.

5. Monitor both PIDs while performing the following steps.

(1) Depress the accelerator pedal and increase the engine speed to **4,000 rpm**.

(2) Release the accelerator pedal (brake pedal is not depressed) and verify that the fuel injector duration time is **0 ms**, and **2-5 ms** when the engine speed drops **1,200 rpm or less**.

• If not as specified, inspect the following.

- ECT sensor and related wiring harness (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6].)

- Neutral/clutch pedal position switch and related wiring harness (MTX) (See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [Z6].)

- TR switch and related wiring harness (ATX) (See TRANSAXLE RANGE (TR) SWITCH INSPECTION.)

Fuel Pump Operation Inspection

1. Connect the WDS or equivalent to the DLC-2.

2. Remove the fuel-filler cap.

3. Turn the ignition switch to the ON position.

4. Turn the fuel pump relay from off to on using the FP PID and inspect if the operation sound is heard.

• If no operation sounds is heard, proceed to next step.

5. Measure the voltage at wiring harness-side fuel pump terminal A.

Specification

B+ (Ignition switch is ON position)

• If the voltage is as specified, inspect the following.

- Fuel pump continuity

- Fuel pump GND

- Wiring harness between fuel pump relay and PCM terminal 1AH (without immobilizer system), 1AC (with immobilizer system)

• If not as specified, inspect the following.

- Fuel pump relay (See RELAY INSPECTION.)

- Wiring harness and connector (Main relay-fuel pump relay-fuel pump)

Fuel Pump Control System Inspection

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position.

3. Access FP PID.

4. Turn the fuel pump relay from off to on and inspect if the operation sound of the fuel pump relay is heard.

• If no operation sound is heard, inspect the fuel pump relay.

• If the fuel pump relay is normal, inspect the following.

- Wiring harnesses and connectors (Main relay-fuel pump relay-PCM)

Spark Test

1. Remove the fuel pump relay.

2. Verify that each ignition coil and connector is connected properly.

3. Inspect the ignition system in the following procedure.

Warning

• High voltage in the ignition system can cause strong electrical shock which can result in serious injury. Avoid direct contact to the vehicle body during the following spark test.

STEP	INSPECTION		ACTION
1	• Disconnect ignition coil from spark plugs. • Remove spark plugs. • Reconnect spark plugs to ignition coil. • Ground spark plugs to engine. • Is strong blue spark visible at each cylinder while cranking?	Yes	Ignition system is normal.
		No	**Some cylinders do not spark:** • Go to the next step. **All cylinders do not spark:** • Go to Step 4.
2	• Inspect the spark plugs for damage, wear, carbon deposits and proper plug gap. • Are the spark plugs normal?	Yes	Go to the next step.
		No	Replace the spark plugs, then return to Step.1.
3	• Inspect following wiring harnesses for open or short circuit: - Ignition coil No.1 terminal C-PCM terminal 2Y - Ignition coil No.2 terminal C-PCM terminal 2U - Ignition coil No.3 terminal C-PCM terminal 2Q - Ignition coil No.4 terminal C-PCM terminal 2M • Are wiring harnesses normal?	Yes	Inspect and replace the ignition coil. (See IGNITION COIL INSPECTION [Z6].)
		No	Repair or replace the malfunctioning part, then return to Step.1.
4	• Measure the voltage at terminal A in each ignition coils. • Is voltage **B+**?	Yes	Go to the next step.
		No	Inspect power supply circuit of ignition coils.
5	• Does the PCM connector or ignition coil connectors have poor connection?	Yes	Repair or replace the connector, then return to Step.1.
		No	Go to the next step.
6	• Are following parts normal? - CKP sensor and crankshaft pulley	Yes	Inspect for open or short circuit in wiring harness and connector of CKP sensor.
		No	Repair or replace the malfunctioning part, then return to Step.1.

EGR Control System Inspection

1. Crank the engine and verify that EGR valve operation (initial operation) sound is heard.

- If the operation sound is not heard, connect WDS or equivalent to the DLC-2 and verify that the DTC P0403 is shown. Perform the DTC inspection. (See DTC TABLE [Z6].)

2. Start the engine and idle it.

3. Increase the step value of EGR valve from **0** to **40** using SEGRP PID.

4. Operate the EGR valve and inspect if the engine speed becomes unstable or the engine stalls.

- If the engine speed will not change, proceed to following.

(1) Stop the engine.

(2) Remove the EGR valve.

(3) Connect the EGR valve connector.

(4) Turn the ignition switch to the ON position.

(5) Increase the step value of EGR valve from **0** to **40** using SEGRP PID.

(6) Inspect the EGR operation.

- If the EGR valve is operated, clean the EGR valve and reinspect from Step 2.
- If the EGR valve will not operate, replace the EGR valve and reinspect from Step 2.

5. Start the engine and warm it up completely.

6. Access the following PIDs.

- ECT
- RPM
- SEGRP
- TP
- VSS

7. Idle the vehicle and verify that the SEGRP value is **0**.

8. Drive the vehicle.

9. Depress the accelerator pedal and verify that the SEGRP value is increased.

- If the SEGRP value will not increase, inspect the VSS, TP and ECT PIDs. (See PCM INSPECTION [Z6].)

10. Stop the vehicle and verify that the SEGRP value is returned **0**.

Purge Control System Inspection

1. Connect the WDS or equivalent to the DLC-2.

2. Start the engine and idle it.

3. Access ECT PID.

4. Verify that the engine coolant temperature is **60 °C {140 °F} or more**.

• If the WDS or equivalent indicates **60 °C {140 °F} or less**, perform out the ECT sensor inspection.

5. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.

6. Put a finger to the purge solenoid valve and verify that there is vacuum applied when the engine is cold.

• If there is no vacuum, inspect the following.

- Wiring harness and connectors (Purge solenoid valve-PCM terminal 2AV)

- Purge solenoid valve

7. Stop the engine.

8. Verify that the DTC P0443 is shown. Perform out DTC inspection. (SeeDTC P0443 [Z6].)

9. Turn the ignition switch to the ON position.

10. Access EVAPCP PID.

11. Increase the duty value of the purge solenoid valve to **50%** and inspect if the operation sound of the valve is heard.

• If the operation sound is heard, inspect for the loose or damaged vacuum hose. (Intake manifold-purge solenoid valve-charcoal canister)

• If the operation sound is not heard, perform the purge solenoid valve inspection.

A/C Cut-off Control System Inspection

1. Start the engine.

2. Turn the A/C switch and fan switch on.

3. Verify that the A/C compressor magnetic clutch actuates.

• If it does not actuate, go to symptom troubleshooting "No.23 A/C does not work sufficiently". (See NO.23 A/C DOES NOT WORK SUFFICIENTLY [Z6].)

4. Fully open the throttle valve and verify that the A/C compressor magnetic clutch does not actuate for **2-5 s**.

• If it actuates, inspect as follows.

(1) Connect WDS or equivalent to the DLC-2.

(2) Turn the A/C switch off.

(3) Turn the ignition switch to the ON position.

(4) Access ACCS PID.

(5) Turn the A/C relay from off to on and inspect if the operation sound of the relay is heard.

• If the operation sound is heard, inspect TP PID.

• If the operation sound is not heard, inspect following.

- A/C relay

- Open circuit or short to GND in wiring harness and connectors (Ignition switch-A/C relay-PCM terminal 1AL)

- A/C related parts

Cooling Fan Motor Operation Inspection

1. Verify that the battery voltage is **above 12.4 V**.

• If the battery voltage is **below 12.4 V**, charge the battery or connect the external power supply.

2. Connect the WDS or equivalent to the DLC-2.

3. Access the following PIDs.

• ECT

• AC_REQ

• COLP

4. Turn the A/C switch to off.

5. Verify that ECT PID is **below 98 °C {209 °F}** and the AC_REQ is off.

• If the ECT PID is **below 98 °C {209 °F}**, inspect the ECT sensor.

• If the AC_REQ PID is on, inspect the A/C switch and A/C refrigerant pressure switch (high/low pressure).

6. Turn the ignition switch to the ON position while the temperature is **below 98 °C {209 °F}** with the ignition switch in the ON position.

7. Verify that the cooling fan is not operating.

• If the cooling fan is operating inspect the following:

(1) Verify that the FAN DUTY PID is **0 %.**

• If the FAN DUTY PID is not **0 %**, inspect the following PID and related parts.

- ECT (ECT sensor)

- AC_REQ (A/C switch and A/C refrigerant pressure switch (high/low) pressure)

- COLP (A/C refrigerant pressure switch (medium pressure))

- VSS (Vehicle speed sensor)

- ACCS (A/C magnetic clutch)

• If the FAN DUTY PID is **0 %**, replace cooling fan component.

8. Turn the A/C switch to on.

9. Verify that the cooling fan is operating while the ECT PID is **below 98 °C {209 °F}**.

• If the cooling fan does not operate, inspect for the following:

- A/C switch

- A/C refrigerant pressure switch

- Fan control module power supply circuit (open or short circuit)

- Fan control module GND circuit (open or short circuit)

- Fan control module control signal circuit (open or short circuit between fan control module terminal B and PCM terminal 1AP)

- Fan control module

(See COOLING FAN MOTOR COMPONENT INSPECTION.)

10. Verify that the cooling fan operates at medium speed while the COLP PID is off and high speed while the COLP PID is on.

• If the cooling fan does not operate medium and/or high speed, inspect for the following:

- A/C refrigerant pressure switch (medium switch)

- Fan control module

(See COOLING FAN MOTOR COMPONENT INSPECTION.)

11. Turn the A/C switch to the off position.

12. Start the engine and idle it.

13. Verify that the cooling fan operating speed increases relative to the ECT PID increase.

• If the cooling fan speed does not increase inspect the following:

- ECT sensor (characteristic)

- Fan control signal circuit (between fan control module terminal B and PCM terminal 1AP)

• If the all items are normal, replace the cooling fan component.

Variable Valve Timing Control System Operation Inspection

When idling cannot be continued

1. Remove the OCV and verify that the spool valve is at maximum retard position.

2. If the spool valve is stuck in advance direction, replace the OCV.

3. Connect the OCV.

4. Turn the ignition switch to the ON position.

5. Verify that the spool valve is at maximum retard position.

6. If the spool valve is stuck in advance direction, inspect for the following.

• Short circuit in wiring harnesses or connectors between the OCV and the PCM.

7. Inspect the variable valve timing actuator.

When idling can be continued

1. Warn-up the engine.

2. Connect the WDS or equivalent to the DLC-2.

3. Idle the engine.

4. Access VT DUTY1 PID.

5. Set the OCV duty valve to **100%** and verify that the engine idles roughly or stalls.

    • If as specified, inspect the timing belt component (valve timing deviation).

    • If not as specified, go to the next step.

6. Remove the OCV and connect the OCV connector to the OCV.

7. Turn the ignition switch to the ON position.

8. Access VT DUTY1 PID.

9. Set the OCV duty value to **100%** and verify that the spool valve operates in the advance direction.

10. If not as specified, inspect the following.

    • OCV operation.

    • Wiring harness and connectors between the OCV and the PCM for open or short circuit.

11. Inspect the following hydraulic passages for clogging and/or leakage.

    • Oil pressure switch-OCV

    • OCV-camshaft

    • Camshaft internal passage

12. If they are normal, replace the intake camshaft pulley (with a built-in variable valve timing actuator).

SYMPTOM TROUBLESHOOTING [ENGINE CONTROL SYSTEM (LF)]

ENGINE SYMPTOM TROUBLESHOOTING [LF]

B3E010318881W01

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

Diagnostic Index

No.	TROUBLESHOOTING ITEM		DESCRIPTION
1	Melting of main or other fuses		-
2	MIL illuminates.		MIL is illuminated incorrectly.
3	Will not crank		Starter does not work.
4	Hard to start/long crank/erratic start/erratic crank		Starter cranks engine at normal speed but engine requires excessive cranking time before starting.
5	Engine stalls.	After start/at idle	Engine stops unexpectedly at idle and/or after start.
6	Cranks normally but will not start		Starter cranks engine at normal speed but engine will not run.
7	Slow return to idle		Engine takes more time than normal to return to idle speed.
8	Engine runs rough/rolling idle		Engine speed fluctuates between specified idle speed and lower speed and engine shakes excessively.
9	Fast idle/runs on		Engine speed continues at fast idle after warm-up. Engine runs after ignition switch is turned off.
10	Low idle/stalls during deceleration		Engine stops unexpectedly at beginning of deceleration or recovery from deceleration.
11	Engine stalls/quits.	Acceleration/cruise	Engine stops unexpectedly at beginning of acceleration or during acceleration. Engine stops unexpectedly while cruising.
	Engine runs rough.	Acceleration/cruise	Engine speed fluctuates during acceleration or cruising.

	Misses	Acceleration/cruise	Engine misses during acceleration or cruising.
	Buck/jerk	Acceleration/cruise/ deceleration	Vehicle bucks/jerks during acceleration, cruising, or deceleration.
	Hesitation/stumble	Acceleration	Momentary pause at beginning of acceleration or during acceleration
	Surges	Acceleration/cruise	Momentary minor irregularity in engine output
12	Lack/loss of power	Acceleration/cruise	Performance is poor under load. (e.g. power down when climbing hills)
13	Knocking/pinging	Acceleration/cruise	Sound is produced when air/fuel mixture is ignited by something other than spark plug. (e.g. hot spot in combustion chamber)
14	Poor fuel economy		Fuel economy is unsatisfactory.
15	Emission compliance		Fails emissions test.
16	High oil consumption/leakage		Oil consumption is excessive.
17	Cooling system concerns	Overheating	Engine runs at higher than normal temperature/overheats.
18	Cooling system concerns	Runs cold	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.		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.		A/C compressor magnetic clutch does not disengage.
25	A/C is not cut off under WOT conditions.		A/C compressor magnetic clutch does not disengage under WOT.
26	Exhaust sulphur smell		Rotten egg smell (sulphur) from exhaust
27	Spark plug condition		Incorrect spark plug condition
28	ATX concerns	Upshift/downshift/ engagement	ATX concerns not related to engine performance

QUICK DIAGNOSTIC CHART [LF]

B3E010318881W02

X: Applicable

	Troubleshooting item		Starter motor malfunction (Mechanical or electrical)	Starter circuit including ignition switch is open.	Starter interlock switch malfunction (MTX with starter interlock system)	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	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 system, thermostat, etc.)	Cooling fan system malfunction	Engine or transaxle mounts are improperly installed.	Cooling fan seat is improper.	Accelerator cable free play misadjustment	Fuel quality	Intake-air temperature is too hot
1	Melting of main or other fuses																								
2	MIL illuminates		x	x	x		x	x			x				x										
3	Will not crank																								
4	Hard to start/long crank/erratic start/erratic crank																							x	
5	Engine stalls.	After start/at idle							x	x	x													x	
6	Cranks normally but will not start								x	x	x													x	
7	Slow return to idle																			x					
8	Engine runs rough/rolling idle								x	x														x	
9	Fast idle/runs on																								
10	Low idle/stalls during deceleration																								
11	Engine stalls/quits.	Acceleration/cruise							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	x
13	Knocking/pinging	Acceleration/cruise							x										x						
14	Poor fuel economy								x	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.																								
26	Exhaust sulfur smell																							x	
27	Spark plug condition								x					x											
28	ATX concerns	Upshift/downshift engagement	See 0503, TROUBLESHOOTING																						

B3E0103W101

X: Applicable

	Possible factor Troubleshooting item		Variable tumble control malfunction	Engine overheating	Air cleaner element clogging or restriction	Air leakage from intake-air system (Loose tubes, cracks, gaskets breakage)	IAC valve improper operation	Idle learning of IAC system is not completed	Throttle body malfunction	Variable intake-air control malfunction	Vacuum leakage (Vacuum hose damage, misrouting)	Ignition coil malfunction (e.g. open, short or cracks)	Initial ignition timing misadjustment (CKP sensor & crankshaft pulley misadjustment)	Erratic signal to ignition coil	Spark plug malfunction	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					
3	Will not crank																				
4	Hard to start/long crank/erratic start/erratic crank				x	x	x				x			x	x	x	x	x	x	x	x
5	Engine stalls.			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
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
9	Fast idle/runs on					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
13	Knocking/pinging	Acceleration/cruise		x															x	x	
14	Poor fuel economy		x		x					x					x					x	
15	Emission compliance				x	x			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
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	x
27	Spark plug condition				x										x	x			x	x	x
28	ATX concerns	Upshift/downshift engagement	See 0503, TROUBLESHOOTING																		

B3E0103W102

x Applicable

No.	Troubleshooting item		Injectors malfunction (Leakage or clogging, inope-rative	Fuel leakage from fuel system (including insulator, injector 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 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	Break switch and related circuit malfunction	Manifold absolute pressure sensor and related sircuit malfunction	HO2S (front or rear) and related circuit malfunction
1	Melting of main or other fuses																					
2	MIL illuminates					x		x											x	x	x	x
3	Will not crank																					
4	Hard to start/long crank/erratic start/erratic crank				x			x	x		x	x			x			x				x
5	Engine stalls.	After start/at idle	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
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				x			
13	Knocking/pinging	Acceleration/cruise				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							
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	Spark plug condition		x	x				x											x			
28	ATX concerns	Upshift/downshift/engagement	See 0503, TROUBLESHOOTING																			

B3E0103W103

X: Applicable

No.	Troubleshooting item		IAT sensor and related circuit malfunction	Barometric pressure sensor malfunction	Neutral or clutch switch and related circuit malfunction	MAF sensor and related circuit malfunction	Knock sensor and related circuit malfunction	TP sensor and related circuit malfunction	TP sensor misadjustment (including looseness)	EHPAS and related circuit malfunction	Improper refrigerant charging amount	A/C relay (A/C control signal circuit malfunction	A/C compressor magnetic clutch malfunction	Improper load signal input	Clutch slippage	VSS and related circuit malfunction	Brake dragging	Loose parts	Improper balance of wheels and tires	Drive line malfunction	Suspension malfunction	Immobilizer system operating (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
4	Hard to start/long crank/erratic start/erratic crank					x																
5	Engine stalls.	After start/at idle		x							x	x										x
6	Cranks normally but will not start																					x
7	Slow return to idle																					
8	Engine runs rough/rolling idle			x						x	x	x		x								
9	Fast idle/runs on													x								
10	Low idle/stalls during deceleration			x	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					
13	Knocking/pinging	Acceleration/cruise	x			x	x															
14	Poor fuel economy					x									x		x					
15	Emission compliance			x																		
16	High oil consumption/leakage																					
17	Cooling system concerns	Overheating									x	x										
18	Cooling system concerns	Runs cold																				
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	x													
26	Exhaust sulfur smell																					
27	Spark plug condition				x	x																
28	ATX concerns	Upshift/downshift/ engagement	See 0503, TROUBLESHOOTING																			

B3E0103W104

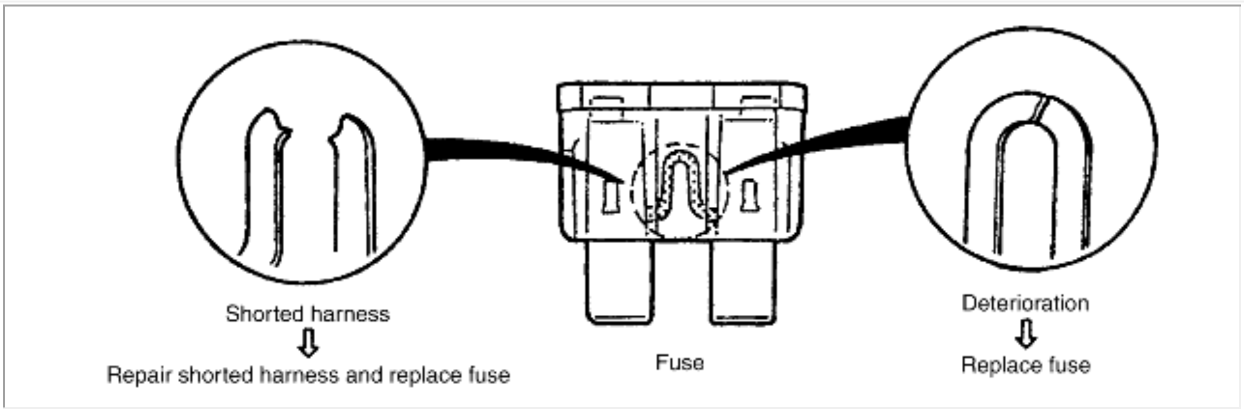
NO.1 MELTING OF MAIN OR OTHER FUSES [LF]

B3E010318881W03

1	MELTING OF MAIN OR OTHER FUSES

[TROUBLESHOOTING HINTS]

Inspect condition of fuse.



Damaged fuse	Related wiring harness
IG KEY1 (30 A)	**IG KEY1 fuse** • Ignition switch - ENGINE fuse
ENGINE (20 A)	**ENGINE fuse** • Main relay • Ignition coil No.1 • Ignition coil No.2 • Ignition coil No.3 • Ignition coil No.4 • Condenser
IG KEY2 (30 A)	**IG KEY2 fuse** • Ignition switch
ENG +B (10 A)	**ENG +B fuse** • PCM
ENGINE (30 A)	**ENGINE fuse** • Main relay - EGI INJ1 fuse - EGI INJ2 fuse - ENG BAR1 fuse - ENG BAR2 fuse
EGI INJ1 (10 A)	**EGI INJ1 fuse** • Fuel injector No.1 • Fuel injector No.2

	• Fuel injector No.3 • Fuel injector No.4
EGI INJ2 (10 A)	**EGI INJ2 fuse** • PCM
ENG BAR1 (10 A)	**ENG BAR1 fuse** • EGR valve • Variable intake-air solenoid valve • Variable tumble solenoid valve • Purge solenoid valve • MAF sensor • Fuel pump relay
ENG BAR2 (10 A)	**ENG BAR2 fuse** • HO2S (front) • HO2S (rear)
BTN (40 A)	**BTN fuse** • OBD fuse
OBD (10 A)	**OBD fuse** • DLC-2
FUEL PUMP (15 A)	**FUEL PUMP fuse** • Fuel pump relay
FAN (40 A)	**FAN fuse** • Fan control module

NO.2 MIL ILLUMINATES [LF]

B3E010318881W04

2	MIL ILLUMITATES
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 WDS or equivalent to the DLC-2. Retrieve any DTC. Are there DTC displayed?	Yes	**DTC is displayed:** • Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:** • Inspect instrument cluster operation. (See INSTRUMENT CLUSTER INSPECTION.)
2	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.3 WILL NOT CRANK [LF]

B3E010318881W05

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

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**Note** • The following test should be performed for vehicles with immobilizer system. Go to Step 7 for vehicles without immobilizer system. Connect the WDS or equivalent 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 connector securely connected to the coil?	Yes	Go to the next step.
		No	Connect the coil connector securely. Return to Step 1.
3	Does the security light illuminate?	Yes	Go to the next step.
		No	Inspect the instrument cluster and wiring harness. (See INSTRUMENT CLUSTER INSPECTION.)
4	Connect the WDS or equivalent to the DLC-2 and retrieve DTC. **DTC** **B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2141, B2431, U2510**	Yes	Go to appropriate DTC inspection. (See DTC TABLE [LF].)
		No	Go to the next step.
5	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	Yes	Repair or replace the 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 1O • Between coil terminal 1AM and instrument cluster terminal 1M	Yes	Repair or replace the wiring harness and connector.
		No	Go to the next step.
7	Inspect the following: • Battery connection	Yes	Go to the next step.
		No	Service if necessary.

	• Battery condition • Fuses Are all items normal?		Repeat Step 7.
8	Is clicking sound heard from starter when the ignition switch is turned to START?	Yes	Go to the next step.
		No	Go to Step 13.
9	Inspect the starting system. (See STARTER INSPECTION.) Is starting system normal?	Yes	Inspect for seized/hydrolocked engine or flywheel. (See FLYWHEEL INSPECTION.)
		No	Repair or replace components as required.
10	Do any other electrical accessories function?	Yes	Go to the next step.
		No	Inspect charging system. (See BATTERY INSPECTION.) (See GENERATOR INSPECTION.)
11	Connect the WDS or equivalent 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].) **Communication error message is displayed:** Inspect for following: • Open circuit in wiring harness between main relay and PCM terminal 1BE • Open circuit in wiring harness between main relay terminal B and PCM terminal 1AT • Main relay is stuck open. • Open or poor GND circuit (PCM terminal 1BH, 1AZ, 1BD, 1BC or 1BG) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Inspect following: • START circuit in ignition switch

			• Open circuit in wiring harness between ignition switch and starter
12	Retrieve any KOEO DTCs using WDS or equivalent. Are there DTCs displayed during KOEO inspection?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:** Inspect the following: • START circuit in ignition switch • Open circuit in wiring harness between ignition switch and starter
13	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [LF]

B3E010318881W06

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 • IAC valve malfunction • PCV valve malfunction • Inadequate fuel pressure • Purge 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 performing the fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.

	• Intake-air system restriction (e.g. air cleaner element, fresh air duct.) Are all items normal?		
2	Connect the WDS or equivalent to the DLC-2. Retrieve any KOEO and KOER DTCs using WDS or equivalent. Is any KOEO or KOER DTC displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		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". (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF].)
		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
5	Inspect 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	Measure the gap between the CKP sensor and teeth of crankshaft pulley. **Specification** **0.5-1.9 mm {0.020-0.75 in}** Is the gap within the specification?	Yes	Go to the next step.
		No	Adjust the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF].)
8	Remove and shake the PCV valve.	Yes	Go to the next step.

	Does the PCV valve rattle?	No	Replace the PCV valve.
9	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Connect the WDS or equivalent to the DLC-2 in Turn the fuel pump on using FP PID in output state control of data logger function. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump and fuel pump relay related circuit. Inspect for clogged fuel line. • If normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
10	Is the fuel line pressure held after the ignition switch is turned off? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See FUEL INJECTOR INSPECTION.) • If the fuel injector is normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
11	Disconnect a vacuum hose from the purge valve and plug opening end of vacuum hose. Start the engine. Is starting condition improved?	Yes	Inspect if the purge valve is stuck open.
		No	Go to the next step.
12	Inspect the MAF sensor for the following: • Contamination • MAF sensor terminal B voltage (GND circuit) Is there any contamination?	Yes	Repair or replace 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		Yes	Replace the EGR valve.

	Inspect engine condition while tapping the EGR valve housing. Does engine condition improve?	No	Go to the next step.
15	Inspect the starting system. (See STARTER INSPECTION.) 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 ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.5 ENGINE STALLS-AFTER START/AT IDLE [LF]

B3E010318881W07

5	ENGINE STALLS-AFTER START/AT IDLE
DESCRIPTION	• The engine stops unexpectedly.
POSSIBLE CAUSE	• A/C system operation is improper • Air leakage from intake-air system parts • Purge valve malfunction • Improper operation of IAC valve • 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 • Immobilizer system and/or circuit malfunction (if equipped) • Immobilizer system operating properly. (Ignition key is not registered.) • Pressure regulator malfunction **Warning** The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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 performed for vehicles with immobilizer system. Go to Step 8 for vehicles without immobilizer system.	Yes	**Both conditions appear:** Go to Step 3.
		No	**Either or other condition appears:**

	Connect the WDS or equivalent to the DLC-2. Do the following conditions appear? • The engine is not completely started. • DTC P1260 is displayed.		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 10.
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	Does the security light illuminate?	Yes	Go to the next step.
		No	Inspect the instrument cluster and wiring harness.
5	Connect the WDS or equivalent to the DLC-2 and retrieve DTC. Are any of 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].)
		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 Is there any malfunction?	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 1O • Between PCM terminal 1AM and instrument cluster terminal 1M 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 • Air cleaner element	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 8.

	• 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, IAC valve • Ignition wiring • Fuel quality: proper octane, contamination, winter/summer blend • Electrical connections • Smooth operation of throttle valve Are all items normal?		
9	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. If the engine stalls, retrieve continuous memory and KOEO DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].) **Communication error message is displayed:** Inspect for the following: • Open circuit in wiring harness between main relay and PCM terminal 1BE • Open circuit in wiring harness between main relay terminal B and PCM terminal 1AT • The main relay is stuck open. • Open or poor GND circuit (PCM terminal 1BH, 1AZ, 1BC, 1BD or 1BG) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.
10	Attempt to start engine at part throttle. Does engine run smoothly at part throttle?	Yes	Inspect the IAC valve and wiring harness. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [LF].)
		No	Go to the next step.
11	Connect the WDS or equivalent 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 following: • Open or short circuit in CKP sensor

			• Open or short circuit between CKP sensor terminal A and PCM terminal 2Y • Open or short circuit in between CKP sensor terminal B and PCM terminal 2Z • Open or short circuit in CKP sensor wiring harnesses If CKP sensor and wiring harness are normal, go to the next step.
12	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.
13	Measure gap between CKP sensor and teeth of crankshaft pulley. **Specification** **0.5-1.9 mm {0.020-0.75 in}** Is gap within specification?	Yes	Go to the next step.
		No	Adjust the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF].)
14	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.
15	Perform the spark test. (See Spark Test.) 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 21.
		No	Repair or replace the malfunctioning part according to spark test result.
16	Inspect 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 for clogged fuel injector.
		No	Install spark plugs on original cylinders. Go to the next step.
17	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
18	Visually inspect the exhaust system part.	Yes	Replace the suspected part.

	Is there any deformed exhaust system part?	No	Go to the next step.
19	Install the fuel pressure gauge between the fuel pipe and fuel distributor. Connect the WDS or equivalent to the DLC-2. Turn the fuel pump on using FP PID in output state control of datalogger function. Is the fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump and fuel pump relay related circuit. Inspect the fuel line for clogging. • If normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
20	Visually inspect the fuel injector for fuel leakage O-ring and fuel line. Service if necessary. Is the fuel line pressure held after the ignition switch is turned off? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Inspect the fuel injector. • If fuel injector is normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
21	**Note** • 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 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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF].) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
22	Disconnect vacuum hose between the purge valve and intake manifold from purge valve side. Plug the opening end of vacuum hose. Start the engine. Is the engine stall now eliminated?	Yes	Inspect if the purge valve is stuck open. Inspect the evaporative emission control system.
		No	Go to the next step.

23	Is air leakage felt or heard at the intake-air system components while racing the engine to higher speed?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
24	Inspect engine condition while tapping the EGR valve housing. Does the engine condition improve?	Yes	Replace the EGR valve.
		No	Go to the next step.
25	Is the engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for cause.
26	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.6 CRANKS NORMALLY BUT WILL NOT START [LF]

B3E010318881W08

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 IAC valve • 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 valve malfunction • Spark plug malfunction • Ignition coil malfunction • Improper valve timing • Immobilizer system and/or circuit malfunction (if equipped) • Immobilizer system operating properly. (Ignition key is not registered) • Pressure regulator malfunction **Warning** The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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** • Following test should be performed for vehicles with immobilizer system. Go to Step 8 for vehicles without immobilizer system. Connect the WDS or equivalent to the DLC-2. Do any of 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 10.
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	Does the security light illuminate?	Yes	Go to the next step.
		No	Inspect the instrument cluster and wiring harness.
5	Connect the WDS equivalent 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 appropriate DTC inspection. (See DTC TABLE [LF].)
		No	Go to the next step.
6	Inspect the following wiring harnesses and connectors: • Between coil terminal A and instrument cluster terminal 2Q • 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:	Yes	Repair or replace the suspected wiring harness and connector.

	• Between PCM terminal 1AI and instrument cluster terminal 1O • Between PCM terminal 1AM and instrument cluster terminal 1M Is there any malfunction?	No	Go to the next step.
8	Verify 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, IAC 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory and KOEO DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].) **Communication error message is displayed:** Inspect for the following: • Open circuit in wiring harness between main relay and PCM terminal 1BE • Open circuit in wiring harness between main relay terminal B and PCM terminal 1AT • Main relay is stuck open. • Open or poor GND circuit (PCM terminal 1BH,1AZ,1BD,1BC or 1BG) • Poor connection of vehicle body GND
		No	**No DTC is displayed:**

			Go to the next step.
10	Does the engine start with the throttle valve closed?	Yes	Go to Step 29.
		No	Go to the next step.
11	Will the engine start and run smoothly at part throttle?	Yes	Inspect the IAC valve and wiring harness.
		No	Go to the next step.
12	Connect the WDS or equivalent 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 between CKP sensor terminal A and PCM terminal 2Y • Open or short circuit between CKP sensor terminal B and PCM terminal 2Z • Open or short circuit in CKP sensor wiring harnesses If CKP sensor and wiring harness are normal, go to the next step.
13	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.
14	Measure the gap between the CKP sensor and teeth of crankshaft pulley. **Specification** **0.5-1.9 mm {0.020-0.75 in}** Is the gap within the specification?	Yes	Go to the next step.
		No	Adjust the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF].)
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 Spark Test.) 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.
17	Inspect spark plug conditions. 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.
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.
20	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Connect the WDS or equivalent to the DLC-2. Turn ON and/or OFF using FP PID in output state control of datalogger function. Is fuel line pressure correct when FP PID is turned On/Off **five times**? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump and the fuel pump relay related circuit. Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
21	Visually inspect the fuel injector O-ring and fuel line for fuel leakage. Service as necessary. Is fuel line pressure held after the ignition switch is turned off? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See FUEL INJECTOR INSPECTION.) • If fuel injector is normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION)
22	Disconnect the vacuum hose between the purge valve and the intake manifold from the purge valve side. Plug the opening end of vacuum hose. Start the engine. Is starting condition improved?	Yes	Inspect if the purge valve is stuck open mechanically. Inspect evaporative emission control system.
		No	Go to the next step.

23	Is air leakage felt or heard at the intake-air system components while racing the engine to higher speed?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
24	Inspect engine condition while tapping the EGR valve housing. Is engine condition improved?	Yes	Replace the EGR valve.
		No	Go to the next step.
25	Is engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for causes.
26	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.7 SLOW RETURN TO IDLE [LF]

B3E010318881W09

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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:**

			Go to the next step.
2	Remove thermostat and inspect operation. (See THERMOSTAT REMOVAL/INSTALLATION [LF].) (See THERMOSTAT INSPECTION [LF].) Is thermostat normal?	Yes	ECT sensor and thermostat are normal. Go to the next step.
		No	Access ECT PID on the WDS or equivalent. 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 contaminations?	Yes	Inspect for air leakage from the intake-air system components while racing engine to higher speed.
		No	Clean or replace the throttle body.
4	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [LF]

B3E010318881W10

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 valve malfunction • IAC valve improper operation • Idle learning of IAC system is not completed • EGR valve malfunction • Erratic or no signal from CMP sensor • Low engine compression • Improper valve timing • Erratic signal from CKP sensor • Improper air/fuel ratio mixture ratio control operation (abnormal signal from MAF sensor or HO2S) • 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 performing the fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.)

	Caution • Disconnecting/connecting quick release connector without cleaning it may possibly 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 IAC system is not completed.)
		No	Go to the next step.
2	Verify 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, IAC valve • Ignition wiring • Electrical connections • Fuses • Smooth operation of throttle valve • PCM GND circuit (PCM terminal 1AZ, 1BC, 1BD, 1BG and/or 1BH) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 2.
3	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		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". (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF].)

		No	Go to the next step.
5	Connect the WDS or equivalent to the DLC-2. Access MAF PID. Drive vehicle with monitoring PID. Is MAF PID within specification? (See PCM INSPECTION [LF].)	Yes	Go to the next step.
		No	Inspect for open or short circuit of MAF sensor and related wiring harness.
6	**Note** • Following test is for engine running rough idle with A/C on concerns. If other symptoms exist, go to the next step. Connect pressure gauge to A/C low and high pressure side lines. Start engine and run it at idle. Turn 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 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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF].) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
7	**Note** • Following test is for engine running rough with P/S on. If other symptoms exist, go to the next step. Start engine and idle it. Access PSP PID. Inspect if PSP PID is On while turning the steering wheel right to left. Is PSP PID normal?	Yes	Inspect the EHPAS. • If there is no malfunction, inspect the following wiring harnesses: - Between PCM terminal 1AI and EHPAS module terminal 1F - Between PCM terminal 1AM and EHPAS module terminal 1D
		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	Measure the gap between the CKP sensor and teeth of crankshaft pulley. **Specification**	Yes	Go to the next step.
		No	Adjust the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF].)

	0.5-1.9 mm {0.020-0.75 in} Is the gap within the specification?		
10	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.
11	Inspect 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 for clogged fuel injector.
		No	Install spark plugs on original cylinders. Go to the next step.
12	Start engine and disconnect IAC valve connector. Does rpm drop or engine stall?	Yes	Go to the next step.
		No	Inspect IAC valve and wiring harness. (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [LF].)
13	Install fuel pressure gauge between fuel pipe and fuel distributor. Start engine and run it at idle. Measure fuel line pressure at idle. Is fuel line pressure correct at idle? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
14	Visually inspect for fuel leakage at fuel injector, O-ring, and fuel line. Service as necessary. Does fuel line pressure hold after ignition switch is turned off? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Inspect fuel injector. • If fuel injector is normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)

15	Connect the WDS or equivalent to the DLC-2. Warm up the engine and idle it. Access O2S11 PID. Is O2S11 PID normal? • **More than 0.45 V** when the accelerator pedal is suddenly depressed: rich condition. • **Less than 0.45 V** during fuel cut: lean condition.	Yes	Go to the next step.
		No	Inspect and repair or replace the front HO2S, wiring harness, connector or terminal, then go to the next step. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF].)
16	Disconnect the vacuum hose between purge valve and intake manifold from purge valve side. Plug opening end of vacuum hose. Start engine. Does engine condition improve?	Yes	Inspect if the purge valve is stuck open mechanically. Inspect EVAP control system.
		No	Go to the next step.
17	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
18	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the part.
		No	Go to the next step.
19	Visually inspect the CMP sensor and teeth of camshaft. Are CMP sensor and teeth of camshaft normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
20	Inspect engine condition while tapping the EGR valve housing. Does engine condition improve?	Yes	Replace the EGR valve.
		No	Go to the next step.
21	Is engine compression correct?	Yes	Inspect valve timing.
		No	Inspect for causes.
22	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM.		

	(See PCM REMOVAL/INSTALLATION [LF].)

NO.9 FAST IDLE/RUNS ON [LF]

B3E010318881W11

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 cable free play misadjustment • Improper load signal input

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	Connect the WDS or equivalent 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". (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF].) **ECT PID is less than 82°C {180°F}:** Go to symptom troubleshooting "No.18 Cooling system concerns - Runs cold". (See NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [LF].)
2	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:** Go to the next step.
3		Yes	Go to the next step.

	Connect the WDS or equivalent to the DLC-2. Access AC_REQ, CPP, CPP/PNP and PSP PIDs. Monitor each PID. (See PCM INSPECTION [LF].) Are PIDs normal?	No	**AC_REQ PID:** Inspect the A/C switch, refrigerant pressure switch and the fan switch. **CPP PID:** Inspect the clutch pedal position switch. (See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF].) **CPP/PNP PID:** Inspect neutral switch. (See NEUTRAL SWITCH INSPECTION [LF].) **PSP PID:** Inspect PSP switch.
4	Is there air leakage felt or heard at the intake-air system components while racing engine to higher speed?	Yes	Repair or replace part if necessary.
		No	Verify the accelerator cable free play. (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [LF].)
5	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.10 LOW IDLE/STALLS DURING DECELERATION [LF]

B3E010318881W12

10	LOW IDLE/STALLS DURING DECELERATION
DESCRIPTION	• Engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.
POSSIBLE CAUSE	• Vacuum leakage

	• IAC valve malfunction • Air leakage from intake-air system • Improper air/fuel mixture ratio control • Evaporative emission control system malfunction • TP 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 • Improper A/C magnetic clutch operation

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	• Does the engine idle rough?	Yes	Go to symptom troubleshooting "No.8 Engine runs rough/rolling idle". (See NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [LF].)
		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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF].)
		No	Go to the next step.
3	Verify the following: • Proper routing and no damage of vacuum lines • IAC valve is connected properly. • 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:**

			Go to the next step.
5	Does the idle speed drop or stall when disconnecting the IAC valve?	Yes	Go to the next step.
		No	Inspect the following: • Circuit from IAC valve to the PCM terminal 2E or 2F for open and short • IAC valve for sticking If normal, go to the next step.
6	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 vehicle. Does engine condition improve?	Yes	Inspect the evaporative emission control system.
		No	Go to the next step.
7	Connect the WDS or equivalent to the DLC-2. Access TP, MAF, VSS, BOO, CPP and PNP PIDs. Monitor each PID while driving the vehicle. (See PCM INSPECTION [LF].) Are PIDs normal?	Yes	Intermittent concern exists. (See INTERMITTENT CONCERN TROUBLESHOOTING [LF].)
		No	**TP PID:** Inspect the TP sensor. (See THROTTLE POSITION (TP) SENSOR INSPECTION [LF].) **MAF PID:** Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [LF].) **VSS PID:** Inspect the VSS. (See DTC TABLE [LF].) **BOO PID:** Inspect the brake switch. (See BRAKE SWITCH INSPECTION.) **CPP PID:** Inspect the clutch pedal position switch. (See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF].) **PNP PID:** Inspect the neutral switch. (See NEUTRAL SWITCH INSPECTION [LF].)
8	Verify test results.		

	• If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)

NO.11 ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES [LF]

B3E010318881W13

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
POSSIBLE CAUSE	• Improper A/C system operation • Erratic signal or no signal from CMP sensor • Air leakage from intake-air system parts • Purge valve malfunction • IAC valve improper operation • 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 • Erratic signal to ignition coil • 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 belt • 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) • TP sensor misadjustment • Intermittent open or short circuit of MAF sensor, TP sensor and VSS • Clutch slippage • 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 performing the fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.)

	(See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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 for 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, IAC valve • Ignition wiring • Fuel quality (e.g. 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. If stall, condition exists retrieve continuous memory and KOEO DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		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 WDS or equivalent to the DLC-2.	Yes	Go to the next step.
		No	**RPM PID:**

	Access RPM, VPWR, MAF, TP and VSS PIDs. Drive the vehicle with monitoring PIDs. Are PIDs within specifications? (See PCM INSPECTION [LF].)		Inspect the CKP sensor and related wiring harness for such as vibration, intermittent open/short circuit. **VPWR PID:** Inspect for open circuit intermittently. **MAF PID:** Inspect for open circuit of the MAF sensor and related wire harness intermittently. **TP PID:** Inspect if output signal from the TP sensor changes smoothly. **VSS PID:** Inspect for open circuit of the VSS and related wire harness intermittently.
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	Measure the gap between the CKP sensor and teeth of crankshaft pulley. **Specification** **0.5-1.9 mm {0.020-0.75 in}** Is the gap within specification?	Yes	Go to the next step.
		No	Adjust the CKP sensor.
7	Inspect spark plug conditions. 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 the 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.
8	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
9	Verify that throttle lever is resting on throttle valve stop screw and/or throttle valve orifice plug.	Yes	Go to the next step.
		No	Adjust if necessary.

	Is the lever in correct position?		
10	Visually inspect deformed exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
11	Install fuel pressure gauge between the fuel pipe and fuel distributor. Connect the WDS or equivalent to the DLC-2. Turn the fuel pump on using FP PID in output state control of datalogger function. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump and the fuel pump relay related circuit. Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
12	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. Is fuel line pressure held after the ignition switch is turned off? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Inspect the fuel injector. • If the fuel injector is normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
13	**Note** • 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 the A/C low and high pressure side lines. Turn the A/C on and measure low side and high side pressure. Are pressure 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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF].) For other symptoms, inspect following: • Refrigerant charging amount • Condenser fan operation
14		Yes	Go to the next step.

	Connect the WDS or equivalent to the DLC-2. Warm up the engine and idle it. Access O2S11 PID. Is O2S11 PID normal? • **More than 0.45 V** when the accelerator pedal is suddenly depressed: rich condition. • **Less than 0.45 V** during fuel cut: lean condition.	No	Inspect and repair or replace the front HO2S, wiring harness, connector or terminal, then go to the next step. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF].)
15	Inspect the evaporative purge hose between the fuel tank and the purge valve. Dose fuel flow into evaporative purge hose?	Yes	Inspect the check valve (two-way). (See FUEL TANK INSPECTION.)
		No	Go to the next step.
16	Disconnect the vacuum hose between the purge valve and the intake manifold from the purge valve side. Plug the opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	Yes	Go to the next step. Inspect if the purge 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 the camshaft pulley. Are the 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 Variable Tumble Control Operation Inspection.) Is the variable tumble control normal?	Yes	Go to the next step.
		No	Replace or replace the malfunctioning part.
19	Inspect the EGR system. (See EGR Control System Inspection.) Is EGR system normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
20	Is engine compression correct?	Yes	Inspect the following: • Valve timing • Clutch • 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 ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE [LF]

B3E010318881W14

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 • Purge valve 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 belt • 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 • Intermittent open or short circuit of MAF sensor, TP sensor, IAT sensor and VSS • Clutch slippage **Warning** The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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 the intake-air system (such as air cleaner element, fresh air duct) • No air leakage from intake-air system	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.

	• No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold; such as EGR valve, IAC valve • Fuel quality (such as proper octane, contamination, winter/summer blend) Are all items normal?		
2	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. If engine stall condition exists, retrieve continuous memory and KOEO DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		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". (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF].)
		No	Go to the next step.
4	Connect the WDS or equivalent to the DLC-2. Access RPM, MAF, TP, IAT and VSS PIDs. Drive the vehicle while monitoring PIDs. Are PIDs within specifications? (See PCM INSPECTION [LF].)	Yes	Go to the next step.
		No	**RPM PID:** Inspect the CKP sensor and related wiring harness for vibration and/or intermittent open/short circuit. **MAF PID:** Inspect for intermittent open circuit of MAF sensor and related wiring harness. **TP PID:** Inspect if TP sensor output increases smoothly. **IAT PID:** Inspect for air suction in intake-air system. If normal, inspect intermittent short circuit of IAT sensor and related wiring harness. **VSS PID:**

			Inspect for intermittent open circuit of VSS and related wiring harness.
5	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.
6	Measure the gap between the CKP sensor and teeth of crankshaft pulley. **Specification** **0.5-1.9 mm {0.020-0.75 in}** Is the gap within the specification?	Yes	Go to the next step.
		No	Adjust the CKP sensor.
7	Inspect spark plug condition. Is the 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 spark plugs on original cylinders. Go to the next step.
8	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace PCV valve.
9	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the part.
		No	Go to the next step.
10	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Connect the WDS or equivalent to the DLC-2. Turn the fuel pump on using FP PID in output state control of datalogger function. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump and the fuel pump relay related circuit. Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit.

			(See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
11	Inspect the variable tumble control operation. (See Variable Tumble Control Operation Inspection.) Does the variable tumble control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
12	Inspect the variable intake-air operation. (See Variable Intake-air Control Operation Inspection.) Does the variable intake-air function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
13	**Note** • The following test is for engine stall with the A/C on concern. If other symptoms exist, go to the next step. Connect pressure gauge to 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 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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF].) For other symptoms, inspect following: • Refrigerant charging amount • Condenser fan operation
14	Inspect A/C cut-off operation. (See A/C Cut-off Control System Inspection.) Does A/C cut-off work properly?	Yes	Go to the next step.
		No	Inspect the A/C cut-off system components.
15	Disconnect vacuum hose between the purge valve and the intake manifold from the purge valve side. Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	Yes	Inspect if the purge valve is stuck open mechanically. Inspect the EVAP control system. (See Purge Control System Inspection.)
		No	Go to the next step.
16	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.

17	Inspect the EGR system. (See EGR Control System Inspection.) Is the EGR system normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
18	Is engine compression correct?	Yes	Inspect the following: • Valve timing • Internal transaxle components (ATX) • Clutch (MTX) • Brake system for dragging
		No	Inspect for cause.
19	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [LF]

B3E010318881W15

13	KNOCKING/PINGING - ACCELERATION/CRUISE
DESCRIPTION	Sound is heard when air/fuel mixture is ignited by something other than spark plug (e.g. 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 performing the fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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 WDS or equivalent 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 WDS or equivalent to the DLC-2. Access IAT, MAF and SPARKADV PIDs. Monitor each PID. (See PCM INSPECTION [LF].) Are PIDs normal?	Yes	Go to the next step.
		No	**IAT PID**: Inspect IAT sensor. **MAF PID**: Inspect MAF sensor. **SPARKADV PID**: Inspect CMP sensor and knock sensor.
3	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		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 the fuel pipe and 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.)	Yes	Inspect ignition timing.
		No	**Low:** Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
6	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.14 POOR FUEL ECONOMY [LF]

B3E010318881W16

14	POOR FUEL ECONOMY
DESCRIPTION	Fuel economy is unsatisfactory.
POSSIBLE CAUSE	• Contaminated air cleaner element • Variable intake-air control malfunction • Engine cooling system malfunction • Weak spark • Poor fuel quality • Erratic or no signal from CMP sensor • Clutch slippage • Variable tumble control malfunction • Improper coolant level • Inadequate fuel pressure

	• Spark plug malfunction • PCV valve malfunction • Brake dragging • Improper valve timing due to jumping out of timing belt • 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 performing fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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 the following: • Air cleaner element for contamination • Fuel quality • Coolant level • Brake dragging • Clutch slippage Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the WDS or equivalent to the DLC-2.	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)

	Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	No	**No DTC is displayed:** Go to the next step.
3	Access ECT PID. Drive the vehicle while monitoring PID. (See PCM INSPECTION [LF].) Is PID within specification?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan and thermostat operation.
4	Perform the spark test. (See Spark Test.) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part according to spark test result.
5	Install 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.)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
6	Inspect variable tumble control operation. (See Variable Tumble Control Operation Inspection.) Does the variable tumble control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
7	Inspect variable intake-air control operation. (See Variable Intake-air Control Operation Inspection.) Does the variable intake-air control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
8	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.

9	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
10	Inspect for contaminated MAF sensor. Is there any contamination?	Yes	Go to the next step.
		No	Inspect for cause.
11	Inspect the MAF sensor for contamination. Is there any contamination?	Yes	Replace the MAF sensor.
		No	Go to the next step.
12	Is engine compression correct?	Yes	Inspect valve timing.
		No	Inspect for cause.
13	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.15 EMISSION COMPLIANCE [LF]

B3E010318881W17

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

	• 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 performing fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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 the following: • Vacuum lines for leakage or blockage • Electrical connections • Proper maintenance schedule followed	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.

	• Intake-air system and air cleaner element concerns: obstructions, leakage or dirtiness Are all items normal?		
2	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:** Go to the next step.
3	Is any other drivability concern present?	Yes	Go to appropriate symptom troubleshooting.
		No	Go to the next step.
4	Connect the WDS or equivalent to the DLC-2. Access ECT PID. Warm up the engine and idle it. Verify ECT PID is correct. (See PCM INSPECTION [LF].) Is ECT PID correct?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan and thermostat operation.
5	Connect the WDS or equivalent to the DLC-2. Warm up the engine and idle it. Access O2S11 PID. Is O2S11 PID normal? • **More than 0.45 V** when the accelerator pedal is suddenly depressed: rich condition. • **Less than 0.45 V** during fuel cut: lean condition.	Yes	Go to the next step.
		No	Inspect and repair or replace the front HO2S, wiring harness, connector or terminal, then go to the next step. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF].)
6	Perform the spark test. (See Spark Test.) 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.
7	Install fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it.	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging.

	Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See FUEL LINE PRESSURE INSPECTION.)		• If normal, replace fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
8	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
9	Inspect for fuel saturation inside the 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. (See FUEL TANK INSPECTION.)
10	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the part.
		No	Go to the next step.
11	Inspect the threeway catalytic converter. (See EXHAUST SYSTEM INSPECTION [LF].) Is the threeway catalytic converter normal?	Yes	Inspect the EGR system. (See EGR Control System Inspection.)
		No	Replace the threeway catalytic converter.
12	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.16 HIGH OIL CONSUMPTION/LEAKAGE [LF]

B3E010318881W18

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 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 ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]

B3E010318881W19

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 belt • 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:**

			Go to the next step.
3	Start the engine and idle it. Turn the A/C switch on. Does the A/C compressor engage?	Yes	Go to Step 5.
		No	Inspect for following and repair or replace if necessary: • Refrigerant charging amount • Open circuit in wiring harness between A/C relay and PCM terminal 1AN • Seized A/C magnetic clutch • A/C magnetic clutch malfunction If all items are normal, go to the next step.
4	Connect the WDS or equivalent to the DLC-2. Access AC_REQ PID. Start the engine and idle it. Turn the A/C switch on. Does AC_REQ PID read On?	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 1AP • 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 Cooling Fan Motor Operation Inspection.) 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 the 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.	Yes	The ECT sensor and thermostat are normal. Inspect engine block for leakage or blockage.

	(See THERMOSTAT REMOVAL/INSTALLATION [LF].) (See THERMOSTAT INSPECTION [LF].) Is thermostat normal?	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 ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [LF]

B3E010318881W20

18	**COOLING SYSTEM CONCERNS -RUNS COLD**
DESCRIPTION	Engine takes excessive period for reaching 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].)

		No	Go to the next step.
3	Remove thermostat and inspect operation. (See THERMOSTAT REMOVAL/INSTALLATION [LF].) (See THERMOSTAT INSPECTION [LF].) Is thermostat normal?	Yes	Go to the next step.
		No	Replace the thermostat.
4	Inspect cooling fan control system operation. (See Cooling Fan Motor Operation Inspection.) Does the cooling fan control system work 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 the temperature gauge reading, inspect the ECT sensor. • If the temperature gauge on the instrument cluster indicates cold range but ECT PID is normal, inspect 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 ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.19 EXHAUST SMOKE [LF]

B3E010318881W21

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 performing fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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.
5	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:** Go to the next step.
6	Install fuel pressure gauge between the 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	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit.

	(See FUEL LINE PRESSURE INSPECTION.)		(See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
7	Is strong blue spark visible at each disconnected high-tension lead while cranking the engine?	Yes	Inspect spark plugs and CMP sensor. (See SPARK PLUG REMOVAL/INSTALLATION [LF].) (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [LF].)
		No	Inspect following: • High-tension leads • Ignition coil and connector
8	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) [LF]

B3E010318881W22

20	FUEL ODOR (IN ENGINE COMPARTMENT)
DESCRIPTION	Gasoline fuel smell or visible leakage
POSSIBLE CAUSE	• Excessive fuel pressure • Purge 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 performing fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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 fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure the fuel line pressure during idle. Is fuel line pressure correct during idle? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
2	Inspect for blockage/restriction or open circuit in wiring harness between the engine vacuum port and charcoal canister. Inspect for blockage in the fuel tank vent system. Is malfunction indicated?	Yes	Replace the vacuum hose.
		No	Go to the next step.
3	Inspect purge valve. (See PURGE SOLENOID VALVE INSPECTION.) Is purge valve operating properly?	Yes	Go to the next step.
		No	Replace the purge valve. (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [LF].)
4		Yes	**DTC is displayed:**

	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?		Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:** Inspect the 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 ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.21 ENGINE NOISE [LF]

B3E010318881W23

21	ENGINE NOISE
DESCRIPTION	Engine noise from under hood
POSSIBLE CAUSE	**Squeal, click or chirp noise:** • Improper engine oil level • Improper drive belt tension • Generation 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 sound 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 following: • 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 sound present?	Yes	Inspect the drive belts or P/S fluid level.
		No	Go to the next step.
3	Is a rattling sound present?	Yes	Inspect rattling location for loose parts.
		No	Go to the next step.
4	Is a hissing sound 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 roaring sound present?	Yes	Inspect looseness for the following: • Dynamic damper • Intake-air system • Exhaust system

		No	Go to the next step.
6	Is a knocking sound present?	Yes	Go to symptom troubleshooting "No.11 Knocking/pinging". (See NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [LF].)
		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 ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.22 VIBRATION CONCERNS (ENGINE) [LF]

B3E010318881W24

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 following systems: • Wheels • 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 ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)

NO.23 A/C DOES NOT WORK SUFFICIENTLY [LF]

B3E010318881W25

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 circuit 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:** Go to the next step.
2	Disconnect A/C compressor connector. Start engine and turn A/C switch on.	Yes	Inspect for GND condition of magnetic clutch on A/C compressor. • If GND condition is normal, inspect for open circuit magnetic clutch coil.

	Is there correct voltage A/C compressor magnetic clutch terminal? **Specification** **More than 10.5 V**	No	Go to the next step.
3	Disconnect the refrigerant pressure switch connector. Connect jumper wire between A/C high-pressure switch terminal. Connect jumper wires between refrigerant pressure switch terminal. Connect the WDS or equivalent to the DLC-2. Access AC_REQ PID. Turn the ignition switch to the ON position. Turn A/C switch on and set blower fan at any speed. Does AC_REQ PID read On?	Yes	Inspect refrigerant pressure switch operation. • If switch is normal, go to the next step.
		No	Inspect for following: • A/C switch is stuck open. • Open circuit in wiring harness between refrigerant pressure switch and PCM terminal 1AP • Open circuit of blower motor fan switch and resistor (if blower motor does not operate) • Evaporator temperature sensor and A/C amplifier
4	Remove jumper wire 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 for stuck open A/C relay. Replace if necessary.
		No	Inspect following and repair or replace if necessary: • Refrigerant charging amount • A/C compressor for being seized
5	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]

B3E010318881W26

24	A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY.
DESCRIPTION	A/C compressor magnetic clutch does not disengage.
POSSIBLE CAUSE	• Stuck engagement A/C compressor magnetic clutch • 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to appropriate DTC inspection. (See DTC TABLE [LF].)
		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 following: • The 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 for magnetic clutch stuck engagement or clearance.
3	Connect WDS or equivalent to DLC-2. Access AC_REQ PID. Start engine and turn A/C switch on. Read AC_REQ PID while disconnecting refrigerant pressure switch connector. **Note** • AC_REQ PID should read Off when disconnecting connector. If AC_REQ PID	Yes	Inspect for short to GND in wiring harness between refrigerant pressure switch and PCM terminal 1AP.
		No	Go to the next step.

	remains On, short to GND may be present. Does AC_REQ PID remain On?		
4	Reconnect refrigerant pressure switch connector. Read AC_REQ PID while turning off A/C switch. **Note** • AC_REQ PID should read Off when turning A/C switch off. If AC_REQ PID remains On, short to GND may be present. Does AC_REQ PID remain On?	Yes	Inspect the following: • Short to GND in wiring harness between the A/C switch and A/C amplifier • Short to GND in wiring harness between the A/C amplifier and refrigerant pressure switch
		No	Inspect for stuck closed A/C switch.
5	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.25 A/C IS NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS [LF]

B3E010318881W27

25	A/C IS NOT CUT OFF UNDER WOT CONDITIONS.
DESCRIPTION	A/C compressor magnetic clutch does not disengage under WOT.
POSSIBLE CAUSE	• TP sensor malfunction • TP sensor misadjustment • Loosely installed TP sensor

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1		Yes	Go to the next step.

	Does A/C compressor disengage when the A/C switch is turned off?	No	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 OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF].)
2	Connect the WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:** Inspect TP sensor for proper adjustment. (See THROTTLE POSITION (TP) SENSOR INSPECTION [LF].)
3	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.26 EXHAUST SULPHUR SMELL [LF]

B3E010318881W28

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 performing fuel system services:

	• 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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 driveability or exhaust smoke concerns present?	Yes	Go to 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 WDS or equivalent to the DLC-2. Retrieve any continuous memory, KOEO and KOER DTCs using WDS or equivalent. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See DTC TABLE [LF].)
		No	**No DTC is displayed:** Go to the next step.
4	Install the fuel pressure gauge between fuel pipe and fuel distributor. Start engine and run it at idle. Is fuel line pressure correct at idle? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)

			High: Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
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 ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

NO.27 SPARK PLUG CONDITION [LF]

B3E010318881W29

27	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 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 performing the fuel system services: • 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. (See BEFORE SERVICE PRECAUTION.) (See AFTER SERVICE PRECAUTION.) **Caution** • Disconnecting/connecting quick release connector without cleaning it may possibly 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 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 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. (See SPARK PLUG REMOVAL/INSTALLATION [LF].)
4	Inspect compression pressure at suspected malfunction cylinder. Is compression pressure correct? (See COMPRESSION INSPECTION [LF].)	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
5	Install all spark plugs. Perform the spark test at suspected malfunction cylinder. Is strong blue spark visible? (Compare with normal cylinder.)	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
6	Perform the fuel line pressure inspection. Is the fuel line pressure correct?	Yes	Inspect fuel injector for following: • Open or short circuit in injector • Leakage • Injection volume
		No	**Zero or low:** Inspect the fuel pump and fuel pump relay related circuit. Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)

7	Inspect the spark plug for 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 (See FUEL INJECTOR INSPECTION.) • Fuel injection volume (See FUEL INJECTOR INSPECTION.) Are all above items normal?	Yes	Inspect for open circuit in wiring harness between the fuel injector terminal and PCM following terminals: • For No.1 cylinder: 2BB • For No.2 cylinder: 2BC • For No.3 cylinder: 2BD • For No.4 cylinder: 2AZ
		No	Replace the fuel injector.
9	Is air cleaner element free of restrictions?	Yes	Go to the next step.
		No	Replace the air cleaner element.
10	Perform the spark test. (See FUEL LINE PRESSURE INSPECTION.) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
11	Perform the fuel line pressure inspection. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump and fuel pump relay elated circuit. Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
12	Inspect the following PIDs. • ECT	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.

	• O2S11 (When engine can be started) • O2S12 (When engine can be started) • MAF (See PCM INSPECTION [LF].) Are PIDs normal?		
13	Perform the purge control inspection. (When engine can be started) (See Purge Control System Inspection.) Is the purge control correct?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
14	Perform the compression inspection. (See COMPRESSION INSPECTION [LF].) Is compression correct?	Yes	Visually inspect for deformed in exhaust system part.
		No	Repair or replace the malfunctioning part.
15	When the engine cannot be started, inspect intake-air system for air leakage. When the engine can be started, perform the intake manifold vacuum inspection. Is air sucked in from the intake-air system?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
16	Perform the fuel line pressure inspection. Is fuel line pressure correct? (See FUEL LINE PRESSURE INSPECTION.)	Yes	Inspect the following PIDs. • ECT • O2S11 • O2S12 • MAF (See PCM INSPECTION [LF].) Inspect PCM GND condition.
		No	**Zero or low:** Inspect the fuel pump and fuel pump relay related circuit. Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit.

			(See FUEL PUMP UNIT REMOVAL/INSTALLATION.) **High:** Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION.)
17	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See ENGINE SYMPTOM TROUBLESHOOTING [LF].) • If malfunction remains, inspect related Service information perform repair or diagnosis. - If vehicle repaired, troubleshooting completed. - If vehicle not repaired or additional diagnostic information not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [LF].)		

INTERMITTENT CONCERN TROUBLESHOOTING [LF]

B3E010318881W30

Vibration Method

1. If malfunction occurs or becomes worse while driving on a rough road or when engine is vibrating, perform the steps below.

Note

• There are several reasons vehicle or engine vibration could cause an electrical malfunction. Some of the things to inspect for are:

- Connectors not fully seated
- Wiring harnesses not having full play
- Wiring harnesses laying across brackets or moving parts
- Wiring harnesses routed too close to hot parts

• An improperly routed, improperly clamped, or loose wiring harness can cause wiring to become pinched between parts.

• The connector joints, points of vibration, and places where wire harnesses pass through the fire wall, body panels, etc. are the major areas to be inspected.

Inspection Method for Switch Connectors or Wiring Harnesses

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position (Engine off).

Note

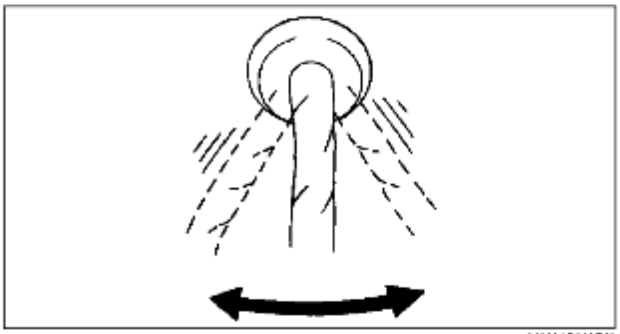
• If engine starts and runs, perform the following steps at idle.

3. Access PIDs for the switch you are inspecting.

4. Turn switch on manually.

5. Slightly shake each connector or wiring harness vertically and horizontally while monitoring the PID.

• If PID value is unstable, inspect for poor connection.



Y3U103WN3

Inspection Method for Sensor Connectors or Wiring Harnesses

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position (Engine off).

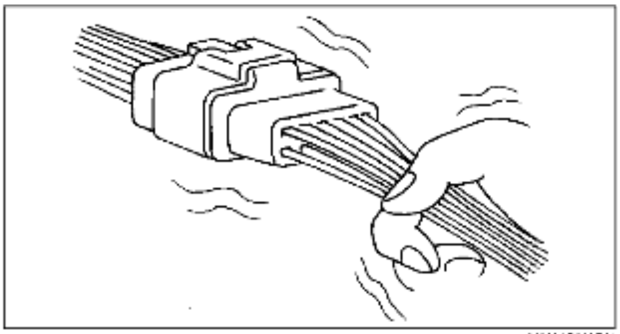
Note

• If the engine starts and runs, perform the following steps during idle.

3. Access PIDs for the switch you are inspecting.

4. Slightly shake each connector or wiring harness vertically and horizontally while monitoring the PID.

• If PID value is unstable, inspect for poor connection.



Y3U103WN4

Inspection Method for Sensors

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position (Engine off).

Note

• If engine starts and runs, perform the following steps at idle.

3. Access PIDs for the switch you are inspecting.

4. Vibrate the sensor slightly with your finger.

   • If PID value is unstable or malfunction occurs, check for poor connection and/or poorly mounted sensor.

Inspection Method for Actuators or Relays

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position (Engine off).

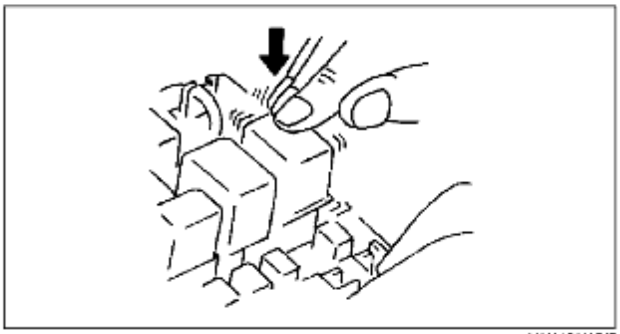
   Note

   • If the engine starts and runs, perform the following steps at idle.

3. Prepare the Output State Control for actuators or relays that you are inspecting.

4. Vibrate the actuator or relay with your finger for **3 s** are Output State Control is activated.

   • If variable click sound is heard, inspect for poor connection and/or poorly mounted actuator or relay.



Y3U103WN5

   Note

   • Vibrating relays too strongly may result in open relays.

Water Sprinkling Method

   Caution

   • Indirectly change the temperature and humidity by spraying water onto the front of the radiator.

   • If a vehicle is subject to water leakage, the leakage may damage the control module. When testing a vehicle with a water leakage problem, special caution must be used.

If malfunction occurs only during high humidity or rainy/snowy weather, perform the following steps.

1. Connect WDS or equivalent to DLC-2 if you are inspecting sensors or switches.

2. Turn the ignition switch to the ON position (Engine off).

   Note

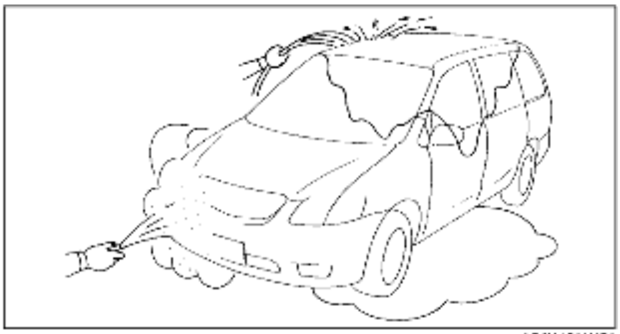
   • If the engine starts and runs, perform the following steps at idle.

3. Access PIDs for sensor or switch if you are inspecting sensors or switches.

4. If you are inspecting the switch, turn it on manually.

5. Spray water onto the vehicle or run it through a car wash.

• If PID value is unstable or malfunction occurs, repair or replace part.



YMU103WC3

ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF]

B3E010318881W31

Main Relay Operation Inspection

1. Verify that the main relay clicks when the ignition switch is turned to ON position and off.

• If there is no operation sound, inspect the following.

- Main relay (See RELAY INSPECTION.)

- Wiring harness and connector between ignition switch and main relay terminal A

- Wiring harness and connector between PCM terminal 1AT and main relay terminal B

Intake Manifold Vacuum Inspection

1. Verify air intake hoses are installed properly.

2. Start the engine and run it at idle.

3. Disconnect the vacuum hose between the intake manifold and purge solenoid valve from the intake manifold side.

4. Connect a vacuum gauge to the intake manifold and measure the intake manifold vacuum.

• If not as specified, inspect the following.

Specification

More than 60 kPa {451 mmHg, 18 inHg}

Note

• Air suction can be located by engine speed change when lubricant is sprayed on the area where suction is occurring.

- Air suction at throttle body, intake manifold and PCV valve installation points

- Accelerator cable free play

- Fuel injector insulator

- Engine compression (See COMPRESSION INSPECTION [LF].)

Idle Air Control System Inspection

Engine coolant temperature compensation inspection

1. Connect the WDS or equivalent to the DLC-2.

2. Access the following PIDs.

    • ECT

    • IAT

    • RPM

3. Verify that the engine is in cold condition, then start the engine.

4. Verify that the engine speed decreases as the engine warms up.

    • If the engine speed does not decrease or decreases slowly, inspect the following.

    - ECT sensor and related wiring harness (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [LF].)

    - IAC valve and related wiring harness (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [LF].)

Load compensation inspection

1. Start the engine and idle it.

2. Connect WDS or equivalent to the DLC-2.

3. Verify that P0506, P0507 or P0511 not displayed.

    • If P0506, P0507 or P0511 shown, perform the DTC inspection. (See DTC TABLE [LF].)

4. Change the duty value of the IAC valve to **100%** using the IAC PID.

5. Verify that the idle speed increases.

    • If the idle speed does not change, inspect the following.

    - IAC valve air passage

    - Open or short circuit in wiring harness between IAC valve terminals and PCM terminals 2E and 2F

6. Access the following PIDs.

    • AC_REQ

    • IAC

    • PSP

- RPM

Note

- Excludes temporary idle speed drop just after the loads are turned on.

7. Verify that the engine speed is within the specification under each load condition.

- If not as specified under each load condition, inspect the following.

- A/C switch and related wiring harness.

- Fan switch and related wiring harness (See FAN SWITCH INSPECTION.)

- PSP switch and related wiring harness.

Engine speed

Load condition		Engine speed (rpm)[*1]
No load		600-700
E/L operating[*2]	38-48 A	650-750
	more than 48 A	700-800
A/C operating[*3]	Refrigerant pressure low[*4]	700-800
	Refrigerant pressure high[*5]	700-800

[*1] :

Neutral or P position

[*2] :

Generator generating current value

[*3] :

A/C switch and fan switch are on.

[*4] :

Refrigerant pressure switch (middle pressure) is off.

[*5] :

Refrigerant pressure switch (middle pressure) is on.

Variable Intake-air Control Operation Inspection

1. Start the engine.

2. Inspect the rod operation under the following condition.

Rod operation

Engine speed	4,750 rpm	
	Less than	More than

Shutter valve actuator	Operate	Not operate

• If the rod operation is not as specified, inspect as follows.

(1) Stop the engine.

(2) Connect WDS or equivalent to the DLC-2.

(3) Verify that DTC P0661 or P0662 is not displayed.

• If DTC P0661 or P0662 is shown, perform the DTC inspection. (See DTC TABLE [LF].)

(4) Turn the ignition switch to the ON position.

(5) Turn the variable intake-air control solenoid valve from on to off using the IMTV PID and verify that operation sound of the solenoid valve is heard.

• If the operation sound is heard, inspect the following.

- Vacuum hose and vacuum chamber for looseness or damage

- Shutter valve actuator (See VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR INSPECTION [LF].)

- Shutter valve stuck open or close

• If the operation sound is not heard, inspect the following.

- Variable intake-air solenoid valve (See VARIABLE INTAKE-AIR SOLENOID VALVE INSPECTION [LF].)

Variable Tumble Control Operation Inspection

1. Connect the WDS or equivalent to the DLC-2.

2. Access ECT PID.

3. Verify that ECT PID is **below 63 °C {145 °F}**.

4. Start the engine.

5. Inspect rod operation under the following condition.

Rod operation

Engine speed	3,750 rpm	
	Less than	More than
Shutter valve actuator	Operate	Not operate

• If the rod operation is not specified, inspect as follows.

(1) Verify that DTC No. P2009 or P2010 is not displayed.

• If DTC No. P2009 or P2010 are shown, perform the DTC inspection. (See DTC TABLE [LF].)

(2) Turn the ignition switch to the ON position.

(3) Turn the variable tumble solenoid valve from on to off using the IMRC PID and verify that operation sound of the solenoid valve is heard.

• If the operation sound is heard, inspect the following.

- Vacuum hose and vacuum chamber for looseness or damage

- Shutter valve actuator (See VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [LF].)

- Shutter valve stuck open or close

• If the operation sound is not heard, inspect the following.

- Variable tumble solenoid valve (See VARIABLE TUMBLE SOLENOID VALVE INSPECTION [LF].)

Fuel Injector Operation Inspection

STEP	INSPECTION	RESULTS	ACTION
1	While cranking the engine, inspect for fuel injector operation sound at each cylinder using a soundscope. Is operation sound heard?	Yes	Fuel injector operation is normal.
		No	**All cylinders no heard:** Go to the next step. **Some cylinders no heard:** Go to Step 3.
2	Perform the main relay operation inspection. Is main relay operation normal?	Yes	Inspect following: • Fuel injector power system related wiring harness and connectors • PCM connectors • Fuel injector GND and related wiring harness and connectors
		No	Repair or replace the malfunctioning part.
3	Change fuel injector connector of not operating fuel injector and operating fuel injector. Is operation sound heard?	Yes	Go to the next step.
		No	Replace fuel injector. (See FUEL INJECTOR INSPECTION)
4	Are wiring harness and connectors of not operation fuel injector normal? (Open or short circuit)	Yes	Inspect PCM terminal voltage of fuel injector signal.
		No	Repair or replace the malfunctioning part.

Fuel Cut Control System Inspection

1. Warm up the engine and idle it.

2. Turn off the electrical loads and A/C switch.

3. Connect the WDS or equivalent to the DLC-2.

4. Access RPM and FUELPW1 PIDs.

5. Monitor both PIDs while performing the following steps.

(1) Depress the accelerator pedal and increase the engine speed to **4,000 rpm**.

(2) Release the accelerator pedal (brake pedal is not depressed) and verify that the fuel injector duration time is **0 ms.**, and **2-5 ms.** when the engine speed drops below **1,300 rpm**.

• If not as specified, inspect the following.

- ECT sensor and related wiring harness (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [LF].)

- Neutral/clutch pedal position switch and related wiring harness (See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF].)

Fuel Pump Operation Inspection

1. Connect the WDS or equivalent to the DLC-2.

2. Remove the fuel-filler cap.

3. Turn the ignition switch to the ON position.

4. Turn the fuel pump relay from off to on using the FP PID and inspect if the operation sound is heard.

• If no operation sounds is heard, proceed to next step.

5. Measure the voltage at wiring harness-side fuel pump terminal A.

Specification

B+ (Ignition switch is ON position)

• If the voltage is as specified, inspect the following.

- Fuel pump continuity

- Fuel pump GND

- Wiring harness between fuel pump relay and PCM terminal 1AQ (without immobilizer system), 1AR (with immobilizer system)

• If not as specified, inspect the following.

- Fuel pump relay (See RELAY INSPECTION.)

- Wiring harness and connector (Main relay-fuel pump relay-fuel pump)

Fuel Pump Control System Inspection

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position.

3. Access FP PID.

4. Turn the fuel pump relay from off to on and inspect if the operation sound of the fuel pump relay is heard.

• If no operation sound is heard, inspect the fuel pump relay.

• If the fuel pump relay is normal, inspect the following.

- Wiring harnesses and connectors (Main relay-fuel pump relay-PCM)

Spark Test

1. Remove the fuel pump relay.

2. Verify that each ignition coil and connector is connected properly.

3. Inspect the ignition system in the following procedure.

Warning

• High voltage in the ignition system can cause strong electrical shock which can result in serious injury. Avoid direct contact to the vehicle body during the following spark test.

STEP	INSPECTION		ACTION
1	• Disconnect ignition coil from spark plugs. • Remove spark plugs. • Reconnect spark plugs to ignition coil. • Ground spark plugs to engine. • Is strong blue spark visible at each cylinder while cranking?	Yes	Ignition system is normal.
		No	**Some cylinders do not spark:** • Go to the next step. **All cylinders do not spark:** • Go to Step 4.
2	• Inspect spark plugs for damage, wear, carbon deposits and proper plug gap. • Are spark plugs normal?	Yes	Go to the next step.
		No	Replace spark plugs, then return to Step.1.
3	• Inspect following wiring harnesses for open or short circuit: - Ignition coil No.1 terminal B-PCM terminal 2BE - Ignition coil No.2 terminal B-PCM terminal 2BF - Ignition coil No.3 terminal B-PCM terminal 2BG - Ignition coil No.4 terminal B-PCM terminal 2BH • Are wiring harnesses normal?	Yes	Inspect and replace ignition coil. (See IGNITION COIL INSPECTION [LF].)
		No	Repair or replace the malfunctioning part, then return to Step.1.
4	• Measure the voltage at terminal A in each ignition coils. • Is voltage reading **B+** ?	Yes	Go to the next step.
		No	Inspect power supply circuit of ignition coils.
5	• Does PCM connector or ignition coil connectors have poor connection?	Yes	Repair or replace connector, then return to Step.1.
		No	Go to the next step.

6	• Are following parts normal? - CKP sensor and crankshaft pulley	Yes	Inspect for open or short circuit in wiring harness and connector of CKP sensor.
		No	Repair or replace the malfunctioning part, then return to Step.1.

EGR Control System Inspection

1. Crank the engine and verify that EGR valve operation (initial operation) sound is heard.

    • If the operation sound is not heard, connect WDS or equivalent to the DLC-2 and verify that the DTC P0403 is shown. Perform the DTC inspection. (See DTC TABLE [LF].)

2. Start the engine and run it at idle.

3. Increase the step value of EGR valve from **0** to **40** using SEGRP PID.

4. Operate the EGR valve and inspect if the engine speed becomes unstable or the engine stalls.

    • If the engine speed will not change, proceed to following.

    (1) Stop the engine.

    (2) Remove the EGR valve.

    (3) Connect the EGR valve connector.

    (4) Turn the ignition switch to the ON position.

    (5) Increase the step value of EGR valve from **0** to **40** using SEGRP PID.

    (6) Inspect the EGR operation.

    • If the EGR valve is operated, clean the EGR valve and reinspect from Step 2.

    • If the EGR valve will not operate, replace the EGR valve and reinspect from Step 2.

5. Start the engine and warm it up completely.

6. Access the following PIDs.

    • ECT

    • RPM

    • SEGRP

    • TP

    • VSS

7. Idle the vehicle and verify that the SEGRP value is **0**.

8. Put the vehicle in drive.

9. Depress the accelerator pedal and verify that the SEGRP value is increased.

    • If the SEGRP value will not increase, inspect the VSS, TP and ECT PIDs. (See PCM INSPECTION [LF].)

10. Stop the vehicle and verify that the SEGRP value is returned **0**.

Purge Control System Inspection

1. Start the engine.

2. Disconnect the vacuum hose between the purge valve and the charcoal canister.

3. Put a finger to the purge valve and verify that there is no vacuum applied when the engine is cold.

    • If there is a vacuum, inspect the following.

    - Wiring harness and connectors (Purge valve-PCM terminal 2AN)

    - Purge valve

4. Start the engine and warm it up completely.

5. Stop the engine.

6. Connect the WDS or equivalent to the DLC-2 and verify that the DTC P0443 is shown. Perform the DTC inspection. (See DTC TABLE [LF].)

7. Turn the ignition switch to the ON position.

8. Access ECT PID.

9. Verify that the engine coolant temperature is **above 78 °C {173 °F}**.

    • If WDS or equivalent indicates **below 78 °C {173 °F}**, perform the ECT sensor inspection.

10. Access EVAPCP PID.

11. Increase the duty value of the purge valve to **50%** and inspect if the operation sound of the valve is heard.

    • If the operation sound is heard, inspect for the loose or damaged vacuum hose. (Intake manifold-purge valve-charcoal canister)

    • If the operation sound is not heard, perform the purge valve inspection.

A/C Cut-off Control System Inspection

1. Start the engine.

2. Turn the A/C switch and fan switch on.

3. Verify that the A/C compressor magnetic clutch actuates.

    • If it does not actuate, go to symptom troubleshooting "No.23 A/C does not work sufficiently".

4. Fully open the throttle valve and verify that the A/C compressor magnetic clutch does not actuate for **2-5 s**.

    • If it actuates, inspect as follows.

    (1) Connect the WDS or equivalent to the DLC-2.

    (2) Turn the A/C switch off.

    (3) Turn the ignition switch to the ON position.

(4) Access ACCS PID.

(5) Turn the A/C relay from off to on and inspect if the operation sound of the relay is heard.

• If the operation sound is heard, inspect TP PID.

• If the operation sound is not heard, inspect following.

- A/C relay

- Open circuit or short to GND in wiring harness and connectors (Ignition switch-A/C relay-PCM terminal 1AN)

- A/C related parts

Cooling Fan Motor Operation Inspection

1. Verify that the battery voltage is **above 12.4 V**.

• If the battery voltage is **below 12.4 V**, charge the battery or connect the external power supply.

2. Connect the WDS or equivalent to the DLC-2.

3. Access the following PIDs.

• ECT

• AC_REQ

• COLP

4. Turn the A/C switch to off.

5. Verify that ECT PID is **below 98 °C {209 °F}** and the AC_REQ is off.

• If the ECT PID is **below 98 °C {209 °F}**, inspect the ECT sensor.

• If the AC_REQ PID is on, inspect the A/C switch and A/C refrigerant pressure switch (high/low pressure).

6. Turn the ignition switch to the ON position while the temperature is **below 98 °C {209 °F}** with the ignition switch in the ON position.

7. Verify that the cooling fan is not operating.

• If the cooling fan is operating inspect the following:

(1) Verify that the FAN DUTY PID is **0 %**.

• If the FAN DUTY PID is not **0 %**, inspect the following PID and related parts.

- ECT (ECT sensor)

- AC_REQ (A/C switch and A/C refrigerant pressure switch (high/low) pressure)

- COLP (A/C refrigerant pressure switch (medium pressure))

- VSS (Vehicle speed sensor)

- ACCS (A/C magnetic clutch)

• If the FAN DUTY PID is **0 %**, replace cooling fan component.

8. Turn the A/C switch to on.

9. Verify that the cooling fan is operating while the ECT PID is **below 98 °C {209 °F}**.

- If the cooling fan does not operate, inspect for the following:

- A/C switch

- A/C refrigerant pressure switch

- Fan control module power supply circuit (open or short circuit)

- Fan control module GND circuit (open or short circuit)

- Fan control module control signal circuit (open or short circuit between fan control module terminal B and PCM terminal 1W)

- Fan control module

(See COOLING FAN MOTOR COMPONENT INSPECTION.)

10. Verify that the cooling fan operates at medium speed while the COLP PID is off and high speed while the COLP PID is on.

- If the cooling fan does not operate middle and/or high speed, inspect for the following:

- A/C refrigerant pressure switch (medium switch)

- Fan control module

(See COOLING FAN MOTOR COMPONENT INSPECTION.)

11. Turn the A/C switch to the off position.

12. Start the engine and idle it.

13. Verify that the cooling fan operating speed increases relative to the ECT PID increase.

- If the cooling fan speed does not increase inspect the following:

- ECT sensor (characteristic).

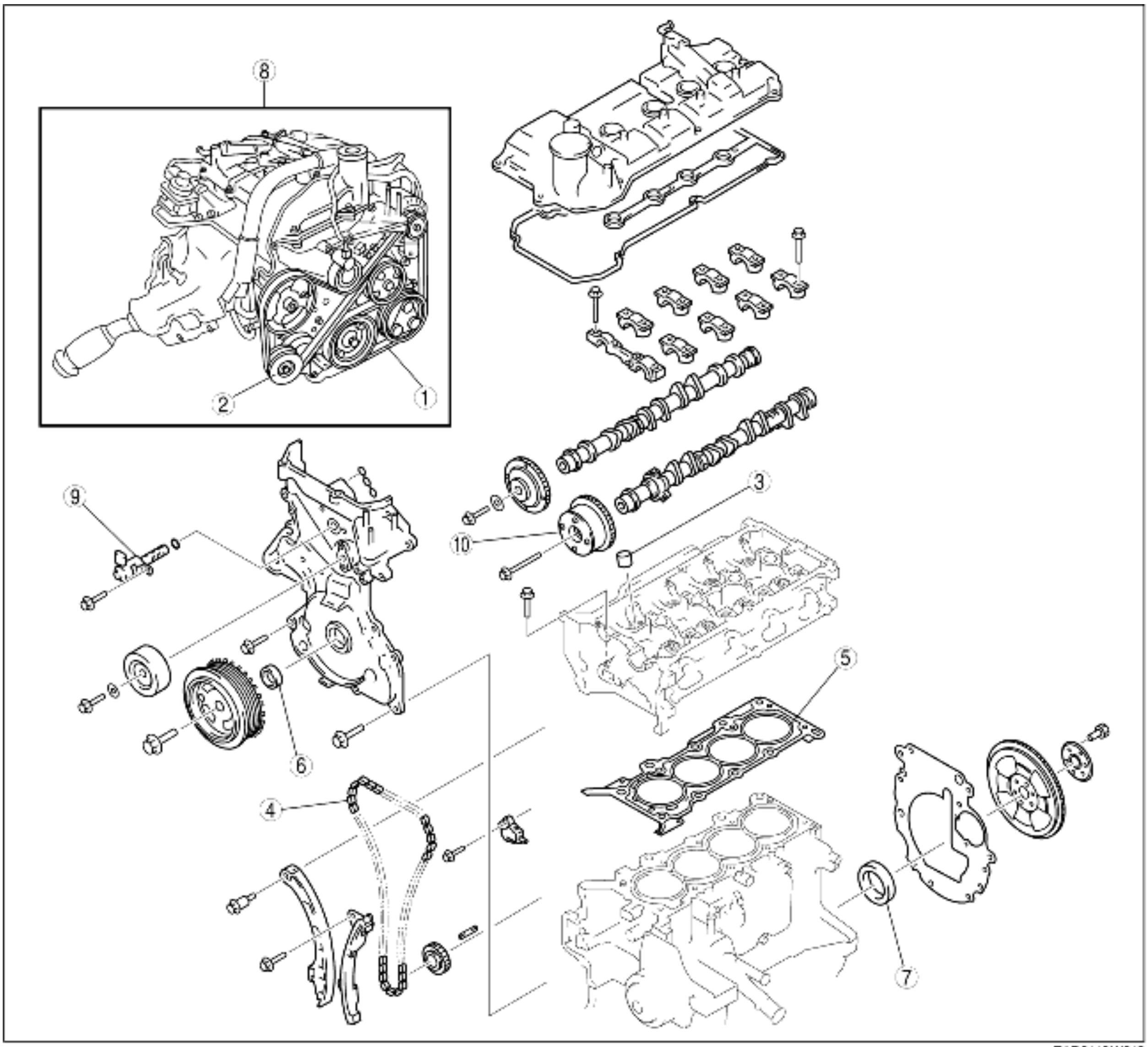
- Fan control signal circuit (between fan control module terminal B and PCM terminal 1W)

- If the all items are normal, replace the cooling fan component.

MECHANICAL[Z6]

ENGINE LOCATION INDEX [Z6]

B3E011015800W01



B3E0110W019

1	Drive belt (See DRIVE BELT INSPECTION [Z6].) (See DRIVE BELT REPLACEMENT [Z6].)
2	Drive belt auto tensioner (See DRIVE BELT AUTO TENSIONER INSPECTION [Z6].)
3	Tappet

	(See VALVE CLEARANCE INSPECTION [Z6].) (See VALVE CLEARANCE ADJUSTMENT [Z6].)
4	Timing chain (See TIMING CHAIN REMOVAL/INSTALLATION [Z6].)
5	Cylinder head gasket (See CYLINDER HEAD GASKET REPLACEMENT [Z6].)
6	Front oil seal (See FRONT OIL SEAL REPLACEMENT [Z6].)
7	Rear oil seal (See REAR OIL SEAL REPLACEMENT [Z6].)
8	Engine (See COMPRESSION INSPECTION [Z6].) (See ENGINE REMOVAL/INSTALLATION [Z6].) (See ENGINE DISASSEMBLY/ASSEMBLY [Z6].)
9	Oil control valve (OCV) (See OIL CONTROL VALVE (OCV) INSPECTION [Z6].) (See OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6].)
10	Variable valve timing actuator (See VARIABLE VALVE TIMING ACTUATOR INSPECTION [Z6].) (See VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [Z6].)

DRIVE BELT INSPECTION [Z6]

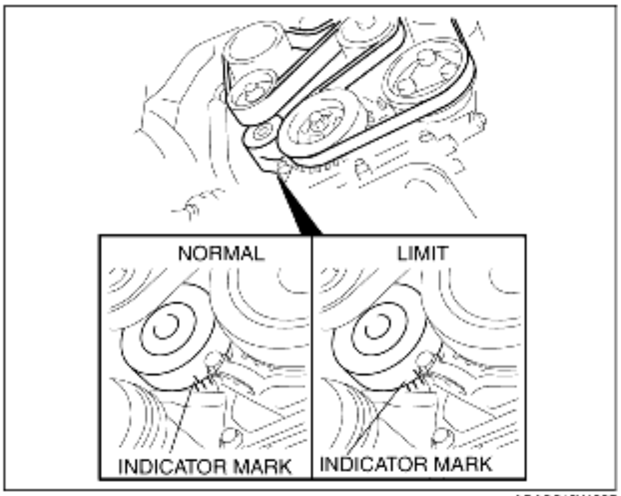
B3E011015800W02

Note

• Drive belt deflection/tension inspection is not necessary because of the use of the drive belt auto tensioner.

1. Remove the under cover and splash shield (RH).

2. Verify that the drive belt auto tensioner indicator mark does not exceed the limit.



ADA2210W005

• If it exceeds the limit, replace the drive belt. (See DRIVE BELT REPLACEMENT [Z6].)

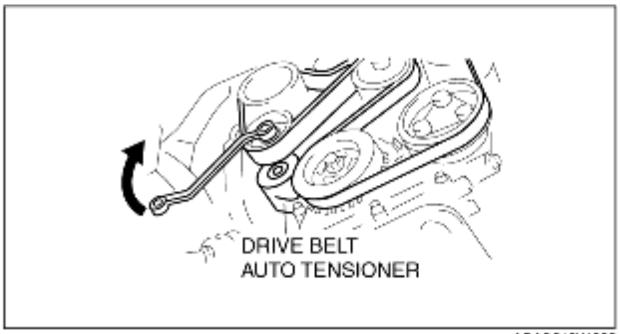
3. Install the under cover and splash shield (RH).

DRIVE BELT REPLACEMENT [Z6]

B3E011015800W03

1. Remove the under cover and splash shield (RH).

2. Rotate the drive belt auto tensioner in the direction shown in the figure and remove the drive belt.



ADA2210W002

3. Install the new drive belt.

4. Verify that the drive belt auto tensioner indicator mark does not exceed the limit. (See DRIVE BELT INSPECTION [Z6].)

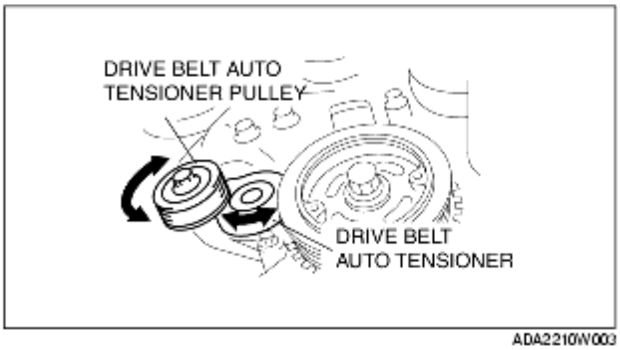
5. Install the under cover and splash shield (RH).

DRIVE BELT AUTO TENSIONER INSPECTION [Z6]

B3E011015800W04

1. Remove the drive belt. (See DRIVE BELT REPLACEMENT [Z6].)

2. Verify that the drive belt auto tensioner moves smoothly in the operational direction.



- If it does not move smoothly, replace the drive belt auto tensioner.

3. Rotate the drive belt auto tensioner pulley by hand and verify that it rotates smoothly.

- If it does not move smoothly, replace the drive belt auto tensioner.

4. Install the drive belt. (See DRIVE BELT REPLACEMENT [Z6].)

VALVE CLEARANCE INSPECTION [Z6]

B3E011012111W01

1. Remove the battery cover.

2. Disconnect the negative battery cable.

3. Remove the under cover and splash shield (RH).

4. Remove the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

5. Remove the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

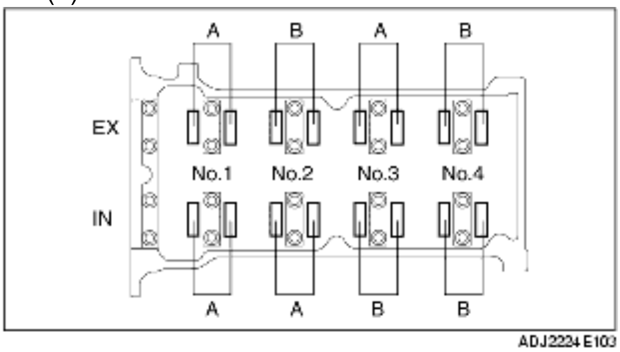
6. Disconnect the ventilation hose.

7. Remove the cylinder head cover.

8. Measure the valve clearance.

(1) Rotate the crankshaft clockwise so that the No.1 cylinder is at TDC of the compression stroke.

(2) Measure the valve clearance at A shown in the figure.



• If not within the specification, replace the tappet and adjust the valve clearance to the median value. (See VALVE CLEARANCE ADJUSTMENT [Z6].)

Standard valve clearance [Engine cold]

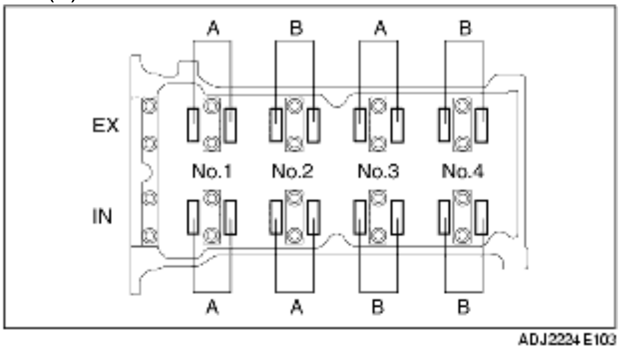
0.27-0.33 mm {0.0107-0.0129 in}

Note

• Make sure to note down the measured values for choosing the suitable replacement tappets.

(3) Rotate the crankshaft clockwise **360**° so that the No.4 cylinder is at TDC of the compression stroke.

(4) Measure the valve clearance at B shown in the figure.



• If not within the specification, replace the tappet and adjust the valve clearance to the median value. (See VALVE CLEARANCE ADJUSTMENT [Z6].)

Standard valve clearance [Engine cold]

0.27-0.33 mm {0.0107-0.0129 in}

Note

• Make sure to note down the measured values for choosing the suitable replacement tappets.

9. Install the cylinder head cover. (See Cylinder Head Cover Installation Note.)

10. Connect the ventilation hose.

11. Install the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

12. Install the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

13. Install the under cover and splash shield (RH).

VALVE CLEARANCE ADJUSTMENT [Z6]

B3E011012111W02

1. Remove the battery cover.

2. Disconnect the negative battery cable.

3. Remove the front wheel and tire (RH). (See GENERAL PROCEDURES (SUSPENSION).)

4. Remove the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

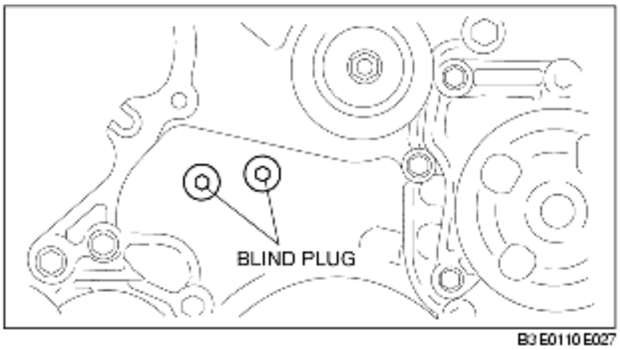
5. Remove the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

6. Disconnect the ventilation hose.

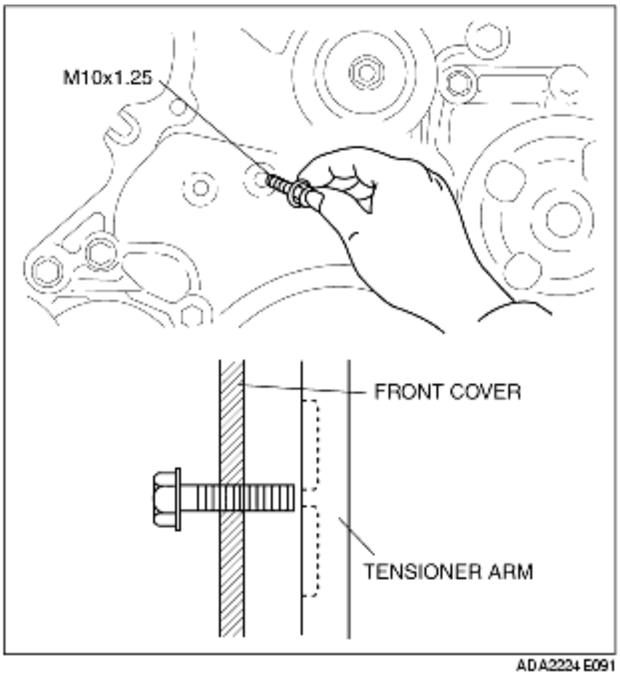
7. Remove the cylinder head cover.

8. Remove the drive belt. (See DRIVE BELT REPLACEMENT [Z6].)

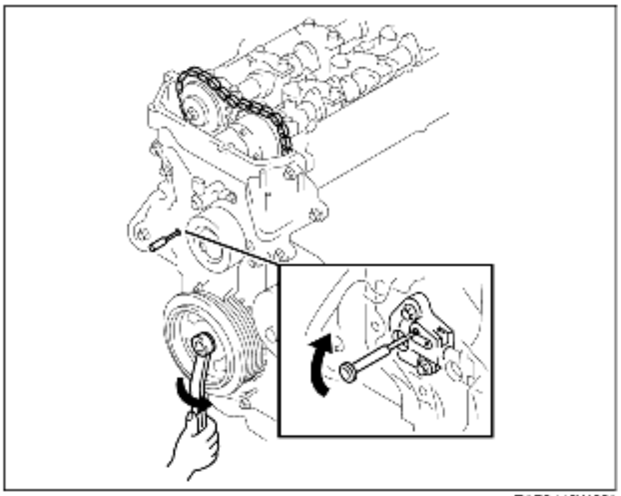
9. Remove the engine front cover blind plug shown in the figure.



10. Insert a bolt **(M10×1.25, length 25 mm {0.98 in} or more)** into the service hole on the right side by hand as shown in the figure until it stops on the tensioner arm. Then rotate the bolt back out approx. halfway so that it sits slightly in front of the tensioner arm.

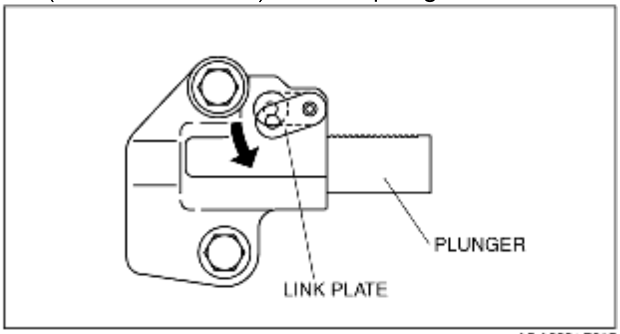


11. Release tension on the timing chain.



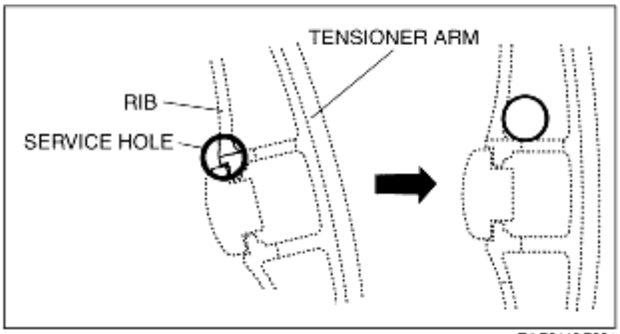
B3E0110W023

(1) Press down the link plate of the chain tensioner from the service hole on the left side using a thin flathead screwdriver (precision screwdriver). Then rotate the crank pulley backwards (counterclockwise) with the plunger lock released.



ADA2224E035

(2) When the timing chain loosens, shift the tensioner arm to the position shown in the figure at the same time.

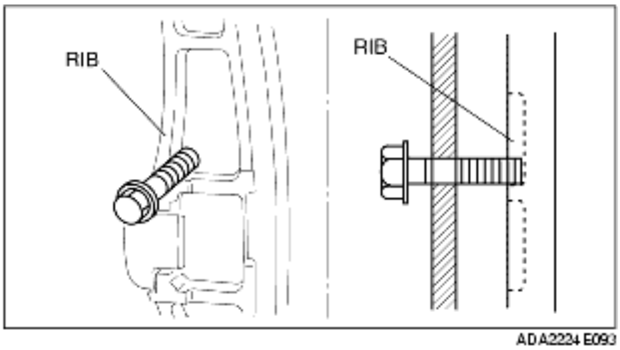


B3E0110E004

Note

• The timing chain presses the tensioner arm by the rotation of the crank pulley backwards (counterclockwise).

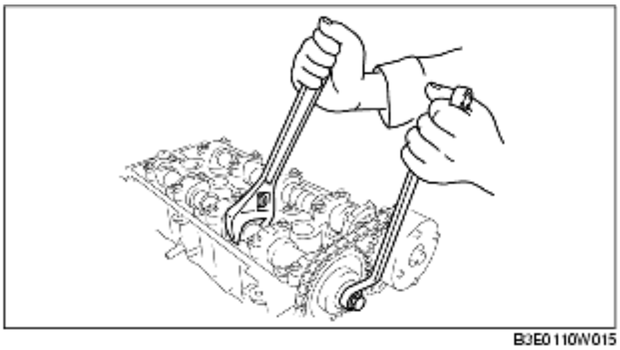
(3) Rotate the bolt **(M10 × 1.25)** installed to the front cover by hand and insert it to the position where it catches the inside of the rib on the tensioner arm.



Note

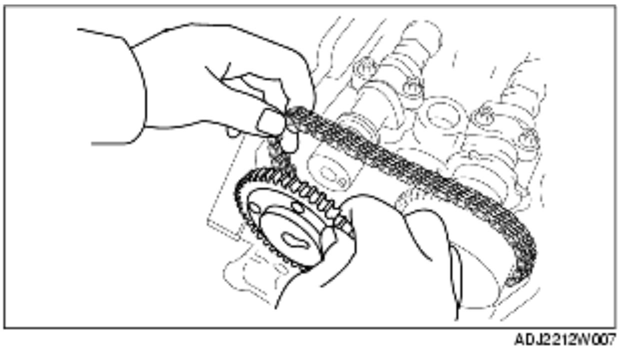
• Fix the tensioner arm by inserting the bolt and rotate it to the right six to seven times until it reaches to the position shown in the figure.

12. Fix the camshaft using a wrench on the cast hexagon.

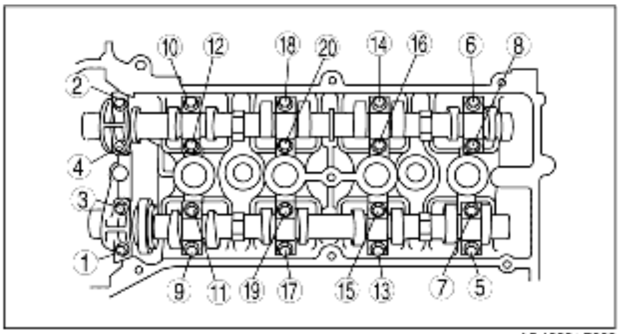


13. Remove the camshaft sprocket installation bolt.

14. Remove the timing sprocket on the exhaust side with the timing chain positioned out of the way.



15. Loosen the camshaft cap installation bolts in 2-3 passes in the order shown in the figure.



ADJ2224E008

16. Remove the camshaft caps.

17. Remove the intake and exhaust camshafts.

18. Remove the tappets.

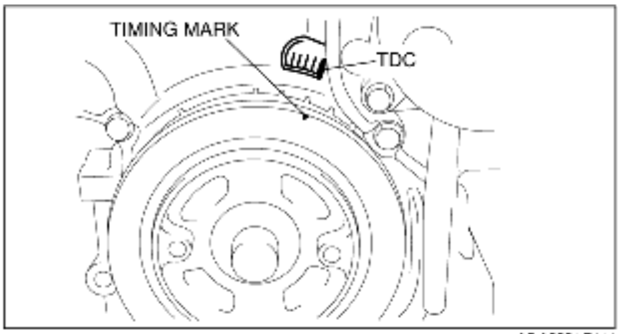
19. Select a proper tappet according to the result of the valve clearance inspection and install it.

Tappet to be selected: thickness of the removed tappet + measured valve clearance - standard valve clearance (0.3 mm {0.0118 in})

Standard valve clearance [Engine cold]

0.27-0.33 mm {0.0107-0.0129 in}

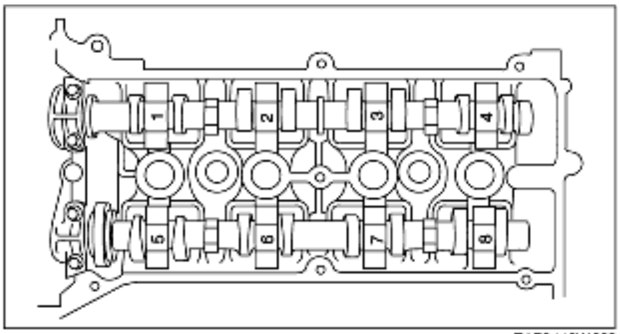
20. Align the timing marks on the crank pulley and the engine front cover, and then align the No.1 cylinder to the TDC.



ADA2224E141

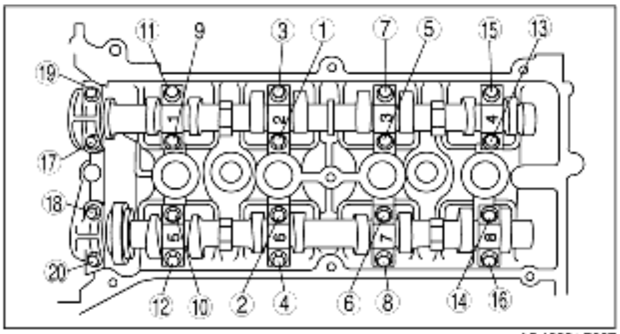
21. Install the intake and exhaust camshafts with the No.1 cylinder so that it is near TDC of the compression stroke.

22. Install the camshaft caps to the position shown in the figure, and temporarily tighten the No.2 and No.7 camshaft installation bolts.



B3E0110W008

23. Tighten the camshaft installation bolts in 2-3 passes uniformly in the order shown in the figure.

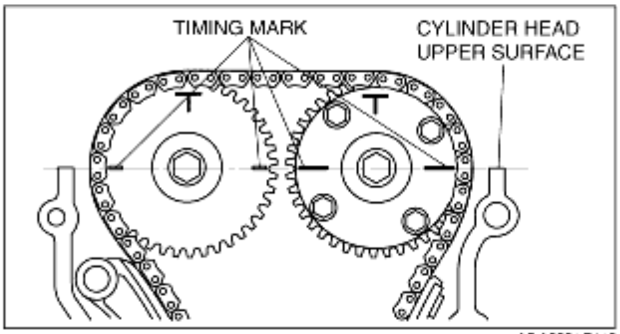


ADJ2224E007

Tightening torque

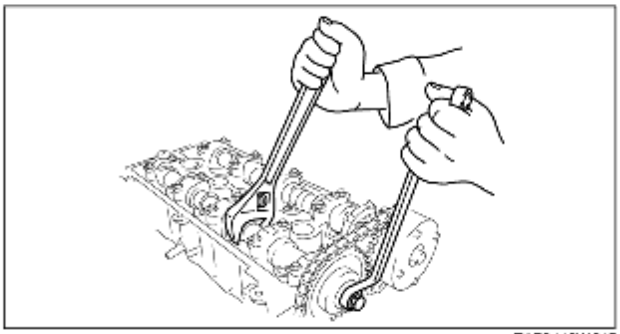
11.3-14.2 N·m {1.16-1.44 kgf·m, 8.4-10.4 ft·lbf}

24. Align the sprocket timing marks on the intake and exhaust camshafts so that they form a straight line in alignment with the upper horizontal surface of the cylinder head.



ADA2224E142

25. Fix the camshaft using a wrench on the cast hexagon.



B3E0110W015

26. Tighten the camshaft sprocket installation bolt.

Tightening torque

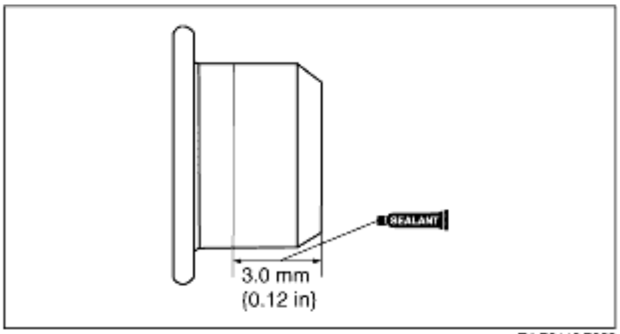
49.6-60.8 N·m {5.06-6.19 kgf·m, 36.6-44.8 ft·lbf}

27. Remove the bolt **(M10 × 1.25)** holding the tensioner arm.

28. Verify that there is no slack in the timing chain, and then verify that the marks on the camshaft sprocket and the crank pulley are aligned.

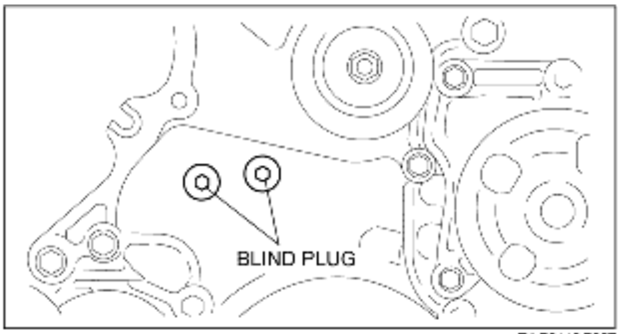
29. Inspect the valve timing by rotating the crankshaft clockwise twice.

30. Apply silicone sealant to the blind plug as shown in the figure.



B3E0110E028

31. Install the engine front cover blind plug.



B3E0110E027

Tightening torque

3.0-5.0 N·m {31-50 kgf·cm, 26.6-44.2 in·lbf}

32. Install the drive belt. (See DRIVE BELT REPLACEMENT [Z6].)

33. Install the cylinder head cover. (See Cylinder Head Cover Installation Note.)

34. Connect the ventilation hose.

35. Install the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

36. Install the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

37. Install the front wheel and tire (RH). (See GENERAL PROCEDURES (SUSPENSION).)

COMPRESSION INSPECTION [Z6]

B3E011001001W01

Warning

• Hot engines can cause severe burns. Be careful not to burn yourself during removal/installation of each component.

• Fuel vapor is hazardous. It can very 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 the "Fuel Line Safety Procedure" when servicing the fuel system, and remove the fuel pump relay.
(See BEFORE SERVICE PRECAUTION.)

1. Verify that the battery is fully charged. (See BATTERY INSPECTION.)

2. Warm up the engine to the normal operating temperature.

3. Stop the engine and leave it for **approx.10 min** to cool down the exhaust system.

4. Remove the fuel pump relay. (See BEFORE SERVICE PRECAUTION.)

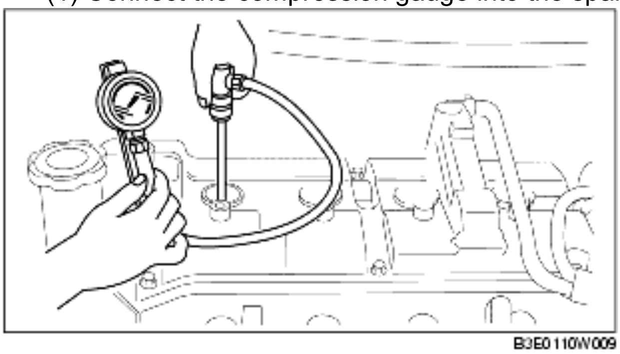
5. Remove the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

6. Remove the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

7. Remove all the spark plugs. (See SPARK PLUG REMOVAL/INSTALLATION [Z6].)

8. Measure the compression pressure using the following procedure.

(1) Connect the compression gauge into the spark plug hole.



(2) Fully open the throttle valve.

(3) Crank the engine and measure the compression pressure.

Compression pressure

• Standard

1,470 kPa {14.99 kgf/cm^2, 213.2 psi} [250 rpm]

• Minimum

1,029 kPa {10.49 kgf/cm^2, 149.2 psi} [250 rpm]

• Maximum difference between cylinders 196.1 kPa {2.0 kgf/cm^2, 28.5 psi}

(4) Perform Steps (1) to (3) all of the cylinders.

(5) If it is less than the minimum specification, or there is a cylinder with a compression value that varies from that of other cylinders by **196.1 kPa {2.0 kgf/cm^2, 28.5 psi} or more** perform Steps (1) to (3) adding a small quantity of engine oil from the spark plug hole.

• If the pressure increases by adding the engine oil, the piston ring or the cylinder surface is worn, or they are damaged. Perform overhaul servicing.

• If the pressure does not increase, valve seizure, valve attachment failure, or pressure leaking from the cylinder head gasket might be occuring. Perform overhaul servicing.

9. Install the spark plugs. (See SPARK PLUG REMOVAL/INSTALLATION [Z6].)

10. Install the ignition coil. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

11. Install the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

12. Install the fuel pump relay. (See BEFORE SERVICE PRECAUTION.)

TIMING CHAIN REMOVAL/INSTALLATION [Z6]

B3E011012040W01

Warning

• Fuel vapor is hazardous. It can very 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 the "Fuel Line Safety Procedure". (See AFTER SERVICE PRECAUTION.)

1. Remove the battery cover.

2. Disconnect the negative battery cable.

3. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT.)

4. Remove the following parts:

(1) Front wheel and tire (RH) (See GENERAL PROCEDURES (SUSPENSION).)

(2) Under cover and splash shield (RH)

(3) Air cleaner component (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

(4) Ignition coils (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

(5) Drive belt (See DRIVE BELT REPLACEMENT [Z6].)

(6) P/S oil pump with the oil hose and oil pipe still connected (See POWER STEERING OIL PUMP (Z6) REMOVAL/INSTALLATION.)

Note

• Fix the P/S oil pump with rope at a position not obstructing the servicing.

(7) Coolant and P/S reserve tank with the hoses and pipes still connected

(8) Generator (See GENERATOR REMOVAL/INSTALLATION [Z6].)

(9) Water pump (See WATER PUMP REMOVAL/INSTALLATION [Z6].)

(10) Accelerator cable bracket (body side)

(11) Earth (No.3 engine mount)

5. Disconnect the following parts:

(1) Ventilation hose

(2) OCV wiring harness

(3) CKP sensor connector

6. Remove in the order indicated in the table.

7. Install in the reverse order of removal.

8. Start the engine.

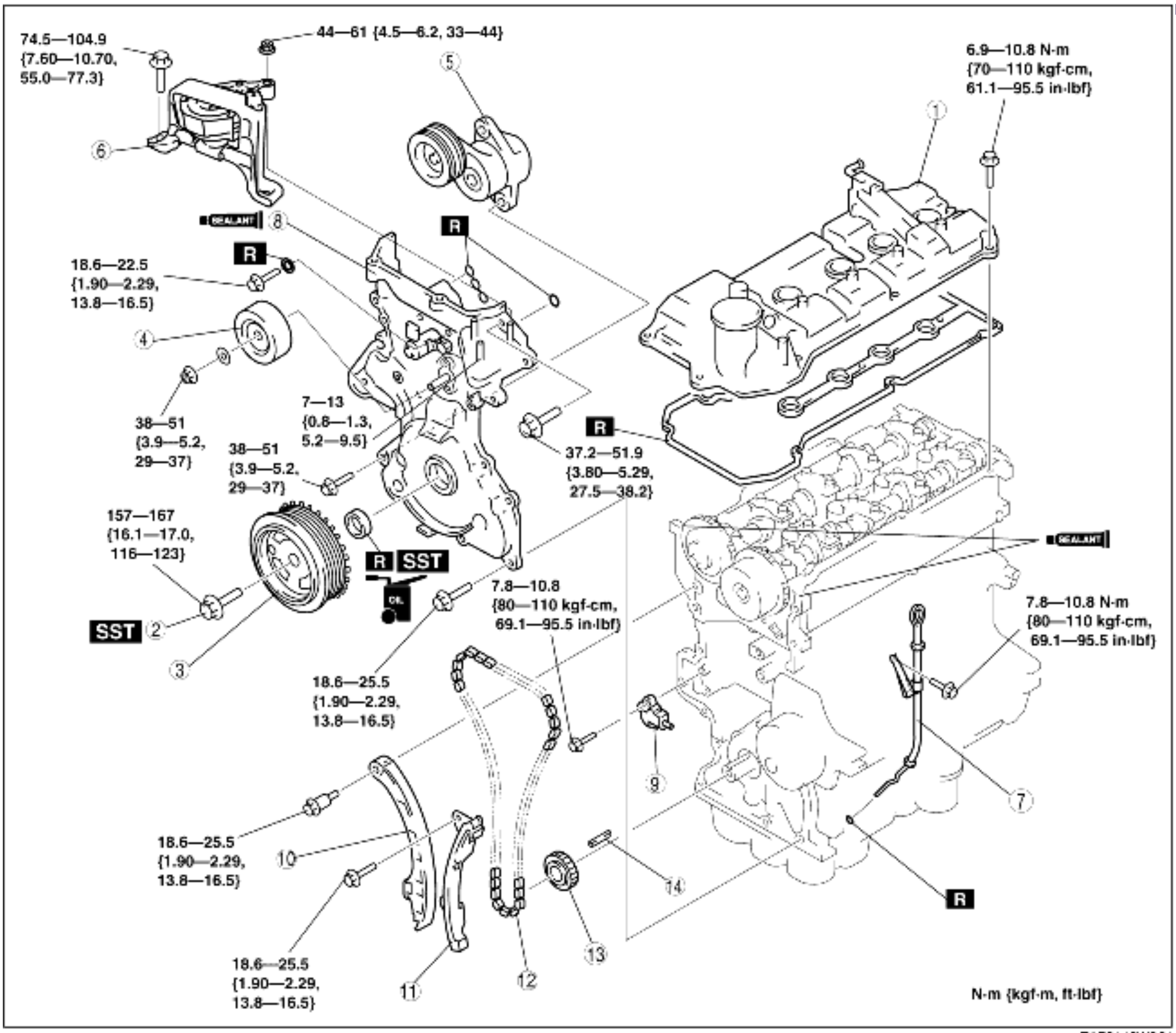
9. Inspect the following and adjust them if necessary.

(1) Amount of engine oil (See ENGINE OIL LEVEL INSPECTION [Z6].)

(2) Pulley and belt for runout and contact

(3) Ignition timing and idle speed. Verify the amount of CO and HC. (See ENGINE TUNE-UP [Z6].)

10. Perform a road test and verify that there is no abnormal vibration or noise.



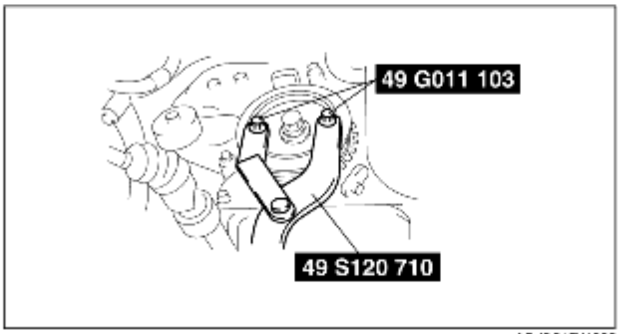
B3E0110W001

1	Cylinder head cover (See Cylinder Head Cover Installation Note.)
2	Crankshaft pulley installation bolt (See Crankshaft Pulley Installation Bolt Removal Note.) (See Crankshaft Pulley Installation Bolt Installation Note.)
3	Crankshaft pulley
4	Idler pulley
5	Drive belt auto tensioner
6	No.3 engine mount (See No.3 Engine Mount Removal Note.) (See No.3 Engine Mount Installation Note.)
7	Oil level gauge pipe

8	Engine front cover (See Engine Front Cover Removal Note.) (See Engine Front Cover Installation Note.)
9	Chain tensioner (See Chain Tensioner Removal Note.)
10	Chain tensioner arm
11	Chain guide
12	Timing chain (See Timing Chain Removal Note.) (See Timing Chain Installation Note.)
13	Crankshaft sprocket
14	Key

Crankshaft Pulley Installation Bolt Removal Note

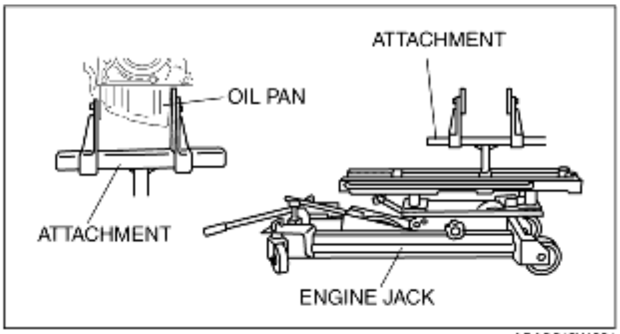
1. Fix the crankshaft pulley using the **SSTs**.



ADJ2215W002

No.3 Engine Mount Removal Note

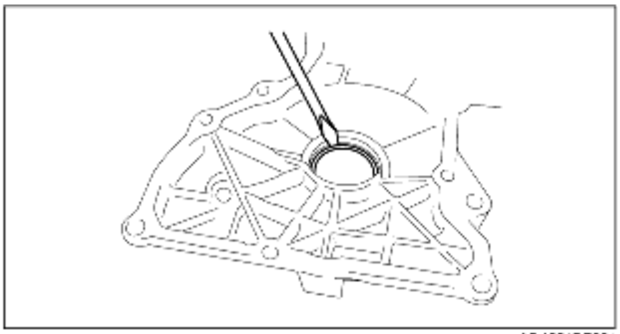
1. Secure the engine using an engine jack and attachment.



ADA2219W001

Engine Front Cover Removal Note

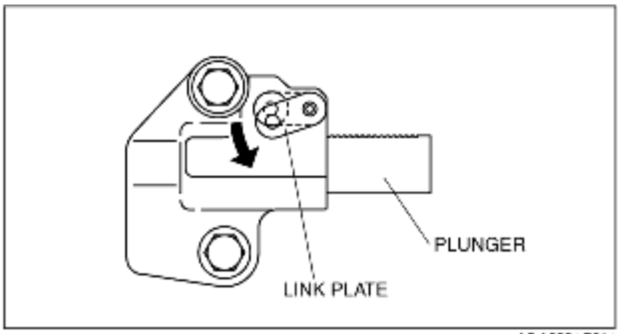
1. Remove the front oil seal using a flathead screwdriver.



ADJ2215E004

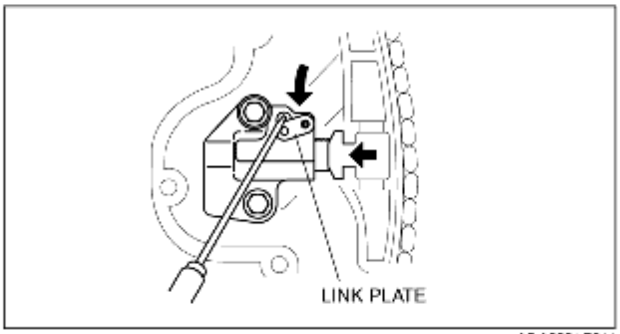
Chain Tensioner Removal Note

1. Push down the link plate of the timing chain tensioner using a thin flathead screwdriver (precision screwdriver), and release the plunger lock.



ADA2224E034

2. Push back the plunger slowly in the direction shown in the figure with the link plate still pushed down.

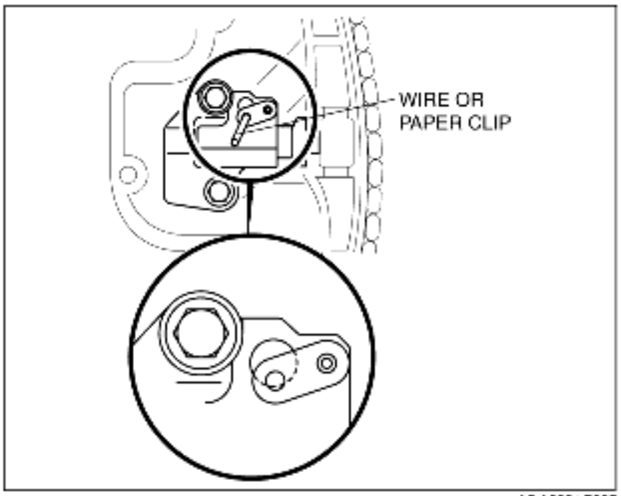


ADA2224E011

3. Release the link plate with the plunger still pressed down.

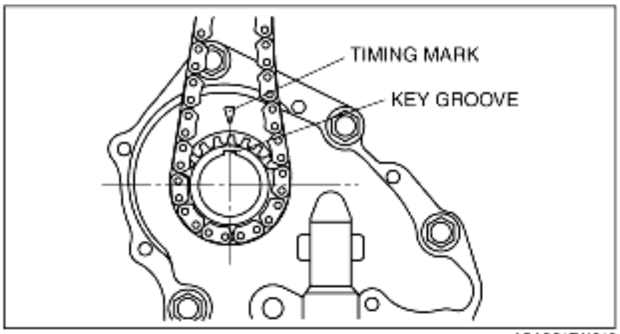
4. Release the pressure slightly from the plunger, and move the plunger back and forth **2-3 mm {0.08-0.11 in)**.

5. Insert an approx. **1.5 mm {0.06 in)** thick wire or paper clip where the link plate hole and the tensioner body hole overlap to fix the link plate and lock the plunger.

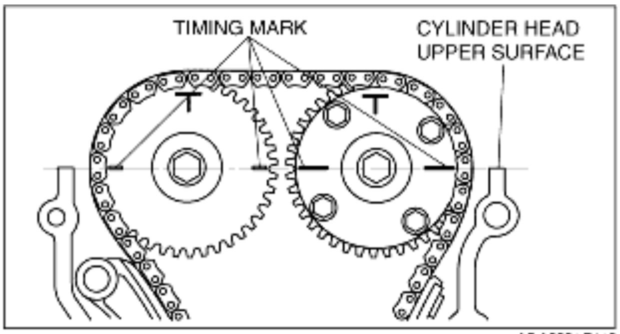


Timing Chain Removal Note

1. Rotate the crankshaft clockwise and align the key groove of the crankshaft sprocket with the timing mark, and then position the No.1 cylinder to TDC.



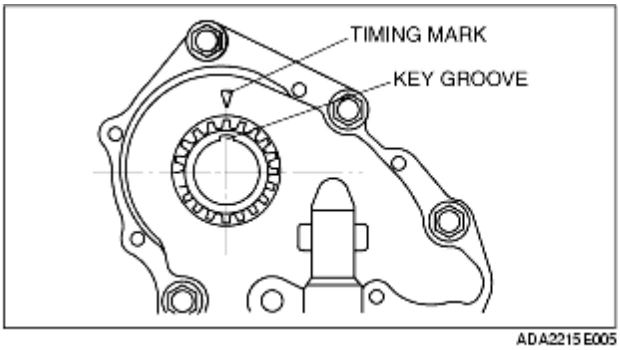
2. Align the timing marks on the camshaft sprockets so that they form a straight line in alignment with the upper horizontal surface of the cylinder head.



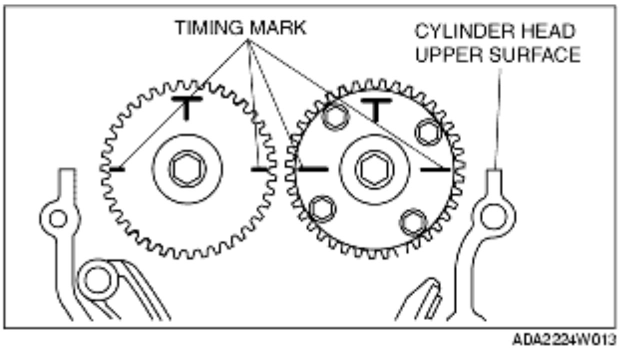
3. Remove the timing chain.

Timing Chain Installation Note

1. Align the key groove of the crank sprocket to the timing mark, and then position the No.1 cylinder to TDC.

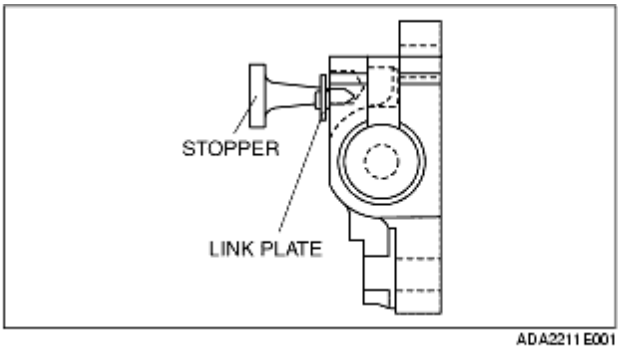


2. Align the timing marks on the camshaft sprockets so that they form a straight line in alignment with the upper horizontal surface of the cylinder head.



3. Install the timing chain.

4. After installing the chain adjuster, remove the wire or the paper clip installed to the chain tensioner, and apply tension to the timing chain. (Remove the installed stopper when installing the new chain tensioner.)

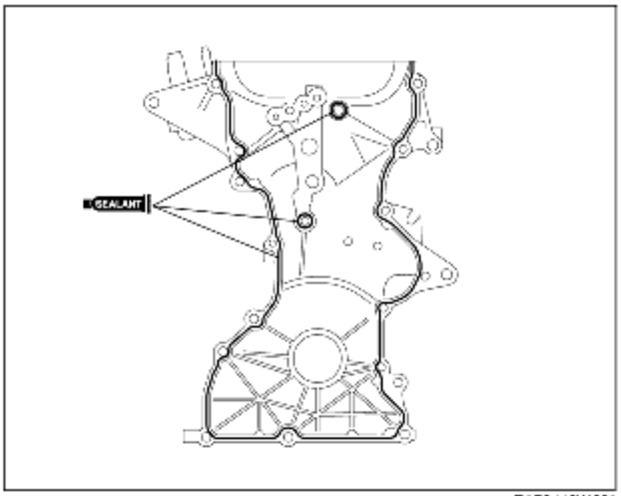


5. Verify that there is no slack on the timing chain, and then verify that each sprocket is positioned in the proper place again.

6. Rotate the crankshaft clockwise twice, and then inspect the valve timing.

Engine Front Cover Installation Note

1. Apply the silicon sealant to the engine front cover as shown in the figure.



B3E0110W003

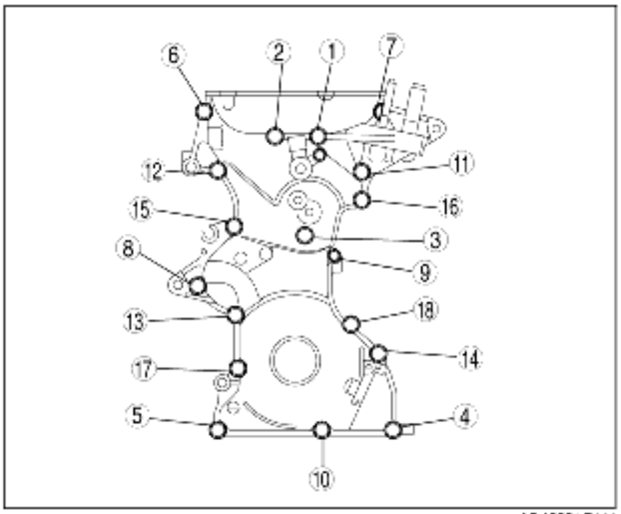
Caution

• Install the engine front cover within 10 min of applying the silicone sealant.

Thickness

2-4 mm {0.08-0.15 in}

2. Tighten the engine front cover installation bolts in the order shown in the figure.



ADJ2224E111

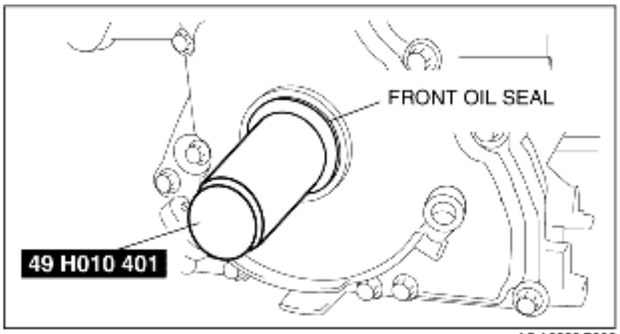
• Install a No.1 bolt using a new seal washer.

Bolt number	Tightening torque
1-6, 8, 10, 12-15, 17, 18	18.6-25.5 N·m {1.90-2.29kgf·m, 13.8-16.5 ft·lbf}
7, 11, 16	37.2-51.9 N·m {3.80-5.29 kgf·m, 27.5-38.2 ft·lbf}
9	7.8-10.8 N·m {80-110 kgf·cm, 69.1-95.5 in·lbf}

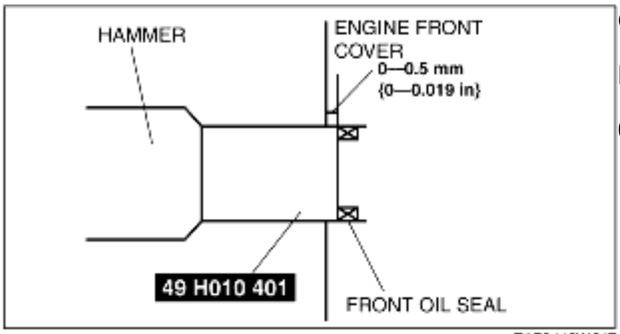
3. Apply clean engine oil to the new front oil seal.

4. Insert the front oil seal into the engine front cover by hand.

5. Tap in the front oil seal using the **SST** and a hammer.



ADA2220E002



B3E0110W017

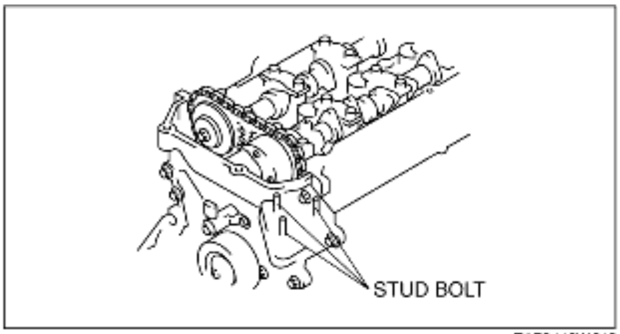
Compression amount

From the engine front cover

0-0.5 mm {0-0.019 in)

No.3 Engine Mount Installation Note

1. Tighten the No.3 engine mount installation stud bolts.



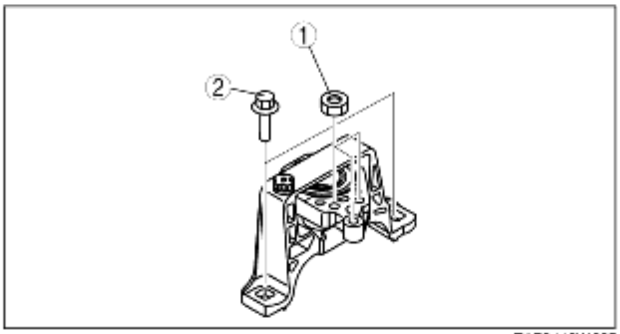
B3E0110W012

Tightening torque

7-13 N·m {0.8-1.3 kgf·m, 5.2-9.5 ft·lbf}

2. Install the No.3 engine mount and temporarily tighten the installation bolts and nuts.

3. Tighten the installation bolts in the order shown in the figure.



B3E0110W005

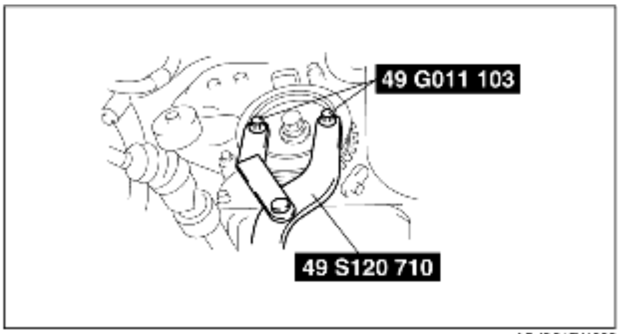
Tightening torque

1 (nuts) : 44-61 N·m {4.5-6.2 kgf·m, 33-44 ft·lbf}

2 (bolts) : 74.5-104.9 N·m {7.60-10.70 kgf·m, 55.0-77.3 ft·lbf}

Crankshaft Pulley Installation Bolt Installation Note

1. Fix the crankshaft pulley using the **SSTs**.



ADJ2215W002

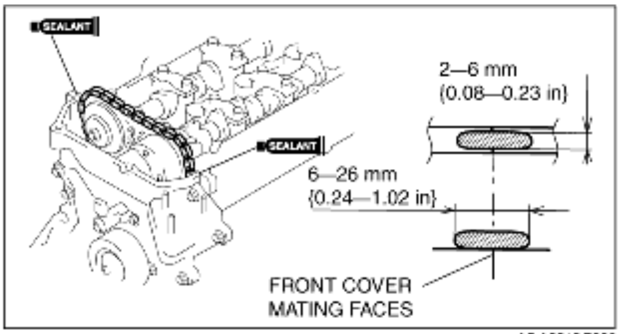
2. Tighten the crankshaft pulley installation bolt.

Tightening torque

157-167 N·m {16.1-17.0 kgf·m, 116-123 ft·lbf}

Cylinder Head Cover Installation Note

1. Apply silicon sealant as shown in the figure.



ADA2212E006

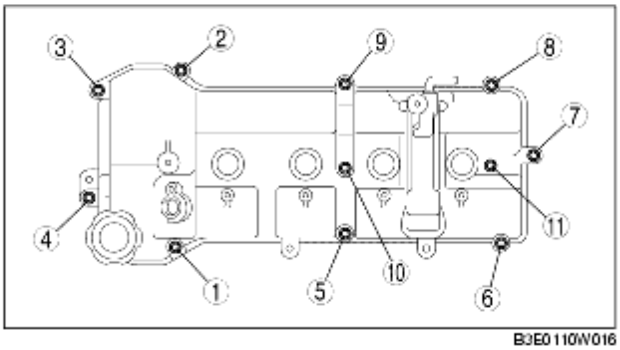
Thickness

2-6 mm {0.08-0.23 in}

Length

6-26 mm {0.24-1.02 in}

2. Tighten the cylinder head cover installation bolts in the order shown in the figure.



Tightening torque

6.9-10.8 N·m {70-110 kgf·cm, 61.1-95.5 in·lbf}

CYLINDER HEAD GASKET REPLACEMENT [Z6]

B3E011010271W01

Warning

• Fuel vapor is hazardous. It can very 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 the "Fuel Line Safety Procedure". (See BEFORE SERVICE PRECAUTION.)

1. Remove the following parts:

(1) Timing chain. (See TIMING CHAIN REMOVAL/INSTALLATION [Z6].)

(2) EGR pipe and EGR valve bracket (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].) (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].) (See EGR VALVE REMOVAL/INSTALLATION [Z6].)

(3) Front HO2S (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)

(4) Accelerator cable and bracket

(5) Fuel hose and fuel injector wiring harness (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.) (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)

(6) Air hose, throttle body and intake manifold (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

2. Disconnect the following parts:

(1) Rear HO2S connector

(2) Main silencer (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)

(3) WU-TWC (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)

(4) Upper radiator hose

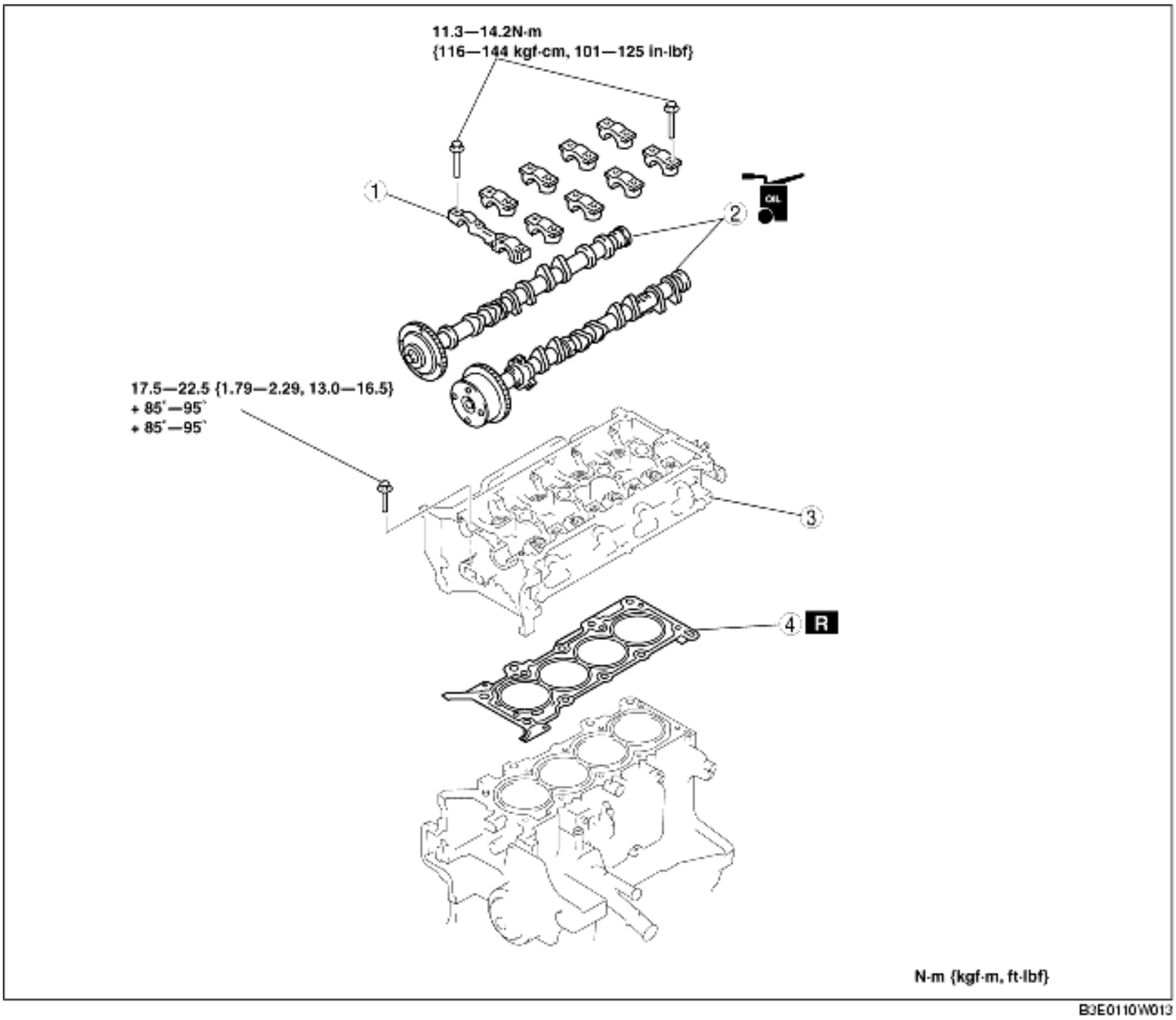
(5) Heater hose

3. Remove in the order indicated in the table.

4. Install in the reverse order of removal.

5. Inspect the compression. (See COMPRESSION INSPECTION [Z6].)

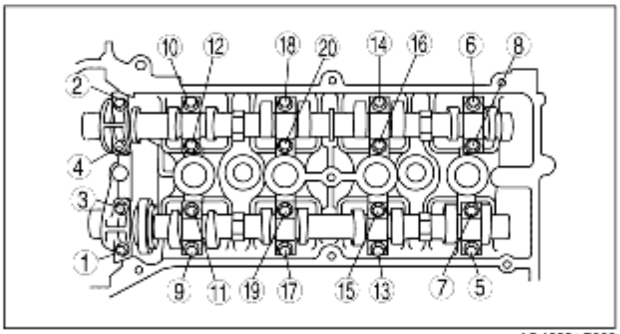
6.



1	Camshaft cap (See Camshaft Cap Removal Note) (See Camshaft Cap Installation Note)
2	Camshaft
3	Cylinder head (See Cylinder Head Removal Note) (See Cylinder Head Installation Note)
4	Cylinder head gasket

Camshaft Cap Removal Note

1. Loosen the camshaft cap installation bolts in 2-3 passes in the order shown in the figure.

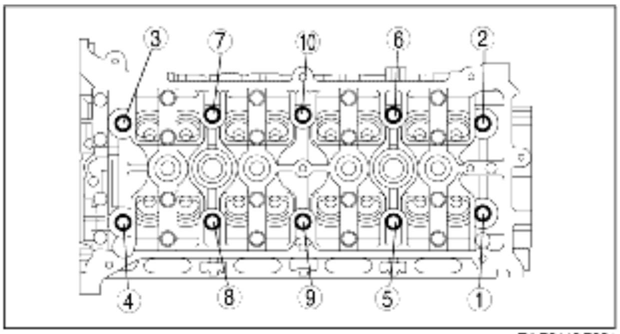


ADJ2224 E008

2. Remove the camshaft caps.

Cylinder Head Removal Note

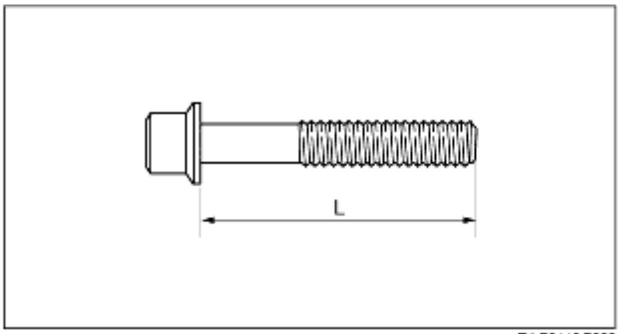
1. Loosen the cylinder head installation bolts in 2-3 passes in the order shown in the figure, and remove them.



B3E0110E024

Cylinder Head Installation Note

1. Measure the length of each cylinder head installation bolt.



B3E0110E098

- If it exceeds the maximum specification, replace the cylinder head installation bolt.

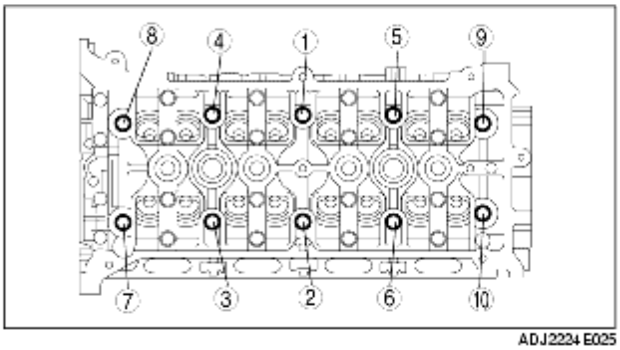
Standard

L: 128.9-129.5 mm {5.075-5.098 in}

Maximum

L:130.2 mm {5.125 in}

2. Tighten the cylinder head installation bolts in three steps in the order shown in the figure.



1. Tightening torque: 17.5-22.5 N·m {1.79-2.29 kgf·m, 13.0-16.5 ft·lbf}

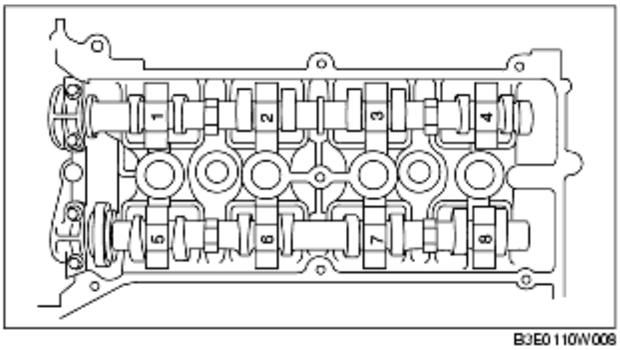
2. Tightening angle: 85°-95°

3. Tightening angle: 85°-95°

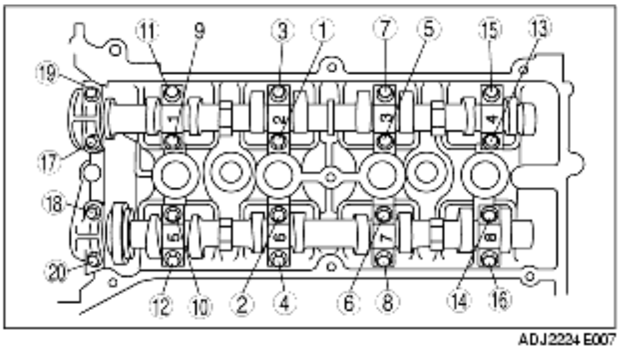
Camshaft Cap Installation Note

1. Align the No.1 cylinder camshaft position to the TDC position, and install the camshaft.

2. Install the camshaft caps in the positions numbered as shown in the figure, and then temporarily tighten the No.2 and No.7 camshaft cap installation bolts.



3. Tighten the camshaft cap installation bolts in 2-3 passes uniformly in the order shown in the figure.



Tightening torque

11.3-14.2 N·m {116-144 kgf·cm, 101-125 in·lbf}

FRONT OIL SEAL REPLACEMENT [Z6]

B3E011010602W01

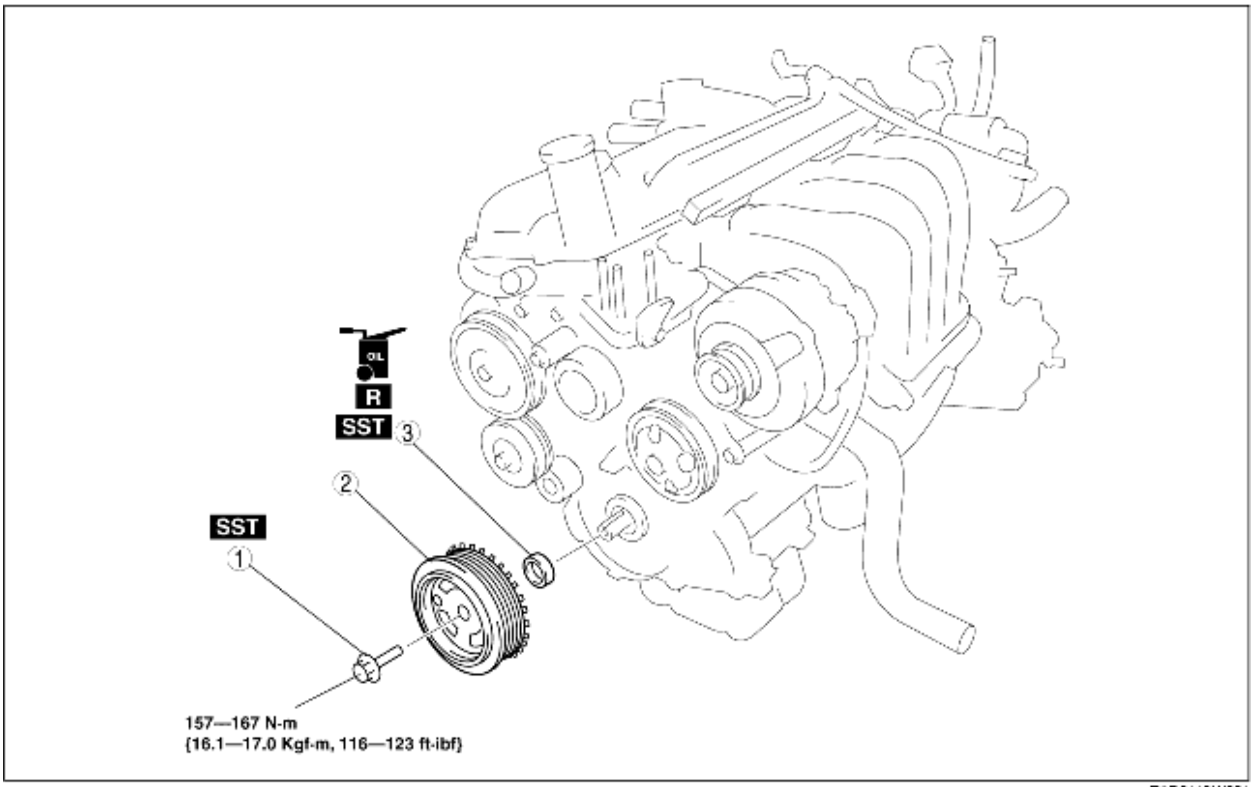
1. Remove the battery cover.

2. Disconnect the negative battery cable.

3. Remove the drive belt. (See DRIVE BELT REPLACEMENT [Z6].)

4. Remove in the order indicated in the table.

5. Install in the reverse order of removal.



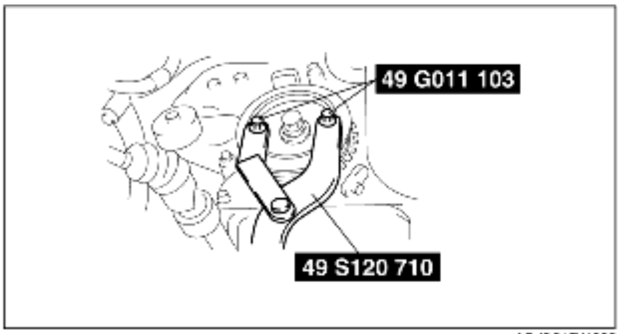
B3E0110W021

1	Crankshaft pulley installation bolt (See Crankshaft Pulley Installation Bolt Removal Note) (See Crankshaft Pulley Installation Bolt Installation Note)
2	Crankshaft pulley
3	Front oil seal (See Front Oil Seal Removal Note) (See Front Oil Seal Installation Note)

Crankshaft Pulley Installation Bolt Removal Note

1. Fix the crankshaft pulley using the **SSTs**.

2. Remove the crankshaft pulley installation bolt.

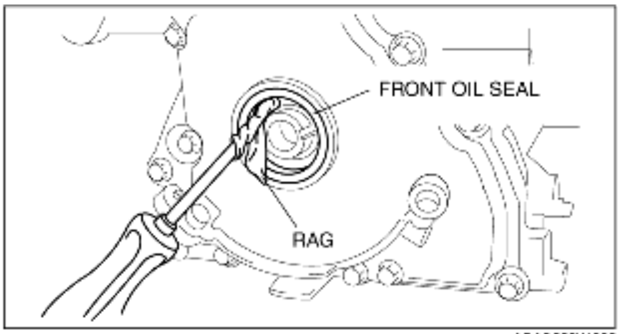


ADJ2215W002

Front Oil Seal Removal Note

1. Remove the oil seal lip using a cutting knife.

2. Remove the oil seal using a flathead screwdriver with the tip protected by a rag to prevent crankshaft oil seal damage.



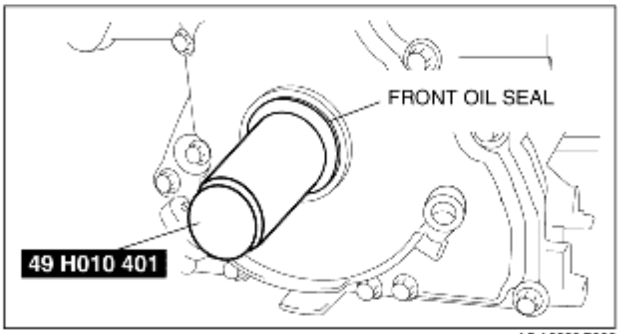
ADA2220W002

Front Oil Seal Installation Note

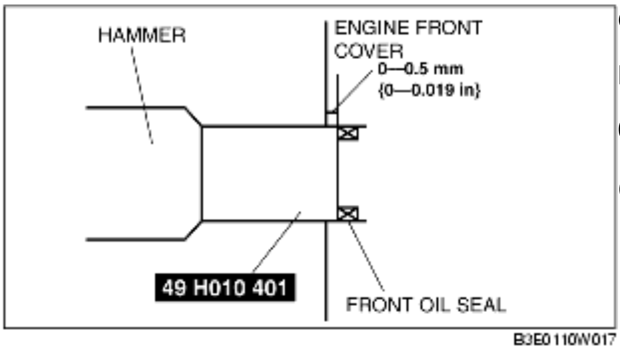
1. Apply clean engine oil to the new front oil seal.

2. Insert the front oil seal into the engine front cover by hand.

3. Tap the front oil seal in using the **SST** and a hammer.



ADA2220E002



Compression amount

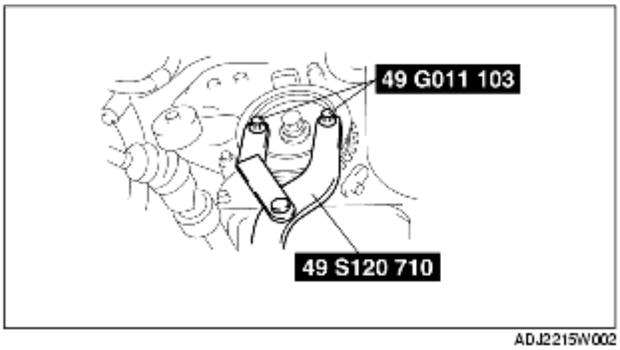
From the engine front cover

0-0.5 mm {0-0.019 in}

Crankshaft Pulley Installation Bolt Installation Note

1. Fix the crankshaft pulley using the **SSTs**.

2. Tighten the crankshaft pulley installation bolt.



Tightening torque

157-167 N·m {16.1-17.0 kgf·m, 116-123 ft·lbf}

REAR OIL SEAL REPLACEMENT [Z6]

B3E011011399W01

1. Remove the following parts:

ATX

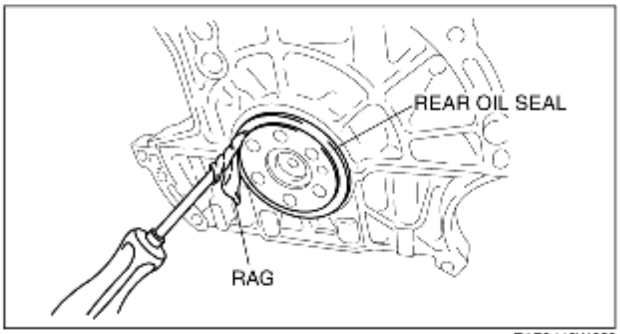
1. Automatic transaxle (See AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION.)
2. Drive plate (See DRIVE PLATE REMOVAL/INSTALLATION.)

MTX

1. Clutch release cylinder (See CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION.)
2. Manual transaxle (See MANUAL TRANSAXLE REMOVAL/INSTALLATION [F35M-R].)
3. Flywheel (See CLUTCH UNIT REMOVAL/INSTALLATION.)

2. Remove the oil seal lip using a cutting knife.

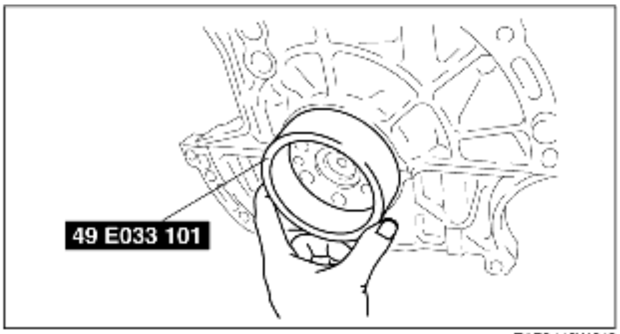
3. Remove the oil seal using a flathead screwdriver with the tip protected by a rag to prevent crankshaft oil seal damage.

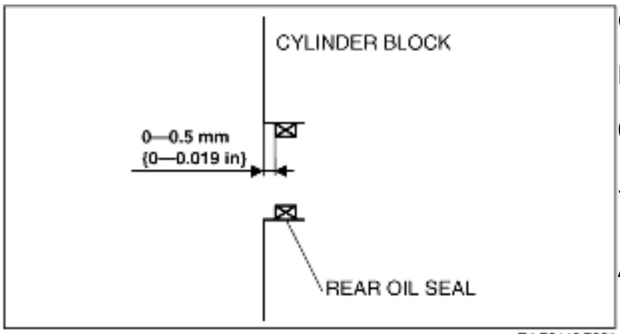


4. Apply clean engine oil to a new rear oil seal.

5. Insert the oil seal into the cylinder block by hand.

6. Install the rear oil seal using the **SST**.





Compression amount

From the cylinder block side end

0-0.5 mm {0-0.019 in}

7. Install the following parts:

ATX

1. Drive plate (See DRIVE PLATE REMOVAL/INSTALLATION.)
2. Automatic transaxle (See AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION.)

MTX

1. Flywheel (See CLUTCH UNIT REMOVAL/INSTALLATION.)
2. Manual transaxle (See MANUAL TRANSAXLE REMOVAL/INSTALLATION [F35M-R].)
3. Clutch release cylinder (See CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION.)

ENGINE REMOVAL/INSTALLATION [Z6]

B3E011001001W02

Warning

• Fuel vapor is hazardous. It can very 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 the "Fuel Line Safety Procedure". (See BEFORE SERVICE PRECAUTION.)

Note

• Perform the engine and transaxle component removal/installation from below the vehicle.

1. Remove the following parts:

   (1) Battery cover, battery box, battery clamp, battery and battery tray (See BATTERY REMOVAL/INSTALLATION [Z6].)

   (2) Front wheels and tires (See GENERAL PROCEDURES (SUSPENSION).)

   (3) Under cover and splash shields

   (4) Flesh-air duct, air hose and air cleaner component (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

   (5) Accelerator cable and bracket

   (6) Drive belt (See DRIVE BELT REPLACEMENT [Z6].)

2. Drain the following fluids:

   (1) ATF (ATX) or transaxle oil (MTX) (See AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT.) (See TRANSAXLE OIL REPLACEMENT [F35M-R].)

   (2) Engine coolant (See ENGINE COOLANT REPLACEMENT.)

   (3) P/S fluid (See AIR BLEEDING.)

3. Disconnect the purge solenoid ventilation hose.

4. Disconnect the P/S return hose from the P/S oil pump side.

5. Disconnect the P/S pressure pipe from the steering gear side.

6. Disconnect the P/S return hose from the P/S reserve tank side.

7. Remove the following parts:

   (1) Member (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)

   (2) Front crossmember, front stabilizer, lower arm, steering gear and No.1 engine mount rubber component (See STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.)

   (3) Drive shaft (See DRIVE SHAFT REMOVAL/INSTALLATION.)

   (4) P/S reserve tank with the hose still connected

   (5) Coolant reserve tank with the hose still connected

   (6) Cooling fan component (See RADIATOR REMOVAL/INSTALLATION.)

   (7) ATF hose, selector cable and wiring harness (ATX) (See AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION.)

(8) Select cable and shift cable (MTX) (See MANUAL TRANSAXLE REMOVAL/INSTALLATION [F35M-R].)

(9) Clutch release cylinder with the pipe still connected (MTX) (See CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION.)

(10) Earth (No.3 engine mount)

(11) The A/C compressor with the pipes still connected.

Note

• Secure the A/C compressor using wire or rope so that it is out of the way.

8. Disconnect the following parts:

(1) Brake vacuum hose

(2) Fuel hose (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)

(3) Heater hose

(4) Upper and lower radiator hose

(5) Main silencer (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)

9. Remove in the order indicated in the table.

10. Install in the reverse order of removal.

Caution

• Do not tighten the No.1 engine mount rubber installation bolt before installing the No.3 engine mount. (See No.3 Engine Mount Installation Note.)

11. Inspect the following and adjust them if necessary.

• Front wheel alignment (See FRONT WHEEL ALIGNMENT.)

• Pulley and belt for runout and contact.

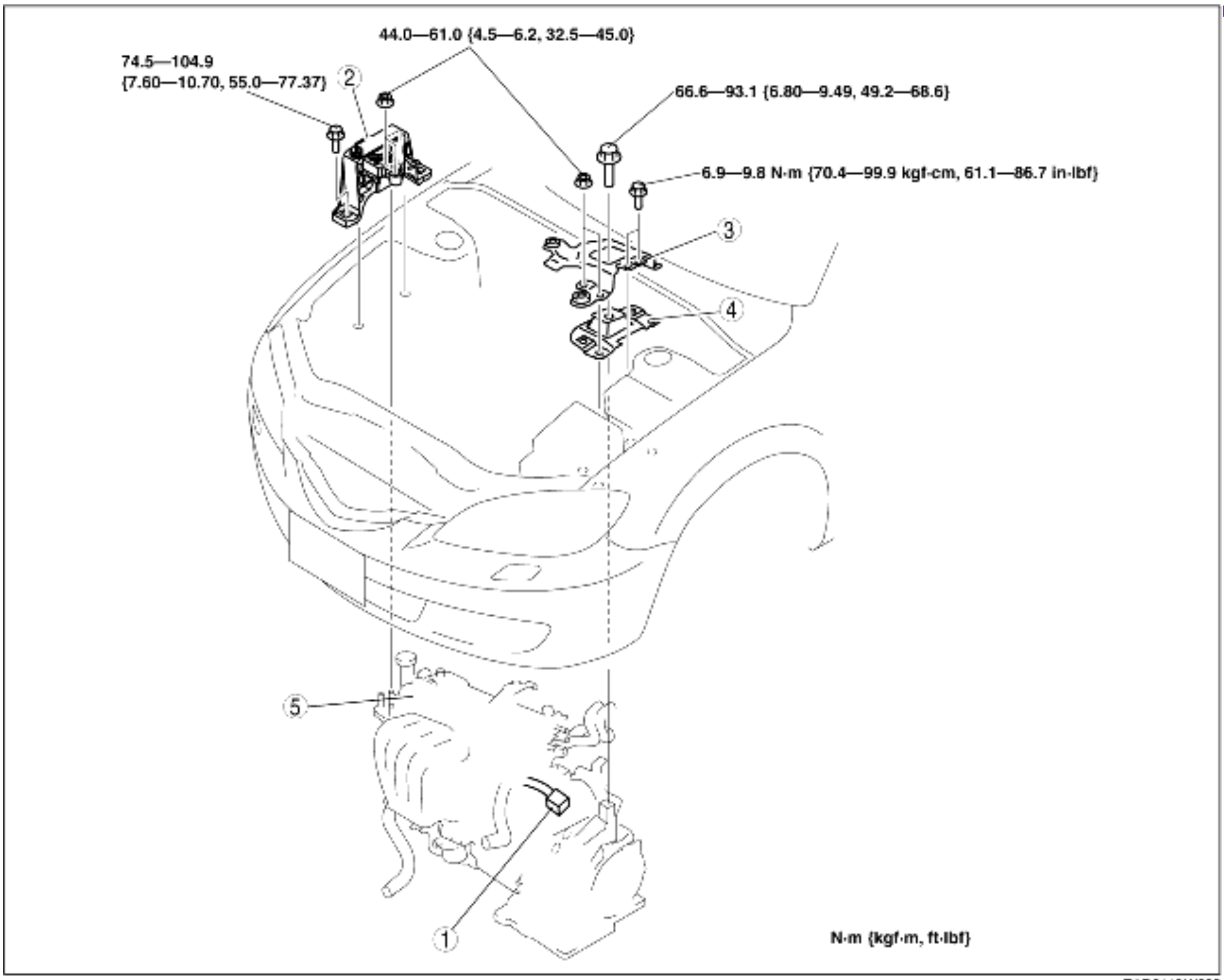
• Leakage of engine oil, engine coolant, ATF, MT oil, and fuel.

• Ignition timing and idle speed. Verify the amount of CO, HC. (See ENGINE TUNE-UP [Z6].)

• Engine-driven accessories operation

Note

• If the engine is overhauled and installed to the vehicle, perform the road test and verify that there is no abnormality.

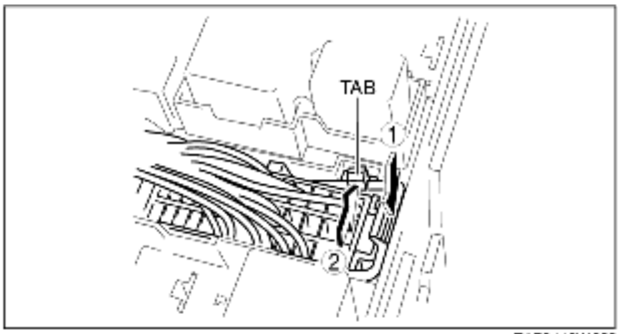


B3E0110W002

1	Main fuse block connector (See Main Fuse Block Connector Removal Note.)
2	No.3 Engine mount (See No.3 Engine Mount, No.4 Engine Mount Rubber Removal Note.) (See No.3 Engine Mount Installation Note.)
3	Battery tray bracket
4	No.4 Engine mount rubber (See No.3 Engine Mount, No.4 Engine Mount Rubber Removal Note.) (See No.4 Engine Mount Rubber Installation Note.)
5	Engine, transaxle

Main Fuse Block Connector Removal Note

1. Release the tab in the order shown in the figure.

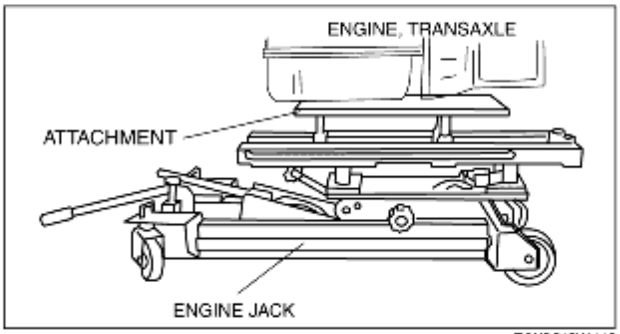


B3E0110W022

2. Pull the lock lever up and remove the connector.

No.3 Engine Mount, No.4 Engine Mount Rubber Removal Note

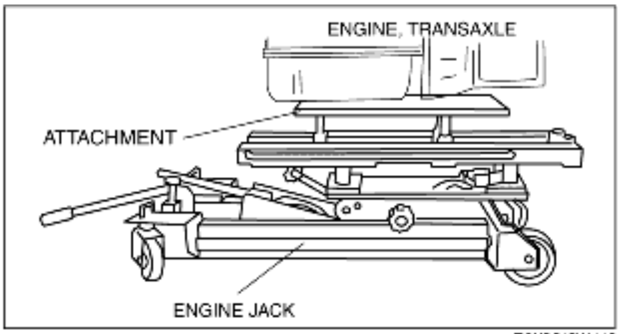
1. Secure the engine and the transaxle using an engine jack and attachment.



B6U2218W110

No.4 Engine Mount Rubber Installation Note

1. Secure the engine and the transaxle using an engine jack and attachment.



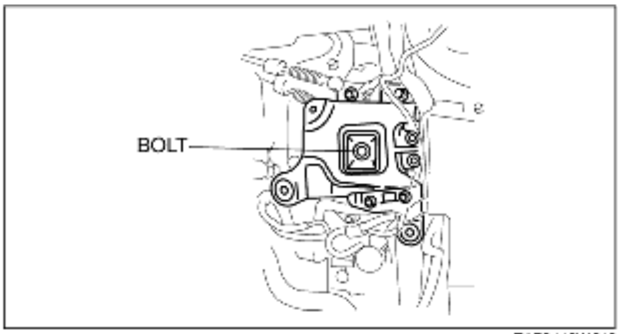
B6U2218W110

2. Install the No.1 engine mount rubber and No.4 engine mount rubber.

Note

• Do not tighten the bolt and nut for the No.1 engine mount rubber and No.4 engine mount rubber during this step.

3. Tighten the No.4 engine mount rubber installation bolt shown in the figure.

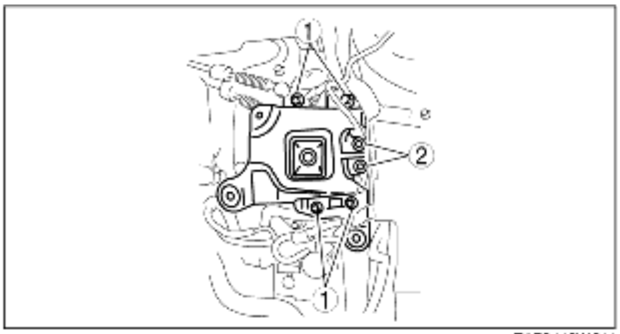


B3E0110W010

Tightening torque

66.6-93.1 N·m {6.80-9.49 kgf·m, 49.2-68.6 ft·lbf}

4. Tighten the No.4 engine mount rubber and battery tray bracket installation bolt and nut in the order shown in the figure.



B3E0110W011

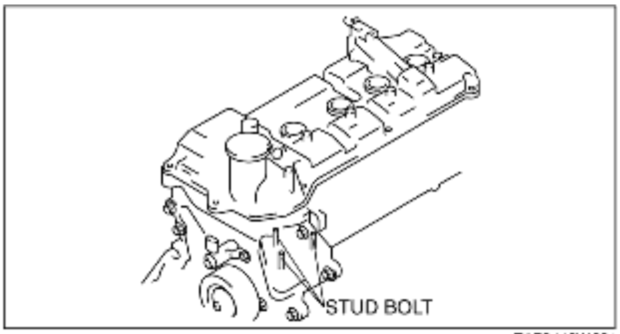
Tightening torque

1: 44-61 N·m {4.5-6.2 kgf·m, 33-44 ft·lbf}

2: 6.9-9.8 N·m {70.4-99.9 kgf·cm, 61.1-86.7 in·lbf}

No.3 Engine Mount Installation Note

1. Tighten the No.3 engine mount installation stud bolts.



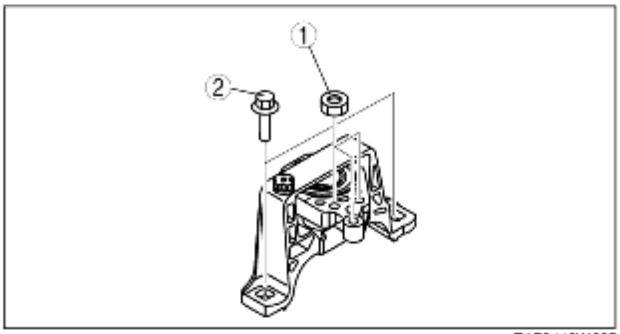
B3E0110W004

Tightening torque

7-13 N·m {0.8-1.3 kgf·m, 5.2-9.5 ft·lbf}

2. Install the No.3 engine mount, and then temporarily tighten the installation bolts and nuts.

3. Tighten the installation bolts in the order shown in the figure.



B3E0110W005

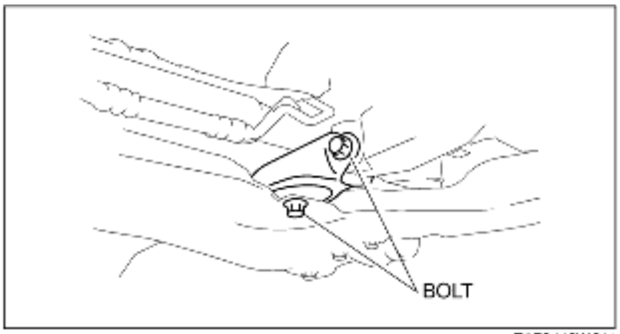
Tightening torque

1 (nuts) : 44-61 N·m {4.5-6.2 kgf·m, 33-44 ft·lbf}

2 (bolts) : 74.5-104.9 N·m {7.60-10.70 kgf·m, 55.0-77.3 ft·lbf}

4. Remove the engine jack and attachment.

5. Tighten the No.1 engine mount rubber installation bolts.



B3E0110W014

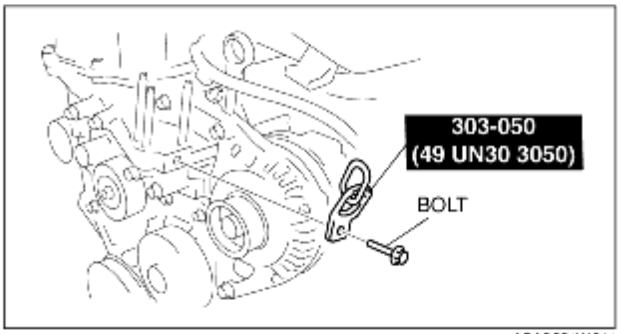
Tightening torque

93.1-116.6 N·m {9.50-11.88 kgf·m, 68.7-85.9 ft·lbf}

ENGINE DISASSEMBLY/ASSEMBLY [Z6]

B3E011001001W03

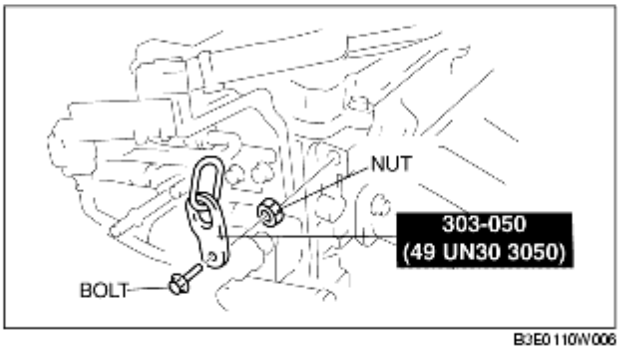
1. Using the bolts **part number 99794 1025** or **M10×1.25, length 25 mm {0.98 in}** to install the **SST** to the position shown in the figure, hang the engine and transaxle, and then take it down from the engine jack.



ADA2224W014

Caution

• When attaching the SST in the engine rear side, install a suitable nut between the engine and the SST.



Tightening torque

38-51 N·m {3.9-5.2 kgf·m, 29-37 ft·lbf}

2. Remove following parts:

(1) Starter (See STARTER REMOVAL/INSTALLATION [Z6].)

(2) Joint shaft (See JOINT SHAFT REMOVAL/INSTALLATION.)

(3) Transaxle (See AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION.) (See MANUAL TRANSAXLE REMOVAL/INSTALLATION [F35M-R].)

(4) EGR pipe and EGR valve bracket (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].) (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].) (See EGR VALVE REMOVAL/INSTALLATION [Z6].)

(5) Exhaust manifold (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)

(6) Generator (See GENERATOR REMOVAL/INSTALLATION [Z6].)

(7) P/S oil pump (See POWER STEERING OIL PUMP (Z6) REMOVAL/INSTALLATION.)

(8) Fuel hose, fuel distributor and fuel injector (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)

(9) Intake manifold (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

(10) Ignition coils (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

(11) CKP sensor (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6].)

3. Install in the reverse order of removal.

VARIABLE VALVE TIMING ACTUATOR INSPECTION [Z6]

B3E011000142W01

Caution

• The variable valve timing actuator cannot be disassembled since it is a precision unit.

1. Remove the battery cover.

2. Disconnect the negative battery cable.

3. Remove the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

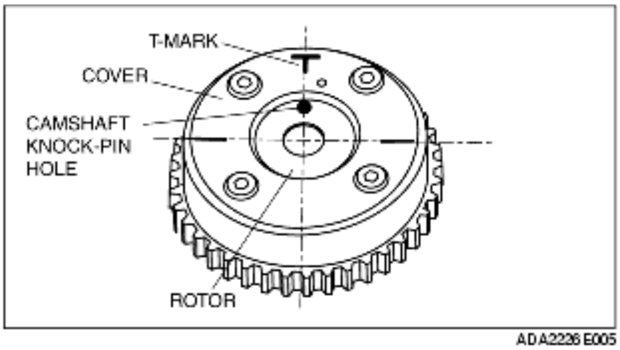
4. Remove the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

5. Disconnect the ventilation hose.

6. Remove the cylinder head cover.

7. Remove the under cover and splash shield (RH).

8. Verify that the camshaft knock pin hole of the variable valve timing actuator and the T- mark of the cover are aligned and fixed as shown in the figure.



• If the camshaft knock pin hole and the T-mark of the cover do not align, rotate the crankshaft two times in the direction the engine rotates, and then verify that they are aligned.

- If they do not align, replace the variable valve timing actuator.

• If under any condition the variable valve timing actuator makes a hitting noise directly after the camshaft exceeds maximum lift while rotating the crankshaft two times in the direction of engine rotation, replace the variable valve timing actuator as it has not been fixed.

9. Install the under cover splash shield (RH). (See DRIVE BELT REPLACEMENT [Z6].)

10. Install the cylinder head cover. (See Cylinder Head Cover Installation Note.)

11. Install the ventilation hose.

12. Install the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

13. Install the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [Z6]

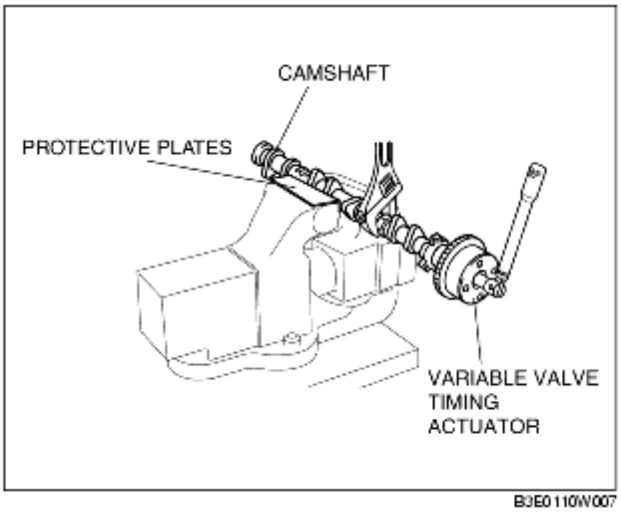
B3E011000142W02

Caution

• Remove the variable valve timing actuator as a single unit with the camshaft sprocket.

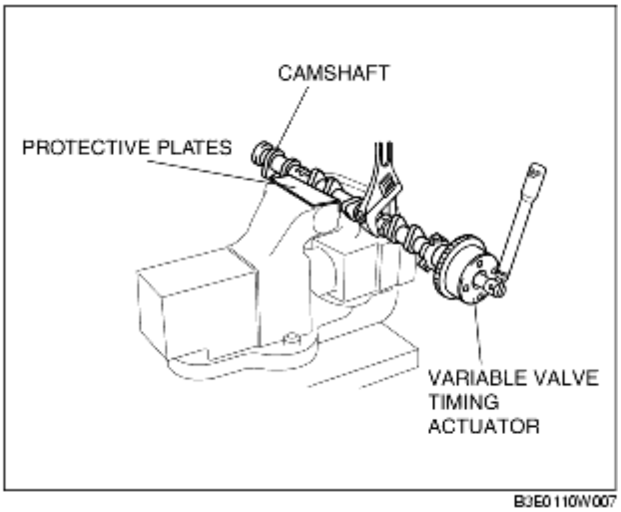
1. Remove the camshaft component according to steps 1 to 17 in the valve clearance adjustment. (See VALVE CLEARANCE ADJUSTMENT [Z6].)

2. Secure the camshaft in a vise and fix the camshaft using a wrench on the cast hexagon as shown in the figure.



3. Loosen the variable valve timing actuator installation bolt, and then remove the variable valve timing actuator.

4. Fix the camshaft using a wrench on the cast hexagon as shown in the figure.



5. Tighten the variable valve timing actuator installation bolt.

Tightening torque

49.6-60.8 N·m {5.10-6.19 kgf·m, 36.6-44.8 ft·lbf}

6. Install the camshaft component according to steps 19 to 35 in the valve clearance adjustment. (See VALVE CLEARANCE ADJUSTMENT [Z6].)

OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6]

B3E011014420W01

1. Remove the battery cover.

2. Disconnect the negative battery cable.

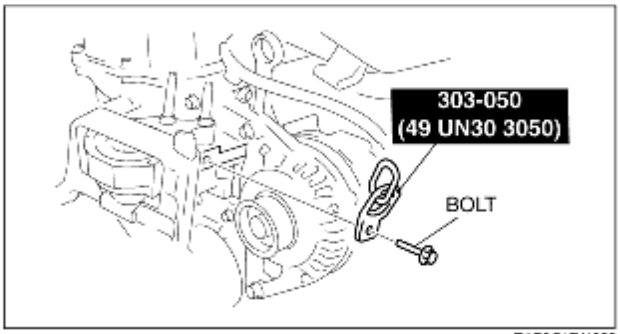
3. Remove the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

4. Remove the accelerator cable and bracket.

5. Remove the P/S reserve tank and coolant reserve tank with the hose still connected.

6. Remove the ground. (No.3 engine mount)

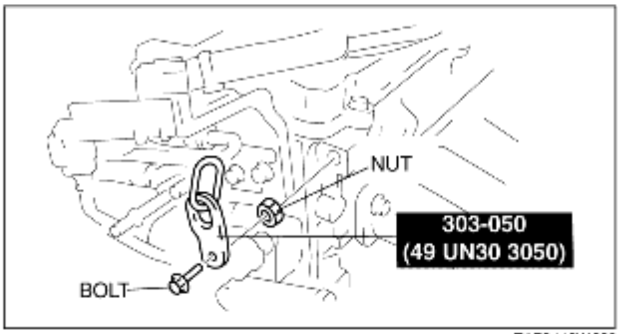
7. Using the bolts **part number 99794 1025** or **M10×1.25, length 25 mm {0.98 in}** to install the **SST** to the position shown in the figure.



B3E0515W022

Caution

• When attaching the SST in the engine rear side, install a suitable nut between the engine and the SST.

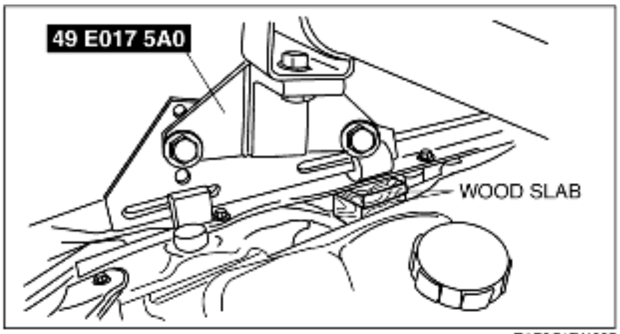


B3E0110W006

Tightening torque

38-51 N·m {3.9-5.2 kgf·m, 29-37 ft·lbf}

8. Install suitable wood slabs between the front fender panel and apron reinforcement upper.



B3E0515W005

Note

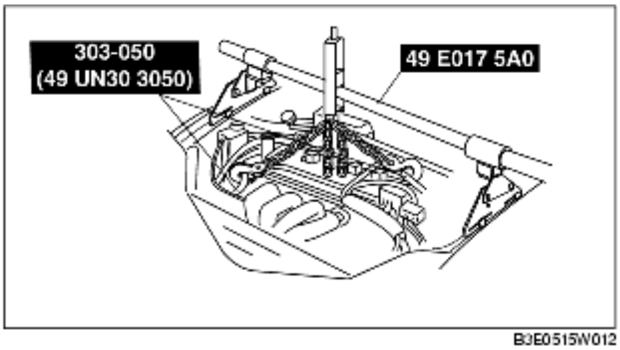
• Wood slab height

4SD: approx. 35 mm {1.4 in}

5HB: approx. 60 mm {2.4 in}

• Cut the wood slab into two pieces and insert.

9. Support the engine using the **SST**.



Note

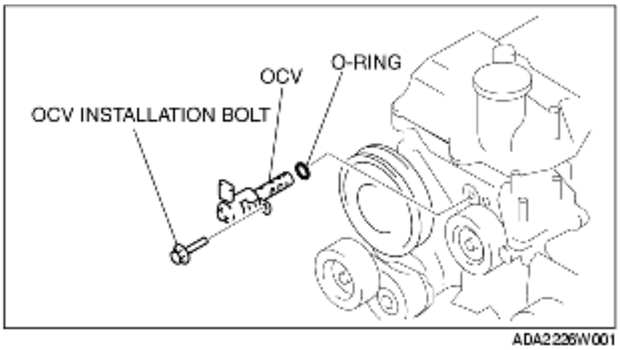
• A hoist or small crane can be used in place of the **SST** (49E 017 5A0).

10. Remove the No.3 engine mount.

11. Disconnect the OCV connector.

12. Remove the OCV installation bolt.

13. Remove the OCV.



14. Install the new O-ring.

15. Install the OCV.

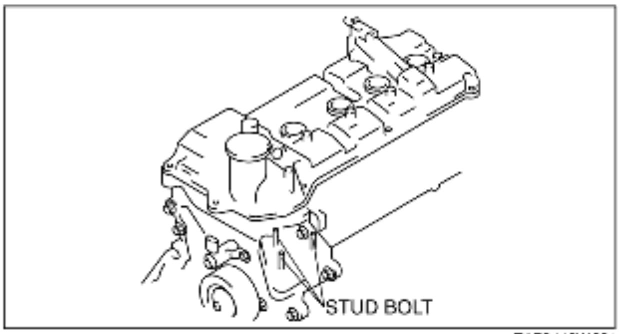
16. Tighten the OCV installation bolt.

Tightening torque

7.8-10.8 N·m {80-110 kgf·cm, 69.1-95.5 in·lbf}

17. Connect the OCV connector.

18. Tighten the No.3 engine mount installation stud bolts.



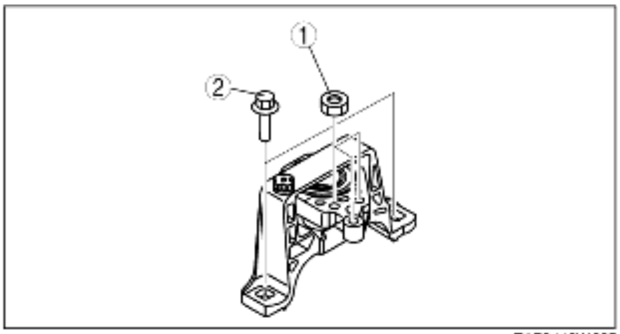
B3E0110W004

Tighting torque

7-13 N·m {0.8-1.3 kgf·m, 5.2-9.5 ft·lbf}

19. Install the No.3 engine mount, and then temporarily tighten the installation bolts and nuts.

20. Tighten the installation bolts and nuts in the order shown in the figure.



B3E0110W005

Tightening torque

1 (nuts) : 44-61 N·m {4.5-6.2 kgf·m, 33-44 ft·lbf}

2 (bolts) : 74.5-104.9 N·m {7.60-10.70 kgf·m, 55.0-77.3 ft·lbf}

21. Install the ground. (No.3 engine mount)

22. Install the P/S reserve tank and coolant reserve tank with the hose still connected.

23. Install the accelerator cable and bracket.

24. Install the air cleaner component. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

25. Connect the negative battery cable.

26. Install the battery cover.

OIL CONTROL VALVE (OCV) INSPECTION [Z6]

B3E011014420W02

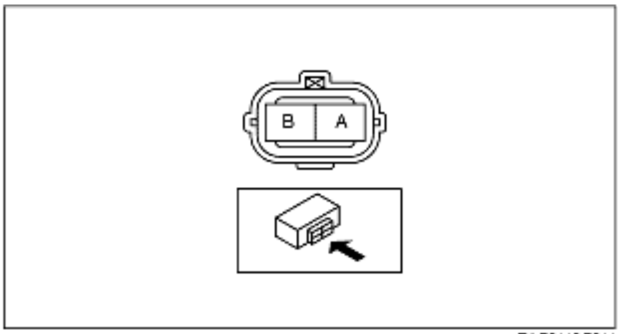
Coil resistance inspection

1. Remove the battery cover.

2. Disconnect the negative battery cable.

3. Disconnect the OCV connector.

4. Measure the coil resistance between terminals A and B using a tester.



B3E0110E011

• If not within the specification, replace the OCV.

Standard

6.9-7.9 ohms [20°C {68°F}]

5. Connect the OCV connector.

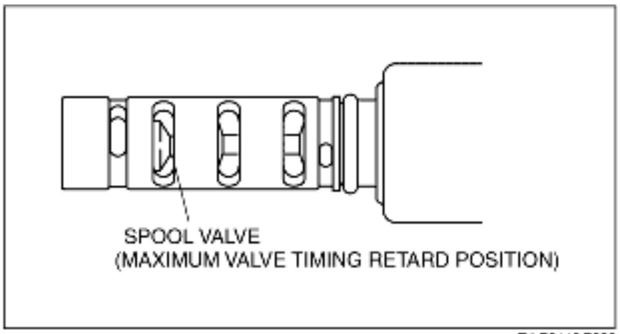
Spool Valve Operation Inspection

1. Remove the battery cover.

2. Disconnect the negative battery cable.

3. Remove the OCV. (See OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6].)

4. Verify that the spool valve inside the OCV is at the maximum valve timing retard position as shown in the figure.

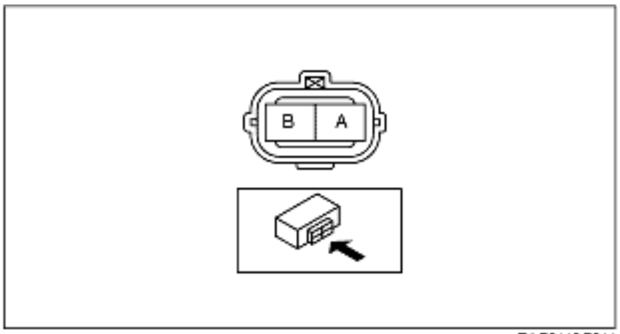


B3E0110E090

• If it cannot be verified, replace the OCV.

5. Verify that the battery is fully charged.

6. Apply battery positive voltage between oil control valve terminals A and B, and verify that the spool valve operates and moves to the maximum valve timing advance position.



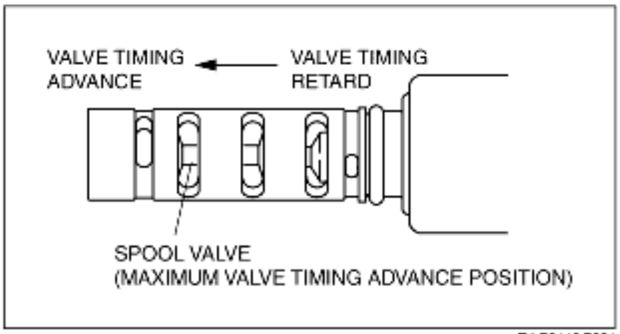
B3E0110E011

• If there is any malfunction, replace the OCV.

Note

• When applying battery positive voltage between the oil control valve terminals, the connection of the negative and positive cable can be either the A or B terminal.

7. Stop applying battery positive voltage and verify that the spool valve returns to the maximum valve timing retard position.



B3E0110E091

• If it cannot be verified, replace the OCV.

8. Install the OCV. (See OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [Z6].)

ENGINE TUNE-UP [Z6]

B3E011002000W01

Engine Tune-up Preparation

1. Warm up the engine to normal operating temperature.

(1) Increase the engine speed to **2,500-3,000 rpm** until the cooling fan starts running.

(2) When the cooling fan starts running, release the accelerator pedal and wait until the cooling fan stops running.

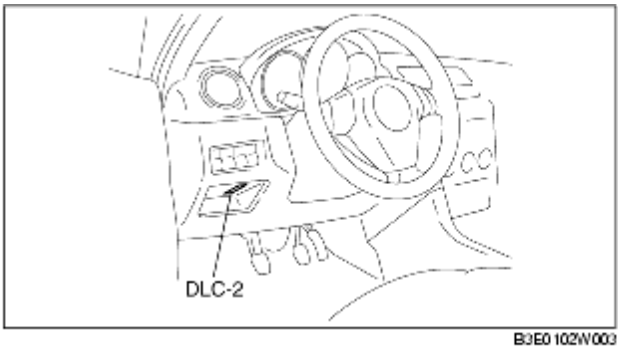
2. Verify the following:

• ATX: Selector lever is in P or N position.

• MTX: Shift lever is in neutral position.

3. Turn off all electrical loads.

4. Connect the WDS or equivalent to the DLC-2.



5. Turn the test mode on using a simulation function.

6. Verify that the idle speed is within the specification using the RPM DATA MONITOR function.

- If not within the specification, adjust the idle speed.

Idle speed

ATX: 700-800 rpm

MTX: 640-740 rpm

Ignition Timing Inspection

Note

- The ignition timing cannot be adjusted.
- The WDS or equivalent is required to verify the ignition timing.

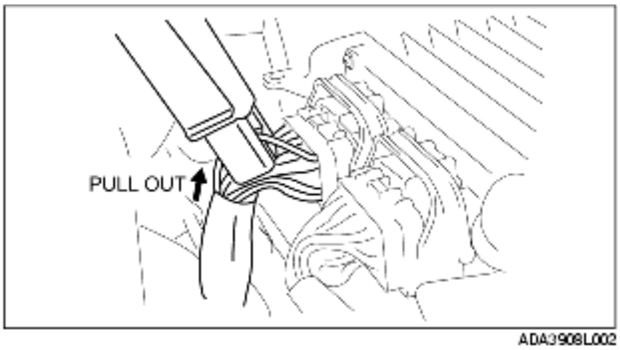
1. Complete the engine tune-up preparation.

Note

- Use a timing light that can detect the primary ignition signal.

2. Remove the PCM connector cover.

3. By referring to the following procedure, connect the timing light to the PCM terminal 2A wire.



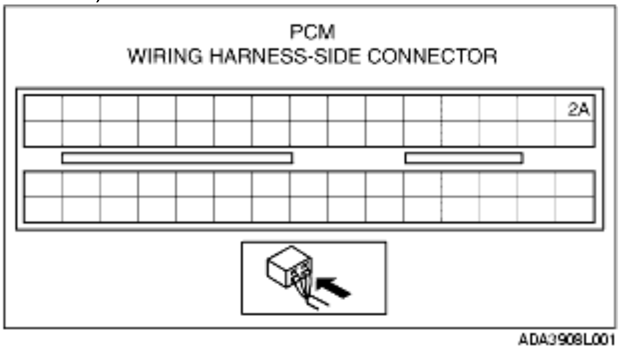
Caution

- To prevent poor contact at the connector terminal, be careful not to pull the wire on the connector side.

Note

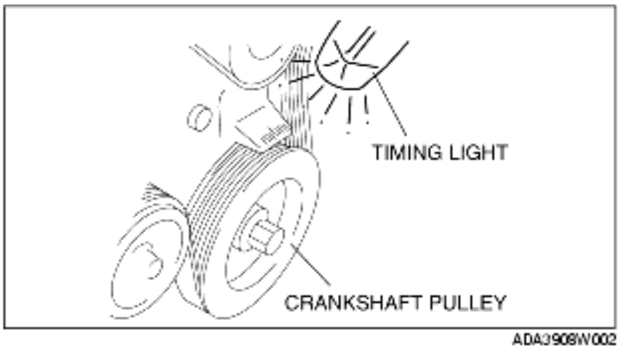
• Pull out the wire **20-30 mm** so that the pickup clip of the timing light can be connected. After the ignition timing inspection, bundle the pulled out wire back together with other wires using tape.

(1) Pull the PCM terminal 2A wire out of the bundle (pull the bundled side only, not the connector side).



(2) Connect the pickup clip of the timing light to the PCM terminal 2A wire.

4. Verify that the crankshaft pulley alignment mark (white) is within the specification.



Ignition timing (Test mode on)

BTDC 9-11°

5. Turn the test mode off using a simulation test.

6. Using the timing light, verify again that the crankshaft pulley alignment mark (white) is within the specification.

• If not within the specification, inspect the following parts:

- CMP sensor

- CKP sensor

- TP sensor

- ECT sensor

- TR switch (ATX)

- Neutral/clutch switch (MTX)

Ignition timing (Test mode off)

BTDC 6-18°

Idle Speed Inspection

Caution

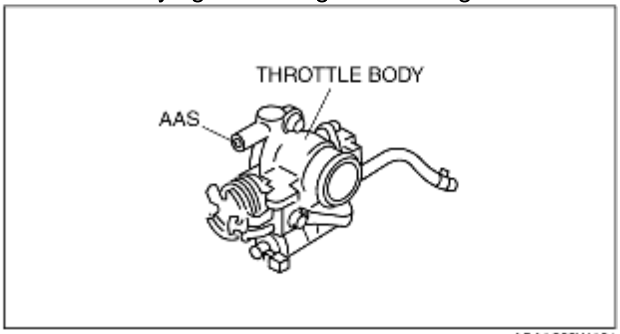
• Changing the TAS while attempting to adjust the idle speed could cause an engine malfunction. Do not change the TAS adjustment position.

1. Complete the engine tune-up preparation.

2. Verify that the ignition timing is within the specification. (See Ignition Timing Inspection.)

3. Verify that the idle speed is within the specification using the RPM DATA MONITOR function.

• If not within the specification, adjust the idle speed to within the specification by turning the AAS after verifying that the ignition timing is within the specification.



ADA3908W301

Idle speed

ATX: 700-800 rpm

MTX: 640-740 rpm

4. Verify that the idle speed is within the specification when each load is applied. (The speed decrease just after the load is applied is not considered.)

• If not within the specification with any of the specified loads applied, inspect the IAC valve.

• If not within the specification when a specified load is applied, inspect the related input parts, wiring harnesses, and connectors.

Standard

Load status		Idle speed (rpm) N, D position (ATX), Neutral position (MTX)		
		ATX		MTX
		N range	D range	
No load		700-800	650-750	640-740
Electrical loads on[*1]	34-42 A	700-800	650-750	650-750
	Above 42 A	700-800	670-770	700-800
A/C on	Low load[*2]	700-800	650-750	

	High load[*3]	700-800
P/S on		700-800

*1 :

Generator generating current value

*2 :

Refrigerant pressure switch (middle pressure switch) is off.

*3 :

Refrigerant pressure switch (middle pressure switch) is on.

Idle Mixture Inspection

1. Warm up the engine to normal operating temperature.

    (1) Increase the engine speed to **2,500-3,000 rpm** until the cooling fan starts running.

    (2) When the cooling fan starts running, release the accelerator pedal and wait until the cooling fan stops running.

2. Verify that the idle speed and ignition timing are within the specification. (See Idle Speed Inspection.) (See Ignition Timing Inspection.)

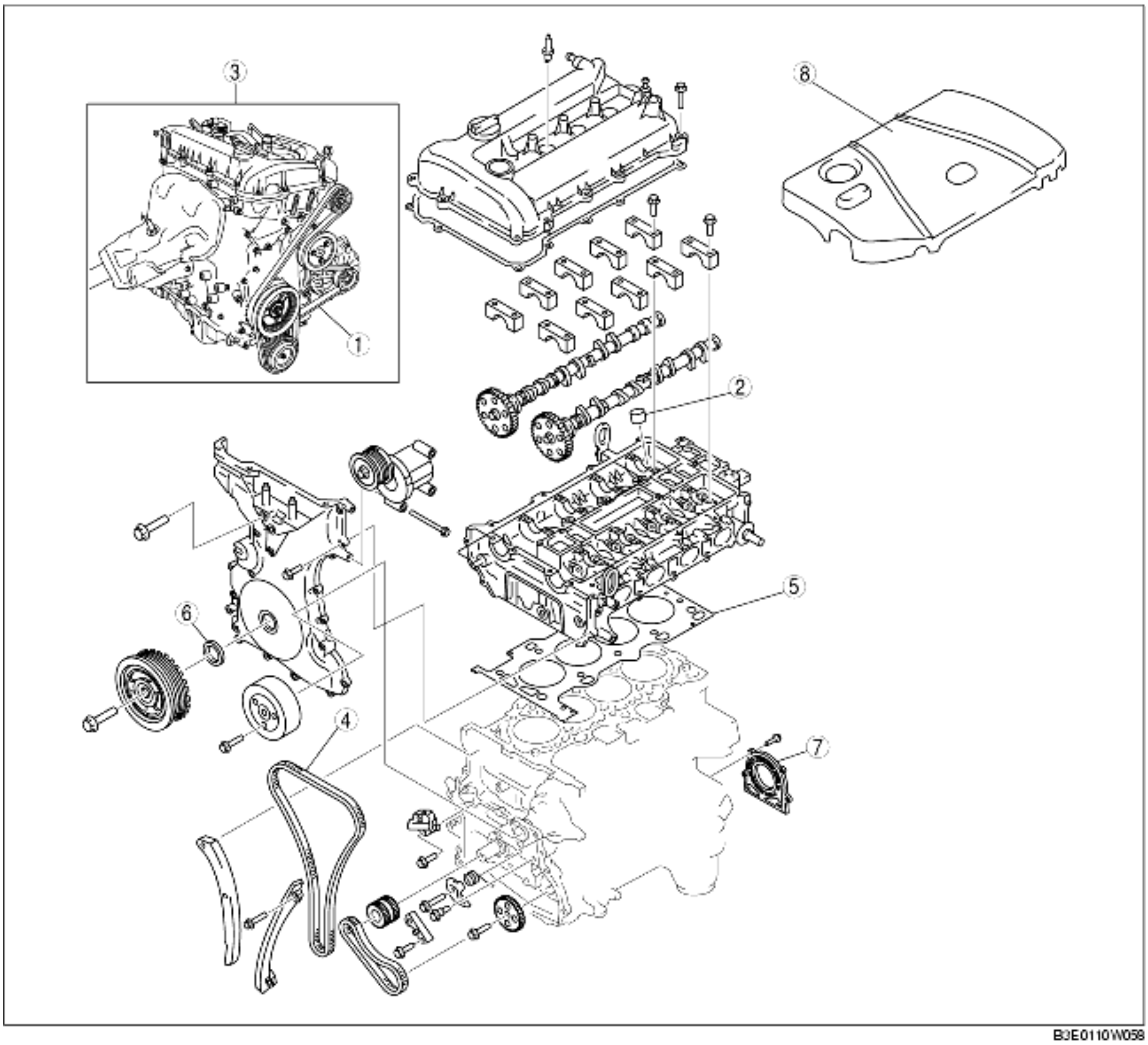
3. Insert an exhaust gas analyzer into the tailpipe.

4. Verify that the CO and HC concentrations are within the regulation.

MECHANICAL

ENGINE LOCATION INDEX [LF]

B3E011001002W01



1	Drive belt (See DRIVE BELT INSPECTION [LF].) (See DRIVE BELT REPLACEMENT [LF].) (See DRIVE BELT AUTO TENSIONER INSPECTION [LF].)
2	Tappet (See VALVE CLEARANCE INSPECTION [LF].)

	(See VALVE CLEARANCE ADJUSTMENT [LF].)
3	Engine (See COMPRESSION INSPECTION [LF].) (See ENGINE REMOVAL/INSTALLATION [LF].) (See ENGINE DISASSEMBLY/ASSEMBLY [LF].)
4	Timing chain (See TIMING CHAIN REMOVAL/INSTALLATION [LF].)
5	Cylinder head gasket (See CYLINDER HEAD GASKET REPLACEMENT [LF].)
6	Front oil seal (See FRONT OIL SEAL REPLACEMENT [LF].)
7	Rear oil seal (See REAR OIL SEAL REPLACEMENT [LF].)
8	Plug hole plate (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

DRIVE BELT INSPECTION [LF]

B3E011015800W05

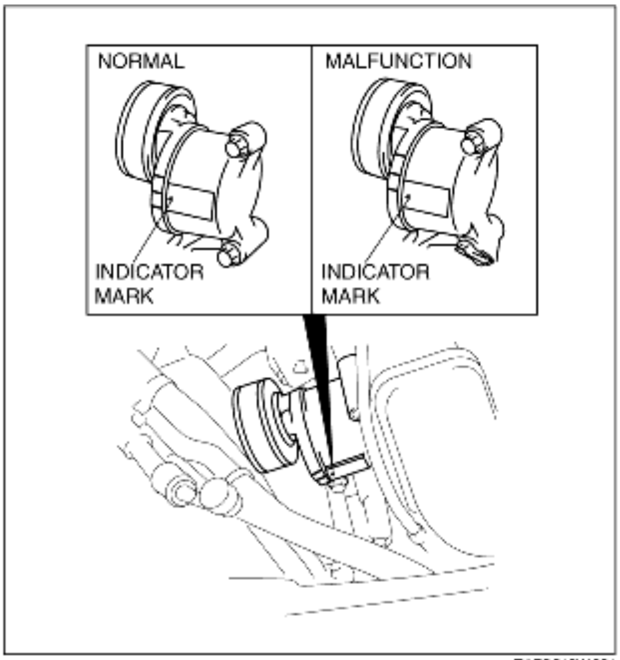
Generator Drive Belt

Note

• Drive belt deflection/tension inspection is not necessary because of the use of the generator drive belt auto tensioner.

1. Verify that the drive belt auto tensioner indicator mark does not exceed the limit.

• If it exceeds the limit, replace the drive belt. (See DRIVE BELT REPLACEMENT [LF].)



B3E2210W001

A/C Drive Belt

Note

• Drive belt deflection/tension inspection is not necessary because of the use of the maintenance-free type A/C drive belt.

• Replace the drive belt if it is found to be damaged during visual inspection, or if there is a malfunction or noise in the A/C compressor.

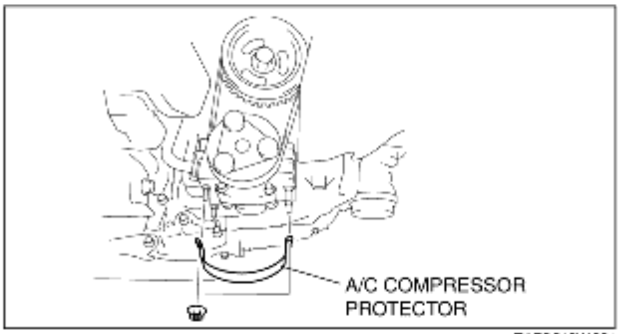
DRIVE BELT REPLACEMENT [LF]

B3E011015800W06

A/C Drive belt

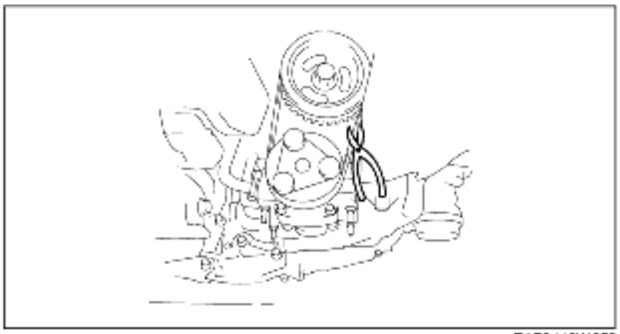
1. Remove the engine under cover and splash shield (RH).

2. Remove the A/C compressor protector.



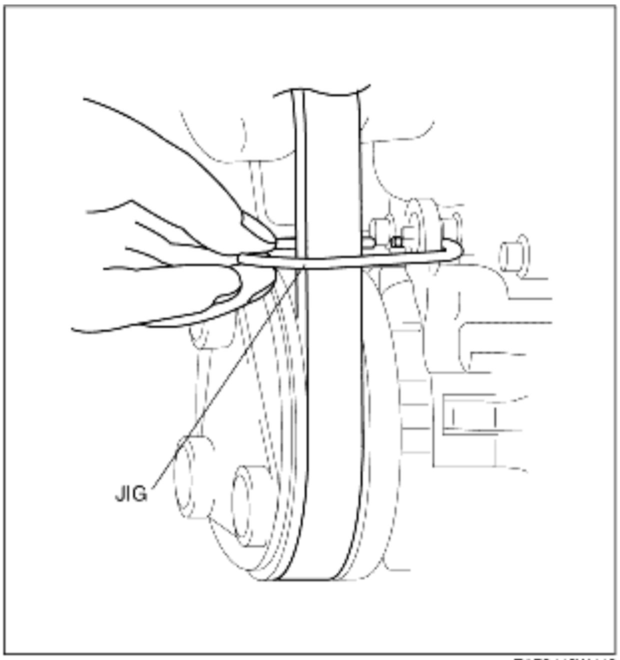
B3E2210W004

3. Cut the A/C drive belt using scissors.



B3E0110W052

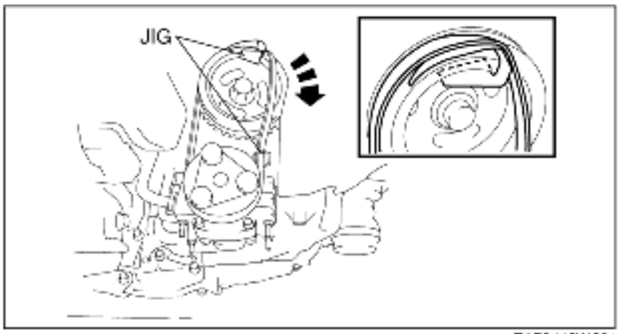
4. Set a new A/C drive belt and jig as shown in the figure.



B3E0110W110

Caution

• The A/C drive belt cannot be reused. Do not reinstall the A/C drive belt that was installed to the engine.



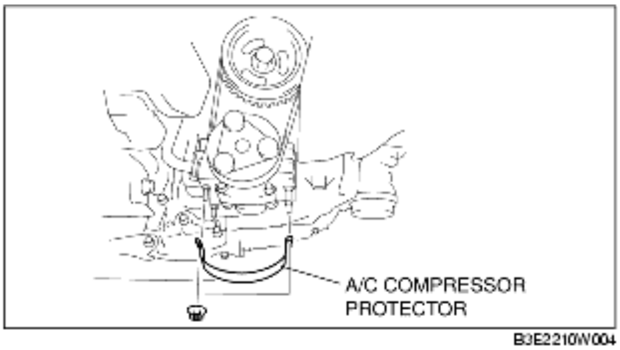
B3E0110W064

Note

• The jig is supplied with a new A/C drive belt.

5. Rotate the crankshaft pulley clockwise and install the A/C drive belt.

6. Install the A/C compressor protector.



Tightening torque

17.6-26.5 N·m

{1.8- 2.7kgf·m, 13.0-19.5ft·lbf}

7. Install the engine under cover and splash shield (RH).

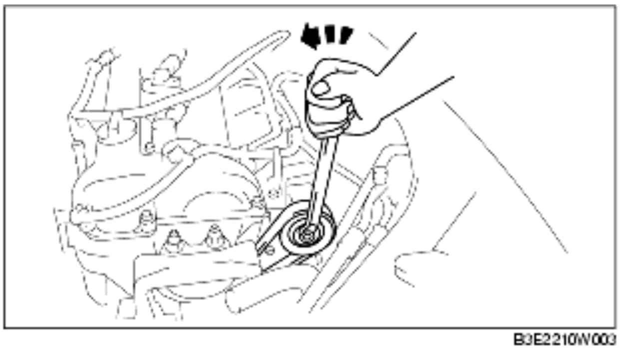
Generator Drive Belt

1. Remove the plug hole plate.

(See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

2. Remove the A/C drive belt.

3. Turn the center of the auto tensioner pulley counterclockwise to release tension to the drive belt tension.



4. Remove the generator drive belt.

5. Install a new generator drive belt.

6. Verify that the generator drive belt auto tensioner indicator mark does not exceed the limit. (SeeDRIVE BELT REPLACEMENT [LF].)

- If it exceeds the limit, replace the drive belt.

7. Install the A/C drive belt.

8. Install the plug hole plate.

(See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

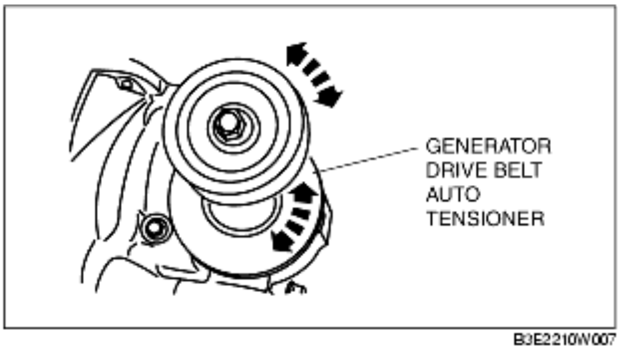
DRIVE BELT AUTO TENSIONER INSPECTION [LF]

B3E011015980W01

1. Remove the drive belt. (See DRIVE BELT REPLACEMENT [LF].)

2. Verify that the generator drive belt auto tensioner moves smoothly in the operational direction.

    • If it does not move smoothly, replace the generator drive belt auto tensioner.



3. Turn the generator drive belt auto tensioner pulley by hand and verify that it rotates smoothly.

    • If it does not move smoothly, replace the generator drive belt auto tensioner.

4. Install the generator drive belt. (See DRIVE BELT REPLACEMENT [LF].)

VALVE CLEARANCE INSPECTION [LF]

B3E011012111W03

1. Remove the plug hole plate and bracket (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

2. Remove the battery cover (See BATTERY REMOVAL/INSTALLATION [LF].)

3. Disconnect the negative battery cable.

4. Disconnect the wiring harness.

5. Remove the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

6. Remove the ventilation hose.

7. Remove the cylinder head cover.

8. Verify that the engine is cold.

9. Measure the valve clearance.

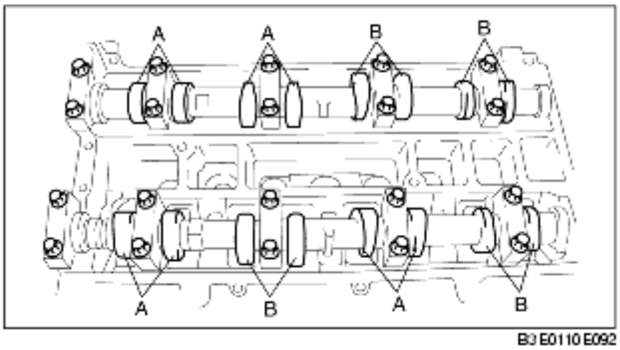
    (1) Turn the crankshaft clockwise so that the No.1 piston is at TDC of the compression stroke.

    (2) Measure the valve clearance at A in the figure.

• If the valve clearance is out of the standard value, adjust it. (See VALVE CLEARANCE ADJUSTMENT [LF].)

Note

• Make sure to note down the measured values for choosing the suitable replacement tappets.



Standard [Engine cold]

IN: 0.22-0.28 mm {0.0087-0.0110 in}

EX: 0.27-0.33 mm {0.0107-0.0129 in}

(3) Turn the crankshaft **360**° clockwise so that the No.4 piston is at TDC of the compression stroke.

(4) Measure the valve clearance at B in the figure.

• If the valve clearance is out of the standard value, adjust it. (See VALVE CLEARANCE ADJUSTMENT [LF].)

Note

• Make sure to note down the measured values for choosing the suitable replacement tappets.

Standard [Engine cold]

IN: 0.22-0.28 mm {0.0087-0.0110 in}

EX: 0.27-0.33 mm {0.0107-0.0129 in}

10. Install the cylinder head cover. (See Cylinder Head Cover Installation Note.)

11. Install the ventilation hose.

12. Install the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

13. Connect the wiring harness.

14. Connect the negative battery cable.

15. Install the battery cover (See BATTERY REMOVAL/INSTALLATION [LF].)

16. Install the plug hole plate and bracket (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

VALVE CLEARANCE ADJUSTMENT [LF]

B3E011012111W04

1. Remove the plug hole plate (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

2. Remove the battery cover (See BATTERY REMOVAL/INSTALLATION [LF].)

3. Disconnect the negative battery cable.

4. Disconnect the wiring harness.

5. Remove the following parts.

   (1) Front wheel and tire (RH). (See GENERAL PROCEDURES (SUSPENSION).)

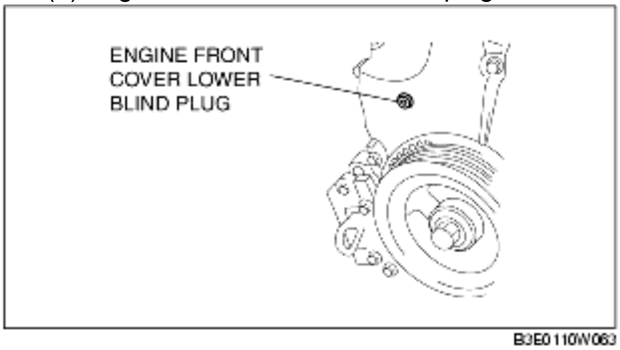
   (2) Engine under cover and splash shield (RH).

   (3) Ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

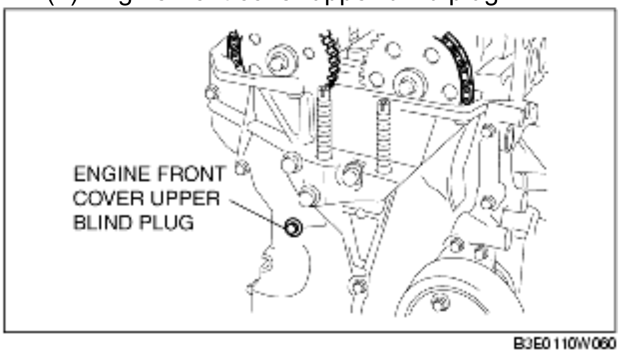
   (4) Ventilation hose.

   (5) Cylinder head cover.

   (6) Engine front cover lower blind plug.

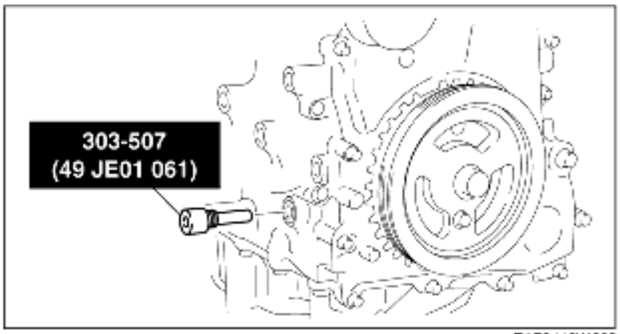


   (7) Engine front cover upper blind plug.



   (8) Cylinder block lower blind plug.

6. Install the **SST** as shown in the figure.

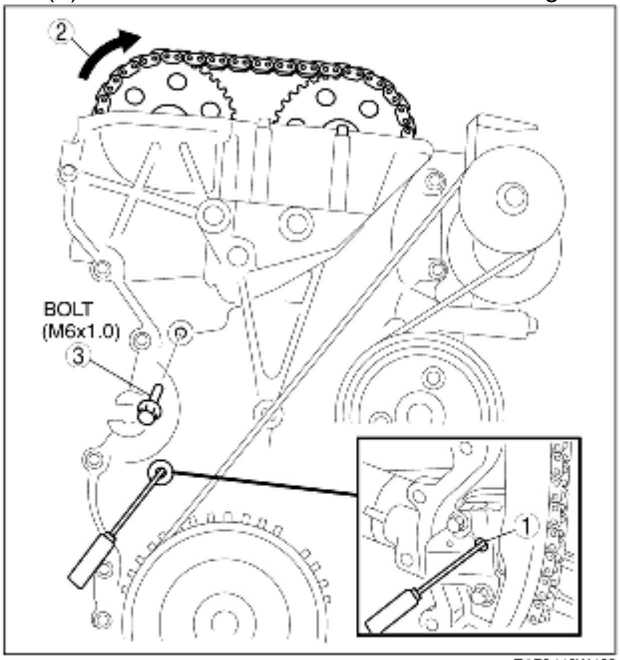


B3E0110W062

7. Turn the crankshaft clockwise the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the **SST**).

8. Loosen the timing chain.

(1) Unlock the chain tensioner ratchet using a suitable screwdriver or equivalent tool.

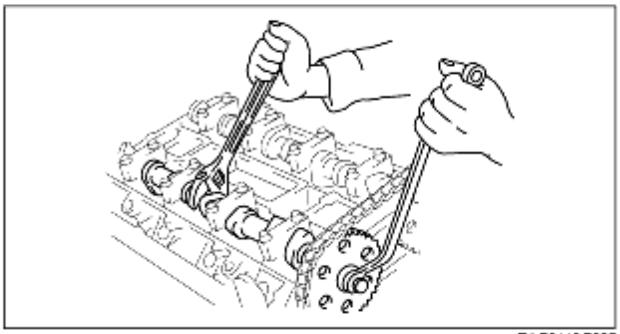


B3E0110W108

(2) Turn the exhaust camshaft clockwise using a suitable wrench on the cast hexagon and loosen the timing chain.

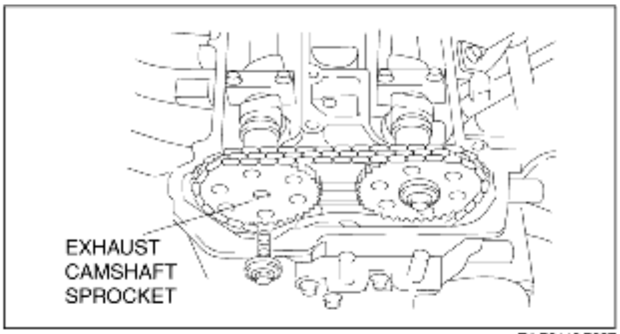
(3) Placing the suitable bolt **(M6 X 1.0 length 25mm-35mm {0.99-1.37in})** at the engine front cover upper blind plug, secure the chain guide at the position where the tension is released.

9. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in the figure.



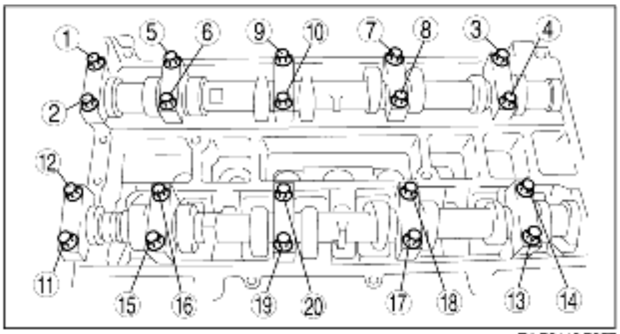
B3E0110E095

10. Remove the exhaust camshaft sprocket.



B3E0110E097

11. Loosen the camshaft cap bolts in 2-3 passes in the order shown in the figure.



B3E0110E057

Note

• The cylinder head and the camshaft caps are numbered to be reassembled in their original position correctly. When removed, keep the caps with the cylinder head they were removed from. Do not mix the caps.

12. Remove the camshaft.

13. Remove the tappet.

14. Select proper adjustment shim.

New adjustment shim

= Removed shim thickness + Measured valve clearance - Standard valve clearance (IN: 0.25 mm {0.0098 in}, EX: 0.30 mm {0.0118 in})

Standard [Engine cold]

IN: 0.22-0.28 mm {0.0087-0.0110 in}

EX: 0.27-0.33 mm {0.0107-0.0129 in}

15. Install the camshaft with No.1 cylinder aligned with the TDC position.

16. Tighten the camshaft cap bolt with the following 2 steps.

Tightening torque

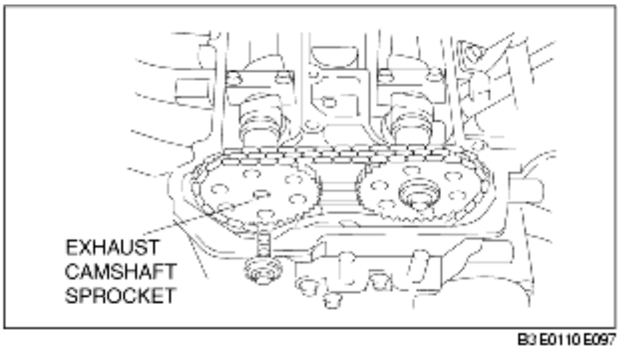
(1) 5.0-9.0 N·m

{51.0-91.7 kgf·cm, 44.3-79.6 in·lbf}

(2) 14.0-17.0 N·m

{1.5-1.7 kgf·m, 10.4-12.5 ft·lbf}

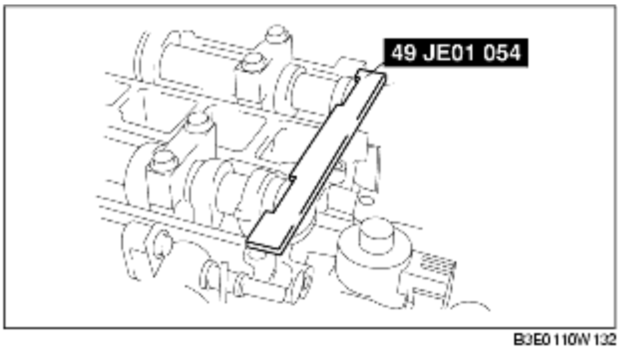
17. Install the exhaust camshaft sprocket.

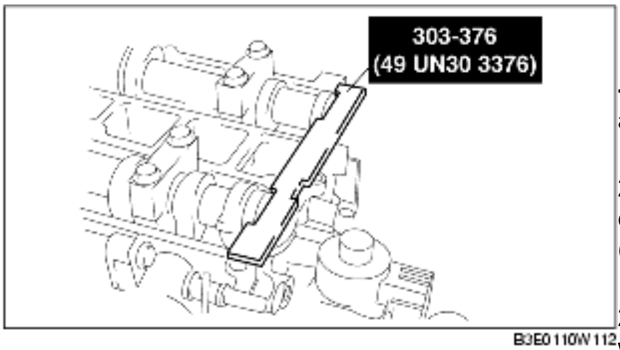


Note

• Do not tighten the bolt for the camshaft sprocket during this step. First confirm the valve timing, then tighten the bolt.

18. Install the **SST** to the camshaft as shown in the figure.

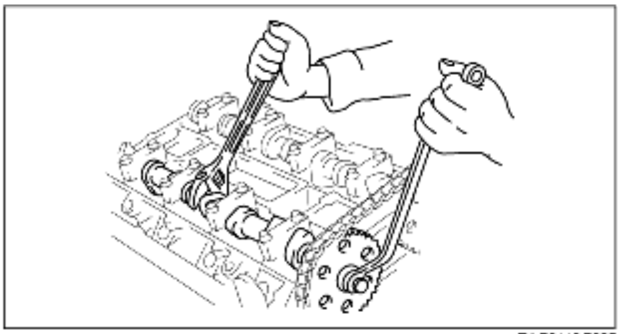




19. Remove the **(M6 X 1.0 length 25mm-35mm {0.99-1.37in})** bolt from the engine front cover to apply tension to the timing chain.

20. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the **SST**).

21. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in the figure.



B3E0110E095

22. Tighten the exhaust camshaft sprocket lock bolt.

Tightening torque

69-75 N·m

{7.1-7.6 kgf·m, 50.9-55.3 ft·lbf}

23. Remove the **SST** from the camshaft.

24. Remove the **SST** from the block lower blind plug.

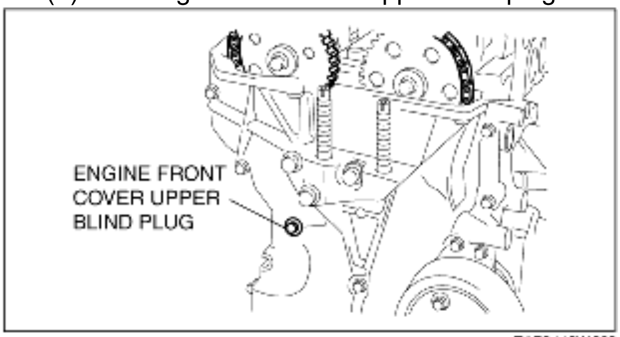
25. Rotate the crankshaft clockwise two turns until the TDC position.

• If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 14.

26. Apply silicone sealant to the engine front cover upper blind plug.

27. Install the following parts.

(1) New engine front cover upper blind plug.



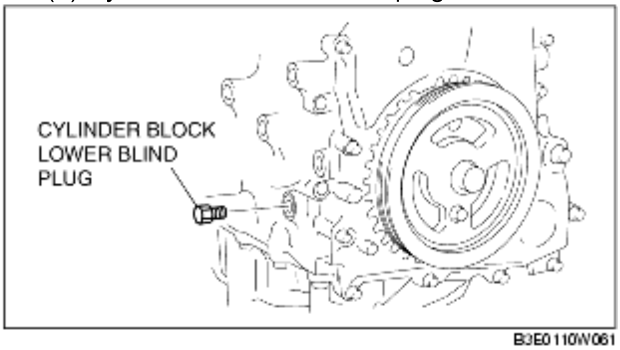
B3E0110W060

Tightening torque

8.0-11.5 N·m

{81.6-117.2 kgf·cm, 70.9-101.7 in·lbf}

(2) Cylinder block lower blind plug.

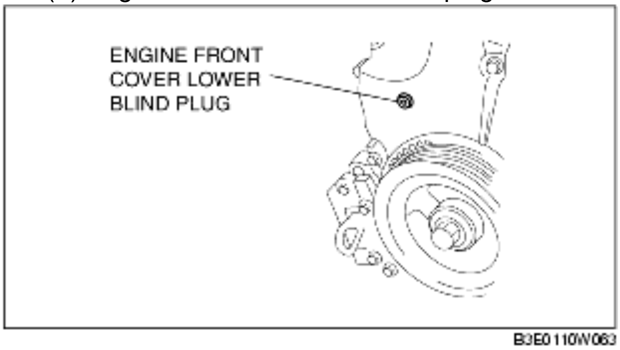


Tightening torque

18-22 N·m

{1.9-2.2 kgf·m, 14-16 ft·lbf}

(3) Engine front cover lower blind plug.



Tightening torque

10-14 N·m

{1.1-1.4 kgf·m, 7.4-10.3 ft·lbf}

(4) Cylinder head cover. (See Cylinder Head Cover Installation Note.)

(5) Ventilation hose.

(6) Ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

(7) Engine under cover and splash shield (RH).

(8) Front wheel and tire (RH). (See GENERAL PROCEDURES (SUSPENSION).)

28. Connect the wiring harness.

29. Connect the negative battery cable.

30. Install the battery cover (See BATTERY REMOVAL/INSTALLATION [LF].)

31. Install the plug hole plate (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

COMPRESSION INSPECTION [LF]

B3E011002000W02

Warning

• Hot engines and oil can cause severe burns. Be careful not to burn yourself during removal/installation of each component.

1. Verify that the battery is fully charged.

• Recharge it if necessary. (See BATTERY INSPECTION.)

2. Warm up the engine to the normal operating temperature.

3. Stop the engine and allow it to cool down for **about 10 min**.

4. Perform "Fuel Line Safety Procedures". Leave the fuel pump relay removed. (See BEFORE SERVICE PRECAUTION.)

Warning

• Fuel vapor is hazardous. It can very 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 the "Fuel Line Safety Procedure". (See Fuel Line Safety Procedure.)

5. Remove the plug hole plate (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

6. Remove the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

7. Remove the spark plugs. (See SPARK PLUG REMOVAL/INSTALLATION [LF].)

8. Connect a compression gauge into the spark plug hole.

9. Fully depress the accelerator pedal and crank the engine.

10. Note down the maximum gauge reading.

11. Inspect each cylinder as above.

• If the measured value is less than the limited value, or there is a cylinder whose compression value varies from that of other cylinders by **196.1 kPa {2.0 kgf/cm^2, 28.5 psi**} or more, add a small amount of engine oil through the spark plug hole. Then measure the compression pressure and perform the respective operations for the following cases.

- If the compression increases, the piston, the piston rings, or cylinder wall may be worn and overhaul is required.

- If the compression stays low, a valve may be stuck or improperly seated and overhaul is required.

- If the compression in adjacent cylinders stays low, the cylinder head gasket may be damaged or the cylinder head distorted and overhaul is required.

Compression

kPa {kgf/cm^2, psi} [rpm]

Item	Engine type
	LF
Standard	1,720 {17.54, 246.8} [300]
Minimum	1,204 {12.28, 174.6} [300]
Maximum difference between cylinders	196.1 {2.0, 28.5}

12. Disconnect the compression gauge.

13. Install the following parts.

(1) Spark plug (See SPARK PLUG REMOVAL/INSTALLATION [LF].)

(2) Ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

(3) Fuel pump relay. (See BEFORE SERVICE PRECAUTION.)

(4) Plug hole plate (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

TIMING CHAIN REMOVAL/INSTALLATION [LF]

B3E011012201W01

Warning

• Fuel vapor is hazardous. It can very 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 the "Fuel Line Safety Procedure". (See Fuel Line Safety Procedure.)

1. Remove the following parts.

(1) Plug hole plate (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

(2) Plug hole plate bracket.

(3) Accelerator cable and bracket.

(4) Battery cover (See BATTERY REMOVAL/INSTALLATION [LF].)

2. Disconnect the negative battery cable.

3. Remove the following parts.

(1) Ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

(2) Front wheel and tire (RH). (See GENERAL PROCEDURES (SUSPENSION).)

(3) Under cover and splash shields

(4) Crankshaft position (CKP) sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF].)

(5) Drive belt. (See DRIVE BELT REPLACEMENT [LF].)

(6) A/C compressor with the oil hose still connected and position the A/C compressor so that it is out of the way. (See A/C COMPRESSOR REMOVAL/INSTALLATION [LF].)

(7) Coolant reserve tank with the hose still connected and position the coolant reserve tank so that it is out of the way.

4. Remove in the order indicated in the table.

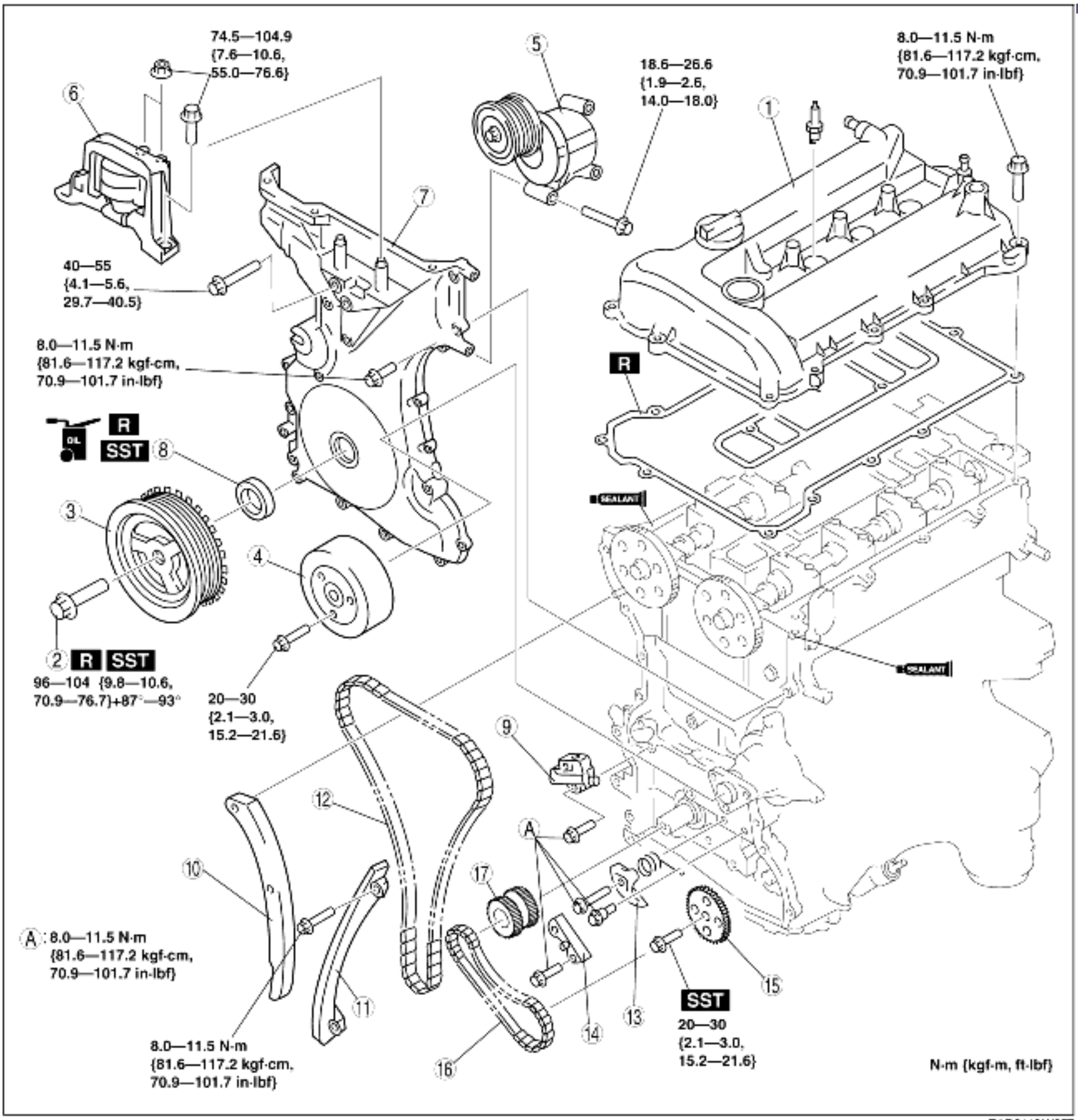
5. Install in the reverse order of removal.

6. Start the engine.

7. Inspect the following and adjust if necessary.

- Pulley and belt for runout and contact.
- Leakage of engine oil.
- Ignition timing and idle speed. Verify the amount of CO and HC. (See ENGINE TUNE-UP [LF].)
- Engine-driven accessories operation.

8. Perform a road test and verify that there is no abnormal vibration or noise.



B3E0110W057

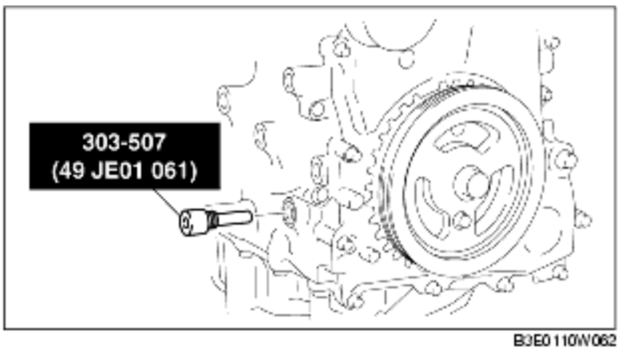
1	Cylinder head cover (See Cylinder Head Cover Installation Note.)
2	Crankshaft pulley lock bolt (See Crankshaft Pulley Lock Bolt Removal Note.) (See Crankshaft Pulley Lock Bolt Installation Note.)
3	Crankshaft pulley
4	Water pump pulley
5	Drive belt auto tensioner
6	No.3 engine mount rubber and No.3 engine joint bracket

	(See No.3 Engine Mount Removal Note.) (See No.3 Engine Mount Rubber and No.3 Engine Mount Bracket Installation Note.)
7	Engine front cover (See Engine Front Cover Installation Note.)
8	Front oil seal (See Engine Front Cover Removal Note.) (See Front Oil Seal Installation Note.)
9	Chain tensioner (See Chain Tensioner Removal Note.)
10	Tensioner arm
11	Chain guide
12	Timing chain (See Timing Chain Installation Note.)
13	Oil pump chain tensioner
14	Oil pump chain guide
15	Oil pump sprocket (See Oil Pump Sprocket Removal Note.) (See Oil Pump Sprocket Installation Note.)
16	Oil pump chain
17	Crankshaft sprocket

Crankshaft Pulley Lock Bolt Removal Note

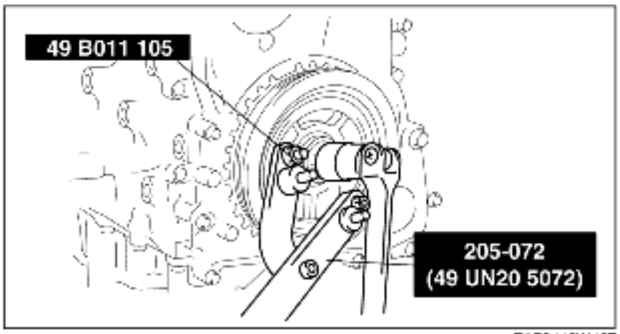
1. Remove the cylinder block lower blind plug.

2. Install the **SST**.



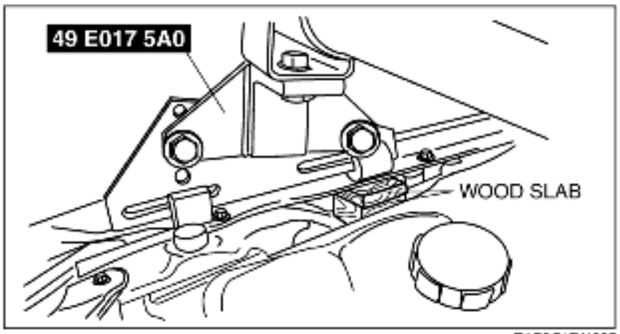
3. Turn the crankshaft clockwise the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the **SST**).

4. Hold the crankshaft pulley using the **SSTs**.



No.3 Engine Mount Removal Note

1. Install the suitable wood slabs between the front fender panel and apron reinforcement upper.



Note

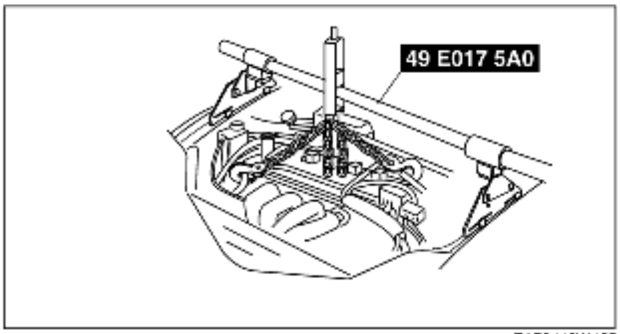
• Wood slab height

4SD: approx. 35 mm {1.38 in}

5HB: approx. 60 mm {2.36 in}

• Cut the wood slab into two piece and insert.

2. Support the engine using the **SST**.

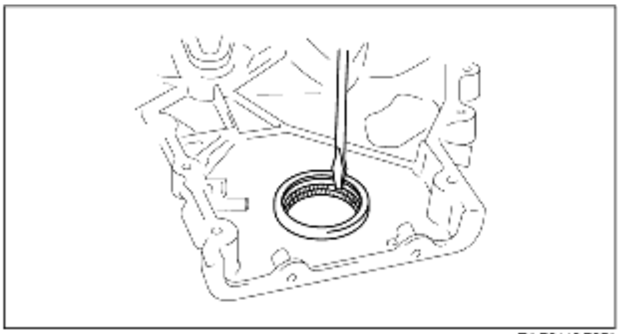


Note

• A hoist or small crane can be used in place of the **SST (49E 017 5A0)**.

Engine Front Cover Removal Note

1. Remove the oil seal using a screwdriver as shown in the figure.



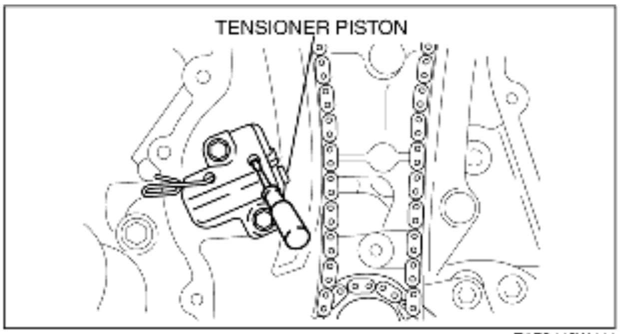
B3E0110E053

Chain Tensioner Removal Note

1. Hold the chain tensioner ratchet lock mechanism away from the ratchet stem using a thin screwdriver.

2. Slowly compress the tensioner piston.

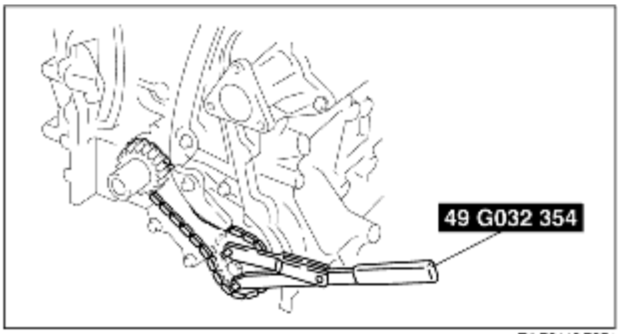
3. Hold the tensioner piston using a **1.5 mm {0.059 in}** wire or paper clip.



B3E0110W111

Oil Pump Sprocket Removal Note

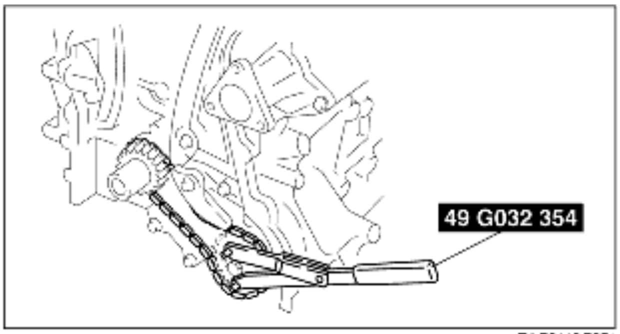
1. Hold the oil pump sprocket using the **SST**.



B3E0110E054

Oil Pump Sprocket Installation Note

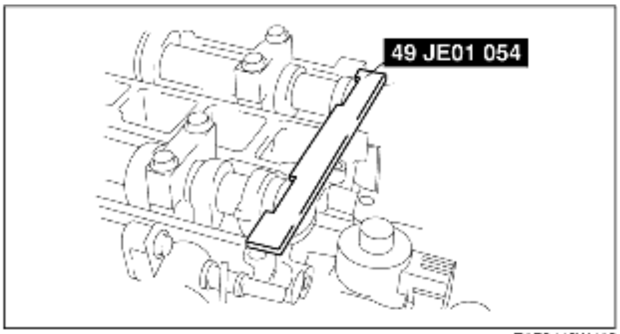
1. Hold the oil pump sprocket using the **SST**.



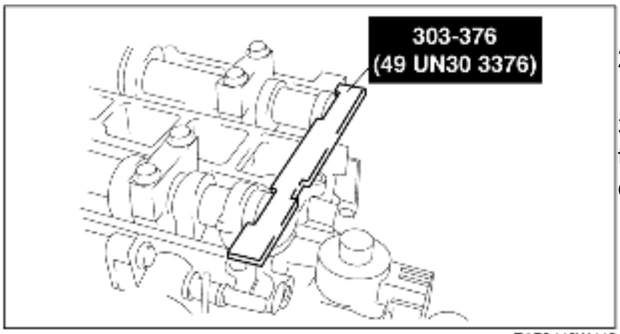
B3E0110E054

Timing Chain Installation Note

1. Install the **SST** to the camshaft as shown in the figure.



B3E0110W132



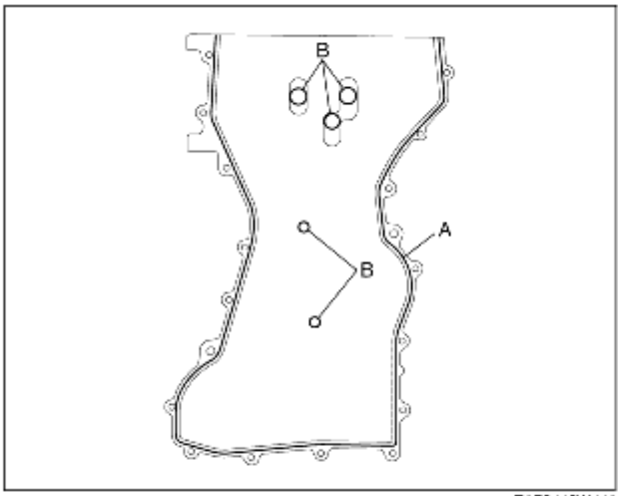
B3E0110W112

2. Install the timing chain.

3. Remove the retaining wire or paper clip from the auto tensioner to apply tension to the timing chain.

Engine Front Cover Installation Note

1. Apply silicone sealant to the engine front cover as shown in the figure.



B3E0110W113

Caution

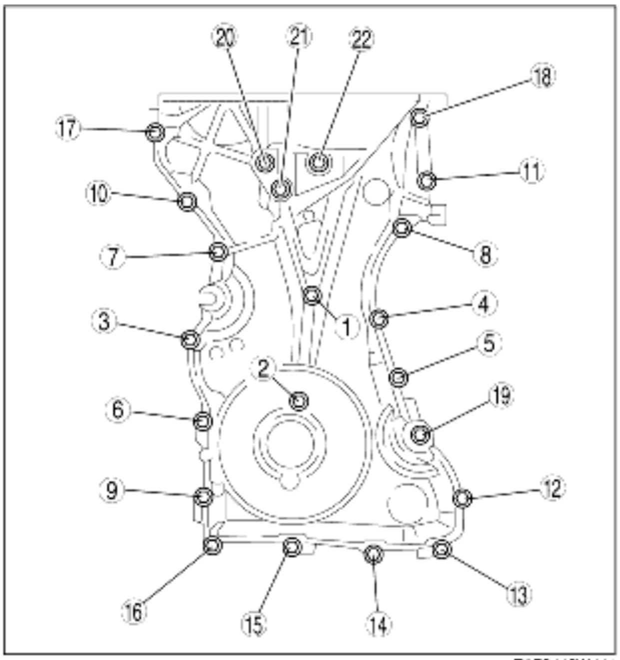
• Install the engine front cover within 10 min of applying the silicone sealant.

Thickness

A: 2.2-3.2 mm {0.087-0.125 in}

B: 1.5-2.5 mm {0.059-0.098 in}

2. Install the engine front cover bolts in the order shown in the figure.



B3E0110W114

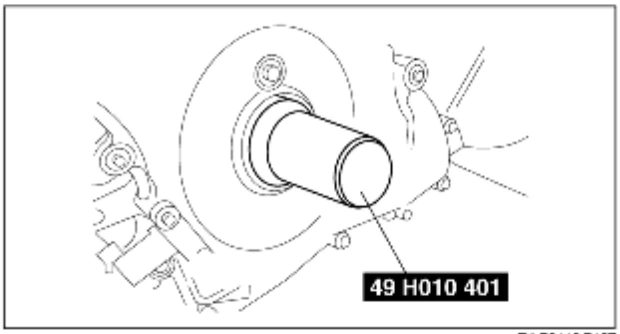
Bolt No.	Tightening torque
1-18	**8.0-11.5 N·m** **{81.6-117.2 kgf·cm, 70.9-101.7 in·lbf}**
19-22	**40-55 N·m {4.1-5.6 kgf·m, 29.7-40.5 ft·lbf}**

Front Oil Seal Installation Note

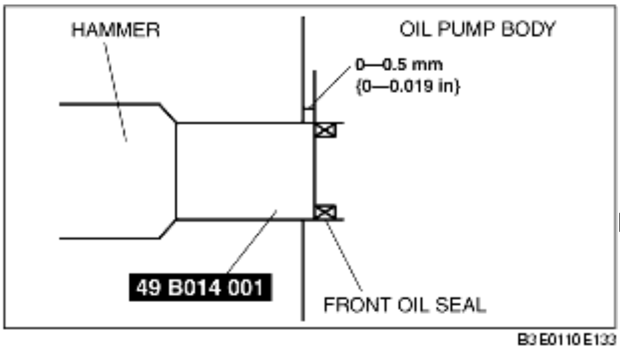
1. Apply clean engine oil to the oil seal.

2. Push the oil seal slightly in by hand.

3. Compress the oil seal using the **SST** and a hammer.

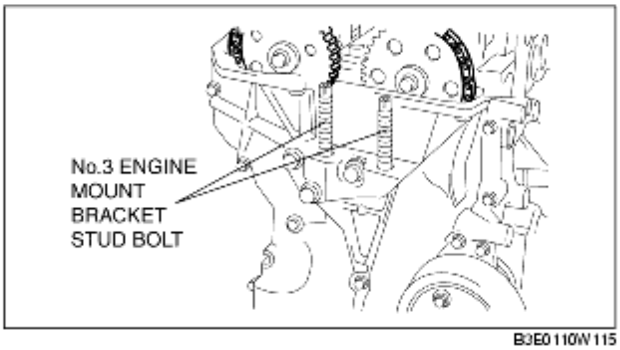


B3E0110E127



No.3 Engine Mount Rubber and No.3 Engine Mount Bracket Installation Note

1. Tighten the stud bolt of the No.3 engine mount bracket.



Tightening torque

7.0-13 N·m

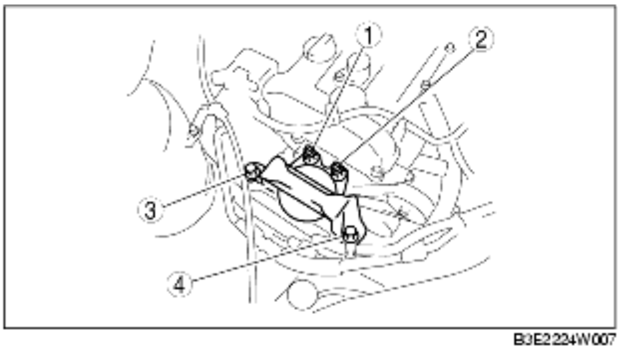
{71.4-132.5 kgf·cm, 62.0-115.0 in·lbf}

Note

• If the No.3 engine mount bracket remove to the engine

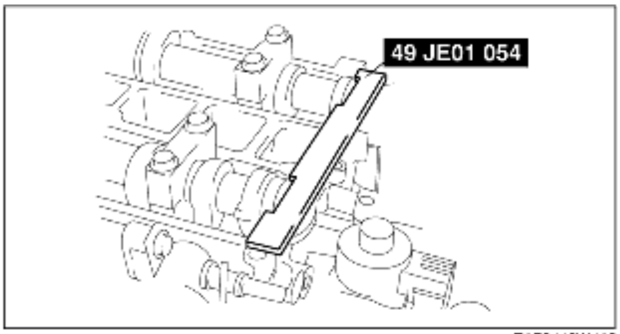
2. Hand-tighten the No.3 engine mount rubber and No.3 engine mount bracket.

3. Tighten the bolts and nuts in the order as shown in the figure.

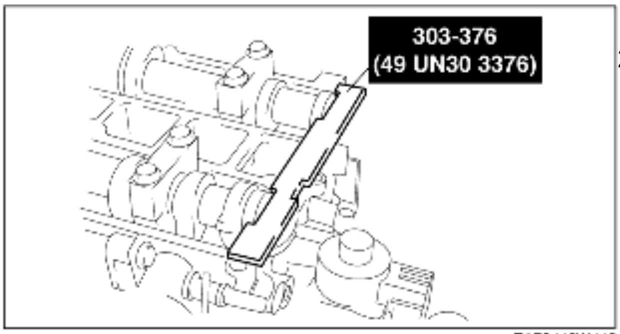


Crankshaft Pulley Lock Bolt Installation Note

1. Install the **SST** to the camshaft as shown in the figure.

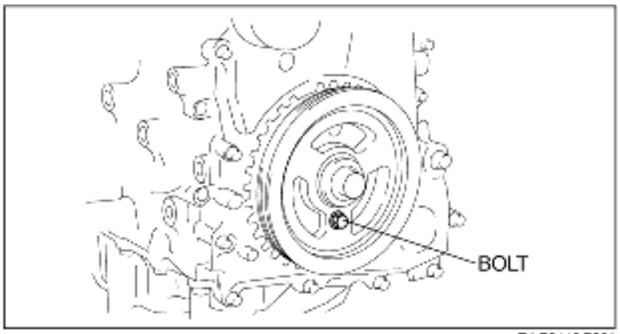


B3E0110W132



B3E0110W112

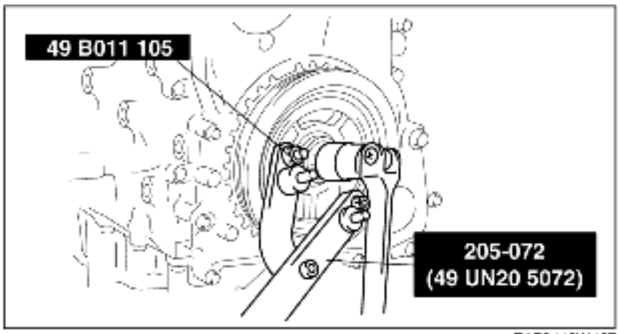
2. Install the **M6 x 1.0** bolt in by hand.



B3E0110E063

3. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the **SST**).

4. Hold the crankshaft pulley using the **SST**.



B3E0110W107

5. Tighten the crankshaft pulley lock bolt in the order shown with the following 2 steps using the **SST (49 D032 316)**.

Tightening torque

(1) 96-104 N·m

{9.8-10.6 kgf·m, 70.9-76.7 ft·lbf}

(2) 87°-93°

6. Remove the **M6 x 1.0** bolt.

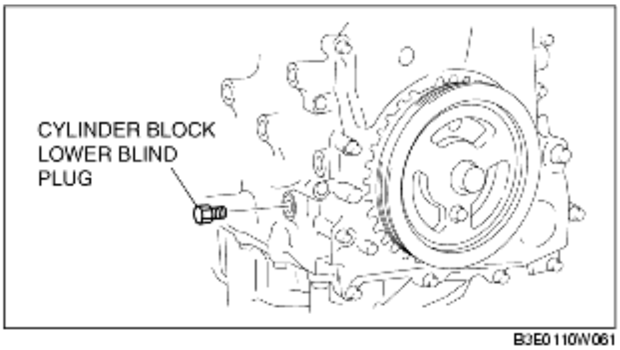
7. Remove the **SST** from the camshaft.

8. Remove the **SST** from the cylinder block lower blind plug.

9. Rotate the crankshaft clockwise two turns until the TDC position.

• If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 1.

10. Install the cylinder block lower blind plug.



Tightening torque

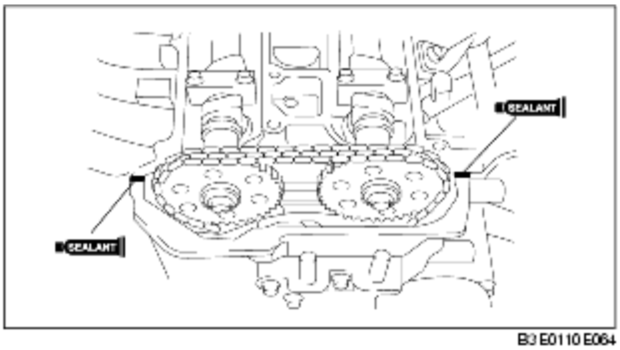
18-22 N·m {1.9-2.2 kgf·m, 14-16 ft·lbf}

Cylinder Head Cover Installation Note

1. Apply silicone sealant to the mating faces as shown in the figure.

Caution

• Install the cylinder head cover within 10 min of applying the silicone sealant.

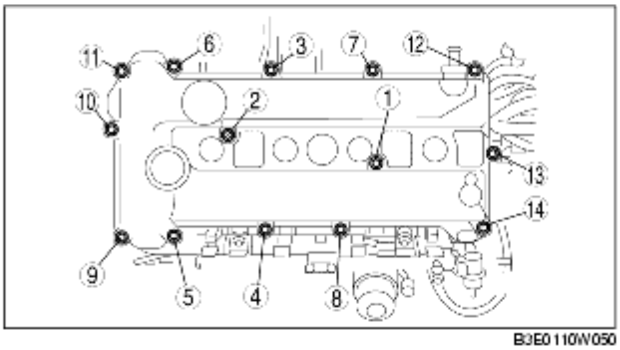


Thickness

4.0-6.0 mm {0.16-0.23 in}

2. Install the cylinder head cover with a new gasket.

3. Tighten the bolts in the order shown in the figure.



Tightening torque

8.0-10.5 N·m

{81.6-107.1 kgf·cm, 70.9-94.4 in·lbf}

CYLINDER HEAD GASKET REPLACEMENT [LF]

B3E011010271W02

Warning

• Fuel vapor is hazardous. It can very 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 the "Fuel Line Safety Procedure". (See Fuel Line Safety Procedure.)

1. Remove the timing chain. (See TIMING CHAIN REMOVAL/INSTALLATION [LF].)

2. Remove the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

3. Remove the intake manifold. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

4. Disconnect the following parts.

    (1) WU-TWC. (See EXHAUST SYSTEM REMOVAL/INSTALLATION [LF].)

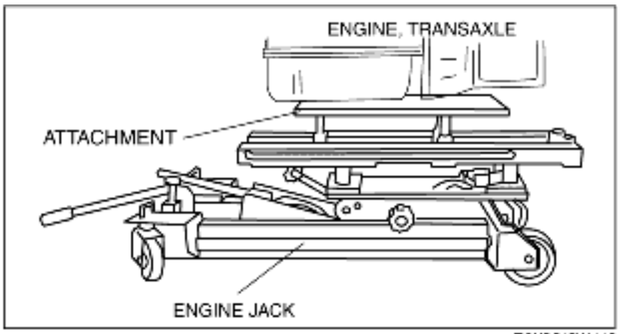
    (2) Radiator upper hose.

    (3) Water hose.

    (4) Heater hose.

    (5) wiring harness.

5. To firmly support the engine, first set the engine jack and attachment to the oil pan.

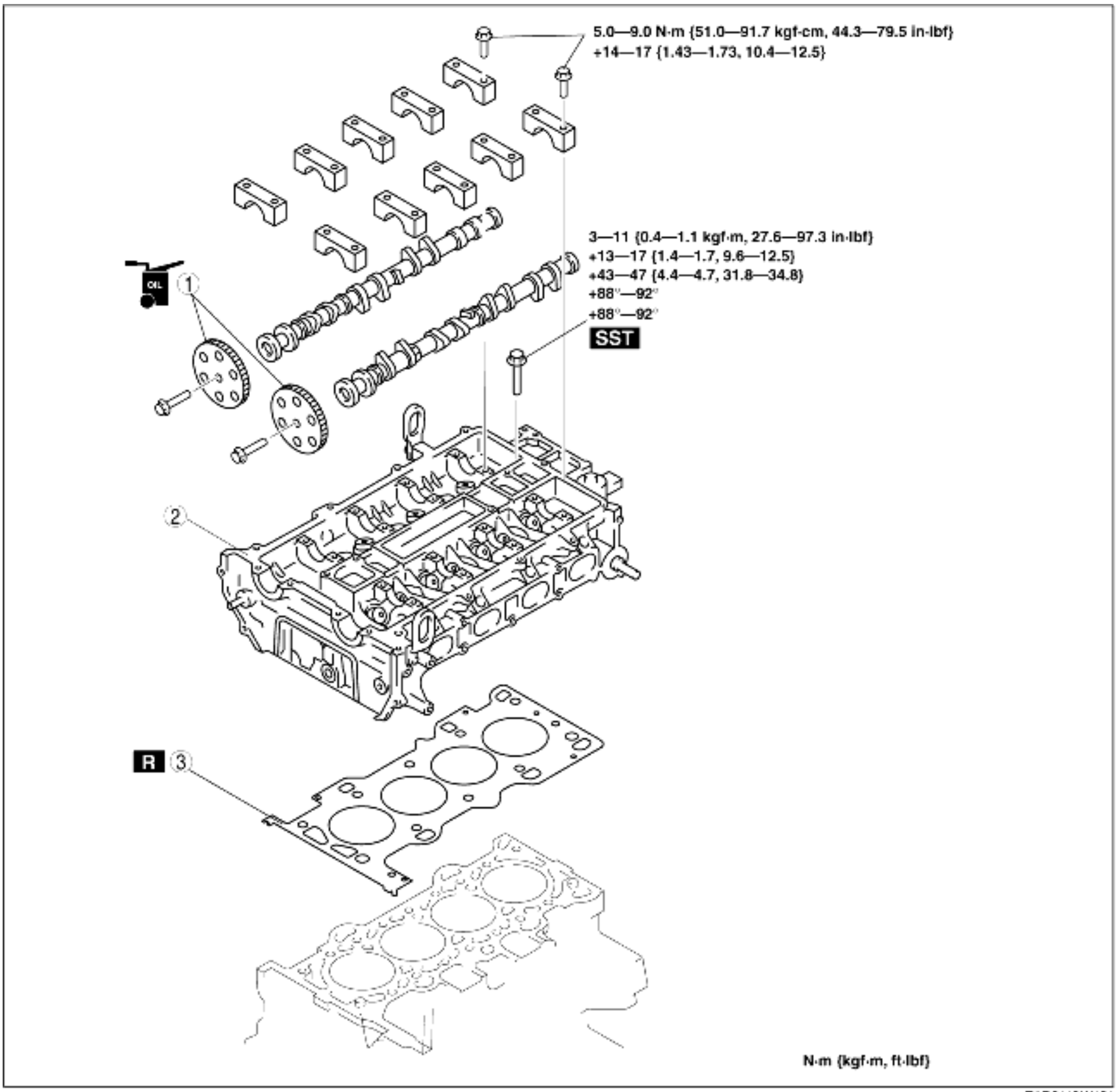


B6U2218W110

6. Remove in the order indicated in the table.

7. Install in the reverse order of removal.

8. Inspect the compression. (See COMPRESSION INSPECTION [LF].)



B3E0110W121

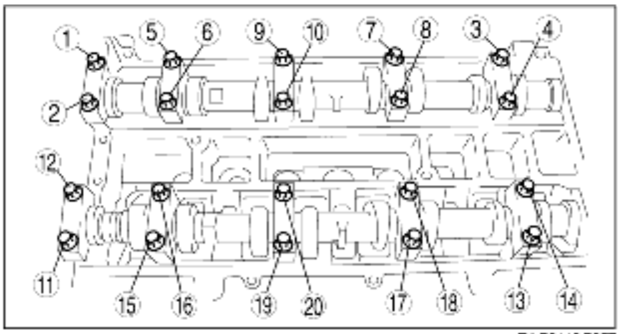
1	Camshaft (See Camshaft Removal Note.) (See Camshaft Installation Note.)
2	Cylinder head (See Cylinder Head Removal Note.) (See Cylinder Head Installation Note.)
3	Cylinder head gasket

Camshaft Removal Note

Note

• The cylinder head and the camshaft caps are numbered to be reassembled in their original position correctly. When removed, keep the caps with the cylinder head they were removed from. Do not mix the caps.

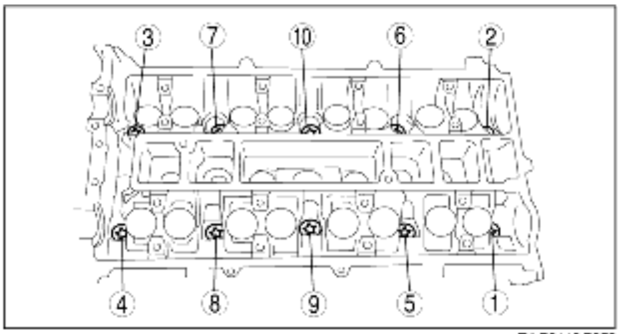
1. Loosen the camshaft cap bolts in 2-3 passes in the order shown in the figure.



B3E0110E057

Cylinder Head Removal Note

1. Loosen the cylinder head bolts in 2-3 passes in the order shown in the figure.

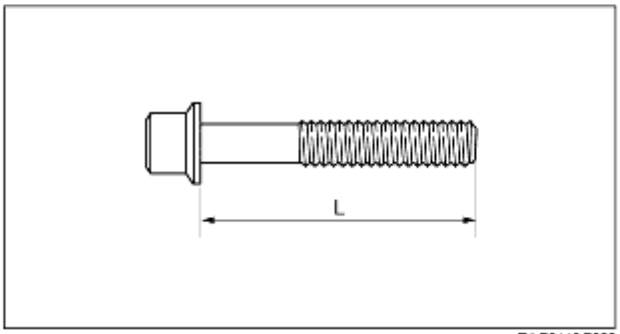


B3E0110E059

Cylinder Head Installation Note

1. Measure the length of each cylinder head bolt.

• Replace any that exceeds maximum length.



B3E0110E088

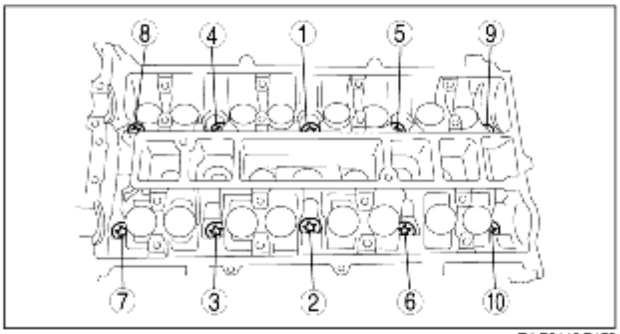
Length L

145.2-145.8 mm {5.72-5.74 in}

Maximum

146.5 mm {5.78 in}

2. Tighten the cylinder head bolts in the order shown with the following 5 steps using the **SST (49 D032 316)**.



B3E0110E159

Tightening torque

(1) 3-11 N·m

{0.4-1.1 kgf·m, 27.6-97.3 in·lbf}

(2) 13-17 N·m

{1.4-1.7 kgf·m, 9.59-12.5 ft·lbf}

(3) 43-47 N·m

{4.4-4.7 kgf·m, 31.8-34.6 ft·lbf}

(4) 88°-92°

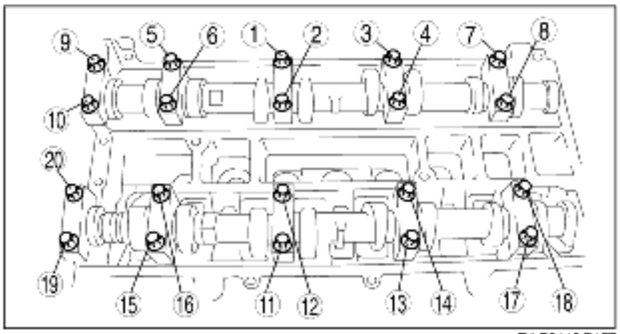
(5) 88°-92°

Camshaft Installation Note

1. Set the cam position of No.1 cylinder at the top dead center (TDC) and install the camshaft.

2. Temporarily tighten the camshaft bearing caps evenly in 2-3 passes.

3. Tighten the camshaft cap bolts in the order shown with the following two steps.



Tighten torque

(1) 5.0-9.0 N·m

{51.0-91.7 kgf·cm, 44.3-79.6 in·lbf}

(2) 14.0-17.0 N·m

{1.5-1.7 kgf·m, 10.4-12.5 ft·lbf}

FRONT OIL SEAL REPLACEMENT [LF]

B3E011010602W02

1. Remove the plug hole plate (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

2. Remove the plug hole plate bracket.

3. Remove the battery cover (See BATTERY REMOVAL/INSTALLATION [LF].)

4. Disconnect the negative battery cable.

5. Disconnect the wiring harness.

6. Remove the following parts.

    (1) Ignition coils (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

    (2) Cylinder head cover. (See Cylinder Head Cover Installation Note.)

    (3) Drive belt. (See DRIVE BELT REPLACEMENT [LF].)

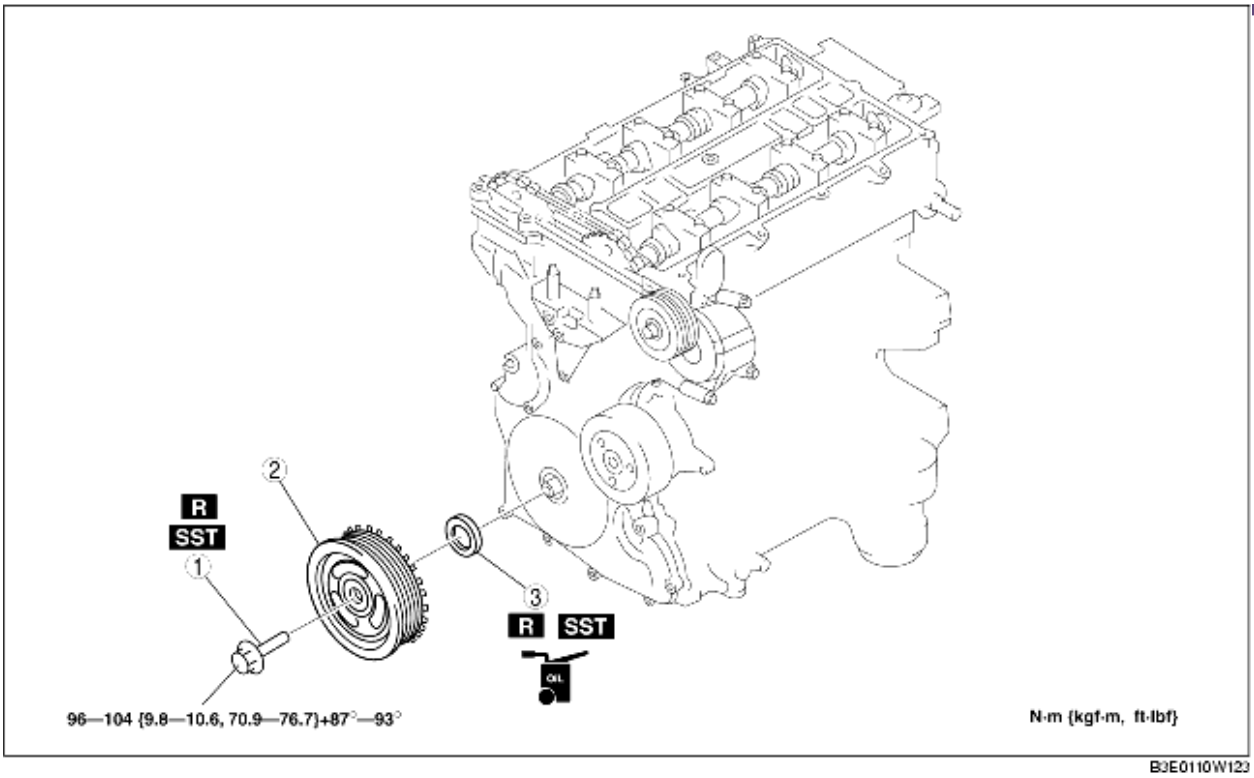
    (4) Front wheel and tire (RH) (See GENERAL PROCEDURES (SUSPENSION).)

    (5) Under cover and splash shield.

    (6) Crankshaft position (CKP) sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF].)

7. Remove in the order indicated in the table.

8. Install in the reverse order of removal.

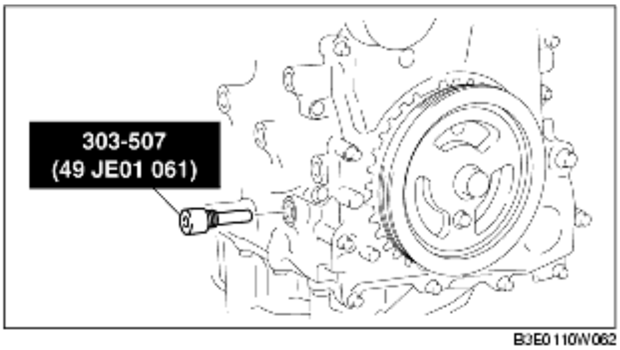


1	Crankshaft pulley lock bolt (See Crankshaft Pulley Lock Bolt Removal Note.) (See Crankshaft Pulley Lock Bolt Installation Note.)
2	Crankshaft pulley
3	Front oil seal (See Front Oil Seal Removal Note.) (See Front Oil Seal Installation Note.)

Crankshaft Pulley Lock Bolt Removal Note

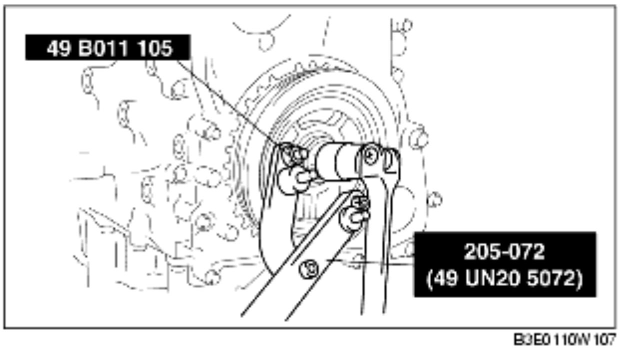
1. Remove the cylinder block lower blind plug.

2. Install the **SST**.



3. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the **SST**).

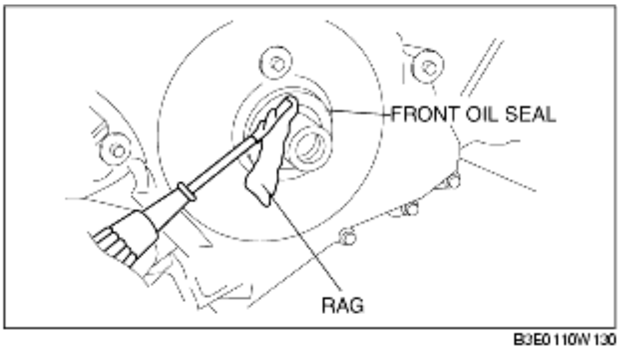
4. Hold the crankshaft pulley using the **SSTs**.



Front Oil Seal Removal Note

1. Cut the oil seal lip using a razor knife.

2. Remove the oil seal using a screwdriver wrapped with a rag.

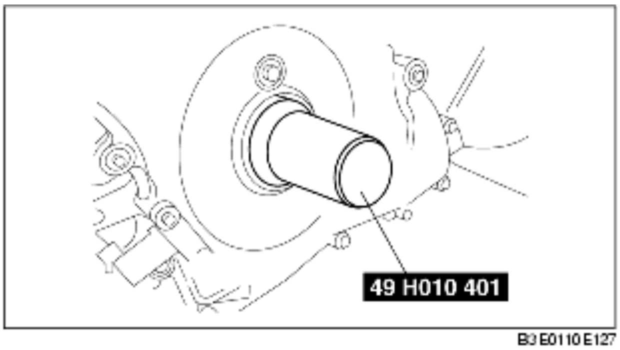


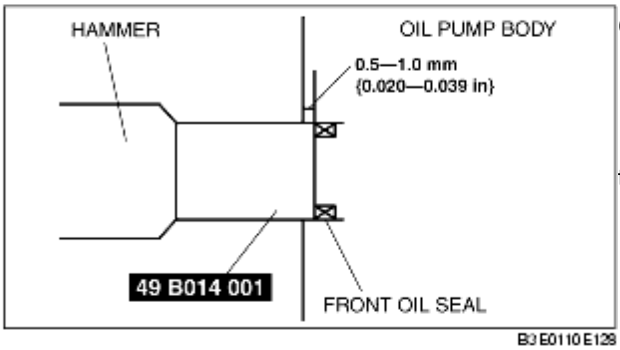
Front Oil Seal Installation Note

1. Apply clean engine oil to the oil seal lip.

2. Push the oil seal slightly in by hand.

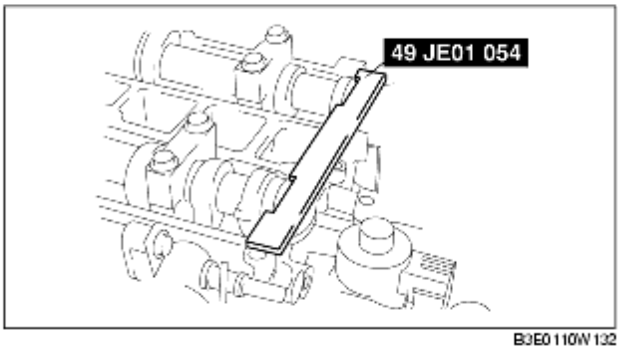
3. Tap the oil seal in evenly using the **SST** and a hammer.

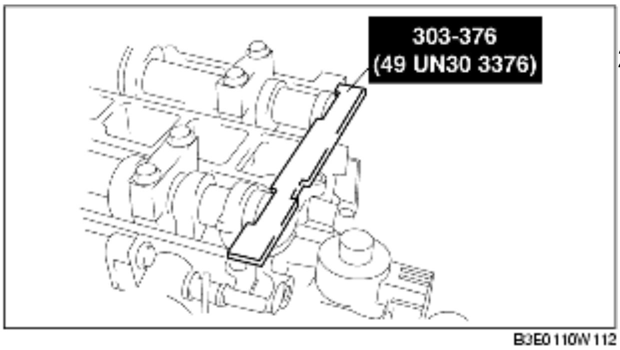




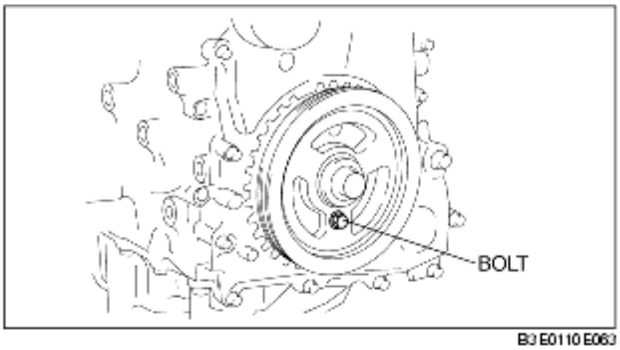
Crankshaft Pulley Lock Bolt Installation Note

1. Install the **SST** on the camshaft as shown in the figure.



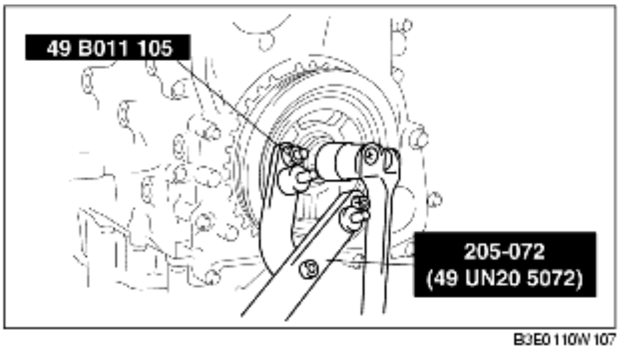


2. Install the **M6 x 1.0** bolt in by hand.



3. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the **SST**).

4. Hold the crankshaft pulley using the **SSTs**.



5. Tighten the crankshaft pulley lock bolt in the order shown following 2 steps using the **SST (49 D032 316)**.

Tightening torque

(1) 96-104 N·m

{9.8-10.6 kgf·m, 70.9-76.7 ft·lbf}

(2) 87°-93°

6. Remove the **M6 x 1.0** bolt.

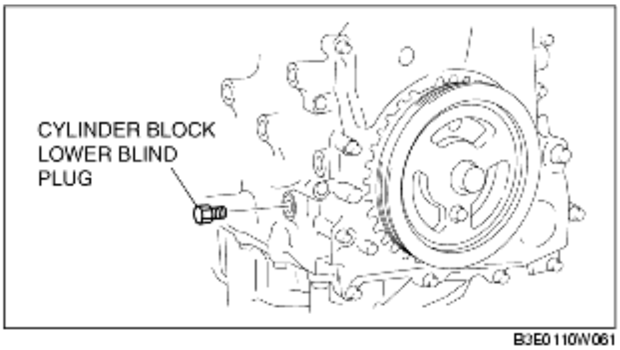
7. Remove the **SST** from the camshaft.

8. Remove the **SST** from the cylinder block lower blind plug.

9. Rotate the crankshaft clockwise 2 turns until the TDC position.

• If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 1.

10. Install the cylinder block lower blind plug.



Tightening torque

18-22 N·m {1.9-2.2 kgf·m, 14-16 ft·lbf}

REAR OIL SEAL REPLACEMENT [LF]

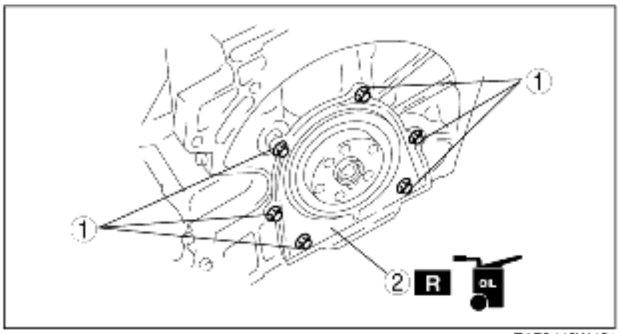
B3E011011399W02

1. Remove the manual transaxle (See CLUTCH UNIT REMOVAL/INSTALLATION.)

2. Remove the flywheel (See CLUTCH UNIT REMOVAL/INSTALLATION.)

3. Remove in the order indicated in the table.

4. Install in the reverse order of removal.

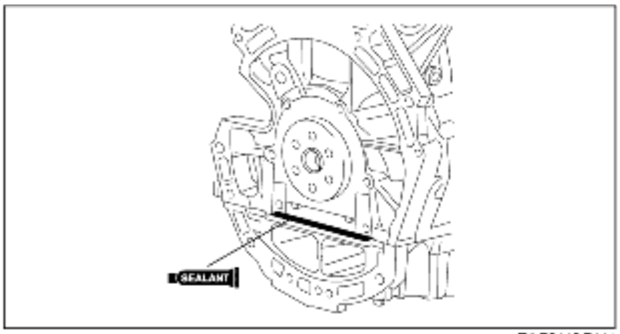


B3E0110W124

1	Bolt
2	Rear oil seal (See Rear Oil Seal Installation Note.)

Rear Oil Seal Installation Note

1. Apply silicone sealant to the mating faces as shown in the figure.



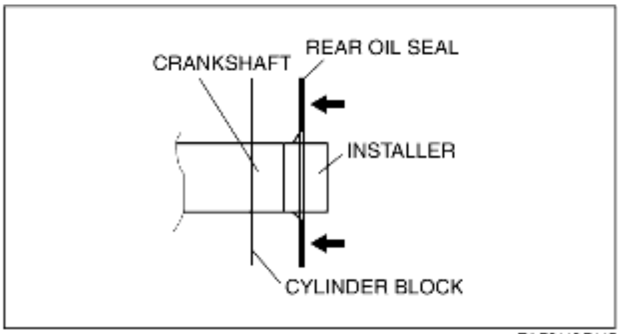
B3E0110E114

Thickness

4.0-6.0 mm {0.16-0.23 in}

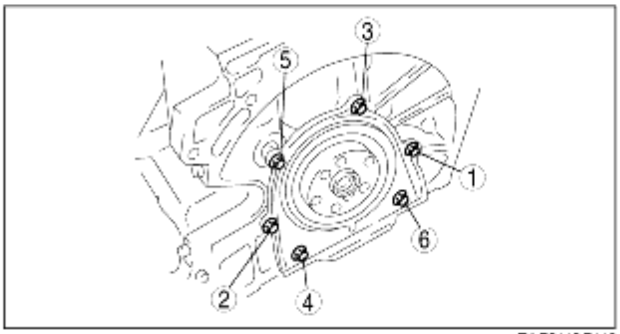
2. Apply clean engine oil to the new oil seal lip.

3. Install the rear oil seal using the installer as shown in the figure.



B3E0110E115

4. Tighten the rear oil seal bolts in the order as shown in the figure.



B3E0110E116

Tightening torque

8.0-11.5 N·m

{81.6-117.2 kgf·cm, 70.9-101.7 in·lbf}

ENGINE REMOVAL/INSTALLATION [LF]

B3E011001001W04

Warning

• Fuel vapor is hazardous. It can very 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 the "Fuel Line Safety Procedure". (See Fuel Line Safety Procedure.)

1. Remove the plug hole plate (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

2. Remove the air hose and air cleaner component (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

3. Remove the battery cover, battery duct, battery clamp, battery and battery tray (See BATTERY REMOVAL/INSTALLATION [LF].)

4. Disconnect the fuel hose (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)

5. Remove the following parts.

(1) Accelerator cable and bracket.

(2) Front wheels and tires (See GENERAL PROCEDURES (SUSPENSION).)

(3) Under cover and splash shields.

(4) A/C drive belt (See DRIVE BELT REPLACEMENT [LF].)

(5) A/C compressor with the pipes still connected.

Note

• Secure the A/C compressor using wire or rope so that it is out of the way.

6. Drain the transaxle oil (MTX) (See TRANSAXLE OIL REPLACEMENT [F35M-R].)

7. Drain the engine coolant (See ENGINE COOLANT REPLACEMENT.)

8. Disconnect the brake vacuum hose.

9. Remove the following parts.

(1) Member (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)

(2) Front crossmember, front stabilizer, lower arm, steering gear and No.1 engine mount rubber component (See STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.)

(3) Drive shafts (See DRIVE SHAFT REMOVAL/INSTALLATION.)

(4) Coolant reserve tank with the hose still connected.

(5) Cooling fan component (See RADIATOR REMOVAL/INSTALLATION.)

(6) Shift cable (MTX) (See MANUAL TRANSAXLE REMOVAL/INSTALLATION [G35M-R].)

(7) Clutch release cylinder with the pipe still connected (MTX) (See CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION.)

10. Disconnect the heater hose.

11. Disconnect the Upper and lower radiator hose.

12. Disconnect the Main silencer (See EXHAUST SYSTEM REMOVAL/INSTALLATION [LF].)

13. Remove in the order indicated in the table.

14. Install in the reverse order of removal.

Caution

• Do not tighten the No.1 engine mount rubber installation bolt before tightening the No.4 engine mount rubber installation bolt. (See No.3 Engine Mount and No.4 Engine Mount Rubber Installation Note.)

15. Start the engine. And inspect and adjust them if necessary.

16. Inspect the following and adjust them if necessary.

• Front wheel alignment (See FRONT WHEEL ALIGNMENT.)

• Puller and belt for runout and contact.

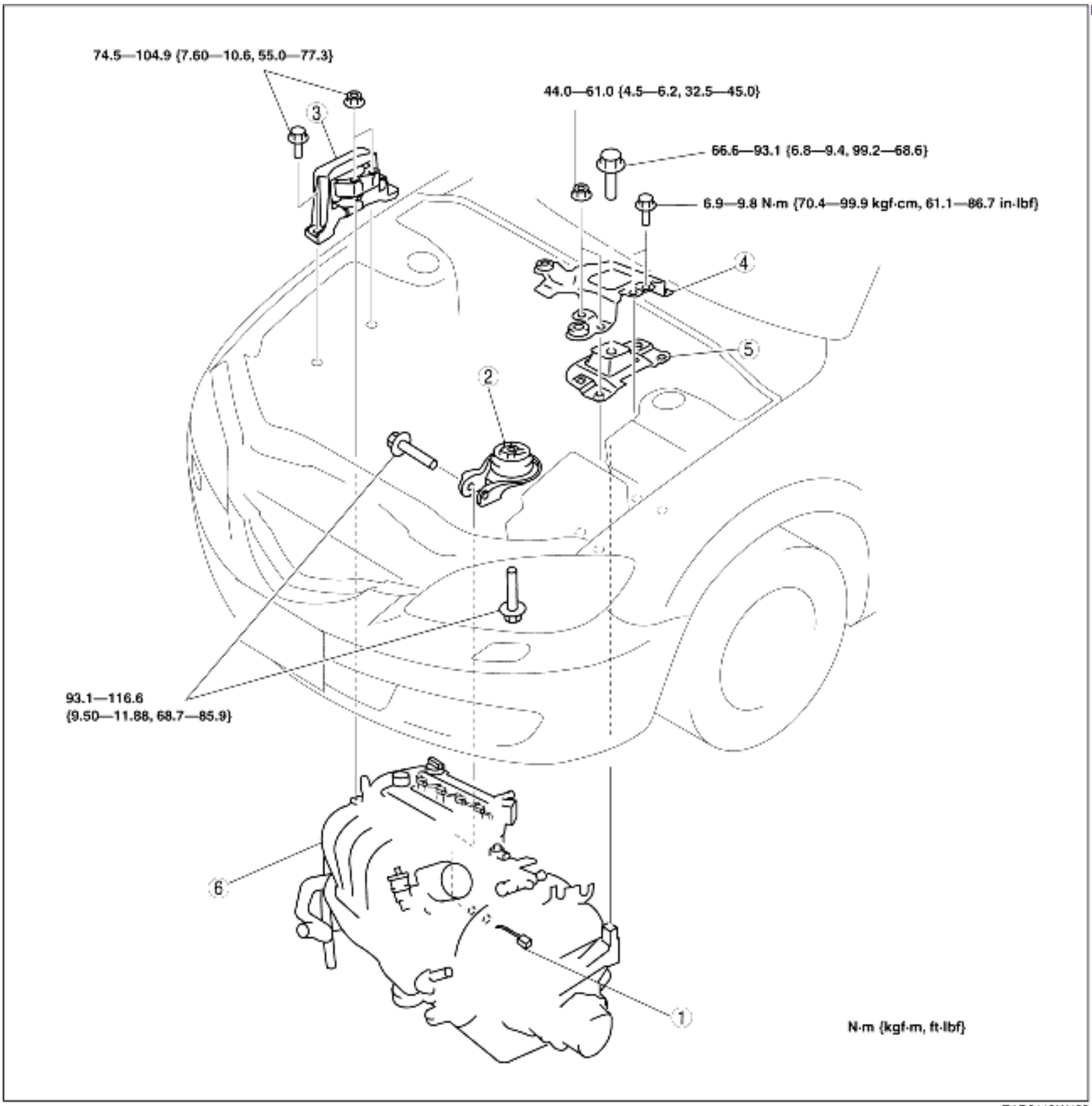
• Leakage of engine oil, engine coolant, MT oil, and fuel.

• Ignition timing and idle speed. Verify the amount of CO, HC. (See ENGINE TUNE-UP [LF].)

• Engine-driven accessories operation.

Note

• If the engine is overhauled and installed to the vehicle, perform the road test and verify that there is no abnormality.



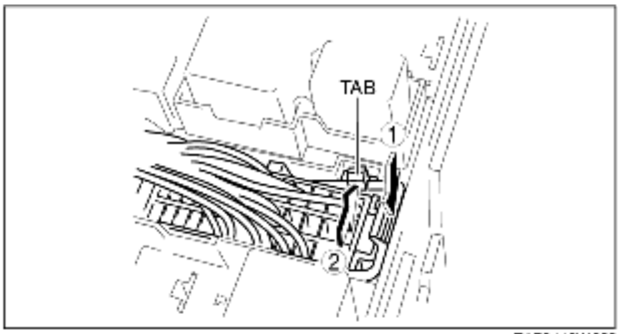
B3E0110W122

1	Main fuse block connector (See Main Fuse Block Connector Removal Note.)
2	No.1 engine mount rubber (See No.1 Engine Mount Rubber Installation Note.)
3	No.3 Engine mount (See No.3 Engine Mount and No.4 Engine Mount Rubber Removal Note.) (See No.3 Engine Mount and No.4 Engine Mount Rubber Installation Note.)
4	Battery bracket
5	No.4 Engine mount rubber

	(See No.3 Engine Mount and No.4 Engine Mount Rubber Removal Note.) (See No.3 Engine Mount and No.4 Engine Mount Rubber Installation Note.)
6	Engine, transaxle

Main Fuse Block Connector Removal Note

1. Release the tab in the order shown in the figure.

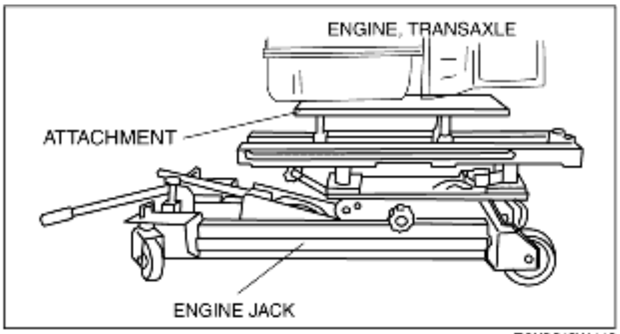


B3E0110W022

2. Pull the lock lever up and remove the connector.

No.3 Engine Mount and No.4 Engine Mount Rubber Removal Note

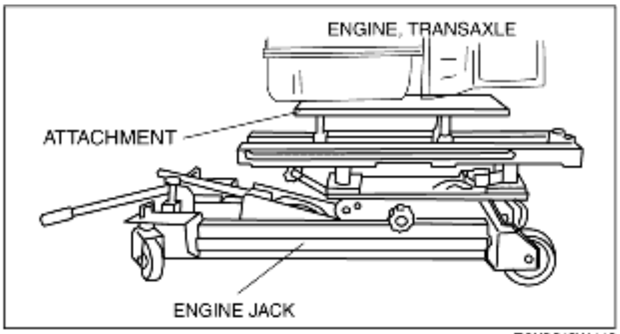
1. Secure the engine and the transaxle using an engine jack and attachment as shown in the figure.



B6U2219W110

No.3 Engine Mount and No.4 Engine Mount Rubber Installation Note

1. Secure the engine and the transaxle using an engine jack and attachment as shown in the figure.



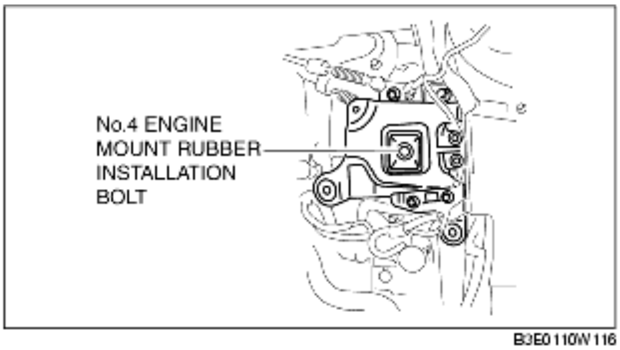
B6U2219W110

2. Install the No.1 engine mount rubber and No.4 engine mount rubber.

Note

• Do not tighten the bolt and nut for the No.1 engine mount rubber and No.4 engine mount rubber during this step.

3. Tighten the No.4 engine mount rubber installation bolt as shown in the figure.

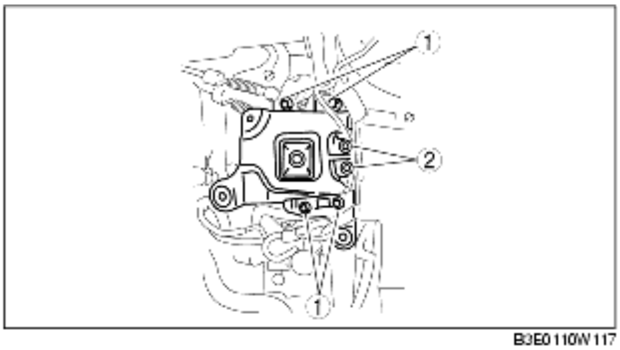


Tightening torque

66.6-93.1 N·m

{6.8-9.4 kgf·m, 49.2-68.6 ft·lbf}

4. Tighten the No.4 engine mount rubber and battery bracket bolts and nuts in the order as shown in the figure.



Tightening torque

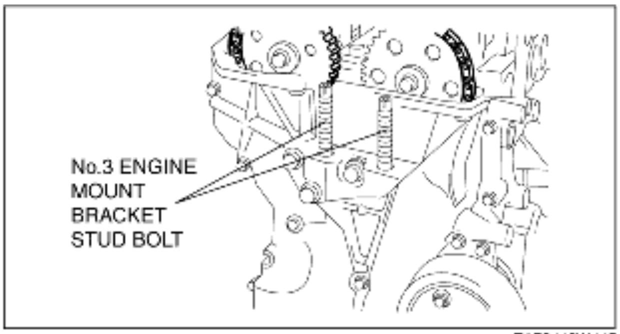
(1) 44.0-61.0 N·m

{4.5-6.2 kgf·m, 32.5-44.9 ft·lbf}

(2) 6.9-9.8 N·m

{70.4-99.9 kgf·cm, 61.1-86.7 in·lbf}

5. Tighten the No.3 engine mount bracket stud bolts.

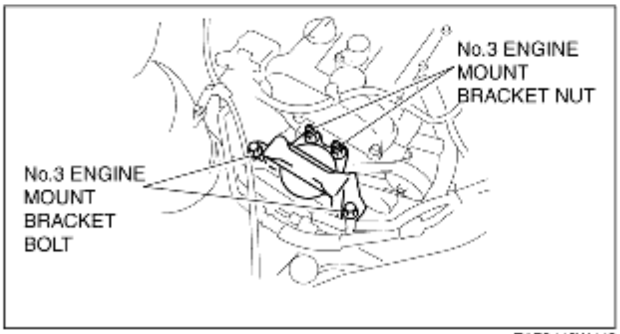


Tightening torque

7.0-13 N·m

{71.4-132.5 kgf·cm, 62.0-115.0 in·lbf}

6. Tighten the No.3 engine joint bracket bolts and nuts in the order as shown in the figure.



Tightening torque

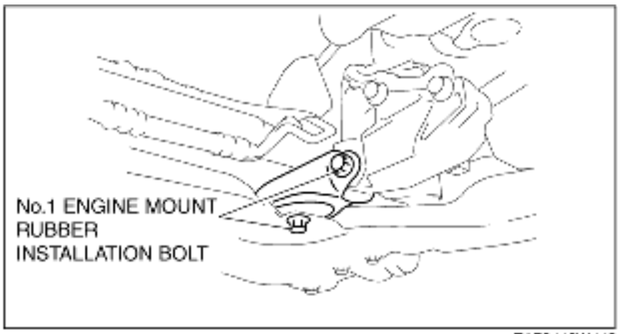
74.5-104.9 N·m

{7.60-10.6 kgf·m, 55.0-77.3 ft·lbf}

No.1 Engine Mount Rubber Installation Note

1. Remove the engine jack and attachment.

2. Tighten the No.1 engine mount rubber installation bolts as shown in the figure.



Tightening torque

93.1-116.6 N·m

{9.50-11.88 kgf·m, 68.7-85.9 ft·lbf}

ENGINE DISASSEMBLY/ASSEMBLY [LF]

B3E011001001W05

1. Disconnect the engine and manual transaxle. (See MANUAL TRANSAXLE REMOVAL/INSTALLATION [F35M-R].)

2. Remove the following part:

(1) the intake-air system. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

(2) the generator. (See GENERATOR REMOVAL/INSTALLATION [LF].)

(3) the ignition coils. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

(4) the crankshaft position (CKP) sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF].)

3. Assemble in the reverse order of disassembly.

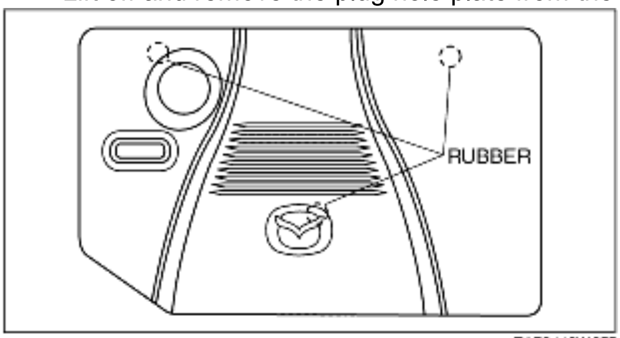
PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]

B3E011000149W01

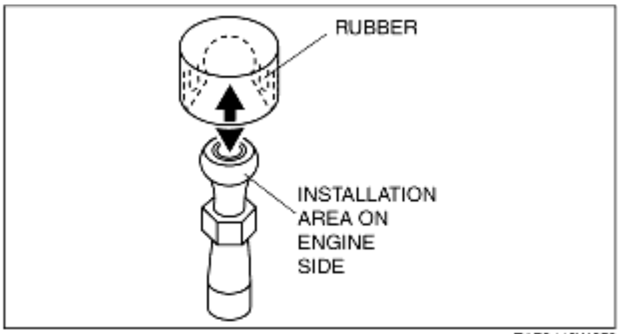
1. Remove the plug hole plate.

Note

• Lift off and remove the plug hole plate from the installation areas as shown in the figure.



B3E0110W055



B3E0110W056

2. Install the plug hole plate.

ENGINE TUNE-UP [LF]

B3E011001001W06

Engine Tune-up Preparation

1. Turn off all electrical loads.

2. Warm up the engine as follows.

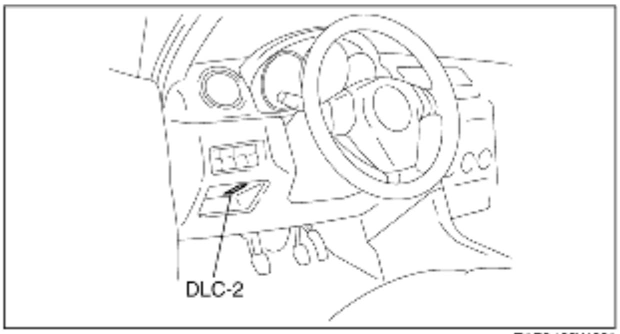
   (1) Start the engine.

   (2) Maintain the engine speed **2,500-3,000 rpm** until the cooling fans start to operate.

   (3) Release the accelerator pedal.

   (4) Wait until the cooling fans stop.

3. Connect the **SST** (WDS or equivalent) to the DLC-2.



B3E0102W003

Ignition Timing Inspection

Note

• Ignition timing is not adjustable.

• Ignition timing verification requires WDS or equivalent.

1. Verify that the ignition timing (WDS: SPARKADV PID) is within the specification using WDS or equivalent.

Ignition timing

Approx. BTDC 8°

2. Verify that ignition timing advances when the engine speed increases gradually.

Idle Speed Inspection

Note

• Idle speed is not adjustable.

• Idle speed verification requires WDS or equivalent.

1. Verify that the idle speed (WDS: RPM PID) is within the specification using WDS or equivalent.

Idle speed

Condition	Engine speed (rpm)*1
No load	600-700
Electrical loads*2 ON (38-48A)	650-750
Electrical loads*2 ON (Above 42A)	700-800
A/C ON and refrigerant pressure switch (middle) OFF	700-800
A/C ON and refrigerant pressure switch (middle) ON	700-800

*1 :

Excludes temporary idle speed drop just after the electrical loads are turned on.

*2 :

Alternator generating current value.

Idle Mixture Inspection

1. Verify that the idle speed and ignition timing are within the specification. (See Idle Speed Inspection.) (See Ignition Timing Inspection.)

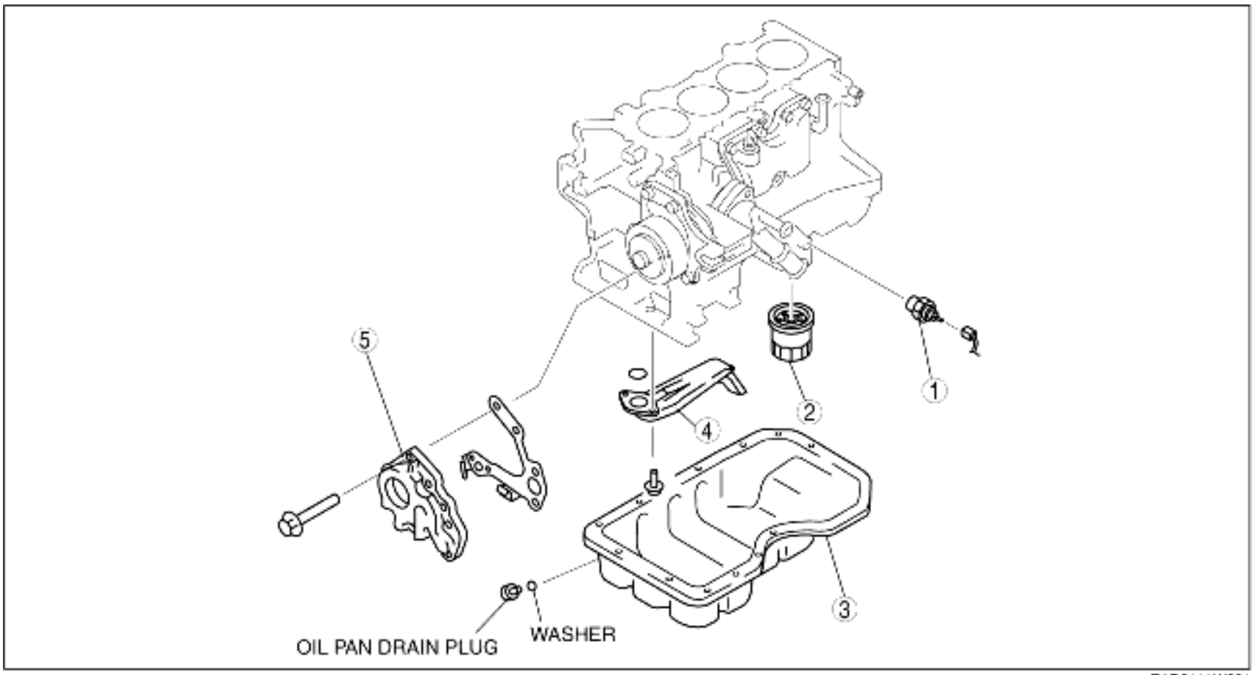
2. Insert an exhaust gas analyzer to the tailpipe.

3. Verify that the CO and HC concentrations are within the regulation.

LUBRICATION

LUBRICATION SYSTEM LOCATION INDEX [Z6]

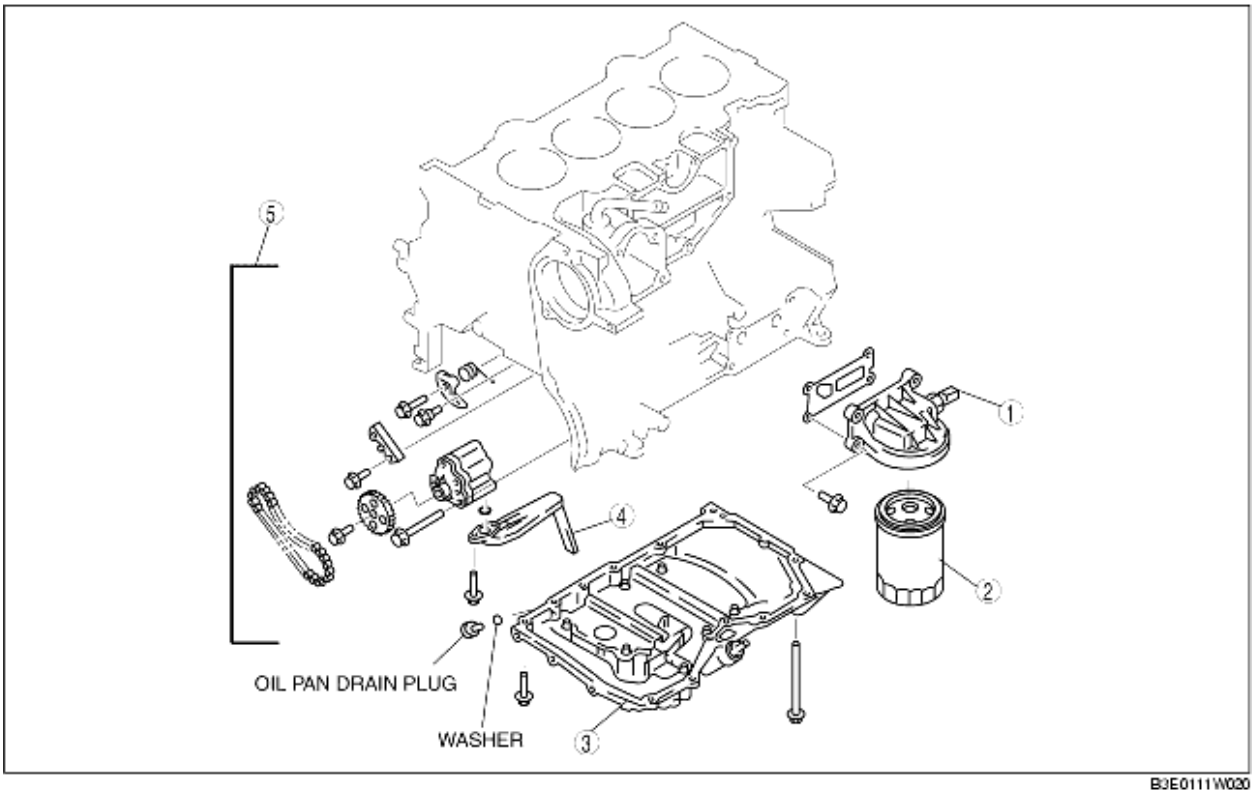
B3E011101003W01



1	Oil pressure switch (See OIL PRESSURE INSPECTION [Z6].)
2	Oil filter (See OIL FILTER REPLACEMENT [Z6].)
3	Oil pan (See OIL PAN REMOVAL/INSTALLATION [Z6].)
4	Oil strainer (See OIL PAN REMOVAL/INSTALLATION [Z6].)
5	Oil pump (See OIL PUMP REMOVAL/INSTALLATION [Z6].) (See OIL PUMP DISASSEMBLY/ASSEMBLY [Z6].) (See OIL PUMP INSPECTION [Z6].)

LUBRICATION SYSTEM LOCATION INDEX [LF]

B3E011101003W02



1	Oil pressure switch (See OIL PRESSURE INSPECTION [LF].)
2	Oil filter (See OIL FILTER REPLACEMENT [LF].)
3	Oil pan (See OIL PAN REMOVAL/INSTALLATION [LF].)
4	Oil strainer (See OIL PUMP REMOVAL/INSTALLATION [LF].)
5	Oil pump component (See OIL PUMP REMOVAL/INSTALLATION [LF].)

OIL PRESSURE INSPECTION [Z6]

B3E011101003W03

Warning

• Continuous exposure with used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

• Hot engines and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.

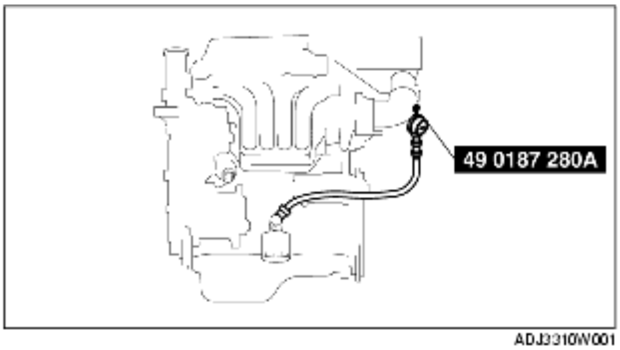
1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Remove the under cover.

4. Remove the oil pressure switch.

5. Screw the **SST** into the oil pressure switch installation hole.



6. Warm up the engine to normal operating temperature.

7. Run the engine at the specified speed, and note the gauge readings.

• If not within the specification, inspect for the cause and repair or replace if necessary.

Note

• The oil pressure can vary with oil viscosity and temperature.

Oil pressure [oil temperature: 100°C {212°F}] (approx. quantity)

330380 kPa {3.36-3.87 kgf/cm^2, 47.8-55.0 psi} min [3,000 rpm]

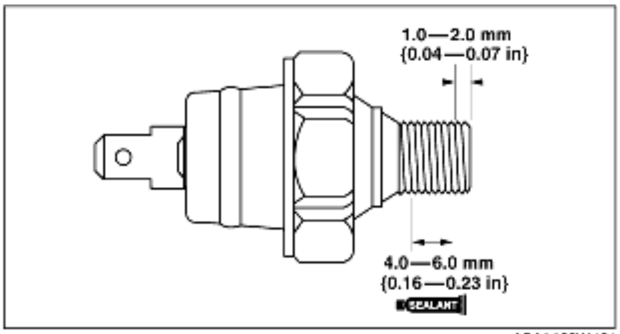
8. Stop the engine and wait until it is cool.

9. Remove the **SST**.

Caution

• Be sure there is no sealant between 1.0-2.0 mm {0.04-0.07 in} from the end of the oil pressure switch to prevent a possible operation malfunction.

10. Apply silicone sealant to the oil pressure switch threads.



ADA3300W 101

11. Install the oil pressure switch.

Tightening torque

1217 Nm {1.2-1.8 kgf·m, 9-13 ft·lbf}

12. Install the under cover.

13. Connect the negative battery cable.

14. Install the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

15. Start the engine and inspect for oil leakage.

• If the oil leaks, specify the malfunctioning part and repair or replace it.

OIL PRESSURE INSPECTION [LF]

B3E011101003W04

Warning

• Continuous exposure to used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

• Hot engines and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.

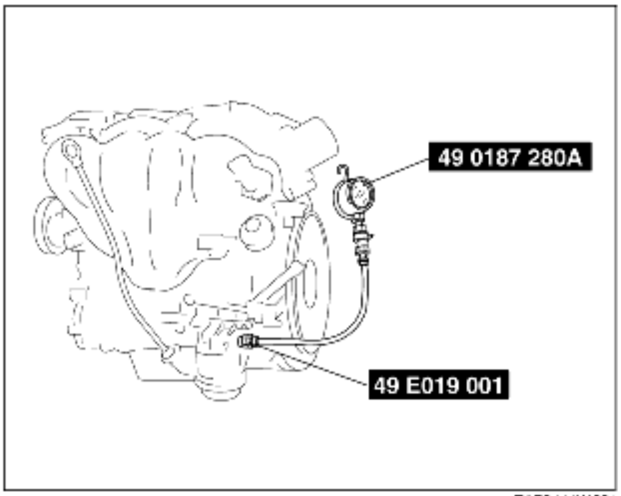
1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

2. Disconnect the negative battery cable.

3. Remove the under cover.

4. Remove the oil pressure switch.

5. Screw the **SST** into the oil pressure switch installation hole.



B3E0111W004

6. Warm up the engine to normal operating temperature.

7. Run the engine at the specified speed, and note the gauge readings.

• If the pressure is not as specified, inspect for the cause and repair or replace if necessary.

Note

• The oil pressure can vary with oil viscosity and temperature.

Oil pressure [oil temperature: 100°C {212°F}] (approx. quantity)

234-521 kPa {2.39-5.31 kgf/cm^2, 33.9-75.5 psi} min [3,000rpm]

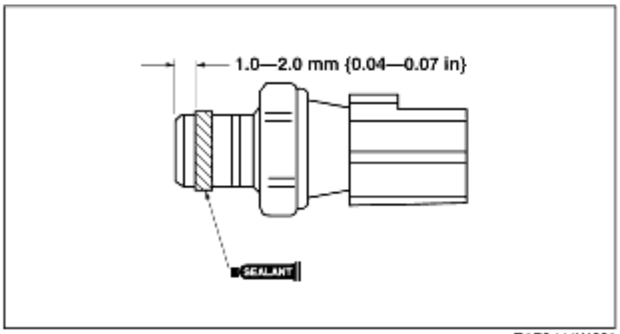
8. Stop the engine and wait until it is cool.

9. Remove the **SST**.

Caution

• Be sure there is no sealant between 1.0-2.0 mm {0.04-0.07 in} from the end of the oil pressure switch to prevent a possible operation malfunction.

10. Apply silicone sealant to the oil pressure switch threads as shown.



B3E0111W003

11. Install the oil pressure switch.

Tightening torque

12-18 N·m {1.2-1.8 kgf·m, 9-13 ft·lbf}

12. Install the under cover.

13. Connect the negative battery cable.

14. Install the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

15. Start the engine and inspect for oil leakage.

- If the oil leaks, specify the malfunctioning part and repair or replace it.

ENGINE OIL LEVEL INSPECTION [Z6]

B3E011114001W01

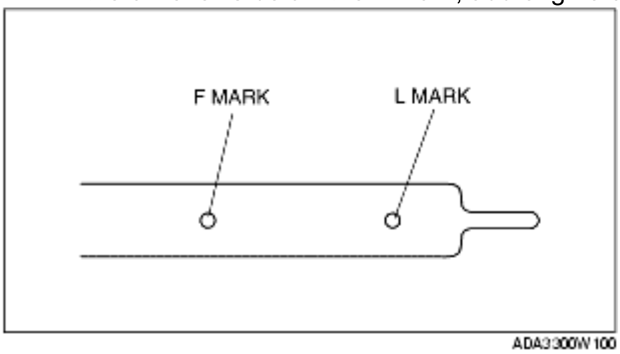
1. Position the vehicle on level ground.

2. Warm up the engine.

3. Stop the engine and allow **approx. 5 min** before continuing.

4. Remove the dipstick and verify that the oil level is between the F and L marks on the dipstick.

- If the oil level is below the L mark, add engine oil.



ENGINE OIL LEVEL INSPECTION [LF]

B3E011114001W02

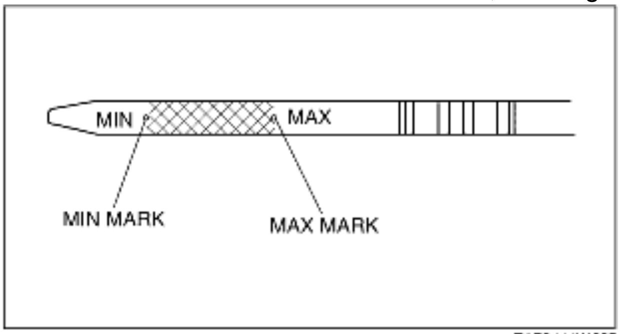
1. Position the vehicle on level ground.

2. Warm up the engine.

3. Stop the engine and allow **approx. 5 min** before continuing.

4. Remove the dipstick and verify that the oil level is between the MAX and MIN marks on the dipstick.

• If the oil level is below the MIN mark, add engine oil.



ENGINE OIL REPLACEMENT [Z6]

B3E011114001W03

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.

• Continuous exposure to used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

Caution

• In case you spill engine oil on the exhaust system, wipe it off completely. If you fail to wipe the spilled engine oil, it will produce fumes because of the heat.

1. Position the vehicle on level ground.

2. Remove the oil filler cap.

3. Remove the oil pan drain plug.

4. Drain the engine oil into a container.

5. Install the oil pan drain plug with a new washer.

Oil pan drain plug tightening torque

3041 N·m {3.1-4.1 kgf·m, 23-30 ft·lbf}

Note

• The amount of residual oil in the engine can vary according to factors such as the replacement method, oil temperature. Verify the oil level after engine oil replacement.

6. Refill the engine with the type and amount of engine oil specified in the table.

Recommended engine oil

Item	Specifications			
	Europe			Except Europe
Grade	API SL, ACEA A3			API SG, SH, SJ, SL, ILSAC GF-2, GF-3
Viscosity (SAE)	5W-30	10W-40	5W-20	40, 30, 20, 20W-20, 10W-30, 10W-40, 10W-50, 20W-40, 15W-40, 20W-50, 15W-50, 5W-20, 5W-30
Remarks	**Mazda genuine Dexelia oil e.g.**		-	-

Oil capacity (approx. quantity)

L {US qt, Imp qt}

Item	Specifications
Oil replacement	3.7 {3.9, 3.3}
Oil and oil filter replacement	3.9 {4.1, 3.4}
Total (dry engine)	4.2 {4.4, 3.7}

7. Install the oil filler cap.

8. Start the engine and confirm that there is no oil leakage.

  • If there is oil leakage, find the cause and repair or replace the applicable part.

9. Inspect the oil level. (See ENGINE OIL LEVEL INSPECTION [Z6].)

ENGINE OIL REPLACEMENT [LF]

B3E011114001W04

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.

• Continuous exposure to used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

Caution

• In case you spill engine oil on the exhaust system, wipe it off completely. If you fail to wipe the spilled engine oil, it will produce fumes because of the heat.

1. Position the vehicle on level ground.

2. Remove the oil filler cap.

3. Remove the oil pan drain plug.

4. Drain the engine oil into a container.

5. Install the oil pan drain plug with a new washer.

Oil pan drain plug tightening torque

30-41 N·m {3.1-4.1 kgf·m, 23-30 ft·lbf}

Note

• The amount of residual oil in the engine can vary according to factors such as the replacement method, oil temperature. Verify the oil level after engine oil replacement.

6. Refill the engine with the type and amount of engine oil specified in the table.

Recommended engine oil

Item	**Specifications**			
	Europe			**Except Europe**
Grade	API SL, ACEA A3			API SG, SH, SJ, SL, ILSAC GF-2, GF-3
Viscosity (SAE)	5W-30	10W-40	5W-20	40, 30, 20, 20W-20, 10W-30, 10W-40, 10W-50, 20W-40, 15W-40, 20W-50, 15W-50, 5W-20, 5W-30
Remarks	**Mazda genuine Dexelia oil e.g.**		-	-

Oil capacity (approx. quantity)

L {US qt, Imp qt}

Item	**Specifications**
Oil replacement	3.9 {4.1, 3.4}
Oil and oil filter replacement	4.3 {4.5, 3.8}
Total (dry engine)	4.6 {4.9, 4.0}

7. Install the oil filler cap.

8. Start the engine and confirm that there is no oil leakage.

• If there is oil leakage, find the cause and repair or replace the applicable part.

9. Inspect the oil level. (See ENGINE OIL LEVEL INSPECTION [LF].)

OIL FILTER REPLACEMENT [Z6]

B3E011114300W01

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.

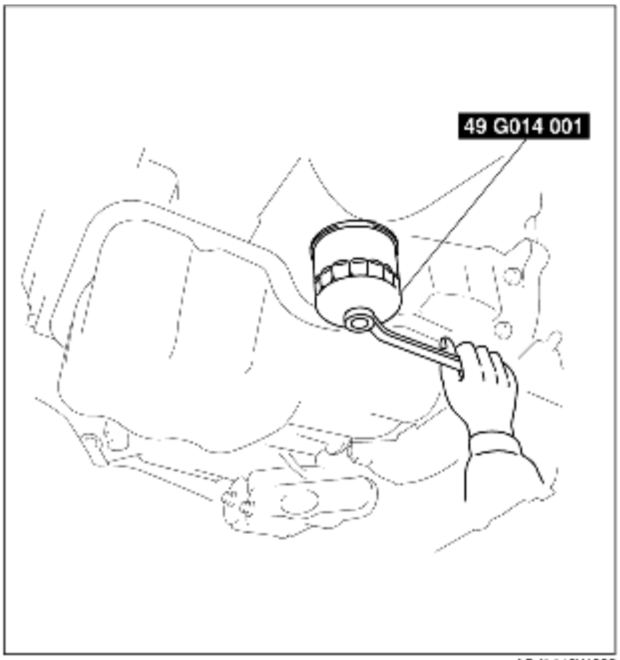
• Continuous exposure to used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

Caution

• In case you spill engine oil on the exhaust system, wipe it off completely. If you fail to wipe the spilled engine oil, it will produce fumes because of the heat.

1. Remove the under cover.

2. Remove the oil filter using the **SST**.



ADJ3310W002

3. Use a clean rag to wipe off the mounting surface on the cylinder block.

4. Apply clean oil to the O-ring of a new oil filter.

5. Install the oil filter using the **SST** with specified tightening torque.

Tightening torque

11.715.7 N·m {1.2-1.6 kgf·m, 8.7-11.5 ft·lbf}

6. Fill with the specified amount of engine oil. (See ENGINE OIL REPLACEMENT [Z6].)

7. Start the engine and confirm that there is no oil leakage.

• If there is oil leakage, find the cause and repair or replace the applicable part.

8. Inspect the oil level. (See ENGINE OIL LEVEL INSPECTION [Z6].)

9. Install the under cover.

OIL FILTER REPLACEMENT [LF]

B3E011114300W02

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.

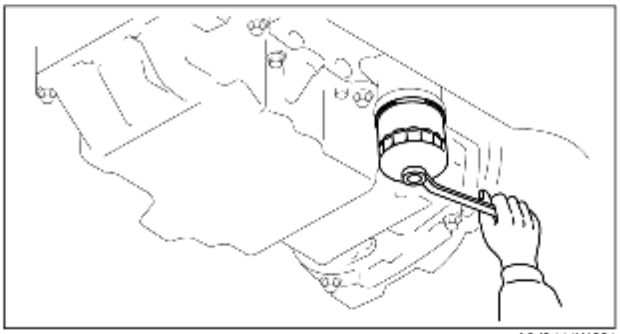
• Continuous exposure to used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

Caution

• In case you spill engine oil on the exhaust system, wipe it off completely. If you fail to wipe the spilled engine oil, it will produce fumes because of the heat.

1. Remove the under cover.

2. Remove the oil filter using a commercially available, cap-type oil filter wrench (**76 mm {3.0 in} diameter, 15 sided**).



A6J0111W001

3. Use a clean rag to wipe off the mounting surface.

4. Apply clean engine oil to the gasket of a new oil filter.

5. Tighten the oil filter using cap-type oil filter wrench with specified tightening torque.

Tightening torque

15-20 N·m {1.6-2.0 kgf·m, 11-14 ft·lbf}

6. Fill with the specified amount of engine oil. (See ENGINE OIL REPLACEMENT [LF].)

7. Start the engine and confirm that there is no oil leakage.

• If there is oil leakage, find the cause and repair or replace the applicable part.

8. Inspect the oil level. (See ENGINE OIL LEVEL INSPECTION [LF].)

9. Install the under cover.

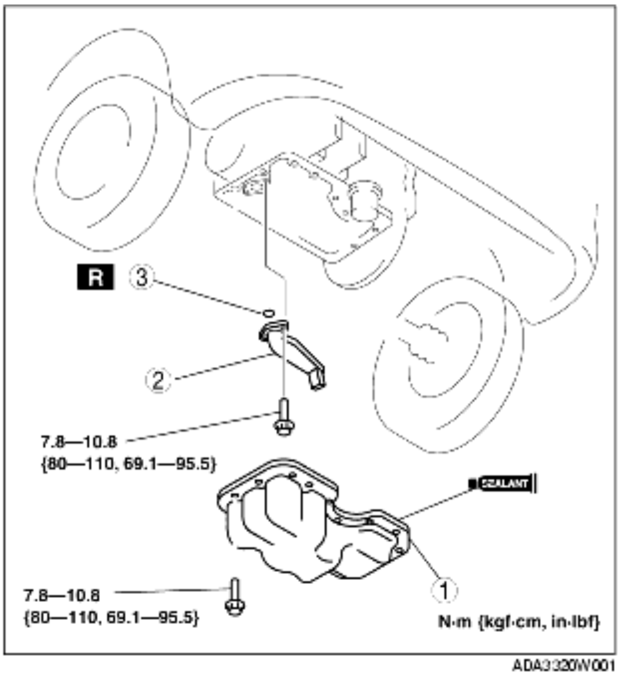
OIL PAN REMOVAL/INSTALLATION [Z6]

B3E011110040W01

Warning

- Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.
- A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.
- Continuous exposure to used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)
2. Disconnect the negative battery cable.
3. Remove the under cover.
4. Drain the engine oil. (See ENGINE OIL REPLACEMENT [Z6].)
5. Remove in the order indicated in the table.



1	Oil pan (See Oil Pan Removal Note.) (See Oil Pan Installation Note.)
2	Oil strainer

3	O-ring

6. Install in the reverse order of removal.

7. Add engine oil. (See ENGINE OIL REPLACEMENT [Z6].)

8. Start the engine and confirm that there is no oil leakage from areas worked on.

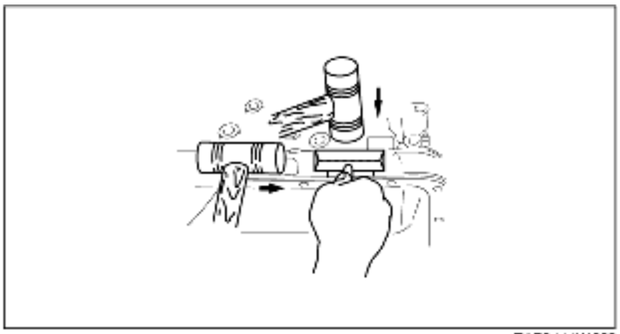
- If there is oil leakage, find the cause and repair or replace the applicable part.

9. Inspect the oil level. (See ENGINE OIL LEVEL INSPECTION [Z6].)

10. Install the under cover.

Oil Pan Removal Note

1. Remove the oil pan using the separator tool.

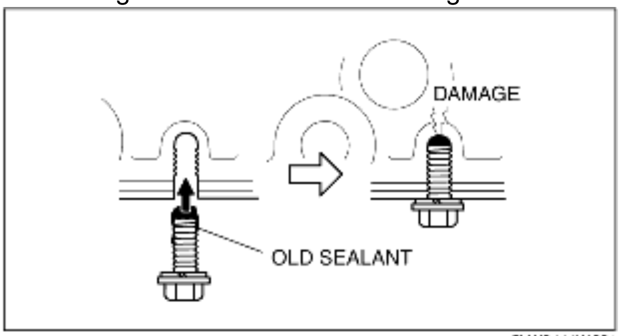


B3E0111W008

Oil Pan Installation Note

Caution

- Apply the silicon sealant in a single, unbroken line around the whole perimeter.
- Install the oil pan within 5 min after applying the silicone sealant.
- Using bolts with the seal adhering could cause cracks in the housing.

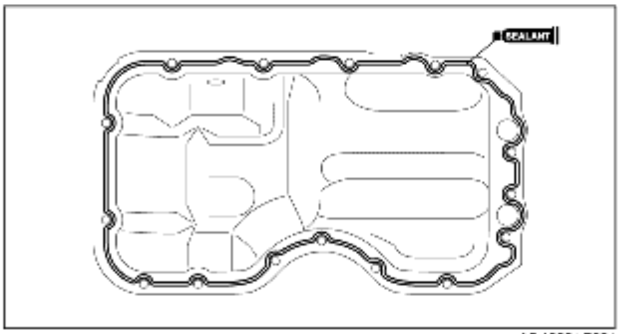


CHU0111W004

1. Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the housing and oil pan.

2. When reusing oil pan installation bolts, clean any old sealant from the bolts.

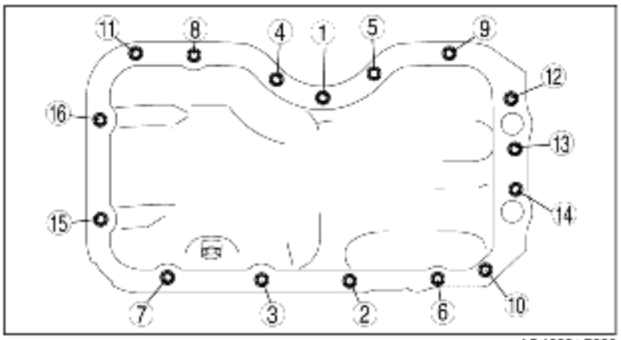
3. Apply silicone sealant to the areas shown in th figure.



Thickness

2.06.0 mm {0.080.24 in}

4. Tighten the bolts in the order shown.



Tightening torque

7.810.8 N·m {80-110 kgf·cm, 69.1-95.5 in·lbf}

OIL PAN REMOVAL/INSTALLATION [LF]

B3E011110040W02

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.

• Continuous exposure to used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

2. Disconnect the negative battery cable.

3. Remove the under cover and splash shield as a single unit.

4. Remove the front tire (RH).

5. Drain the engine oil. (See ENGINE OIL REPLACEMENT [LF].)

6. Remove the plug hole plate. (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

7. Remove the drive belt. (See DRIVE BELT REPLACEMENT [LF].)

8. Position the coolant reserve tank out of the way.

9. Remove the A/C compressor with the pipes still connected. (See A/C COMPRESSOR REMOVAL/INSTALLATION [LF].)

10. Remove the ignition coil. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

11. Position the accelerator cable bracket out of the way.

12. Remove the crankshaft position (CKP) sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF].)

13. Remove the engine front cover. (See TIMING CHAIN REMOVAL/INSTALLATION [LF].)

14. Remove in the order indicated in the table.

15. Install in the reverse order of removal.

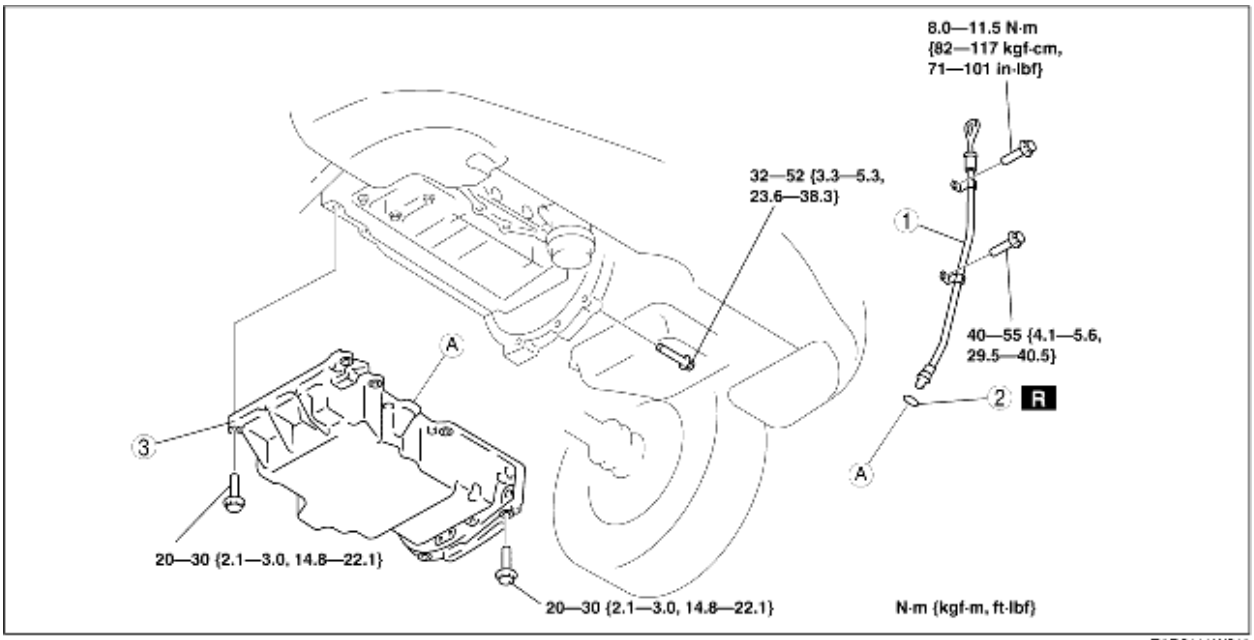
16. Refill the engine with the specified type and amount of the engine oil. (See ENGINE OIL REPLACEMENT [LF].)

17. Start the engine and inspect for oil leakage.

- If the oil leaks, specify the malfunctioning part and repair or replace it.

18. Inspect the oil level. (See ENGINE OIL LEVEL INSPECTION [LF].)

19. Inspect for the ignition timing and idle speed. (See ENGINE TUNE-UP [LF].)



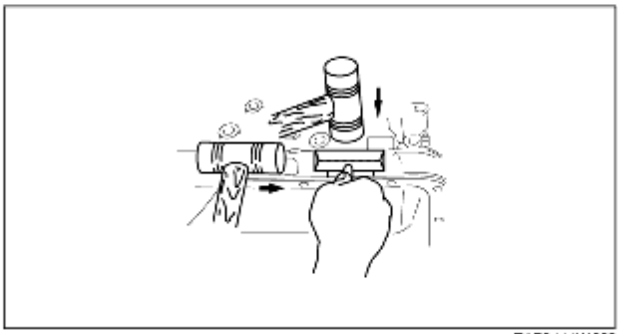
B3E0111W013

1	Oil level gauge pipe

2	O-ring
3	Oil pan (See Oil Pan Removal Note.) (See Oil Pan Installation Note.)

Oil Pan Removal Note

1. Remove the oil pan using the separator tool.



B3E0111W008

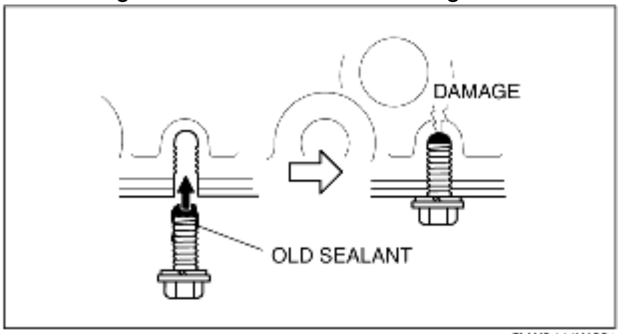
Oil Pan Installation Note

Caution

• Apply the silicon sealant in a single, unbroken line around the whole perimeter.

• Install the oil pan within 5 min after applying the silicone sealant.

• Using bolts with the seal adhering could cause cracks in the housing.

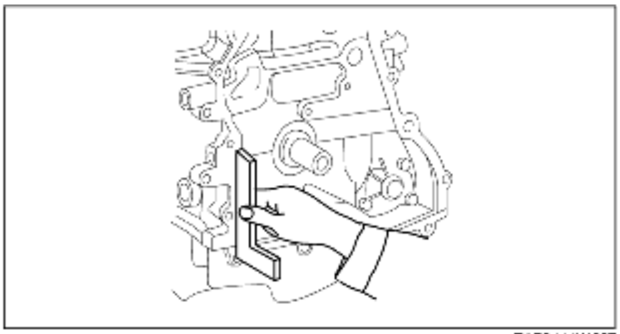


CHU0111W004

1. Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the housing and oil pan.

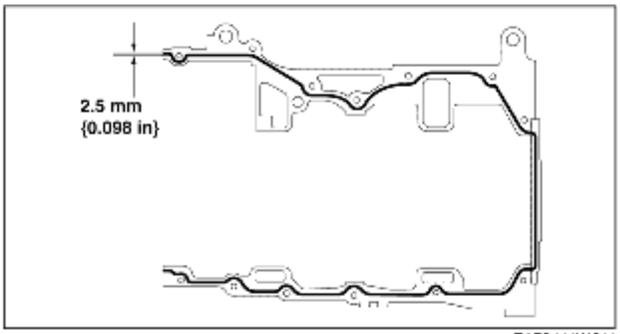
2. When reusing oil pan installation bolts, clean any old sealant from the bolts.

3. Use a square ruler to align the oil pan and the cylinder block junction side on the engine front cover side.



B3E0111W007

4. Apply silicone sealant to the oil pan along the inside of the bolt holes as shown.

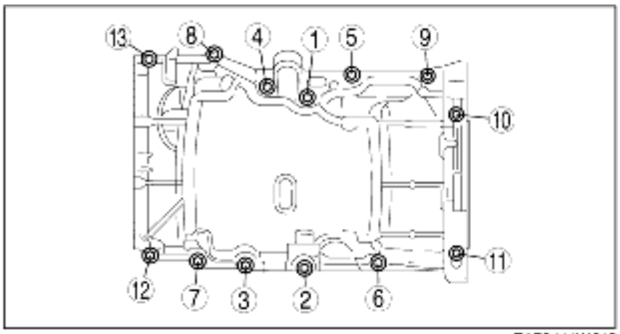


B3E0111W011

Thickness

2.5 mm {0.098 in}

5. Tighten the bolts in the order shown.



B3E0111W012

OIL PUMP REMOVAL/INSTALLATION [Z6]

B3E011119220W01

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.

• Continuous exposure to used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Remove the under cover and splash shield as a single unit.

4. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT.)

5. Position the coolant reserve tank out of the way.

6. Remove the power steering fluid tank with the hoses still connected.

7. Remove the power steering oil pump with the hoses and pipes still connected. (See POWER STEERING OIL PUMP (Z6) REMOVAL/INSTALLATION.)

8. Disconnect the crankshaft position (CKP) sensor connector. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6].)

9. Position the oil control valve (OCV) wiring harness out of the way.

10. Position the accelerator cable bracket out of the way.

11. Remove the following.

    (1) Front tire (RH)

    (2) Drive belt (See DRIVE BELT REPLACEMENT [Z6].)

    (3) Air cleaner case, PCM component, and fresh air duct (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

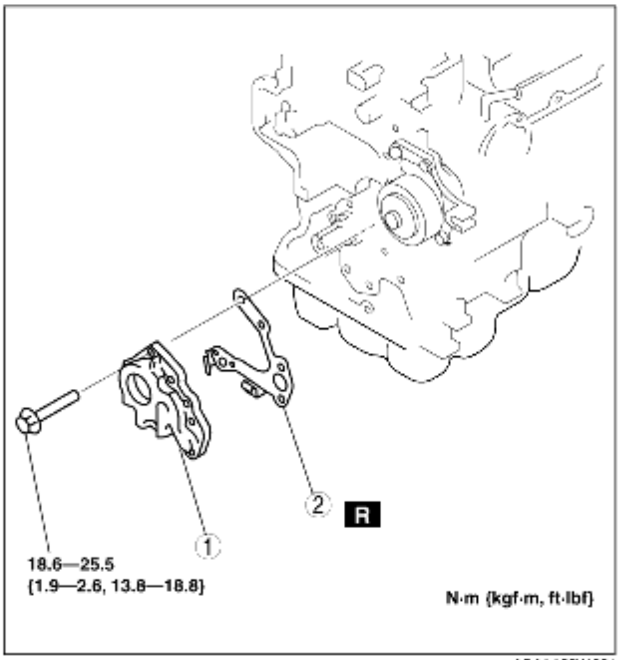
    (4) Ignition coil (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)

    (5) Generator (See GENERATOR REMOVAL/INSTALLATION [Z6].)

    (6) Water pump (See WATER PUMP REMOVAL/INSTALLATION [Z6].)

    (7) Timing chain (See TIMING CHAIN REMOVAL/INSTALLATION [Z6].)

12. Remove in the order indicated in the table.



ADA3322W001

1	Oil pump (See Oil Pump Installation Note.)
2	Oil pump gasket

13. Install in the reverse order of removal.

14. Add the engine coolant. (See ENGINE COOLANT REPLACEMENT.)

15. Start the engine and inspect for oil leakage.

- If the oil leaks, specify the malfunctioning part and repair or replace it.

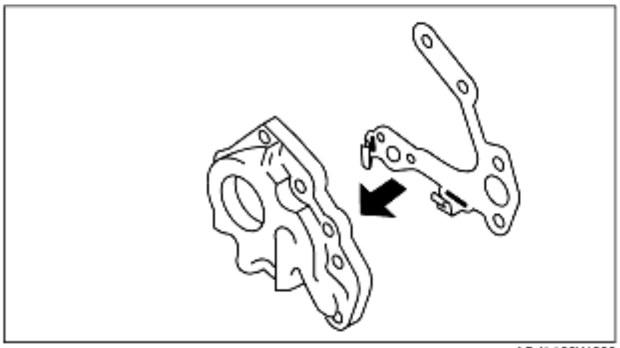
16. Inspect the oil pressure. (See OIL PRESSURE INSPECTION [Z6].)

17. Inspect the oil level. (See ENGINE OIL LEVEL INSPECTION [Z6].)

18. Inspect for the ignition timing and idle speed. (See ENGINE TUNE-UP [Z6].)

Oil Pump Installation Note

1. Install the oil pump gasket to the oil pump.



ADJ3300W200

2. Install the oil pump and the oil pump gasket to the engine as a single unit.

OIL PUMP REMOVAL/INSTALLATION [LF]

B3E011119220W02

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.

• Continuous exposure to used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

2. Disconnect the negative battery cable.

3. Remove the under cover and splash shield as a single unit.

4. Remove the front tire (RH).

5. Drain the engine oil. (See ENGINE OIL REPLACEMENT [LF].)

6. Remove the plug hole plate. (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

7. Remove the drive belt. (See DRIVE BELT REPLACEMENT [LF].)

8. Position the coolant reserve tank out of the way.

9. Remove the A/C compressor with the pipes still connected. (See A/C COMPRESSOR REMOVAL/INSTALLATION [LF].)

10. Remove the ignition coil. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

11. Remove the spark plug. (See SPARK PLUG REMOVAL/INSTALLATION [LF].)

12. Position the accelerator cable bracket out of the way.

13. Remove the crankshaft position (CKP) sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF].)

14. Remove the engine front cover. (See TIMING CHAIN REMOVAL/INSTALLATION [LF].)

15. Remove the oil pan. (See OIL PAN REMOVAL/INSTALLATION [LF].)

16. Remove in the order indicated in the table.

17. Install in the reverse order of removal.

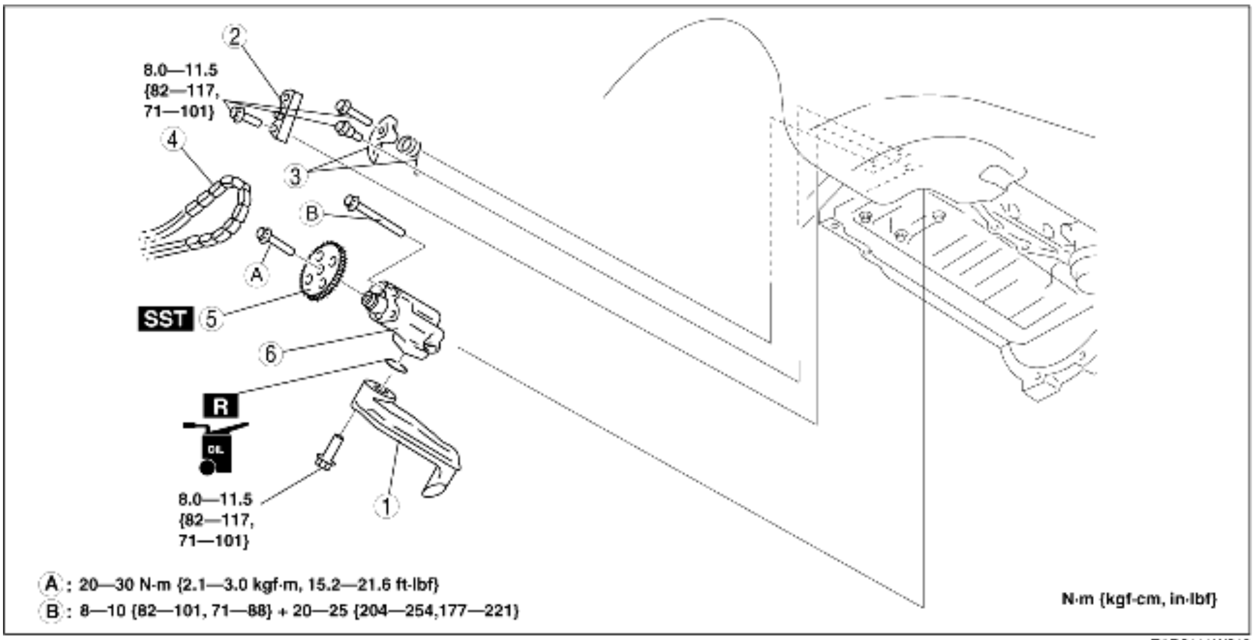
18. Refill the engine with the specified type and amount of the engine oil. (See ENGINE OIL REPLACEMENT [LF].)

19. Start the engine and inspect for oil leakage.

- If the oil leaks, specify the faulty part and repair or replace it.

20. Inspect the oil level. (See ENGINE OIL LEVEL INSPECTION [LF].)

21. Inspect for the ignition timing and idle speed. (See ENGINE TUNE-UP [LF].)

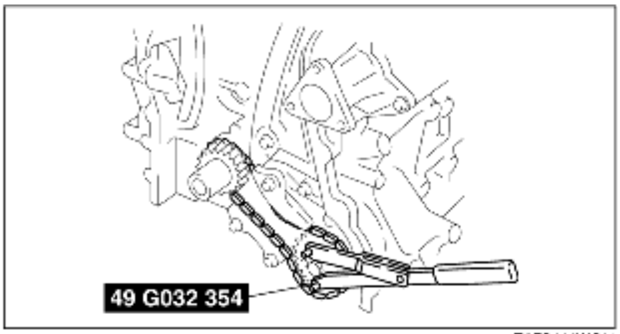


B3E0111W016

1	Oil strainer
2	Oil pump chain guide
3	Oil pump chain tensioner and spring component
4	Oil pump chain
5	Oil pump sprocket (See Oil Pump Sprocket Removal/Installation Note.)
6	Oil pump (See Oil Pump Installation Note.)

Oil Pump Sprocket Removal/Installation Note

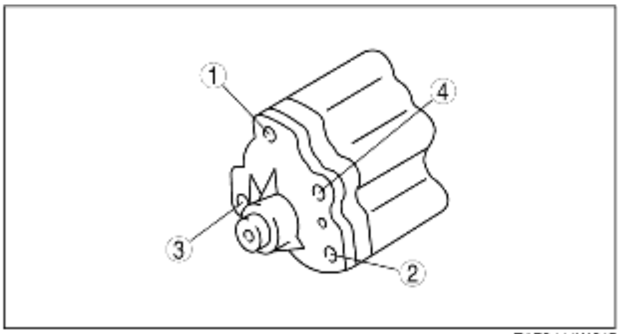
1. Install the **SST** to the oil pump sprocket to stop the oil pump from rotating.



B3E0111W014

Oil Pump Installation Note

1. Tighten the oil pump bolts in two steps in the order indicated in the figure.



B3E0111W015

Tightening torque:

1) 8-10 N·m {82-101 kgf·cm, 71-88 in·lbf}

2) 20-25 N·m {2.1-2.5 kgf·m, 15.2-18.4 ft·lbf}

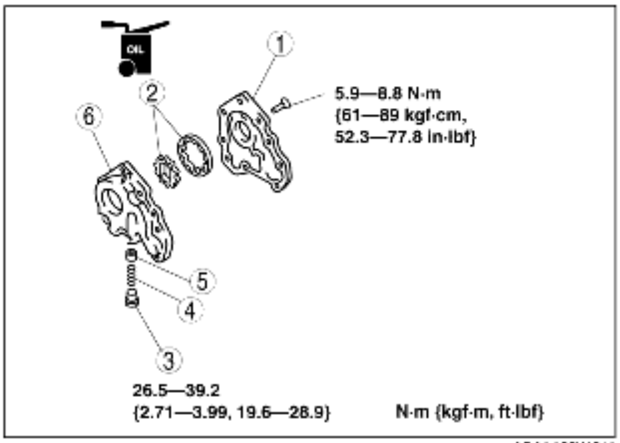
OIL PUMP DISASSEMBLY/ASSEMBLY [Z6]

B3E011119220W03

Warning

• Continuous exposure with used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

1. Disassemble in the order indicated in the table.



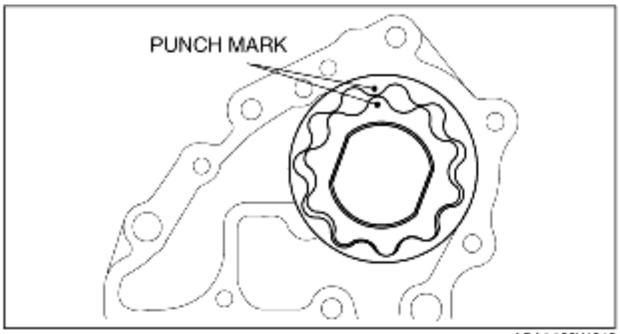
ADA3300W013

1	Oil pump cover
2	Inner rotor, outer rotor (See Inner Rotor, Outer Rotor Installation Note.)
3	Plunger plug
4	Plunger spring
5	Control plunger
6	Oil pump body

2. Assemble in the reverse order of disassembly.

Inner Rotor, Outer Rotor Installation Note

1. Align the punch marks of the inner and outer rotor and assemble.



ADA3300W012

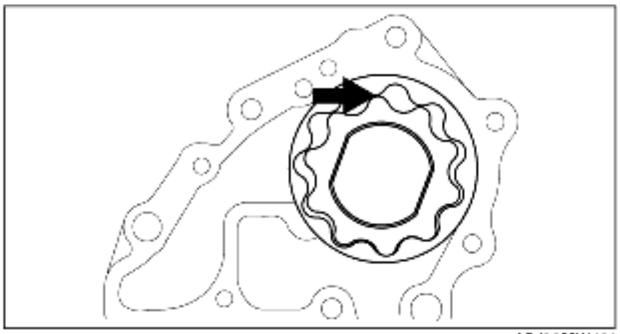
OIL PUMP INSPECTION [Z6]

B3E011119220W04

Warning

• Continuous exposure with used engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

1. Measure the clearance between the inner rotor and the outer rotor using a feeler gauge.



ADJ3300W131

• If it exceeds the maximum specification, replace the inner rotor or the outer rotor, or the both.

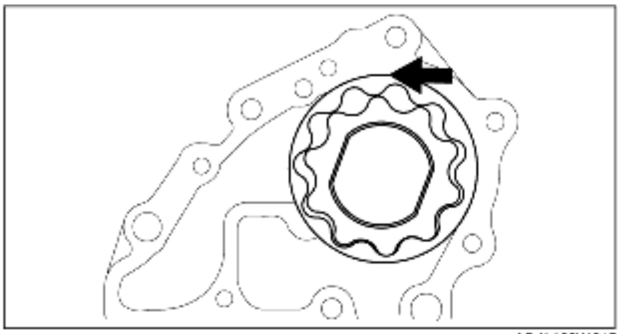
Standard tip clearance

0.020.18 mm {0.00080.0070 in}

Maximum tip clearance

0.20 mm {0.0079 in}

2. Measure the clearance between the outer rotor and the body using a feeler gauge.



ADJ3300W015

• If it exceeds the maximum specification, replace the outer rotor or oil pump body, or both.

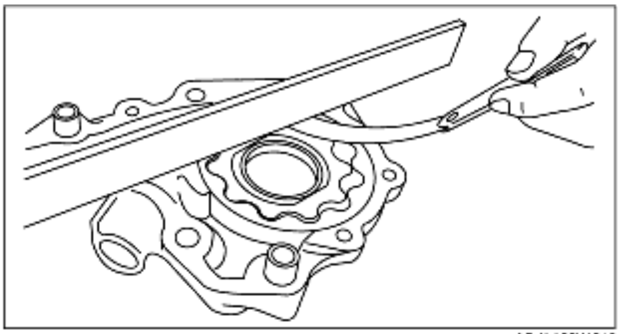
Standard body clearance

0.090.175 mm {0.00360.0068 in}

Maximum body clearance

0.20 mm {0.0079 in}

3. Measure the side clearance using a feeler gauge.



ADJ3300W016

• If it exceeds the maximum specification, replace the inner rotor or oil pump body, or both.

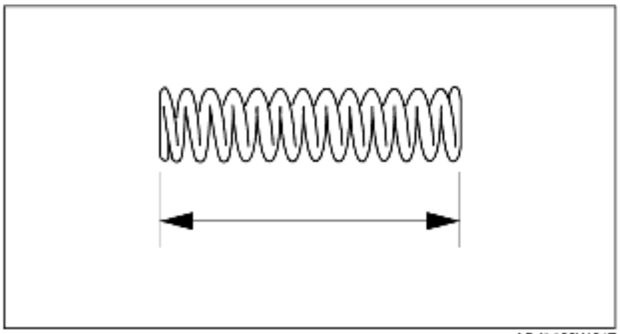
Standard side clearance

0.030.07 mm {0.00120.0027}

Maximum side clearance

0.09 mm {0.0035 in}

4. Measure the free length of the plunger spring using the vernier caliper.



ADJ3300W017

- If it is less than the specification, replace the plunger spring.

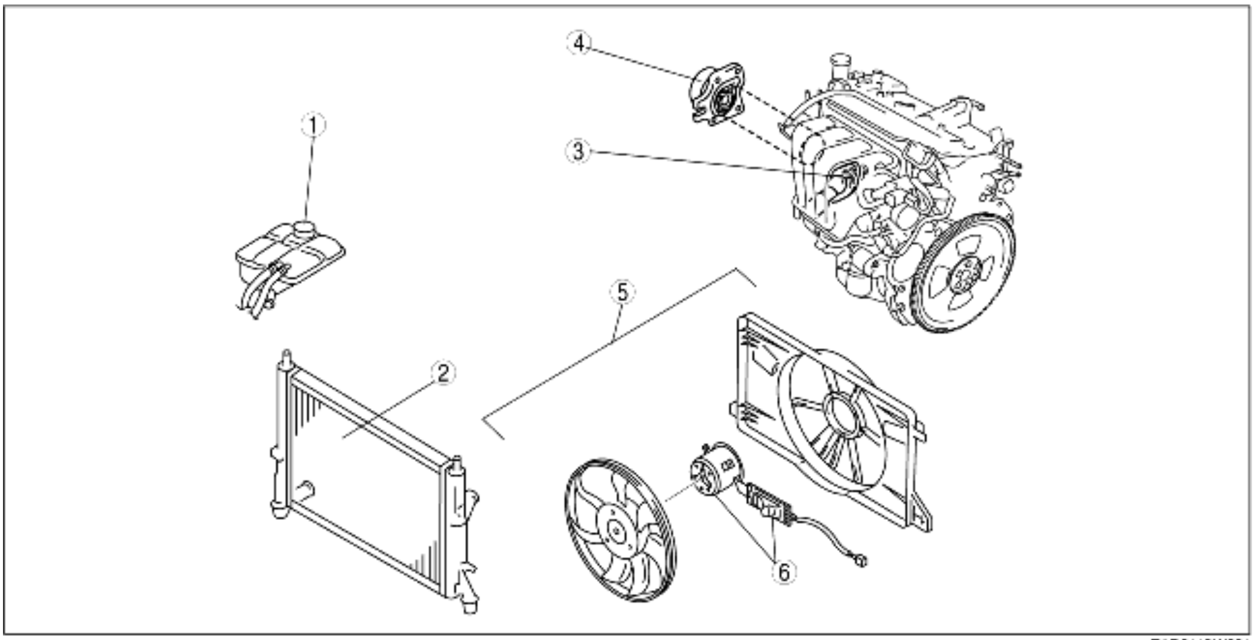
Free length

45.94 mm {1.8087 in}

COOLING SYSTEM

COOLING SYSTEM LOCATION INDEX [Z6]

B3E011201004W01

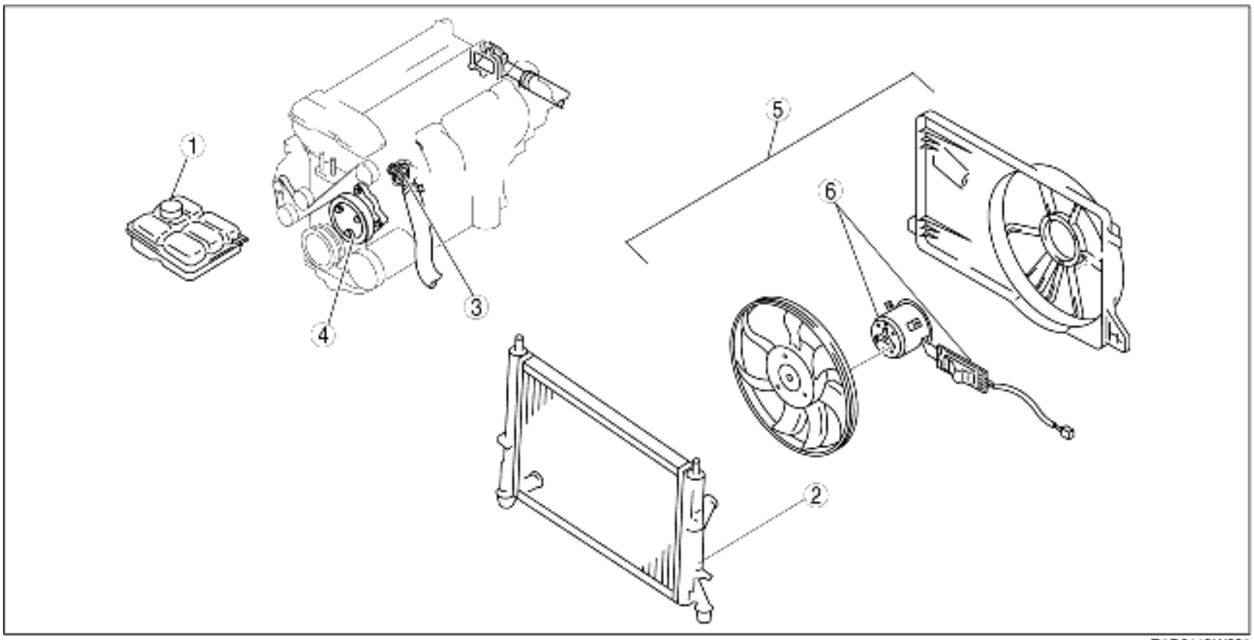


B3E0112W001

1	Cooling system cap (See COOLING SYSTEM CAP INSPECTION.)
2	Radiator (See RADIATOR REMOVAL/INSTALLATION.)
3	Thermostat (See THERMOSTAT REMOVAL/INSTALLATION [Z6].) (See THERMOSTAT INSPECTION [Z6].)
4	Water pump (See WATER PUMP REMOVAL/INSTALLATION [Z6].)
5	Cooling fan component (See RADIATOR REMOVAL/INSTALLATION.)
6	Cooling fan motor component (See COOLING FAN MOTOR COMPONENT INSPECTION.)

COOLING SYSTEM LOCATION INDEX [LF]

B3E011201004W02



B3E0112W003

1	Cooling system cap (See COOLING SYSTEM CAP INSPECTION.)
2	Radiator (See RADIATOR REMOVAL/INSTALLATION.)
3	Thermostat (See THERMOSTAT REMOVAL/INSTALLATION [LF].) (See THERMOSTAT INSPECTION [LF].)
4	Water pump (See WATER PUMP REMOVAL/INSTALLATION [LF].)
5	Cooling fan component (See RADIATOR REMOVAL/INSTALLATION.)
6	Cooling fan motor component (See COOLING FAN MOTOR COMPONENT INSPECTION.)

COOLING SYSTEM SERVICE WARNINGS

B3E011215001W01

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.

• When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

ENGINE COOLANT LEVEL INSPECTION

B3E011215001W02

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.

• When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Verify that the engine coolant level in the coolant reserve tank installed on the shroud panel is between the MIN and MAX marks.

2. If the engine coolant level is below MIN mark, add engine coolant.

ENGINE COOLANT PROTECTION INSPECTION

B3E011215001W03

1. Measure the coolant temperature and specific gravity with a thermometer and a hydrometer.

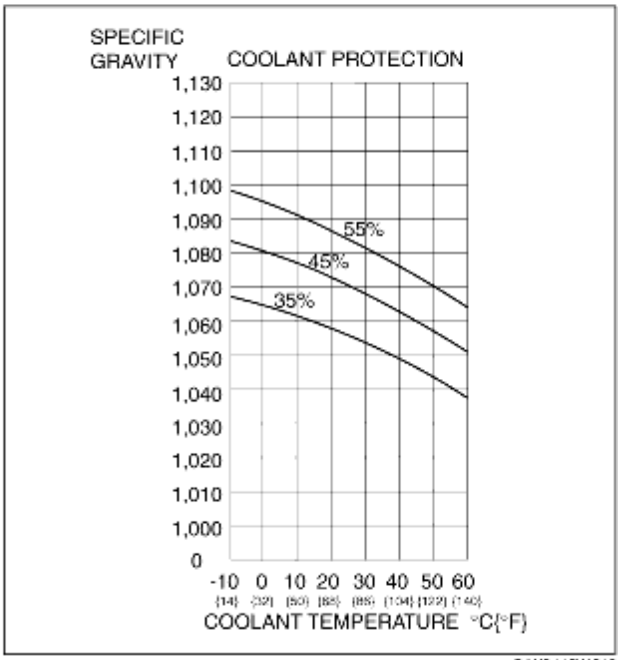
Caution

• The engine has aluminum parts that can be damaged by alcohol or methanol antifreeze. Do not use alcohol or methanol in the cooling system. Use only ethylene-glycol-based coolant.

• Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will reduce the coolant's effectiveness.

2. Determine the coolant protection by referring to the graph shown.

• If the coolant protection is not proper, add water or coolant.



C3U0112W016

ENGINE COOLANT REPLACEMENT

B3E011215001W04

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

• Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.

• When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

Caution

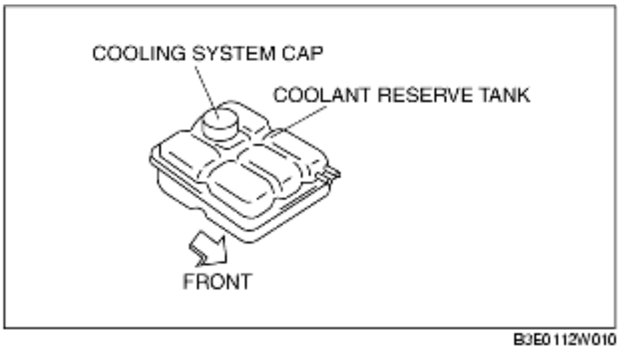
• Use engine coolant at a concentration that meets the environmental conditions in which the vehicle is driven, otherwise engine damage could occur.

• The engine has aluminum parts that can be damaged by alcohol or methanol antifreeze. Do not use alcohol or methanol in the cooling system. Use only ethylene-glycol-based coolant.

• Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will reduce the coolant's effectiveness.

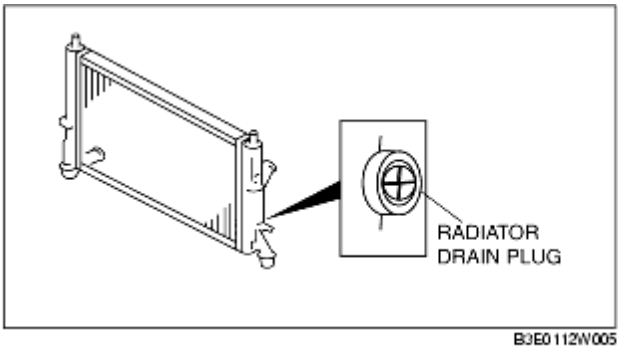
• Engine coolant damages paint. If engine coolant does get on a painted surface, rinse it off quickly.

1. Remove the cooling system cap.



2. Remove the under cover.

3. Remove the radiator drain plug and drain the engine coolant into a container.



4. Flush the cooling system with water until all traces of color are gone.

5. Let the system drain completely.

6. Tighten the radiator drain plug.

Tightening torque

1.2-1.5 N·m {13-15 kgf·cm, 11-13 in·lbf}

7. Referring to the following chart, select proper volume percentage of the water and coolant.

Antifreeze solution mixture percentage

Coolant protection	**Volume percentage**		**Gravity at 20 °C {68 °F}**
	Water	**Coolant**	
Above -16 °C {3 °F}	65	35	1.057
Above -26 °C {-15°F}	55	45	1.072
Above -40 °C {-40 °F}	45	55	1.086

8. Refill the coolant into the coolant reserve tank up to the MAX mark on the tank.

9. Fully install the cooling system cap.

Caution

• If the water temperature gauge rises too high, stop the engine and decrease the water temperature to prevent overheating. Then, verify the malfunctioning part and repair or replace it.

10. Start the engine and idle it until the thermometer indicator is in the center when the engine is at **below 1,500 rpm**.

11. After the engine warms up, perform the following steps verifying that engine coolant temperature does not increase too high using the thermometer.

(1) Run the engine at **2,500 rpm** for **5 min**.

(2) Run the engine at **3,000 rpm** for **5 s**, then idle.

(3) Repeat Step (2) approx. two times.

12. Stop the engine and wait until the coolant temperature decreases.

13. Check the coolant level.

• If It is low, refill the coolant into the coolant reserve tank up to the MAX mark on the tank.

14. Inspect for coolant leakage.

• If the coolant leaks, specify the malfunctioning part and repair or replace it.

ENGINE COOLANT LEAKAGE INSPECTION

B3E011215001W05

Warning

• Never remove the cooling system cap while the engine is running, or when the engine and radiator are hot. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.

• Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.

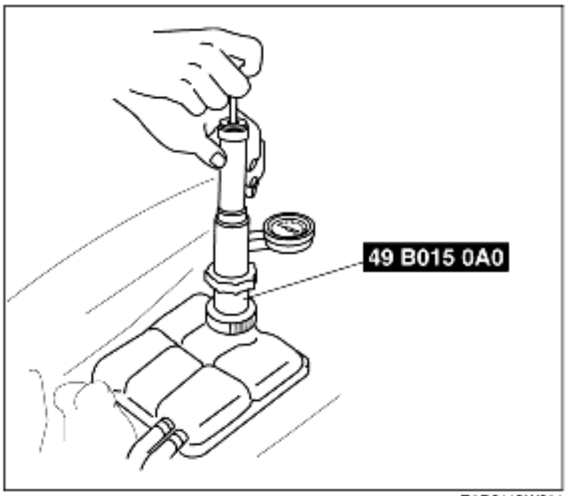
• When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Inspect the engine coolant level.

2. Remove the cooling system cap.

3. Clean the installation parts of the cooling system cap and the upper radiator hose.

4. Install the **SST** and a radiator cap tester to the coolant reserve tank filler port.



B3E0112W031

5. Apply pressure using the radiator cap tester.

Caution

• Applying more than Z6: 100 kPa {1.0 kgf/cm^2, 14.5 psi}, LF: 145 kPa {1.5 kgf/cm^2, 21 psi} can damage the hoses, fittings, and other components, and cause leakage.

Pressure

Z6: 100 kPa {1.0 kgf/cm^2, 14.5 psi} [1 min]

LF: 145 kPa {1.5 kgf/cm^2, 21 psi} [1 min]

6. When pressurizing the coolant reserve tank, verify that the pressure is maintained.

• If the gauge needle drops, it may indicate water leakage, therefore perform leakage inspection.

- If engine coolant leaks from the upper hose installation part, replace the upper hose and the clamp.

- If the engine coolant leaks from the main body of the radiator (caulked part), replace the radiator.

COOLANT RESERVE TANK REMOVAL/INSTALLATION

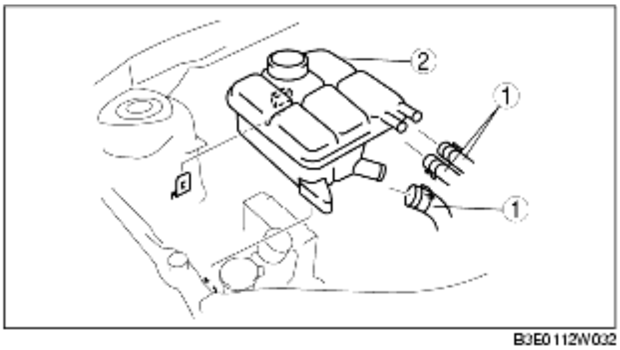
B3E011215201W01

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

1. Drain the engine coolant until the coolant reserve tank becomes empty. (See ENGINE COOLANT REPLACEMENT.)

2. Remove in the order indicated in the table.



1	Hose
2	Coolant reserve tank

3. Install in the reverse order of removal.

4. Add engine coolant. (See ENGINE COOLANT REPLACEMENT.)

5. Inspect for engine coolant leakage. (See ENGINE COOLANT LEAKAGE INSPECTION.)

COOLING SYSTEM CAP INSPECTION

B3E011215201W02

Warning

• Never remove the cooling system cap while the engine is running, or when the engine and radiator are hot. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.

• Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.

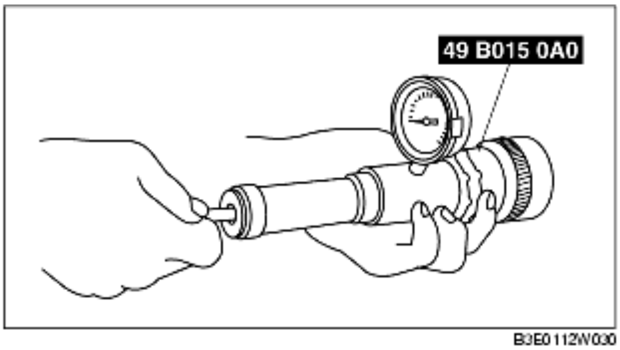
• When you're sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Clean the cooling system cap and the sealed part.

2. Inspect the crack or turn over on the sealed part of the cooling system cap.

• If there is malfunction, replace the cooling system cap.

3. Attach the cooling system cap to the radiator cap tester.



4. Hold the cooling system cap downward and apply pressure gradually. Verify that the pressure holds for **10 s**.

- If the pressure is not held stable within the specification, replace the cooling system cap.

Pressure

Z6: 90-110 kPa

{0.92-1.12 kgf/cm^2, 13.1-15.9 psi}

LF: 135-155 kPa

{1.38-1.58 kgf/cm^2, 19.6-22.4 psi}

RADIATOR REMOVAL/INSTALLATION

B3E011215200W01

Warning

- Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].) (See BATTERY REMOVAL/INSTALLATION [LF].)

2. Disconnect the negative battery cable.

3. Remove the under cover.

4. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT.)

5. Disconnect the coolant reservoir hose from the radiator.

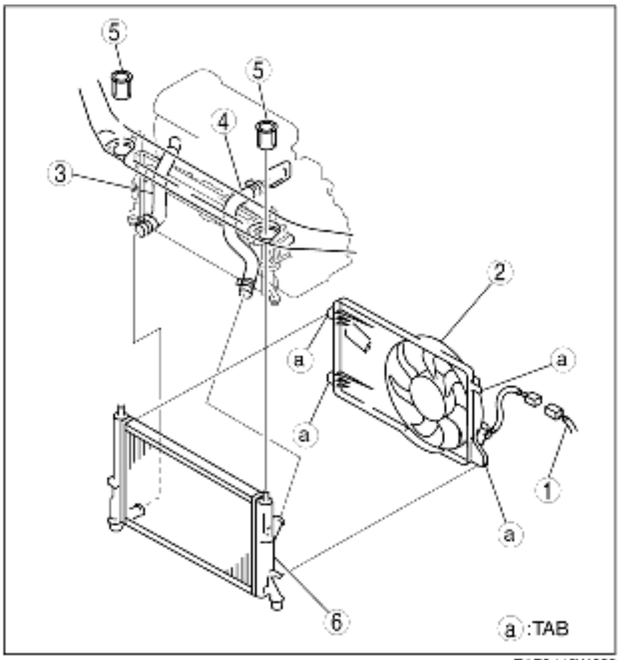
6. Position the front wiring harnesses out of the way.

7. Remove in the order indicated in the table.

8. Install in the reverse order of removal.

9. Add engine coolant. (See ENGINE COOLANT REPLACEMENT.)

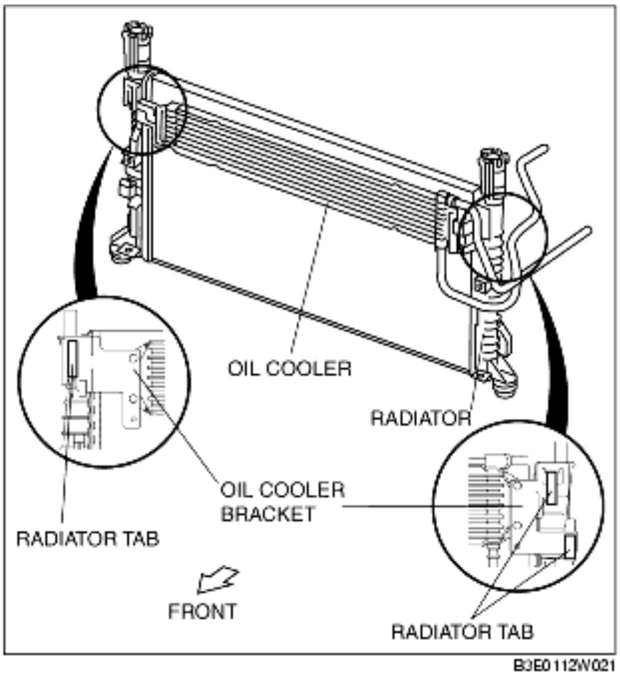
10. Inspect for engine coolant leakage. (See ENGINE COOLANT LEAKAGE INSPECTION.)



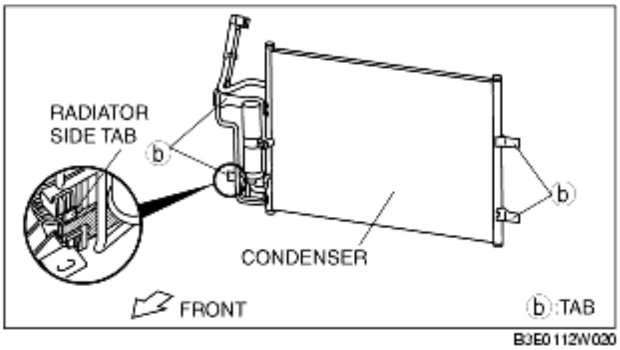
1	Fan control module connector
2	Cooling fan component (See Cooling Fan Component Installation Note.)
3	Radiator lower hose
4	Radiator upper hose
5	Radiator mount
6	Radiator (See Radiator Removal Note.) (See Radiator Installation Note.)

Radiator Removal Note

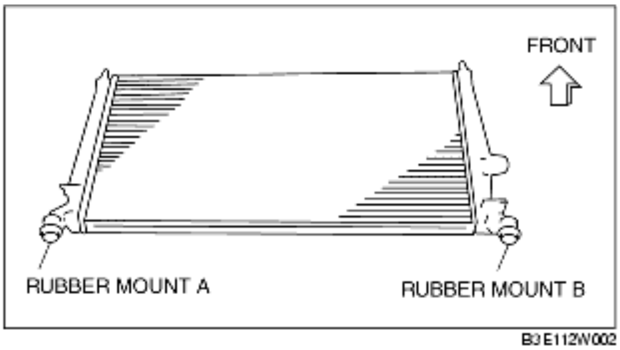
1. Remove the oil cooler from the radiator with the hoses still connected by pulling the radiator tabs outward. (ATX)



2. Remove the condenser from the radiator with the pipes still connected, by pressing the radiator side tab to unlock the tab B on the condenser.



3. Remove rubber mount A from the mount installation hole.



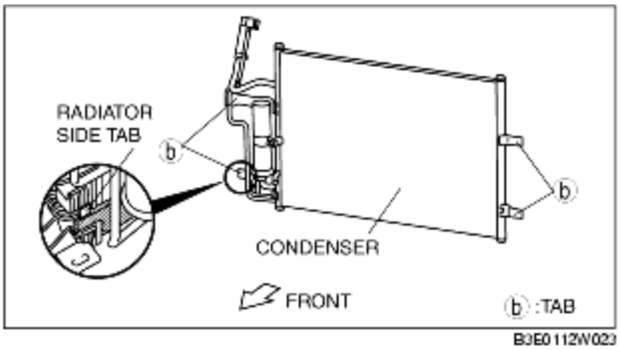
4. Tilt the radiator to the engine side.

5. Remove rubber mount B from the mount installation hole.

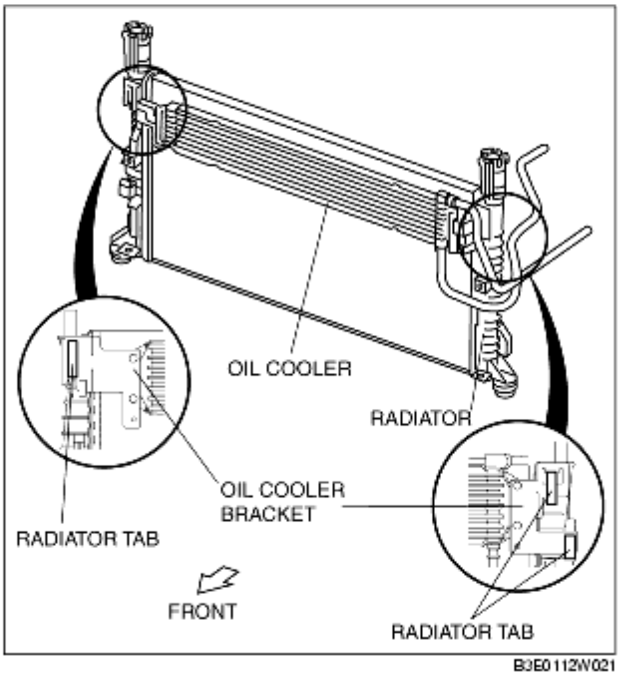
6. Remove the radiator from below.

Radiator Installation Note

1. Install the condenser to the radiator by aligning lower side tab B with the radiator side tab, install upper tab B, then install lower side tab B.



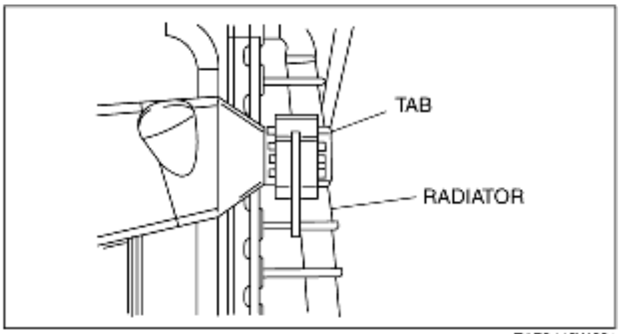
2. Install the oil cooler by inserting oil cooler bracket to the radiator tab on the radiator. (ATX)



3. Install the radiator.

Cooling Fan Component Installation Note

1. Insert tab A to the radiator to install the cooling fan component.



B3E0112W004

THERMOSTAT REMOVAL/INSTALLATION [Z6]

B3E011215171W01

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

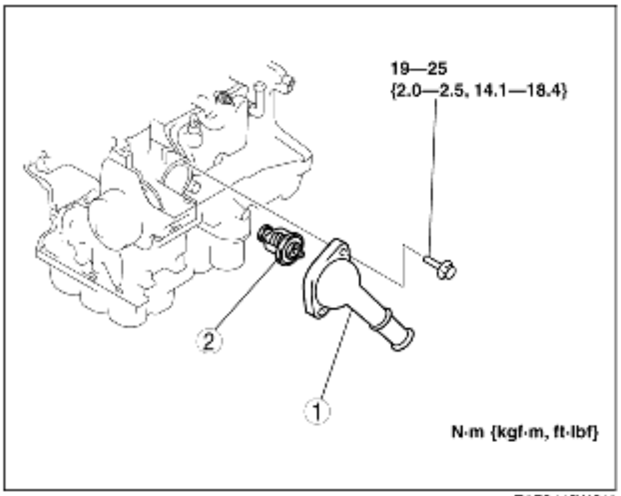
2. Disconnect the negative battery cable.

3. Remove the under cover.

4. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT.)

5. Disconnect the lower radiator hose from the thermostat.

6. Remove in the order indicated in the table.



B3E0112W013

1	Thermostat cover
2	Thermostat (See Thermostat Installation Note.)

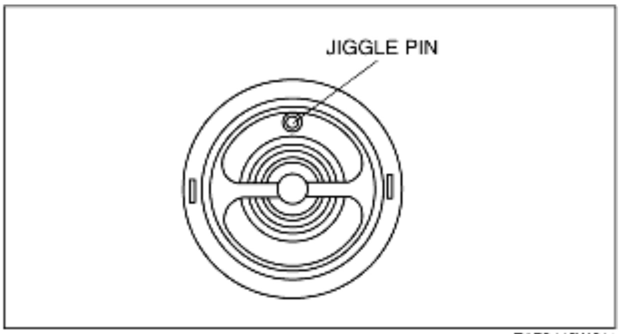
7. Install in the reverse order of removal.

8. Add engine coolant. (See ENGINE COOLANT REPLACEMENT.)

9. Inspect the system for engine coolant leakage. (See ENGINE COOLANT LEAKAGE INSPECTION.)

Thermostat Installation Note

1. Install the thermostat into the thermostat case with the jiggle pin at the top.



B3E0112W014

THERMOSTAT REMOVAL/INSTALLATION [LF]

B3E011215171W02

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

2. Disconnect the negative battery cable.

3. Remove the under cover and splash shield as a single unit.

4. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT.)

5. Position the coolant reserve tank out of the way.

6. Remove the plug hole plate. (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

7. Position the drive belt out of the way. (See DRIVE BELT REPLACEMENT [LF].)

8. Remove the drive belt tensioner. (See TIMING CHAIN REMOVAL/INSTALLATION [LF].)

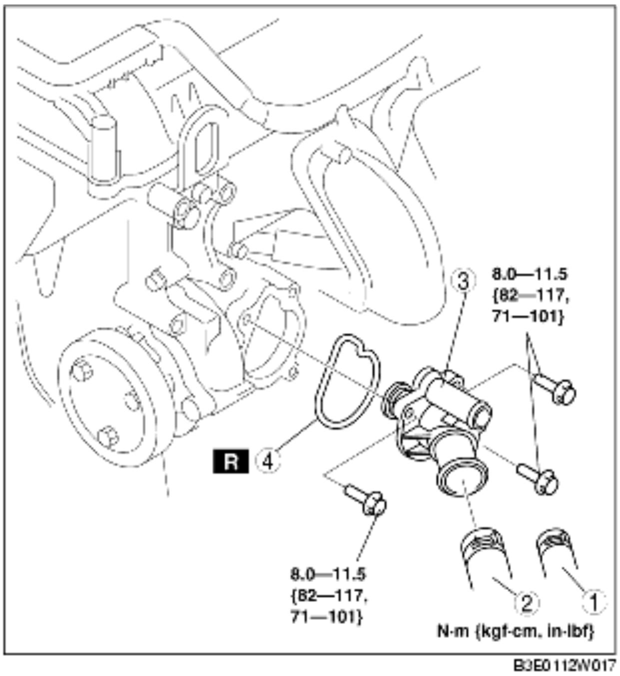
9. Remove in the order indicated in the table.

10. Install in the reverse order of removal.

11. Add engine coolant. (See ENGINE COOLANT REPLACEMENT.)

12. Inspect for the engine coolant leakage. (See ENGINE COOLANT LEAKAGE INSPECTION.)

13.



1	Hose
2	Lower radiator hose
3	Thermostat component
4	Gasket

THERMOSTAT INSPECTION [Z6]

B3E011215171W03

1. Inspect the thermostat for the following.

Warning

• During inspection, the thermostat and water are extremely hot and they can cause burns. Do not touch the thermostat and water.

• The valve should not open under normal temperature.

• Opening temperature and valve lift

- If there is malfunction, replace the thermostat.

Item		Specification
Initial-opening temperature	(°C {°F})	80-84 {176-183}
Full-open temperature	(°C {°F})	95 {203}
Full-open lift	(mm {in})	8.5 {0.33} or more

THERMOSTAT INSPECTION [LF]

B3E011215171W04

1. Inspect the thermostat for the following.

Warning

• During inspection, the thermostat and water are extremely hot and they can cause burns. Do not touch the thermostat and water.

• The valve should not open under normal temperature.

• Opening temperature and valve lift

- If there is malfunction, replace the thermostat.

Item		Specification
Initial-opening temperature	(°C {°F})	80-84 {176-183}
Full-open temperature	(°C {°F})	97 {207}
Full-open lift	(mm {in})	8.0 {0.31} or more

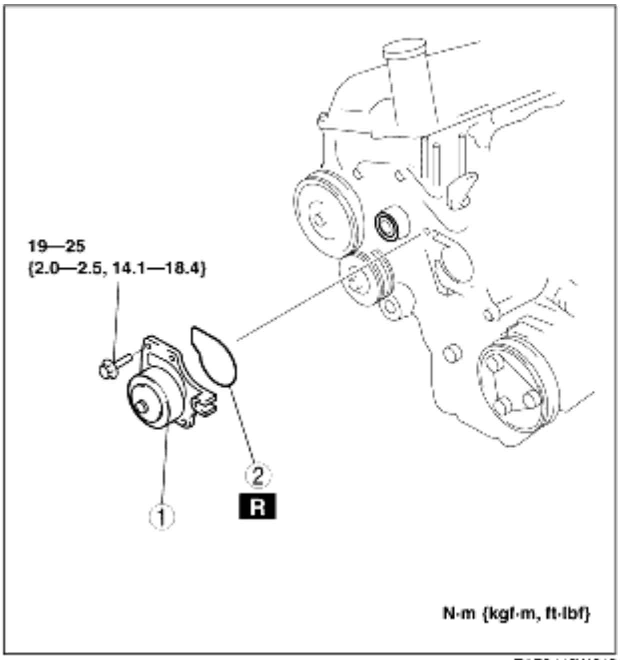
WATER PUMP REMOVAL/INSTALLATION [Z6]

B3E011215010W01

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)
2. Disconnect the negative battery cable.
3. Remove the under cover and splash shield as a single unit.
4. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT.)
5. Position the coolant reserve tank out of the way.
6. Remove the drive belt. (See DRIVE BELT REPLACEMENT [Z6].)
7. Position the power steering fluid tank out of the way.
8. Remove the generator. (See GENERATOR REMOVAL/INSTALLATION [Z6].)
9. Remove in the order indicated in the table.



B3E0112W012

1	Water pump component
2	O-ring

10. Install in the reverse order of removal.

11. Add engine coolant. (See ENGINE COOLANT REPLACEMENT.)

12. Inspect for engine coolant leakage. (See ENGINE COOLANT LEAKAGE INSPECTION.)

WATER PUMP REMOVAL/INSTALLATION [LF]

B3E011215010W02

Warning

• Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

2. Disconnect the negative battery cable.

3. Remove the under cover and splash shield as a single unit.

4. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT.)

5. Position the coolant reserve tank out of the way.

6. Remove the plug hole plate. (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

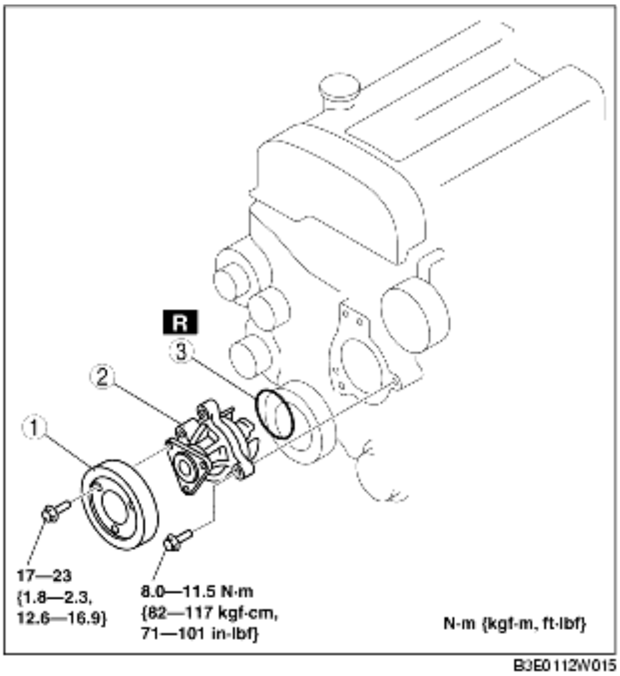
7. Loosen the water pump pulley bolt and position the drive belt out of the way. (See DRIVE BELT REPLACEMENT [LF].)

8. Remove in the order indicated in the table.

9. Install in the reverse order of removal.

10. Add engine coolant. (See ENGINE COOLANT REPLACEMENT.)

11. Inspect for engine coolant leakage. (See ENGINE COOLANT LEAKAGE INSPECTION.)



1	Water pump pulley
2	Water pump
3	O-ring

COOLING FAN MOTOR COMPONENT INSPECTION

B3E011215025W01

1. Verify that battery voltage is **12.4 V or more.**

    • If it cannot be verified, charge the battery or contact an external power supply to the vehicle.

2. Connect the WDS or equivalent to the DLC-2.

3. Turn the ignition switch to the ON position.

Note

• The cooling fan does not operate if the duty value of the fan control signal is **10 % or less,** or **95 % or more.**

• The range of the duty value of the fan control signal which the simulation function can control is **10 %-90%.**

• Due to the cooling fan protection function, there is a time lag until the fan control signal reaches the specified duty value. (Example: If a fan control signal with a **90 %** duty value is input while the cooling fan is stopped, it takes **approx. 14 s** until the fan speed increases and stabilizes.)

4. Using the "FAN DUTY" simulation function, input fan control signals with duty values of **20 %, 40 %, 60 %, and 80 % at 30 s intervals** and verify that the cooling fan operation speed increases.

• If the cooling fan does not operate, inspect the following:

- Open or short circuit in fan control module power supply

- Open or short circuit in fan control module ground

- Open or short circuit in the wiring harness between fan control module terminal B and PCM terminal 1AP (Z6)/ 1W (LF).

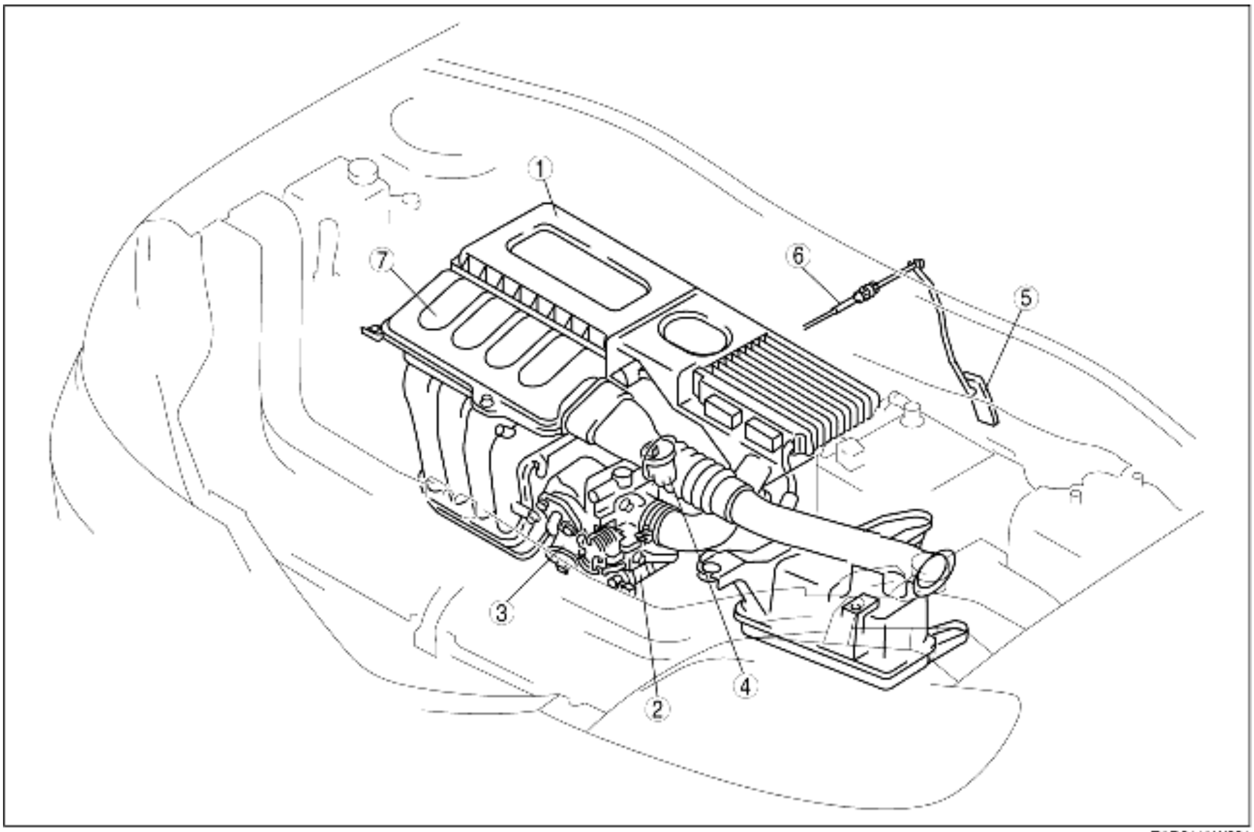
• If the wiring harnesses and connectors are normal, inspect the cooling fan component.

• If the cooling fan operation speed does not increase, replace the cooling fan component.

INTAKE-AIR SYSTEM[Z6]

INTAKE-AIR SYSTEM LOCATION INDEX [Z6]

B3E011300113W01



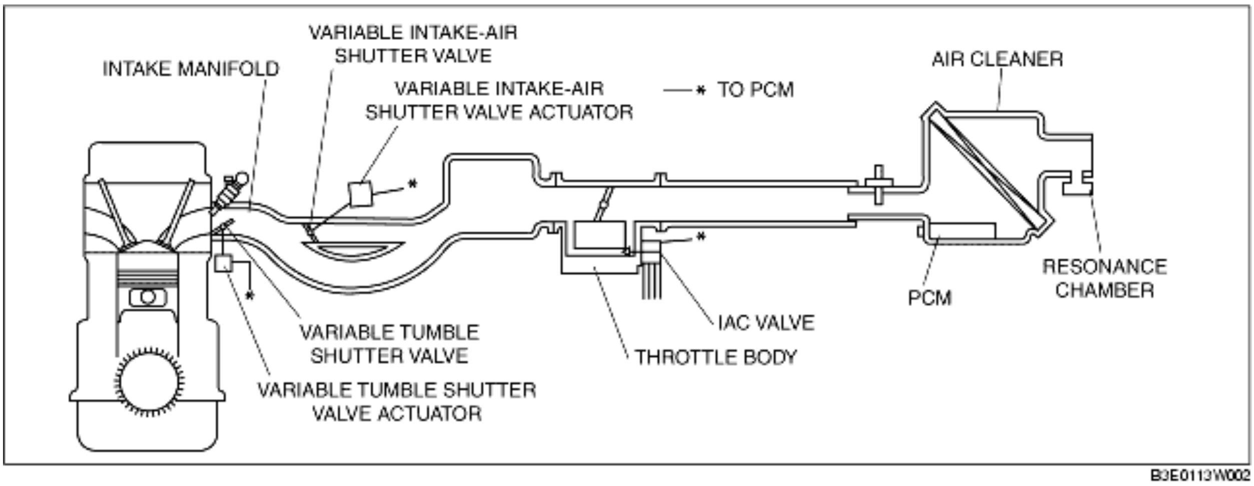
B3E0113W001

1	Air cleaner (See AIR CLEANER ELEMENT INSPECTION [Z6].)
2	IAC solenoid valve (See IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION [Z6].) (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [Z6].)
3	Variable intake-air shutter valve actuator (See VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION [Z6].) (See VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR INSPECTION [Z6].)
4	Variable tumble shutter valve actuator (See VARIABLE TUMBLE SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION [Z6].) (See VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [Z6].)

5	Accelerator pedal (See ACCELERATOR PEDAL REMOVAL/INSTALLATION [Z6].)
6	Accelerator cable (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [Z6].)
7	Intake-air system (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

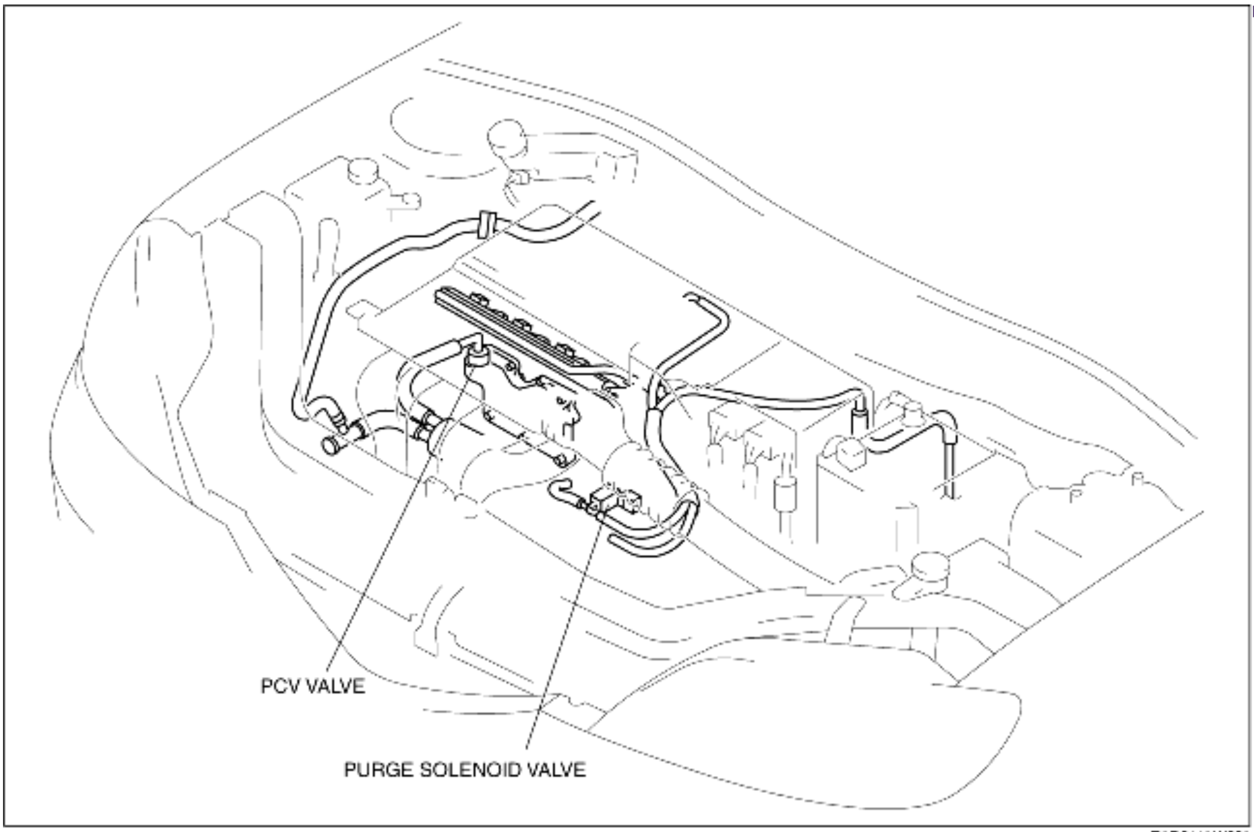
INTAKE-AIR SYSTEM DIAGRAM [Z6]

B3E011300113W02



INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [Z6]

B3E011300113W03



B3E0113W003

INTAKE-AIR SYSTEM MANIFOLD VACUUM INSPECTION [Z6]

B3E011300113W04

1.• Verify that the intake air hoses are installed securely.

2. Warm up the engine.

3. Disconnect the vacuum hose connecting the intake manifold and the purge solenoid valve (purge solenoid valve side) and install the vacuum gauge.

4. Measure the intake manifold vacuum while idling (no load) using the vacuum gauge.

• If not within the specification, perform the following inspections.

- Accelerator cable play

- Compression pressure (See COMPRESSION INSPECTION [Z6].)

- Air suction (installation areas of throttle body, fuel injector, PCV valve, intake manifold)

Note

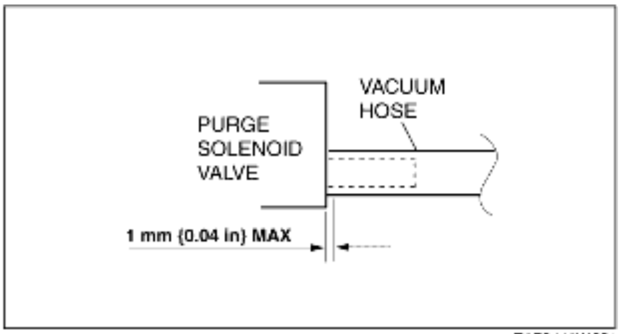
• If any air suction exists, the change in engine speed can be made apparent by spraying the penetrant lubricating spray on the applicable part.

Standard

ATX: -71.0 kPa {-533 mmHg, -21.0 inHg} or more

MTX: -72.0 kPa {-541 mmHg, -21.3 inHg} or more

5. After measuring the intake manifold vacuum, install the vacuum hose to the purge solenoid valve as shown in the figure.



B3E0113W024

INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6]

B3E011300113W05

Warning

• A hot engine and intake air system can cause severe burns. Turn off the engine and wait until they are cool before removing the intake air system.

• Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure". (See BEFORE SERVICE PRECAUTION.)

Caution

• The PCM is built into the air cleaner cover. Applying excessive pressure to the cover could damage the PCM. Be careful not to put your hands on the PCM during the removal/installation.

• Removing the PCM from the air cleaner could damage the sealing or the circuitry. Do not remove the PCM from the air cleaner.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

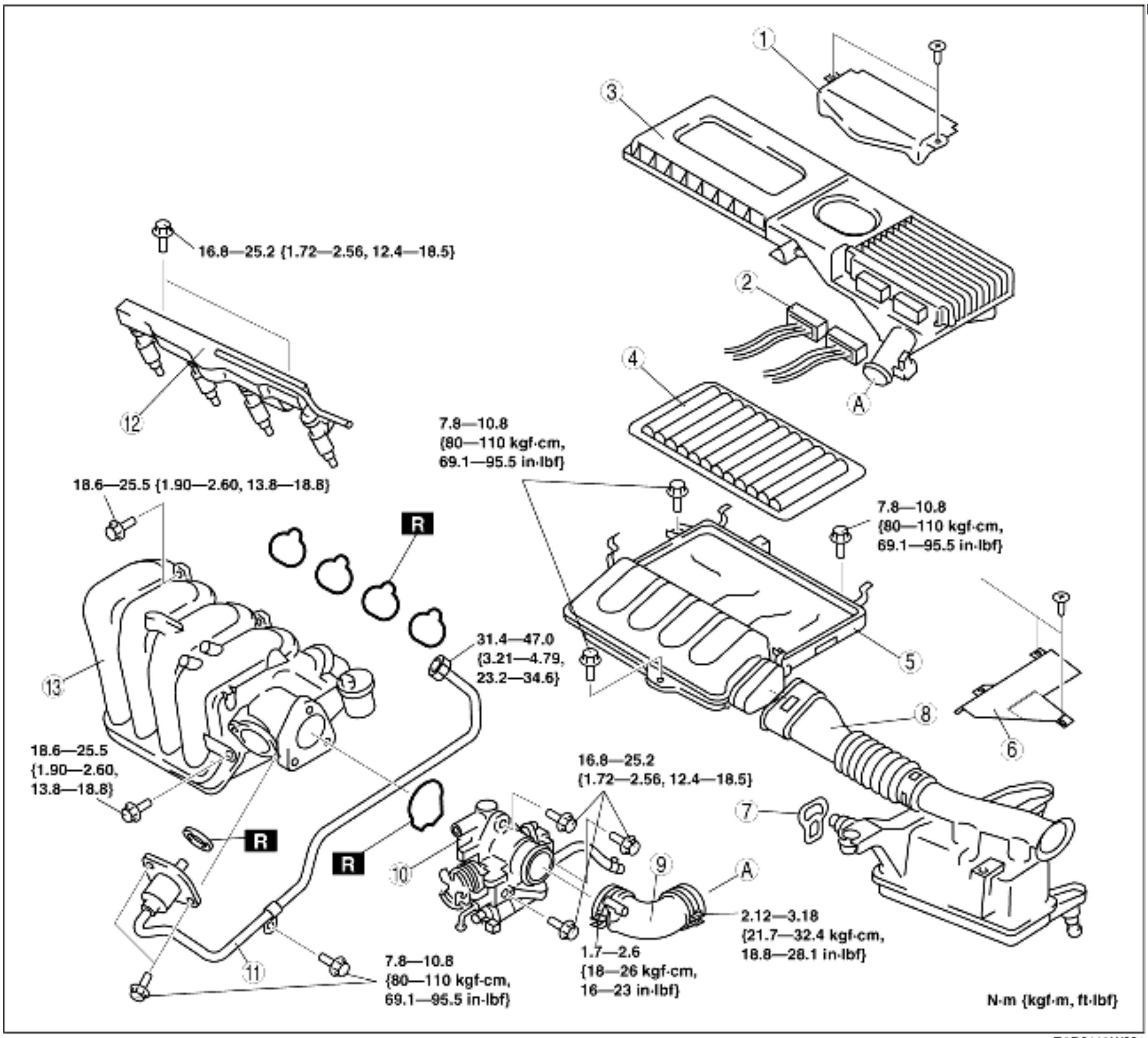
2. Disconnect the negative battery cable.

3. Remove the under cover.

4. Remove in the order indicated in the table.

5. Install in the reverse order of removal.

6. Complete the "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)



B3E0113W004

1	PCM connector cover
2	PCM connector (See PCM Connector Installation Note.)
3	Air cleaner cover
4	Air cleaner element
5	Air cleaner case
6	Fresh-air duct cover
7	Strap (See Strap Installation Note.)
8	Fresh-air duct (See Fresh-air Duct Installation Note.)

9	Air hose (See Air Hose Installation Note.)
10	Throttle body (See Throttle Body Removal Note.)
11	EGR pipe (Intake manifold side) (See EGR Pipe Installation Note.)
12	Fuel distributor (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)
13	Intake manifold (See Intake Manifold Removal Note.)

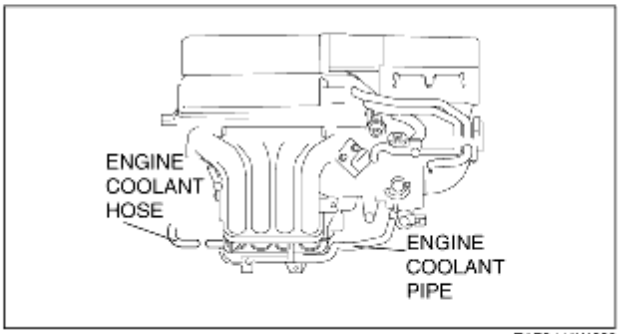
Throttle Body Removal Note

1. Remove the purge solenoid valve. (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [Z6].)

2. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT.)

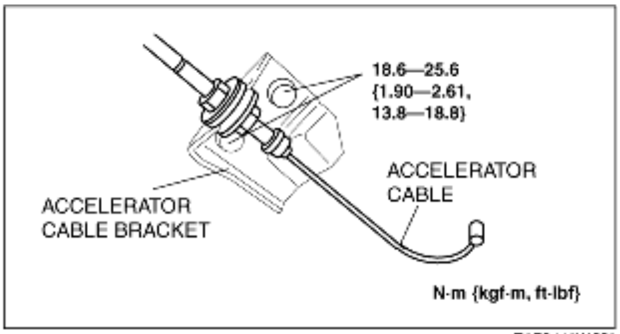
Intake Manifold Removal Note

1. Disconnect the engine coolant hose from the engine coolant pipe as shown in the figure.



B3E0113W006

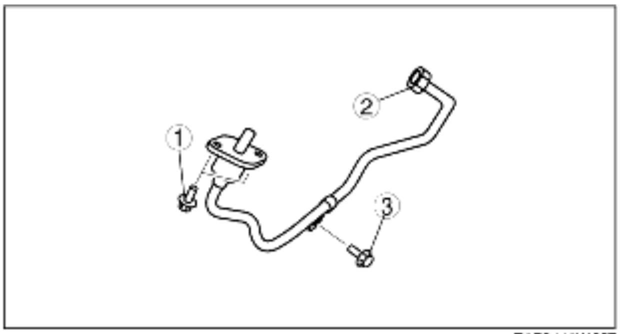
2. Remove the accelerator cable bracket from the intake manifold.



B3E0113W223

EGR Pipe Installation Note

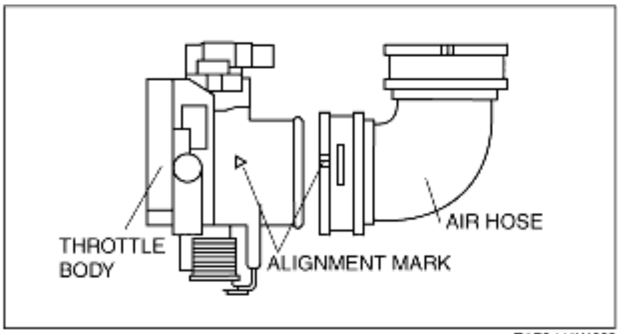
1. Install the EGR pipe installation bolts and the nut in the order indicated in the table.



B3E0113W027

Air Hose Installation Note

1. Align the alignment marks on the throttle body and the air hose.



B3E0113W008

Fresh-air Duct Installation Note

Note

• Before installing the fresh-air duct, verify that the rubber mounts on the battery support bracket have not fallen off.

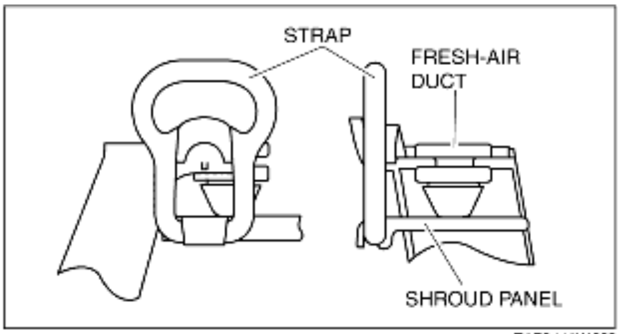
• When inserting the fresh-air duct into the rubber mounts, applying soapy water aids the operation.

1. Verify that two rubber mounts are installed on the battery support bracket.

2. Install the fresh-air duct into the rubber mounts.

Strap Installation Note

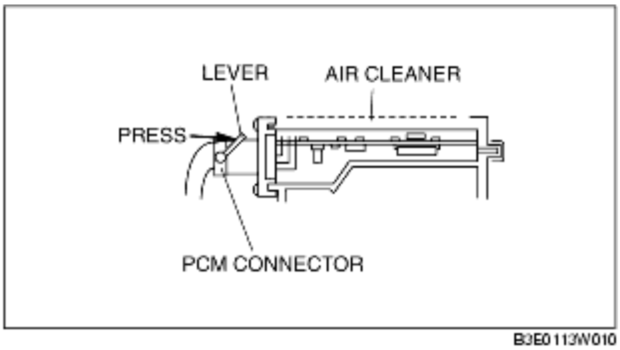
1. Using the strap, secure the shroud panel and the fresh-air duct as shown in the figure.



B3E0113W009

PCM Connector Installation Note

1. Insert the PCM connector fully into the air cleaner and push the lever until a click is heard.



AIR CLEANER ELEMENT INSPECTION [Z6]

B3E011313300W01

1. Remove the air cleaner element. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

2. Inspect the following items:

    • If there is any abnormality, clean or replace the air cleaner element.

    - Has the replacement interval come?

    - Is the air cleaner element soiled, damaged, or bent?

    - Are the air cleaner case and the air cleaner element correctly sealed?

    - Is the correct air cleaner element installed?

IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION [Z6]

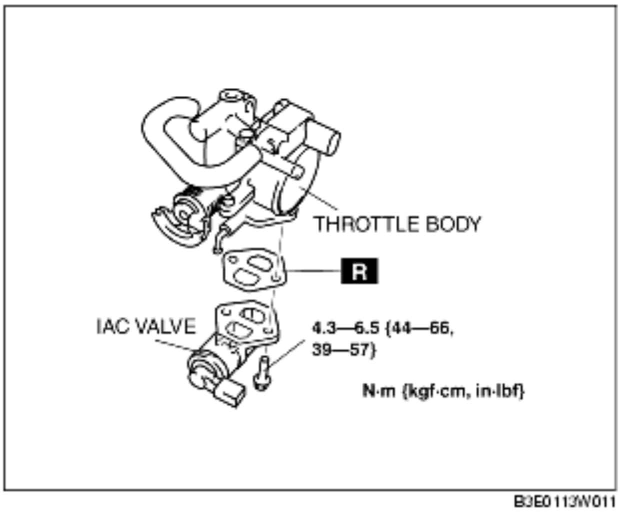
B3E011320661W01

1. Remove the under cover.

2. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

3. Disconnect the negative battery cable.

4. Remove the IAC valve.



5. Install in the reverse order of removal.

IDLE AIR CONTROL (IAC) VALVE INSPECTION [Z6]

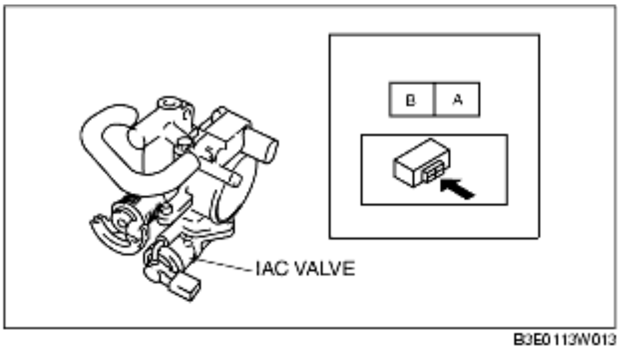
B3E011320661W02

Resistance Inspection

1. Disconnect the negative battery cable.

2. Disconnect the IAC valve connector.

3. Measure the resistance between IAC valve terminals A and B.

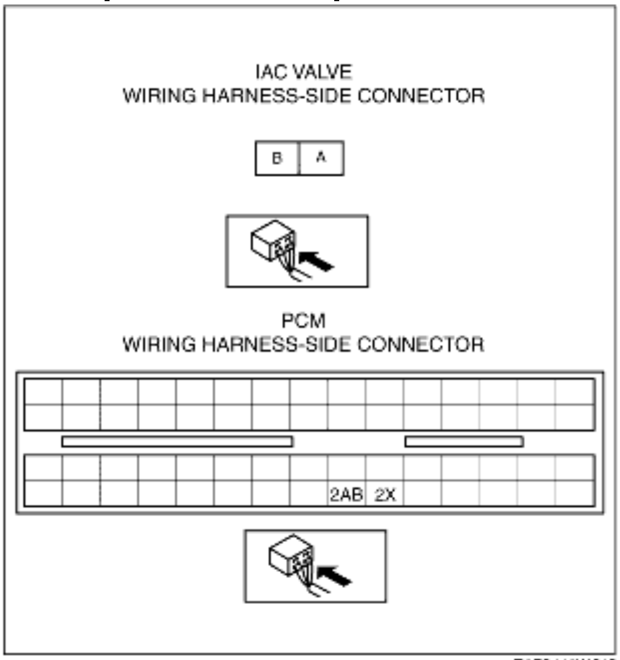


- If within the specification, carry out the "Circuit Open/Short Inspection".
- If not within the specification, replace the IAC valve.

Resistance

8.8-10.6 ohms [24°C {75 °F}]

Circuit Open/Short Inspection



B3E0113W012

1. Inspect the following wiring harnesses for an open or short circuit. (Continuity check)

Open circuit

• If there is no continuity, the circuit is open. Repair or replace the wiring harness.

- IAC valve terminal A and PCM terminal 2X

- IAC valve terminal B and PCM terminal 2AB

Short circuit

• If there is continuity, the circuit is shorted. Repair or replace the wiring harness.

- IAC valve terminal A and body GND

- IAC valve terminal B and power supply

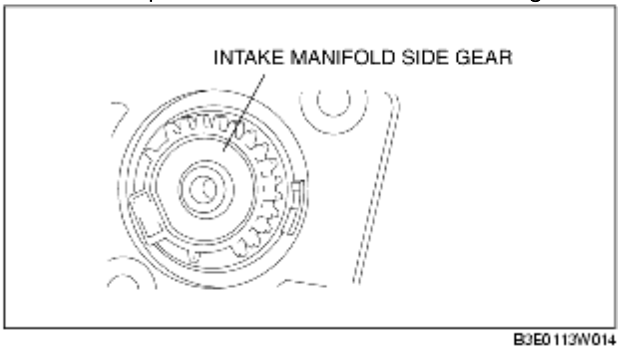
VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION [Z6]

B3E011320130W01

Caution

• Be careful of the following after removing the actuator to prevent abnormal gear wear and gear lock which could result in shutter valve malfunction.

- Do not pull out the intake manifold side gear.



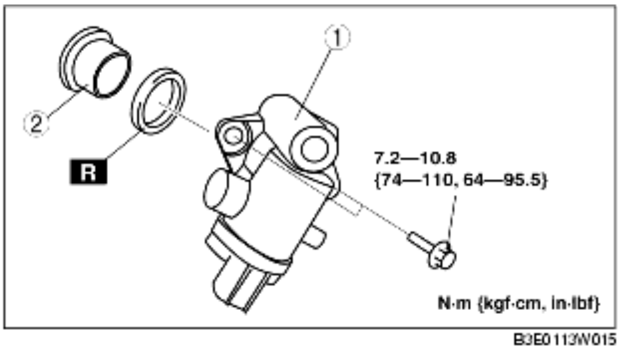
- Do not allow foreign material to contact the intake manifold side gear.

- Keep the inside of the actuator away from foreign material.

• Improper installation of the actuator and retainer will cause gear lock and might result in shutter valve malfunction. To prevent this, install the actuator and shutter valve as described in the following procedure:

1. Disconnect the negative battery cable.

2. Remove in the order indicated in the table.



1	Variable intake-air shutter valve actuator (See Variable Intake-air Shutter Valve Actuator Removal Note.) (See Variable Intake-air Shutter Valve Actuator Installation Note.)
2	Retainer (See Retainer Removal Note.) (See Retainer Installation Note.)

3. Install in the reverse order of removal.

Variable Intake-air Shutter Valve Actuator Removal Note

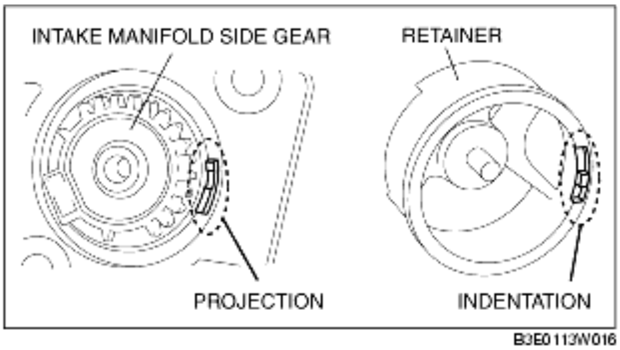
1. After removing the actuator, cover it with a plastic sheet to prevent foreign material from entering the inside of the actuator.

Retainer Removal Note

1. After removing the retainer, cover it with a plastic sheet to prevent foreign material from contacting the intake manifold side gear.

Retainer Installation Note

1. Install the retainer by positioning the projection on the intake manifold with the indentation on the retainer.



2. Be careful not to shift the retainer installation position.

Variable Intake-air Shutter Valve Actuator Installation Note

1. Verify that the retainer installation position has not shifted.

2. Verify that the gasket is installed.

3. Verify that intake manifold side gear and actuator side gear are engaged properly so that the actuator can be installed without any excessive force.

VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR INSPECTION [Z6]

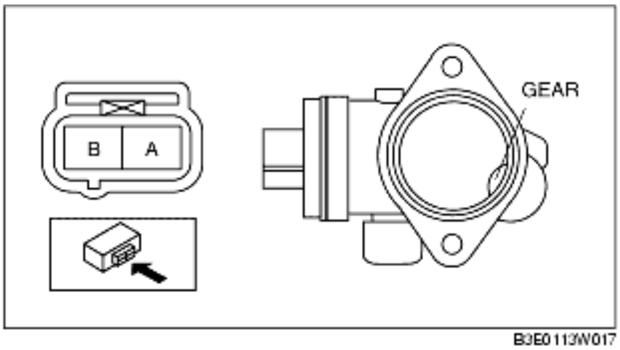
B3E011320130W02

Operation Inspection

1. Disconnect the negative battery cable.

2. Remove the variable intake-air shutter valve actuator.

3. Connect the battery positive voltage to terminal A or B, and verify that the gear moves.

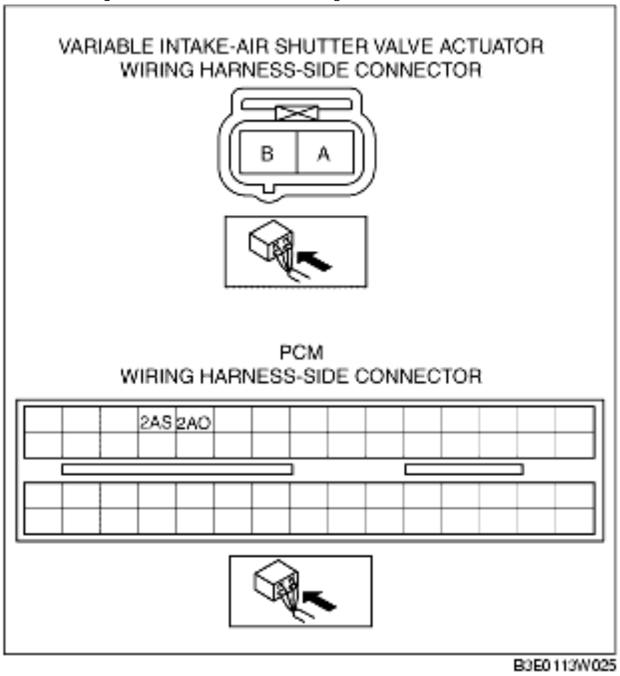


• If there is no malfunction, carry out the "Circuit Open/Short Inspection".

• If there is any malfunction, replace the variable intake-air shutter valve actuator.

Terminal		**Gear rotation direction**
A	**B**	
B+	GND	Counterclockwise
GND	B+	Clockwise

Circuit Open/Short Inspection



1. Inspect the following wiring harnesses for an open or short circuit. (Continuity check)

Open circuit

• If there is no continuity, the circuit is open. Repair or replace the wiring harness.

- Variable intake-air shutter valve actuator terminal A and PCM terminal 2AO

- Variable intake-air shutter valve actuator terminal B and PCM terminal 2AS

Short circuit

• If there is continuity, the circuit is shorted. Repair or replace the wiring harness.

- Variable intake-air shutter valve actuator terminal A and power supply

- Variable intake-air shutter valve actuator terminal A and body GND

- Variable intake-air shutter valve actuator terminal B and power supply

- Variable intake-air shutter valve actuator terminal B and body GND

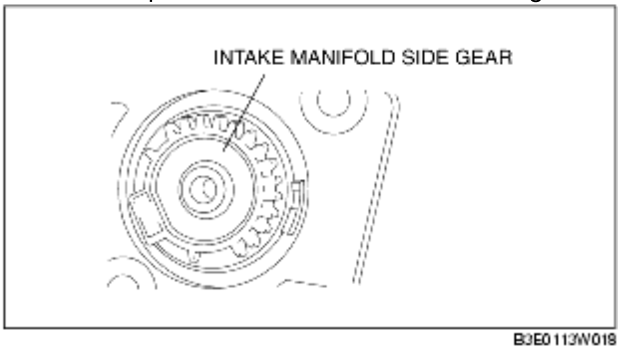
VARIABLE TUMBLE SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION [Z6]

B3E011320130W03

Caution

• Be careful of the following after removing the actuator to prevent abnormal gear wear and gear lock which could result in shutter valve malfunction.

- Do not pull out the intake manifold side gear.



- Do not allow foreign material to contact the intake manifold side gear.

- Keep the inside of the actuator away from foreign material.

• Improper installation of the actuator and retainer will cause gear lock and might result in shutter valve malfunction. To prevent this, install the actuator and shutter valve as described in the following procedure:

1. Disconnect the negative battery cable.

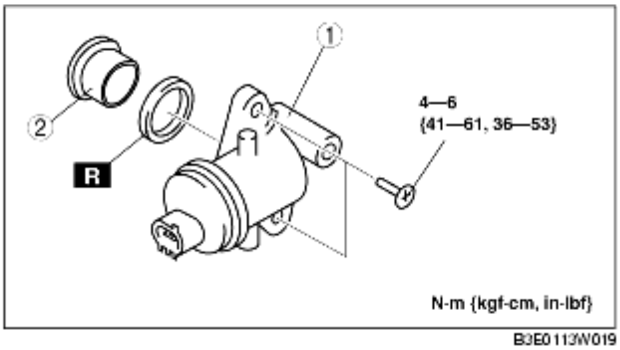
2. Remove the following parts for easier access.

    • Air cleaner (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

    • Fresh-air duct

    • Battery

3. Remove in the order indicated in the table.



1	Variable tumble shutter valve actuator (See Variable Tumble Shutter Valve Actuator Removal Note) (See Variable Tumble Shutter Valve Actuator Installation Note)
2	Retainer (See Retainer Removal Note) (See Retainer Installation Note)

4. Install in the reverse order of removal.

Variable Tumble Shutter Valve Actuator Removal Note

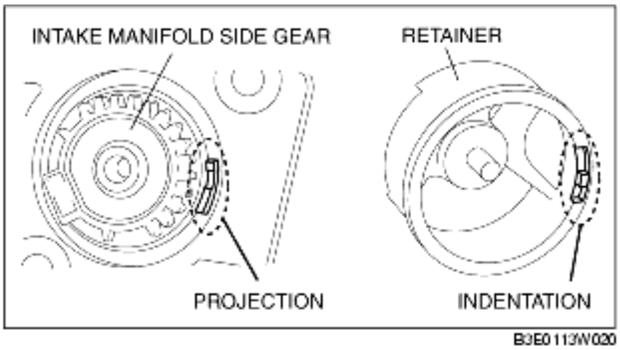
1. After removing the actuator, cover it with a plastic sheet to prevent foreign material from entering the inside of the actuator.

Retainer Removal Note

1. After removing the retainer, cover it with a plastic sheet to prevent foreign material from contacting the intake manifold side gear.

Retainer Installation Note

1. Install the retainer by positioning the projection on the intake manifold with the indentation on the retainer.



2. Be careful not to shift the retainer installation position.

Variable Tumble Shutter Valve Actuator Installation Note

1. Verify that the retainer installation position has not shifted.

2. Verify that the gasket is installed.

3. Verify that intake manifold side gear and actuator side gear are engaged properly so that the actuator can be installed without any excessive force.

VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [Z6]

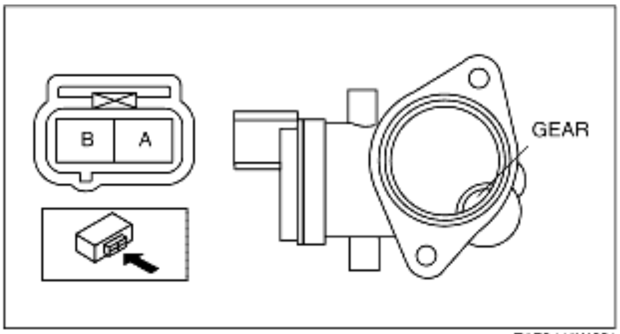
B3E011320130W04

Operation Inspection

1. Disconnect the negative battery cable.

2. Remove the variable tumble shutter valve actuator.

3. Connect the battery positive voltage to terminal A or B, and verify that the gear moves.

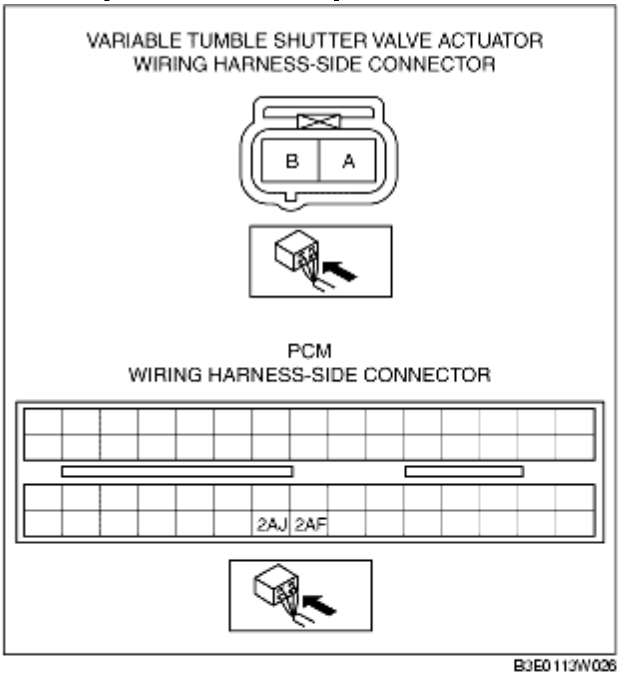


• If there is no malfunction, carry out the "Circuit Open/Short Inspection".

• If there is any malfunction, replace the variable tumble shutter valve actuator.

Terminal A	Terminal B	Gear rotation direction
B+	GND	Counterclockwise
GND	B+	Clockwise

Circuit Open/Short Inspection



1. Inspect the following wiring harnesses for an open or short circuit. (Continuity check)

Open circuit

- If there is no continuity, the circuit is open. Repair or replace the wiring harness.

- Variable tumble shutter valve actuator terminal A and PCM terminal 2AJ

- Variable tumble shutter valve actuator terminal B and PCM terminal 2AF

Short circuit

- If there is continuity, the circuit is shorted. Repair or replace the wiring harness.

- Variable tumble shutter valve actuator terminal A and power supply

- Variable tumble shutter valve actuator terminal A and body GND

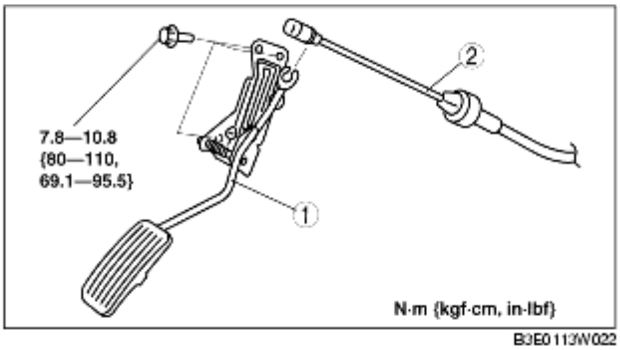
- Variable tumble shutter valve actuator terminal B and power supply

- Variable tumble shutter valve actuator terminal B and body GND

ACCELERATOR PEDAL REMOVAL/INSTALLATION [Z6]

B3E011341600W01

1. Remove in the order indicated in the table.



1	Accelerator pedal
2	Accelerator cable

2. Install in the reverse order of removal.

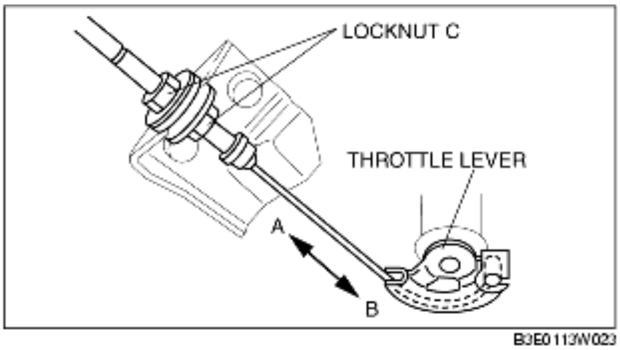
3. Adjust the accelerator cable. (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [Z6].)

ACCELERATOR CABLE INSPECTION/ADJUSTMENT [Z6]

B3E011341660W01

1. Verify that the throttle valve is fully closed.

2. Move the accelerator cable in the directions of A and B, and verify that the accelerator cable play is within the specification.



- If not within the specification, adjust the cable play using locknut C.

Standard

1.0-3.0 mm {0.04-0.11 in}

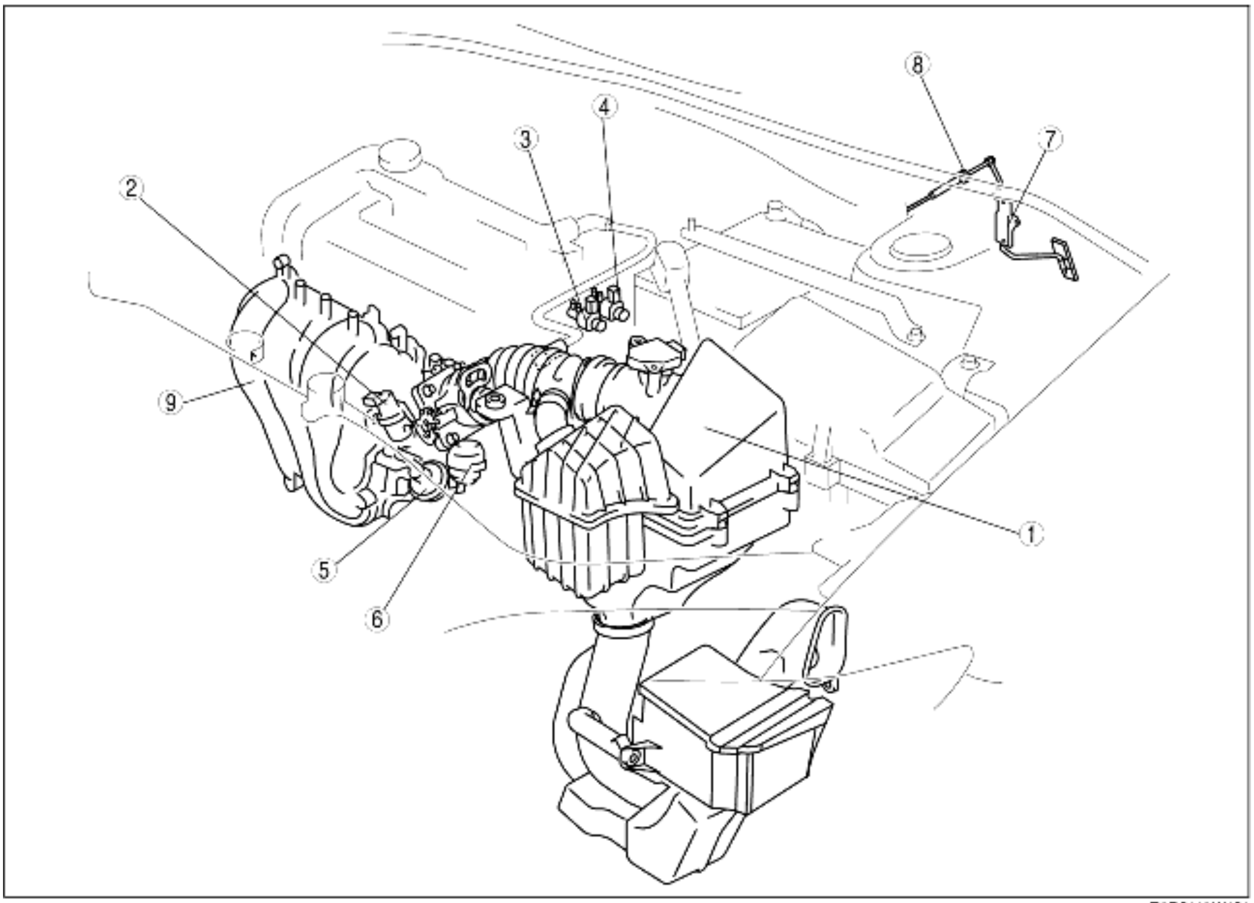
Tightening torque

9.8-14.7 N·m {100-149 kgf·cm, 86.8-130 in·lbf}

INTAKE-AIR SYSTEM[LF]

INTAKE-AIR SYSTEM LOCATION INDEX [LF]

B3E011300113W06

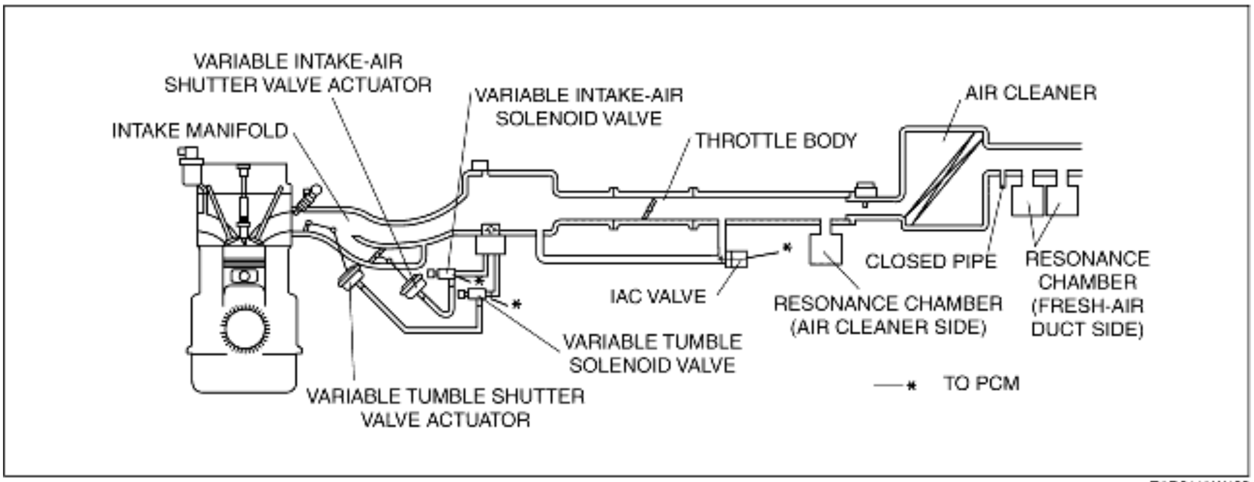


1	Air cleaner (See AIR CLEANER ELEMENT INSPECTION [LF].)	
2	IAC solenoid valve (See IDLE AIR CONTROL (IAC) VALVE INSPECTION [LF].)	
3	Variable intake-air solenoid valve (See VARIABLE INTAKE-AIR SOLENOID VALVE INSPECTION [LF].)	
4	Variable tumble solenoid valve (See VARIABLE TUMBLE SOLENOID VALVE INSPECTION [LF].)	
5	Variable intake-air shutter valve actuator (See VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR INSPECTION [LF].)	

6	Variable tumble shutter valve actuator (See VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [LF].)
7	Accelerator pedal (See ACCELERATOR PEDAL REMOVAL/INSTALLATION [LF].)
8	Accelerator cable (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [LF].)
9	Intake-air system (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

INTAKE-AIR SYSTEM DIAGRAM [LF]

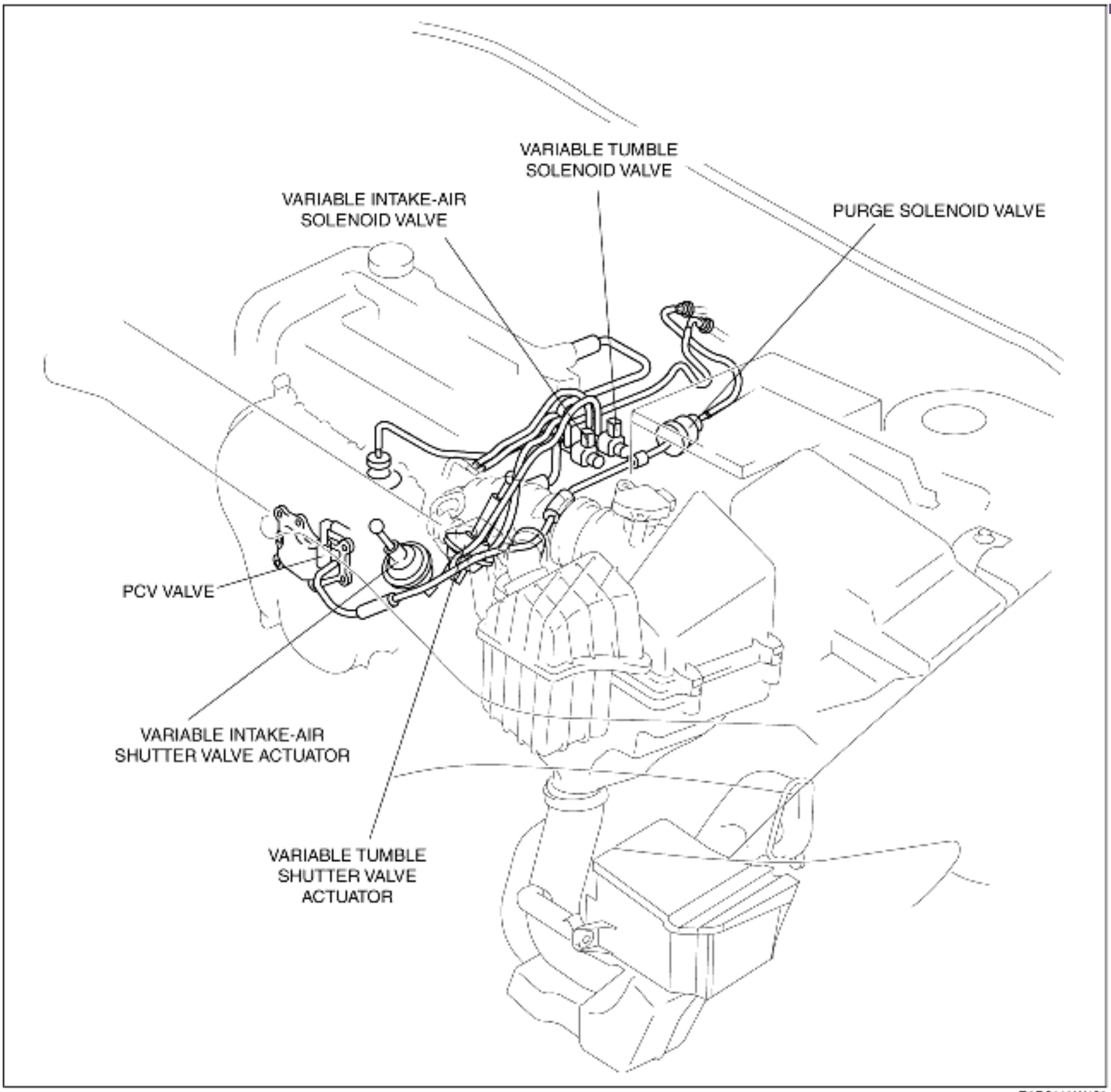
B3E011300113W07



B3E0113W102

INTAKE-AIR SYSTEM HOSE ROUTING DIAGRAM [LF]

B3E011300113W08



B3E0113W103

INTAKE-AIR SYSTEM MANIFOLD VACUUM INSPECTION [LF]

B3E011300113W09

1.• Verify that the intake air hoses are installed securely.

2. Warm up the engine.

3. Disconnect the vacuum hose connecting the intake manifold and the purge solenoid valve (intake manifold side) and install the vacuum gauge.

4. Using the vacuum gauge, measure the intake manifold vacuum in the idling condition (no load).

  • If not within the specification, perform the following inspections.

  - Accelerator cable play

- Compression pressure (See COMPRESSION INSPECTION [LF].)

- Air suction (throttle body, fuel injector, PCV valve, intake manifold)

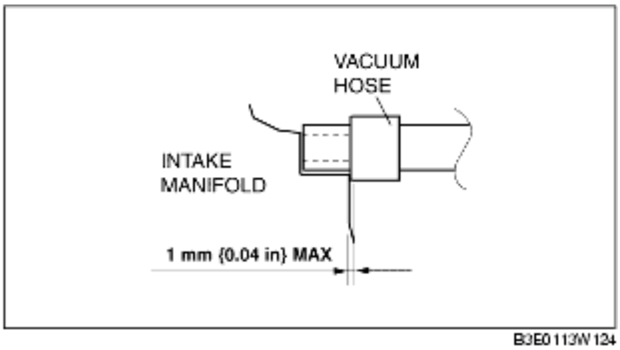
Note

• If any air suction exists, the change in engine speed can be made apparent by spraying penetrant lubricating spray on the applicable part.

Standard

-60.0 kPa {-451 mmHg, -17.8 inHg} or more

5. After measuring the intake manifold vacuum, install the vacuum hose to the intake manifold as shown in the figure.



INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]

B3E011300113W10

Warning

• A hot engine and intake air system can cause severe burns. Turn off the engine and wait until they are cool before removing the intake air system.

• Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure", while referring to the "BEFORE SERVICE PRECAUTIONS". (See BEFORE SERVICE PRECAUTION.)

1. Remove the plug hole plate. (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

2. Remove the battery cover and battery duct. (See BATTERY REMOVAL/INSTALLATION [LF].)

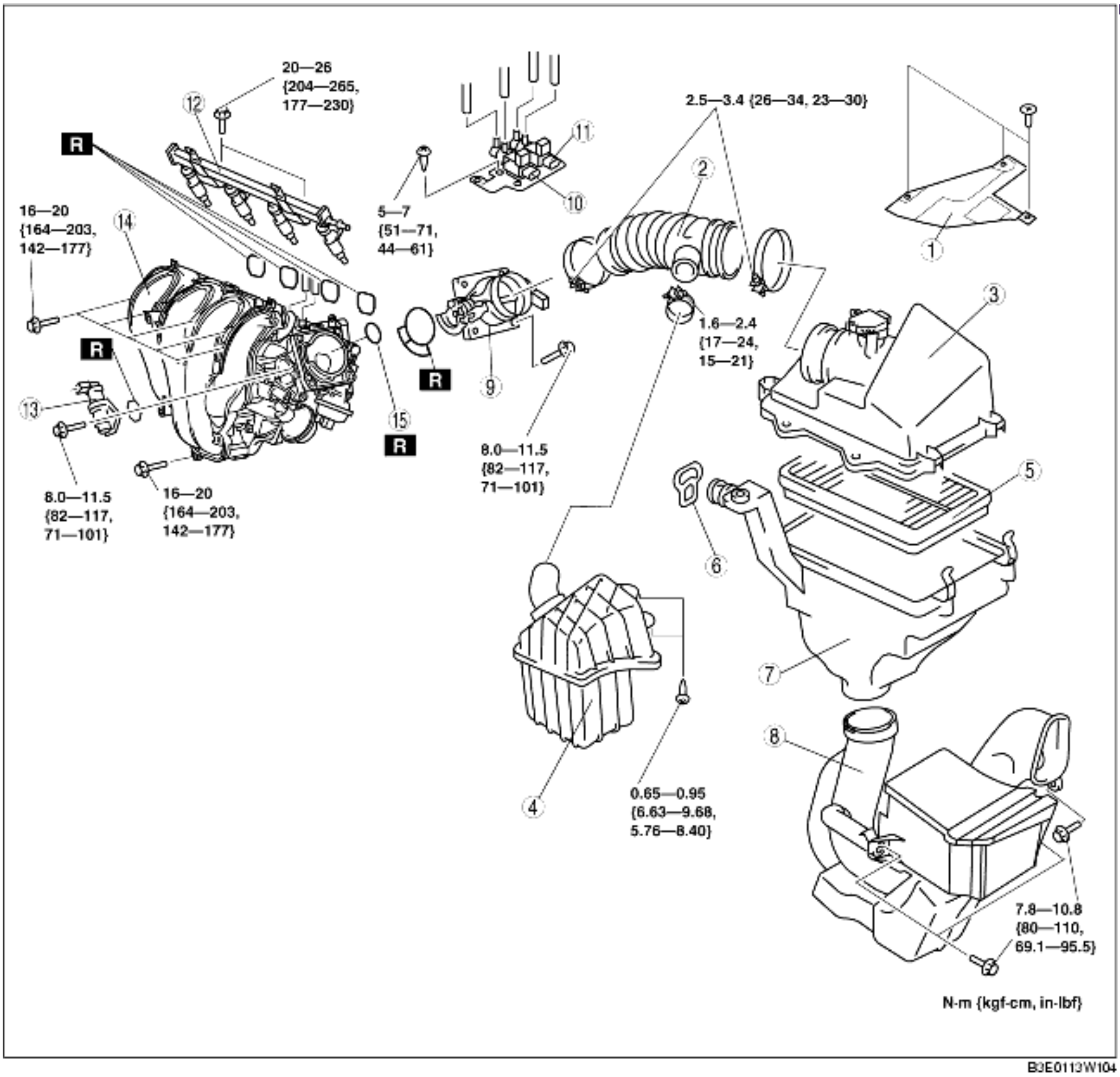
3. Remove the under cover.

4. Disconnect the negative battery cable.

5. Remove in the order indicated in the table.

6. Install in the reverse order of removal.

7. Complete the "AFTER SERVICE PRECAUTIONS". (See AFTER SERVICE PRECAUTION.)



1	Intake-air cover
2	Air hose (See Air Hose Installation Note.)
3	Air cleaner cover
4	Resonance chamber (Air cleaner side)
5	Air cleaner element
6	Strap (See Strap Installation Note.)
7	Air cleaner case (See Air Cleaner Case Installation Note.)

8	Fresh-air duct (See Fresh-air Duct Removal Note.)
9	Throttle body
10	Variable intake air solenoid valve
11	Variable tumble solenoid valve
12	Fuel distributor (See FUEL INJECTOR REMOVAL/INSTALLATION [LF].)
13	IAC solenoid valve
14	Intake manifold (See Intake Manifold Removal Note.)
15	EGR pipe gasket

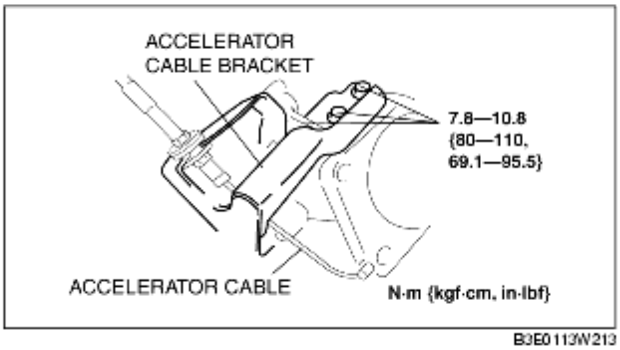
Fresh-air Duct Removal Note

1. Remove the front bumper before removing the fresh-air duct. (See FRONT BUMPER REMOVAL/INSTALLATION.)

Intake Manifold Removal Note

1. Remove the dipstick pipe. (See OIL PAN REMOVAL/INSTALLATION [LF].)

2. Remove the accelerator cable bracket from the intake manifold.



Air Cleaner Case Installation Note

Note

• Before installing the air cleaner case, verify that the rubber mounts on the battery support bracket have not fallen off.

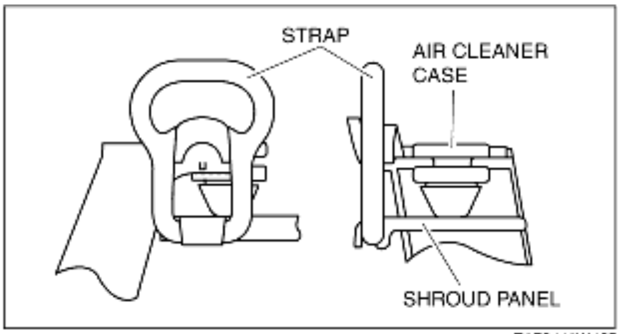
• When inserting the air cleaner case into the rubber mounts, applying soapy water aids the operation.

1. Verify that two rubber mounts are installed on the battery support bracket.

2. Install the air cleaner case into the rubber mounts.

Strap Installation Note

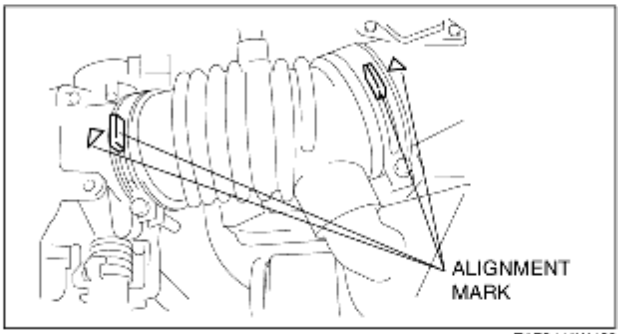
1. Using the strap, secure the shroud panel and the air cleaner case as shown in the figure.



B3E0113W105

Air Hose Installation Note

1. Align the alignment marks on the throttle body and the air hose.



B3E0113W106

AIR CLEANER ELEMENT INSPECTION [LF]

B3E011313300W02

1. Remove the air cleaner element. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

2. Inspect the following items:

- If there is any malfunction, clean or replace the air cleaner element.
- If the replacement interval has come, replace the air cleaner element.

- Is the air cleaner element soiled, damaged, or bent?
- Are the air cleaner case and the air cleaner element correctly sealed?
- Is the correct air cleaner element installed?

IDLE AIR CONTROL (IAC) VALVE INSPECTION [LF]

B3E011320661W03

Note

• Perform the following inspection only when directed.

Operation Test

1. Carry out the "Idle Air Control Inspection". (See Idle Air Control System Inspection.)

• If not as specified, perform the further inspection for the IAC valve.

Resistance Inspection

1. Disconnect the negative battery cable.

2. Disconnect the IAC valve connector.

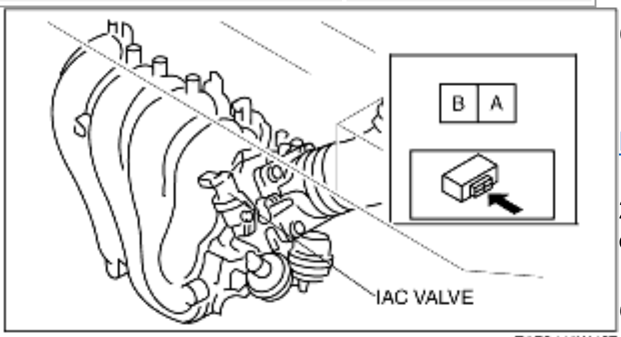
3. Measure the resistance between the IAC valve terminals using an ohmmeter.

• If not as specified, replace the IAC valve. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

• If as specified but the Operation Test is failed, carry out the "Circuit Open/Short Inspection".

Specification

Ambient temperature (°C {°F})	Resistance (ohms)
23 {73}	8.8-10.6



B3E0113W107

Circuit Open/Short Inspection

1. Disconnect the PCM connector. (See PCM REMOVAL/INSTALLATION [LF].)

2. Inspect the following wiring harnesses for open or short (continuity check).

Open circuit

• If there is no continuity, the circuit is open. Repair or replace the wiring harness.

- IAC valve terminal A and PCM terminal 2E

- IAC valve terminal B and PCM terminal 2F

Short circuit

• If there is continuity, the circuit is shorted. Repair or replace the wiring harness.

- IAC valve terminal A and power supply

- IAC valve terminal A and GND

- IAC valve terminal B and power supply

- IAC valve terminal B and GND

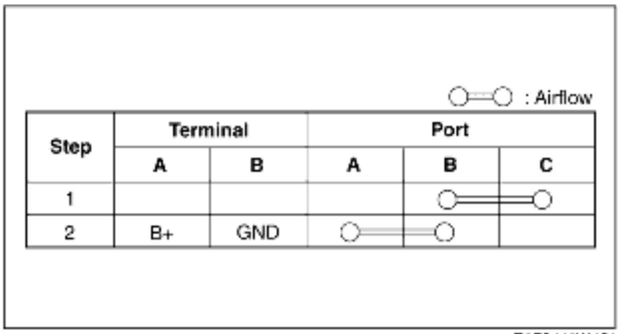
VARIABLE INTAKE-AIR SOLENOID VALVE INSPECTION [LF]

B3E011318740W01

1. Remove the variable intake-air solenoid valve. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

2. Inspect airflow between the ports under the following conditions.

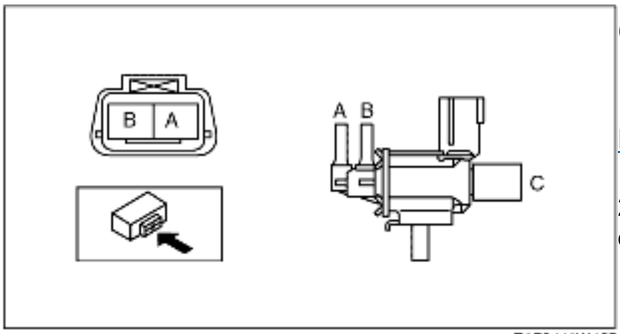
- If not as specified, replace the variable intake-air solenoid valve.
- If as specified, carry out the "Circuit Open/Short Inspection".



○—○ : Airflow

Step	Terminal A	Terminal B	Port A	Port B	Port C
1				○	○
2	B+	GND	○	○	

B3E0113W121

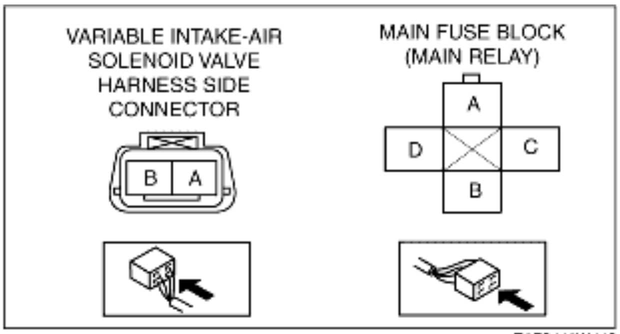


B3E0113W125

Circuit Open/Short Inspection

1. Disconnect the PCM connector. (See PCM REMOVAL/INSTALLATION [LF].)

2. Inspect the following wiring harness for open or short (continuity check).



B3E0113W110

Open circuit

- If there is no continuity, the circuit is open. Repair or replace the wiring harness.

- Variable intake-air solenoid valve terminal A and PCM terminal 2AJ

- Variable intake-air solenoid valve terminal B and main relay terminal

Short circuit

- If there is continuity, the circuit is shorted. Repair or replace the wiring harness.

- Variable intake-air solenoid valve terminal B and body GND

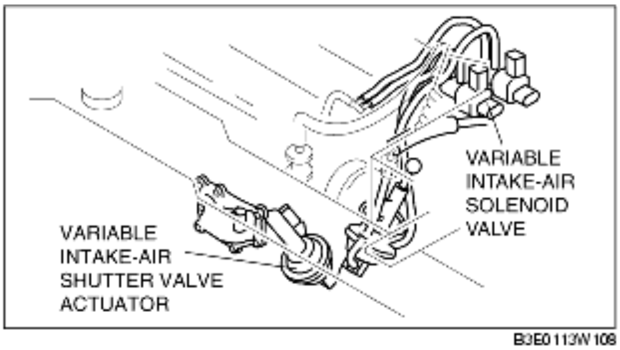
- Variable intake-air solenoid valve terminal A and power supply

VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR INSPECTION [LF]

B3E011320130W05

1. Remove the air hose. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

2. Disconnect the vacuum hose from the variable intake-air shutter valve actuator.



3. Connect a vacuum pump to the variable intake-air shutter valve actuator.

4. Apply vacuum and verify that the rod moves.

- If the rod dose not move, replace the intake manifold.

Vacuum kPa {mmHg, inHg}	Rod movement
Below -2.7 {-21, -0.9 }	Not operate
Above -33.4 {-251, -9.89 }	Fully pulled

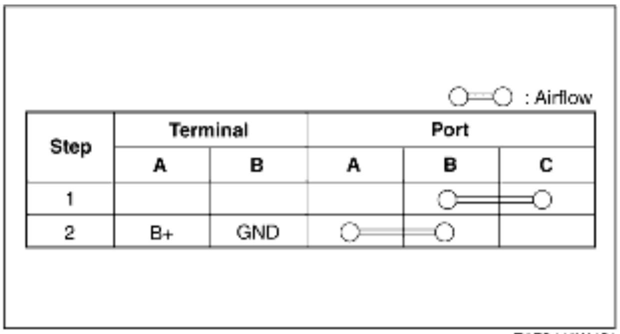
VARIABLE TUMBLE SOLENOID VALVE INSPECTION [LF]

B3E011318740W02

1. Remove the variable tumble solenoid valve. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

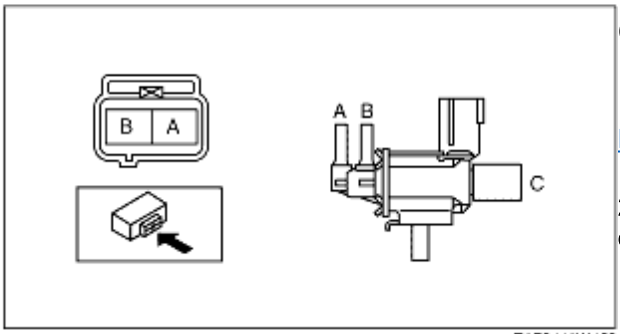
2. Inspect airflow between the ports under the following conditions.

- If not as specified, replace the variable tumble solenoid valve.
- If as specified, carry out the "Circuit Open/Short Inspection".



Step	Terminal A	Terminal B	Port A	Port B	Port C
1				○—	—○
2	B+	GND	○—	—○	

B3E0113W121

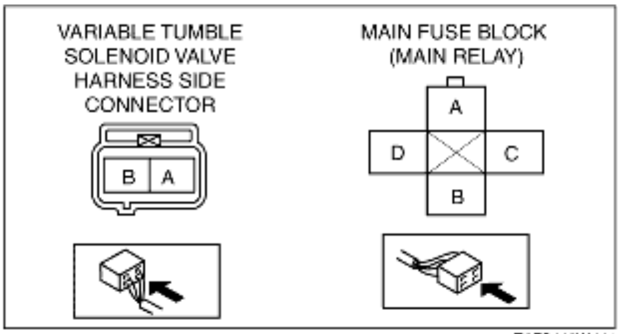


B3E0113W120

Circle Open/Short Inspection

1. Disconnect the PCM connector. (See [PCM REMOVAL/INSTALLATION [LF]].)

2. Inspect the following wiring harness for open or short (continuity check).



B3E0113W114

Open circuit

- If there is no continuity, the circuit is open. Repair or replace the wiring harness.

- Variable tumble solenoid valve terminal B and PCM terminal 2AI

- Variable tumble solenoid valve terminal A and main relay terminal A

Short circuit

- If there is continuity, the circuit is shorted. Repair or replace the wiring harness.

- Variable tumble solenoid valve terminal A and body GND

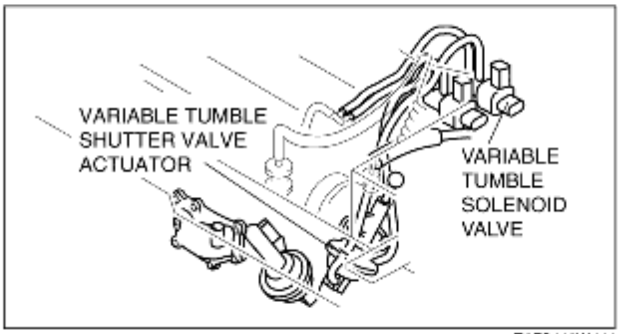
- Variable tumble solenoid valve terminal B and power supply

VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [LF]

B3E011320130W06

1. Remove the air hose. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

2. Disconnect the vacuum hose from the variable tumble shutter valve actuator.



3. Connect a vacuum pump to the variable tumble shutter valve actuator.

4. Apply vacuum and verify that the rod moves.

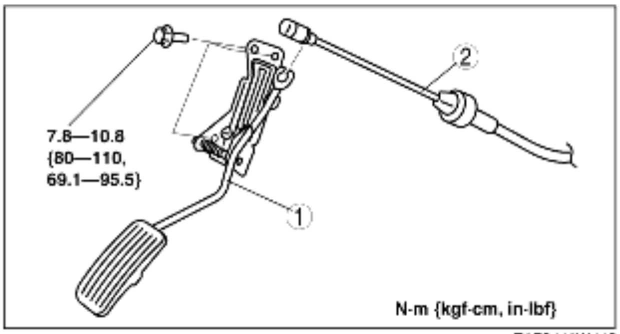
- If the rod dose not move, replace the intake manifold.

Vacuum kPa {mmHg, inHg}	Rod movement
Below -2.7 {-21, -0.9 }	No operate
Above -33.4 {-251, -9.89 }	Fully pulled

ACCELERATOR PEDAL REMOVAL/INSTALLATION [LF]

B3E011341600W02

1. Remove in the order indicated in the table.



1	Accelerator pedal
2	Accelerator cable

2. Install in the reverse order of removal.

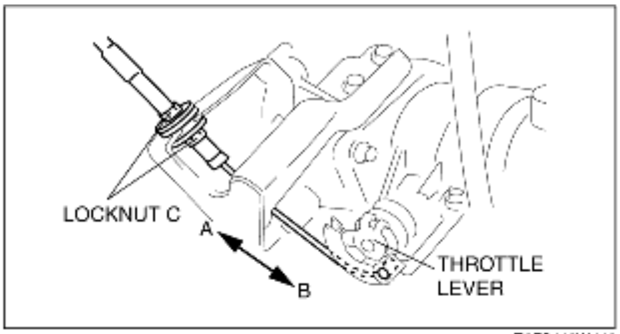
3. Adjust the accelerator cable. (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [LF].)

ACCELERATOR CABLE INSPECTION/ADJUSTMENT [LF]

B3E011341660W02

1. Verify that the throttle valve is fully closed.

2. Move the accelerator cable in the directions of A and B, and verify that the accelerator cable play is within the specification.



B3E0113W113

• If not within the specification, adjust the cable play using locknut C.

Standard

1.0-3.0 mm {0.04-0.11 in}

Tightening torque

9.8-14.7 N·m {100-149 kgf·cm, 86.8-130 in·lbf}

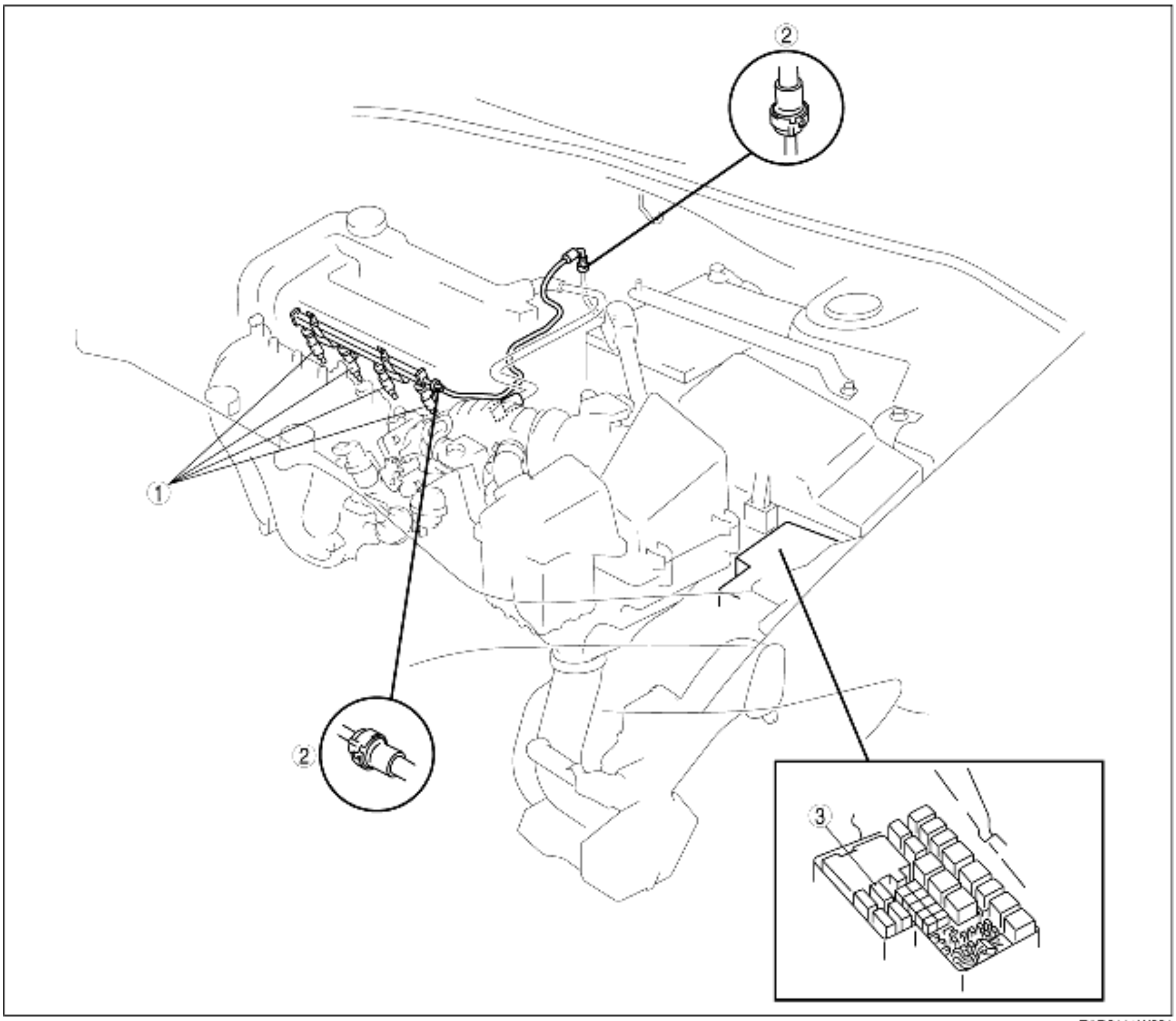
FUEL SYSTEM

FUEL SYSTEM LOCATION INDEX

B3E011401006W01

Engine Compartment Side

LF

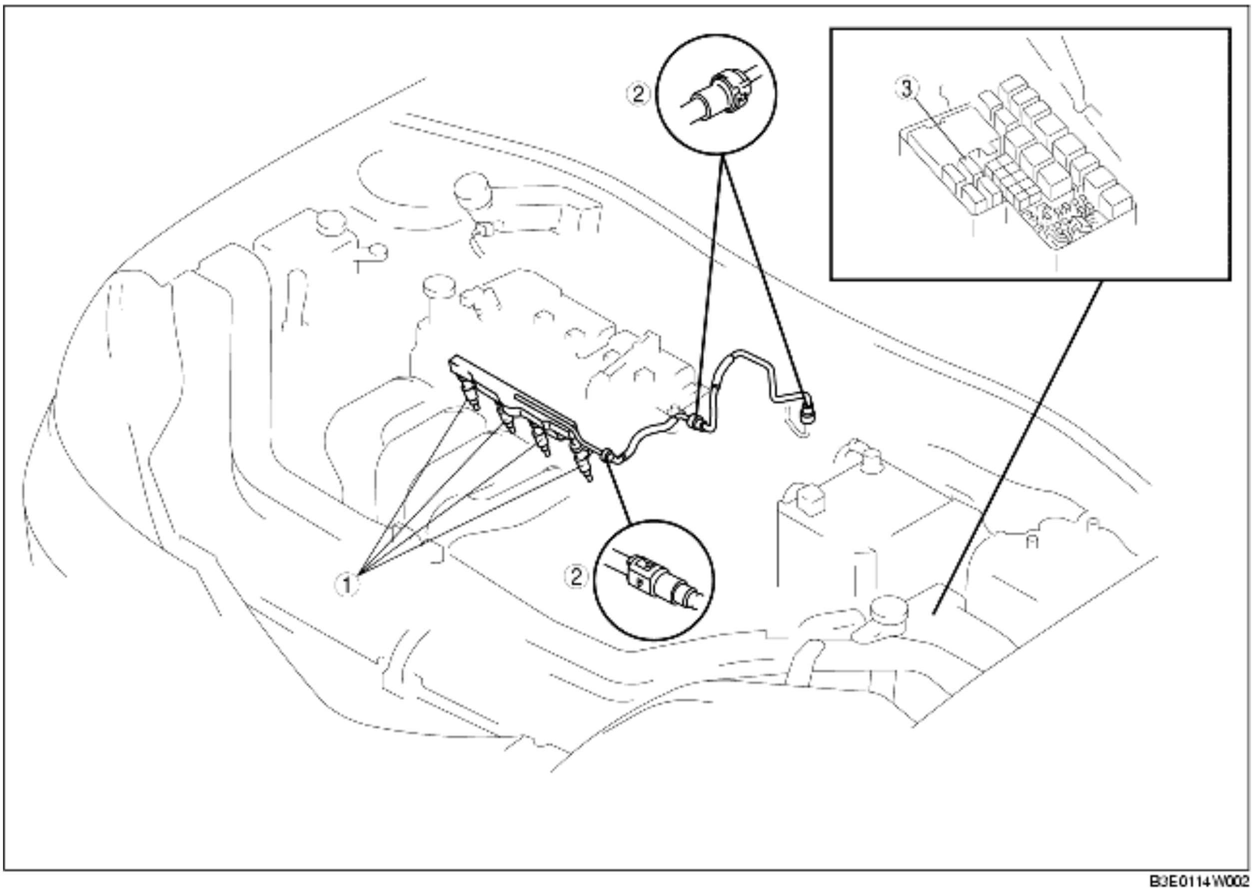


B3E0114W001

1	Fuel injector (See FUEL INJECTOR REMOVAL/INSTALLATION [LF].) (See FUEL INJECTOR INSPECTION.)
2	Quick release connector (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)

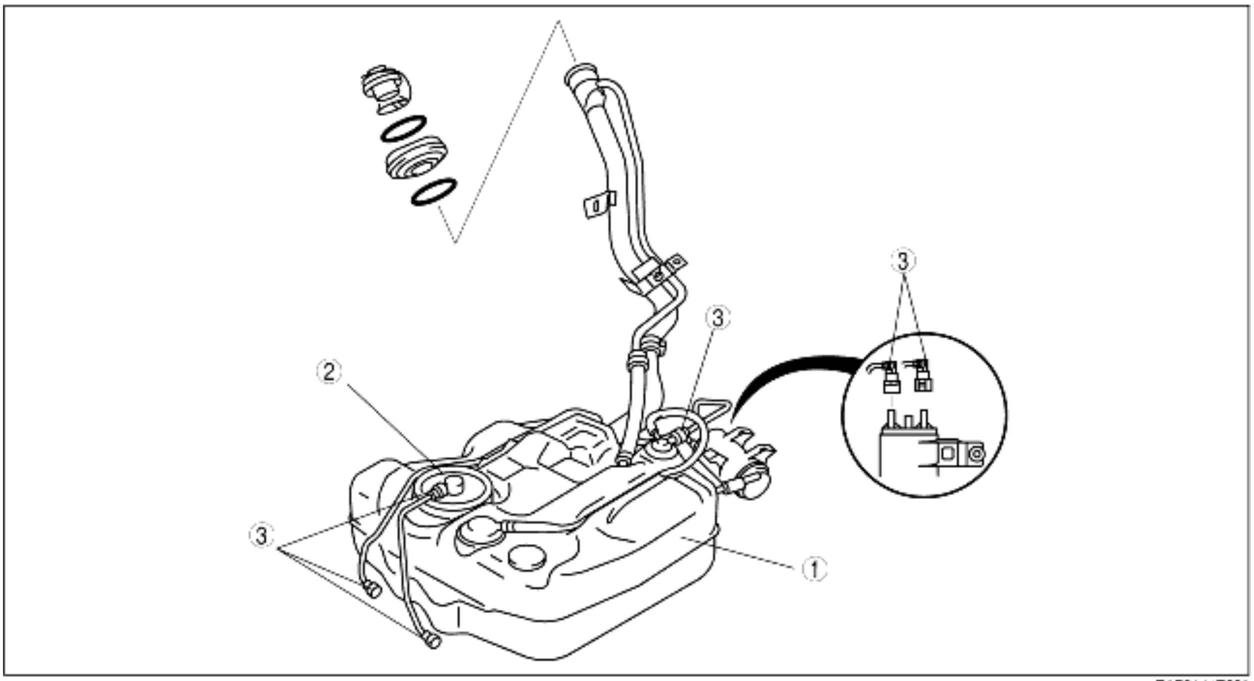
3	Fuel pump relay

Z6



1	Fuel injector (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].) (See FUEL INJECTOR INSPECTION.)
2	Quick release connector (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)
3	Fuel pump relay

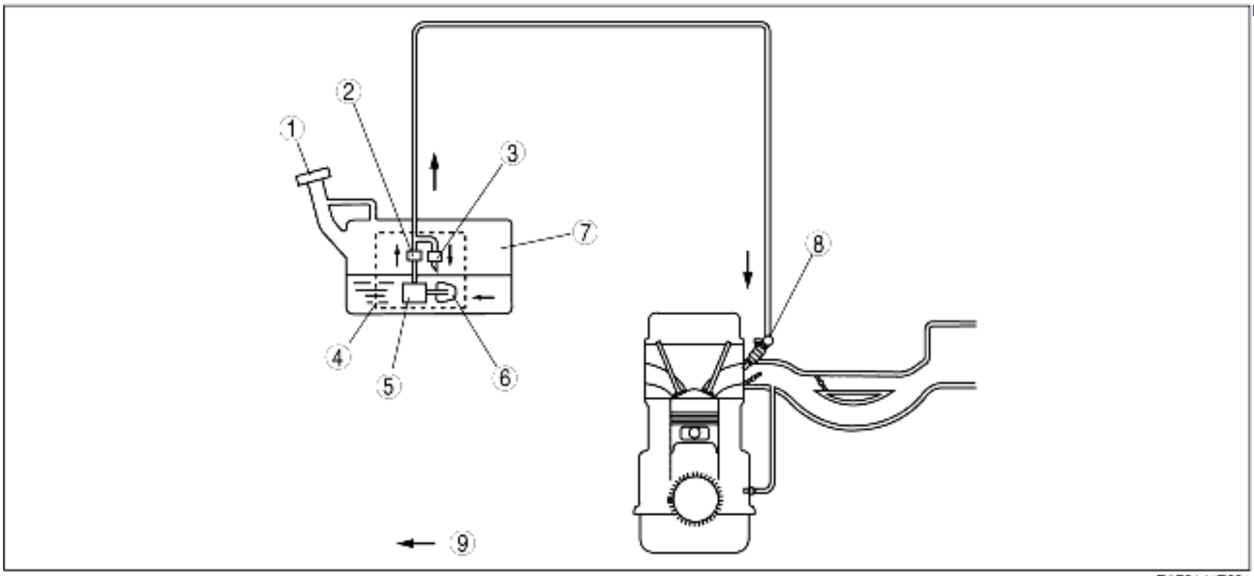
Fuel Tank Side



1	Fuel tank (See FUEL TANK REMOVAL/INSTALLATION.) (See FUEL TANK INSPECTION.)
2	Fuel pump unit (See FUEL PUMP UNIT REMOVAL/INSTALLATION.) (See FUEL PUMP UNIT DISASSEMBLY/ASSEMBLY.) (See FUEL PUMP UNIT INSPECTION.)
3	Quick release connector (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)

FUEL SYSTEM FLOW DIAGRAM

B3E011401006W02



1	Fuel-filler cap
2	Fuel filter (high-pressure)
3	Pressure regulator
4	Fuel pump unit
5	Fuel pump
6	Fuel filter (low-pressure)
7	Fuel tank
8	Fuel injector
9	Fuel flow

BEFORE SERVICE PRECAUTION

B3E011401006W03

Warning

• Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.

• Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure".

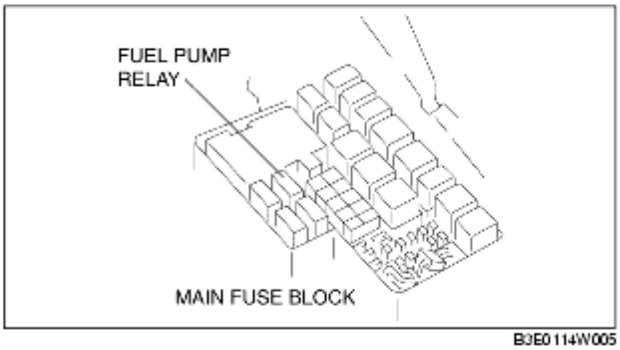
Caution

• If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.

Fuel Line Safety Procedure

1. Remove the fuel-filler cap to release the pressure inside the fuel tank.

2. Remove the fuel pump relay.



3. Start the engine.

4. After the engine stalls, crank the engine **several times**.

5. Turn the ignition switch to the LOCK position.

6. Install the fuel pump relay.

AFTER SERVICE PRECAUTION

B3E011401006W04

Warning

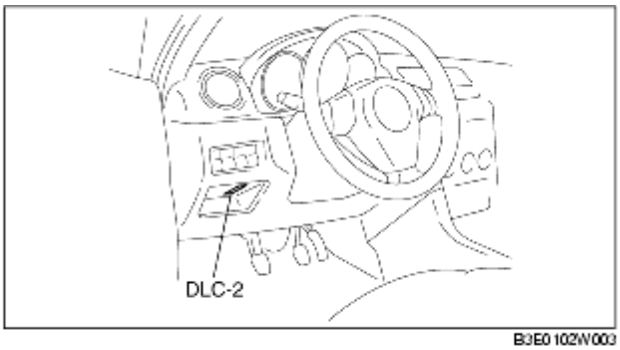
• Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Inspection".

Fuel Leakage Inspection

Warning

• Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, complete the following inspection with the engine stopped.

1. Connect the WDS or equivalent to the DLC-2.



2. Turn the ignition switch to the ON position.

3. Using the simulation function "FP", start the fuel pump.

4. Verify that there is no fuel leakage from the pressurized parts.

- If there is leakage, replace the fuel hoses and clips.
- If there is damage on the seal on the fuel pipe side, replace the fuel pipe.

Standard

There shall be no leakage after 5 min.

5. After reinstallation, repeat step 2-3 in the fuel leakage inspection.

FUEL LINE PRESSURE INSPECTION

B3E011401006W05

Warning

- Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. To prevent this, complete the following inspection with the engine stopped.

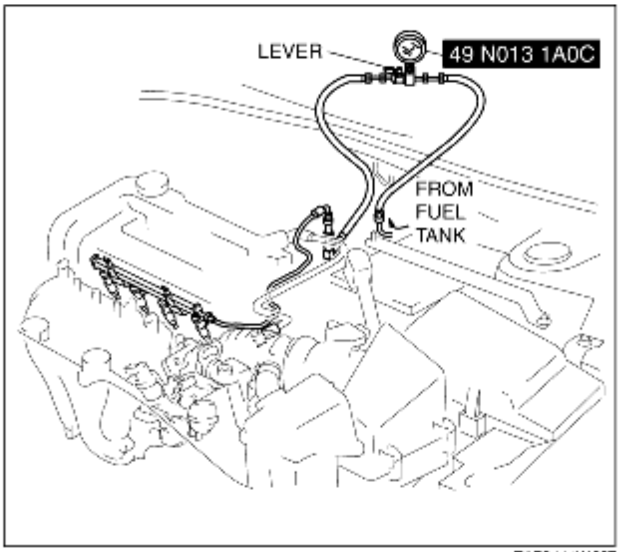
1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

2. Disconnect the negative battery cable.

3. Disconnect the quick release connector (in the engine compartment). (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)

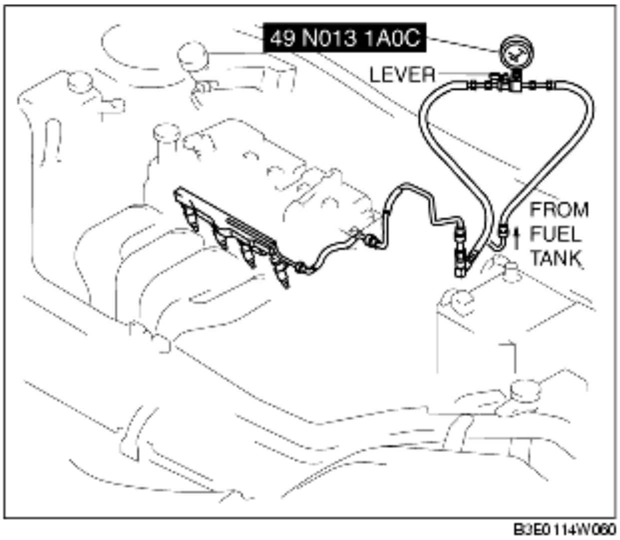
4. Turn the lever of the **SST** parallel to the hose as shown in the figure.

LF



B3E0114W007

Z6

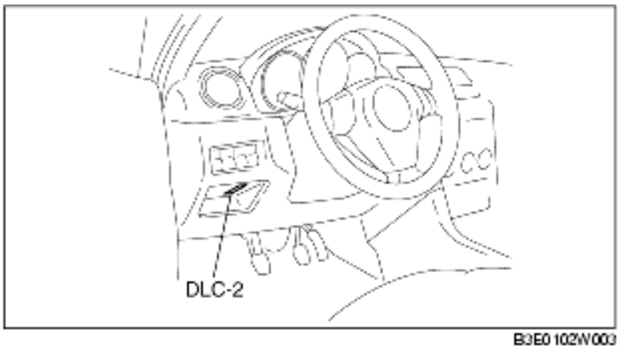


5. Insert the **SST** quick release connector into the fuel pipe until a click is heard.

6. Verify that the quick release connector is firmly connected by pulling it by hand.

7. Connect the negative battery cable.

8. Connect the WDS or equivalent to the DLC-2.



9. Turn the ignition switch to the ON position.

10. Using the simulation function "FP", start the fuel pump.

11. Operate the fuel pump for **10 s**.

12. Measure the fuel line pressure.

- If not within the specification, inspect the following:

If it less than the specification:

- Fuel pump unit

- Fuel line leakage

If it exceeds the specification:

- Fuel line clogging

Fuel pressure

350-410 kPa {3.57-4.18 kgf/cm^2, 50.8-59.4 psi}

13. Stop the fuel pump.

14. Measure the fuel hold pressure **after 5 min**.

• If not within the specification, inspect the following:

- Fuel line for clogging or leakage

Fuel hold pressure

250 kPa {2.55 kgf/cm^2, 36.2 psi} or more

15. Disconnect the **SST**.

16. Connect the quick release connector. (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)

17. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

FUEL TANK REMOVAL/INSTALLATION

B3E011442110W01

Warning

• Repairing a fuel tank containing fuel is dangerous. Explosion or fire may cause death or serious injury. Always properly steam clean a fuel tank before repairing it.

1. Park the vehicle on a level surface.

2. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

Warning

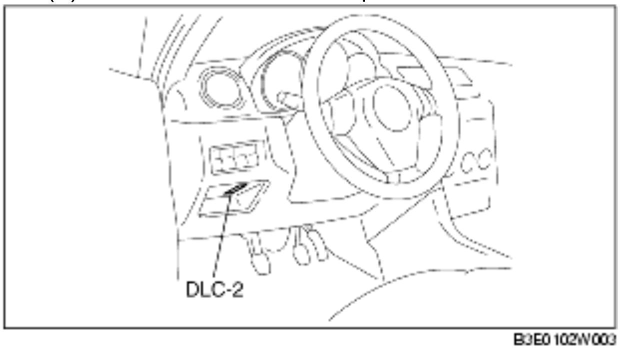
• A person charged with static electricity could cause a fire or explosion, resulting in death or serious injury. Before draining fuel, make sure to discharge static electricity by touching a vehicle.

3. Drain the fuel from the fuel tank using the following procedure:

(1) Disconnect the quick release connector (in the engine compartment). (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)

(2) Attach a long hose to the disconnected fuel pipe and drain the fuel into a proper receptacle.

(3) Connect the WDS or equivalent to the DLC-2.



(4) Turn the ignition switch to the ON position.

(5) Using the simulation function "FP", start the fuel pump.

Caution

• The fuel pump may malfunction if it is operated without any fuel in the fuel tank (fuel pump idling). Constantly monitor the amount of fuel being discharged and immediately stop operation of the pump when essentially no fuel is being discharged.

(6) When essentially no fuel is being discharged from the hose, turn the ignition switch to the LOCK position.

(7) Disconnect the negative battery cable.

4. Remove the rear seat cushion. (See REAR SEAT REMOVAL/INSTALLATION.)

5. Remove the service hole cover.

6. Disconnect the fuel pump unit connector.

7. Remove the charcoal canister protector. (See CHARCOAL CANISTER REMOVAL/INSTALLATION.)

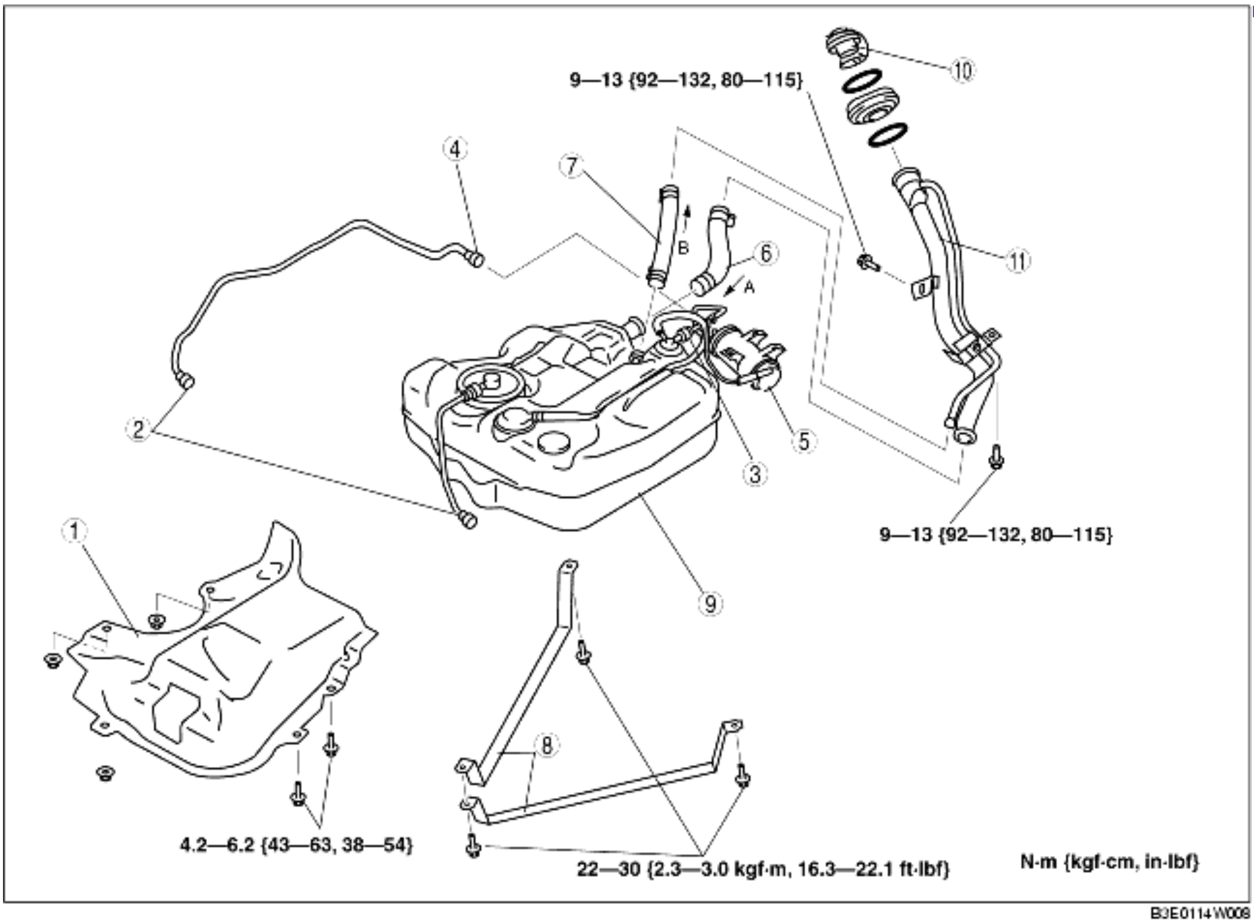
8. Lower the main silencer so that the insulator can be removed. (See EXHAUST SYSTEM REMOVAL/INSTALLATION [LF].) (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)

9. Remove the rear under cover (LH).

10. Remove in the order indicated in the table.

11. Install in the reverse order of removal.

12. Inspect all parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)



1	Insulator
2	Quick release connector (fuel tank front) (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)
3	Quick release connector (on rollover valve) (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)
4	Quick release connector (on charcoal canister, purge solenoid valve side) (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)
5	Charcoal canister (See CHARCOAL CANISTER REMOVAL/INSTALLATION.)
6	Joint hose (See Joint Hose Installation Note.)
7	Breather hose (See Breather Hose Installation Note.)
8	Strap
9	Fuel tank

10	Fuel-filler cap
11	Fuel-filler pipe (See Fuel-filler Pipe Removal Note.)

Fuel-filler Pipe Removal Note

1. Remove the rear tire (RH).

2. Remove the rear mudguard (RH).

3. Support the rear crossmember using a transmission jack.

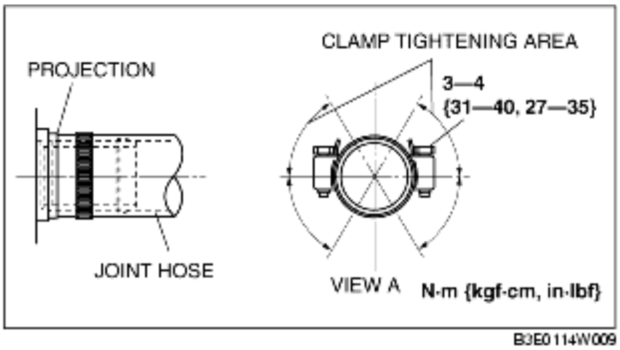
4. Remove the rear shock absorber (RH) lower bolts. (See REAR SHOCK ABSORBER REMOVAL/INSTALLATION.)

5. Loosen the rear crossmember installation nuts (6 locations) and lower the rear crossmember **30 mm {1.2 in}**. (See REAR CROSSMEMBER REMOVAL/INSTALLATION.)

6. Remove the fuel-filler pipe.

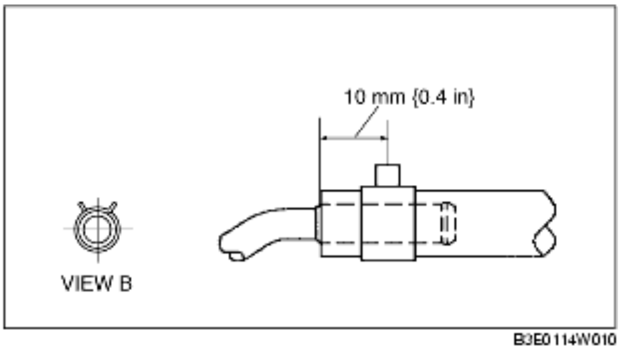
Joint Hose Installation Note

1. Install the joint hose and clamp as shown in the figure.



Breather Hose Installation Note

1. Install the breather hose and clamp as shown in the figure.



FUEL TANK INSPECTION

B3E011442110W02

Note

- The two rollover valves built into the fuel tank and check valves (two-way) built into the rollover valves are inspected in this inspection.

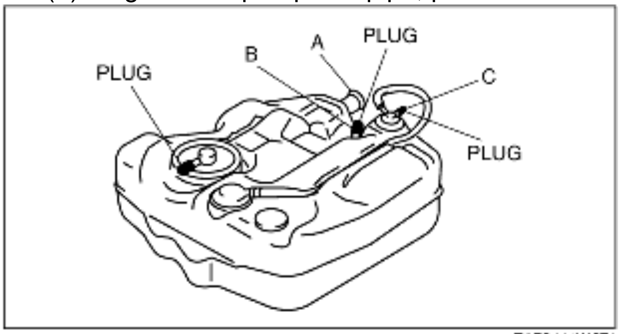
1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

2. Disconnect the negative battery cable.

3. Remove the fuel tank. (See FUEL TANK REMOVAL/INSTALLATION.)

4. Perform the following procedure to verify the fuel tank airtightness.

(1) Plug the fuel pump unit pipe, ports B and C.



B3E0114W071

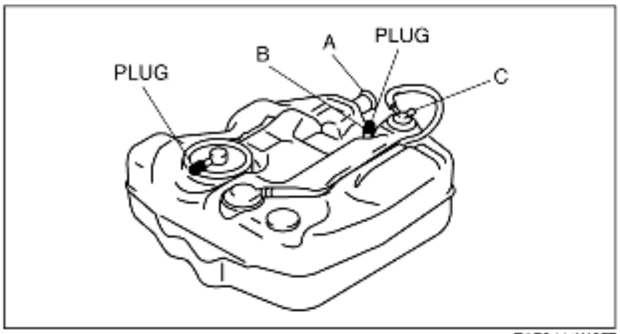
(2) Apply a pressure of **3 kPa {22 mmHg, 0.8 inHg}** to port A and wait for a while.

(3) Verify that there is no air leakage from the fuel tank.

5. Plug the fuel pump unit pipe and port B.

6. Level the fuel tank.

7. Apply a pressure of **3 kPa {22 mmHg, 0.8 inHg}** to port A and wait for a while.



B3E0114W057

8. With the pressure still applied, verify that there is airflow from port C and the pressure is **0-3 kPa {0-22 mmHg, 0-0.8 inHg}**.

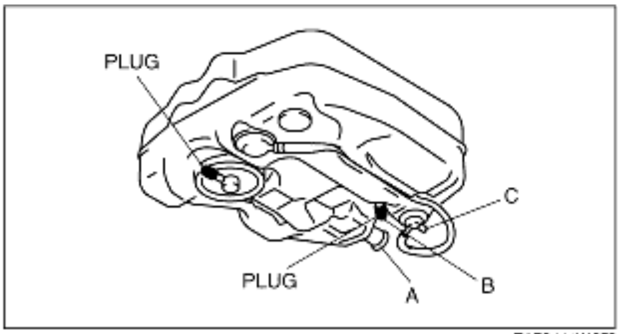
- If there is no airflow, replace the fuel tank.

9. Apply a pressure of **-0.5 kPa {-3.7 mmHg, -0.1 inHg}** to port A and wait for a while.

10. With the pressure still applied, verify that there is airflow from port C and the pressure is **0- -0.5 kPa {0- -3.7 mmHg, 0- -0.1 inHg}.**

- If there is no airflow, replace the fuel tank.
- If there is airflow, place the fuel tank upside down.

11. Apply a pressure of **3 kPa {22 mmHg, 0.8 inHg}** to port A and wait for a while.



B3E0114W058

12. With the pressure still applied, verify that there is no airflow from port C.

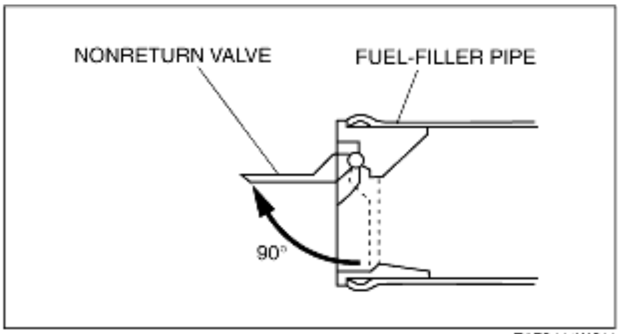
- If there is airflow, replace the fuel tank.

NONRETURN VALVE INSPECTION

B3E011442270W01

1. Remove the fuel-filler pipe. (See FUEL TANK REMOVAL/INSTALLATION.)

2. Move the valve and verify that the valve opens to **90**°.



B3E0114W011

- If it does not open, replace the fuel-filler pipe.

3. Verify that the nonreturn valve returns to the normal position by spring force.

- If it does not return, replace the fuel-filler pipe.

FUEL PUMP UNIT REMOVAL/INSTALLATION

B3E011413350W01

Warning

• Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure", while referring to "BEFORE SERVICE PRECAUTION".

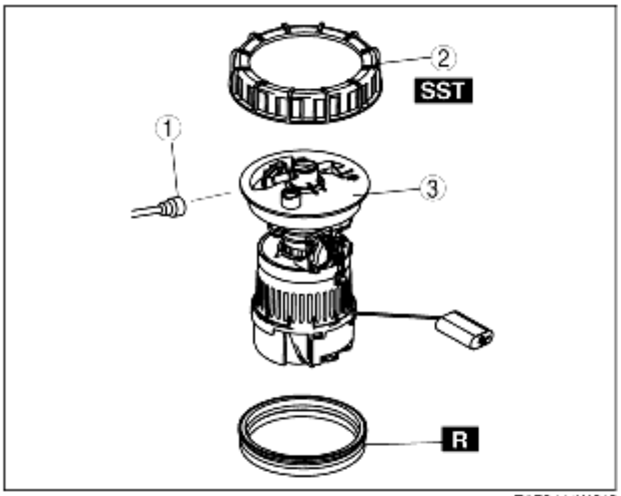
• Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, before performing the fuel pump unit removal/installation, always complete the "Fuel Leak Inspection After Fuel Pump Unit Installation".

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

2. Disconnect the negative battery cable.

3. Remove the fuel tank. (See FUEL TANK REMOVAL/INSTALLATION.)

4. Remove in the order indicated in the table.



B3E0114W012

1	Quick release connector (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)
2	Fuel pump cap (See Fuel Pump Cap Removal Note.) (See Fuel Pump Cap Installation Note.)
3	Fuel pump unit

5. Install in the reverse order of removal.

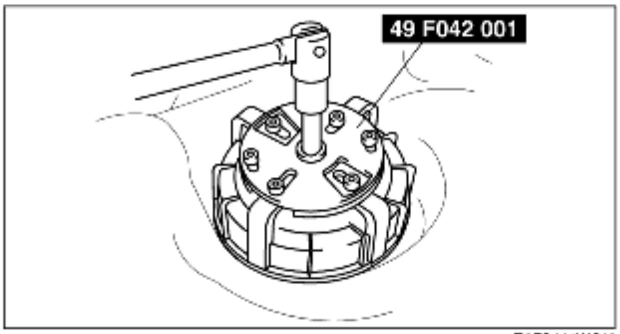
6. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Fuel Pump Cap Removal Note

Caution

• The fuel pump cap could be damaged if the SST is used with any gap between the cap and the SST. Securely attach the SST so that there is no gap between the SST tabs and the side of the cap.

1. Remove the fuel pump cap using the **SST**.



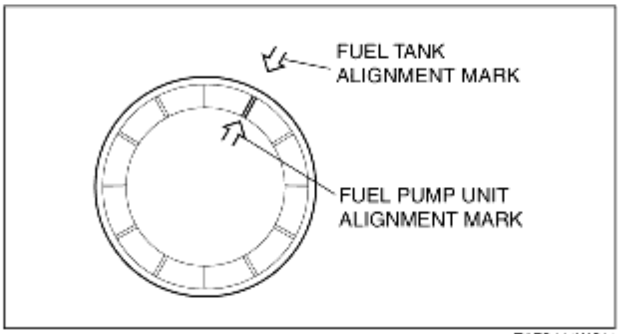
B3E0114W013

Fuel Pump Cap Installation Note

Note

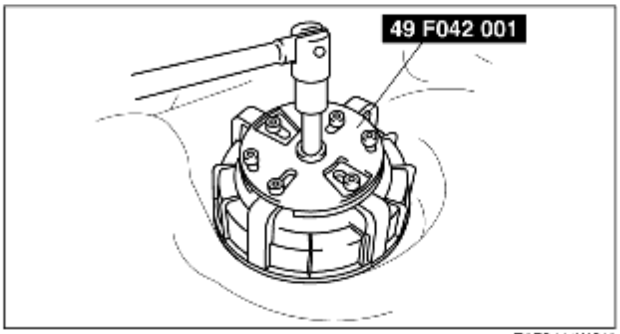
• The fuel pump unit will rotate and cannot be secured in the specified position if there is any gasoline on the gasket. Thoroughly wipe away all gasoline from the gasket.

1. Align the fuel tank and fuel pump unit alignment marks as shown in the figure.



B3E0114W014

2. Set the **SST** as shown in the figure.



B3E0114W013

3. Using the **SST**, tighten the fuel pump cap within the specified tightening torque without shifting the alignment marks.

• If the specified tightening torque cannot be obtained, replace the fuel pump cap and gasket.

• If the specified tightening torque cannot be obtained after replacement of the fuel pump cap and gasket, replace the fuel tank.

Fuel pump cap tightening torque

80-90 N·m {8.2-9.1 kgf·m, 59-66 ft·lbf}

Fuel Leakage Inspection After Pump Unit Installation

1. Before installing the fuel tank, verify that there is no leakage when a pressure of **+5.9 kPa {+44 mmHg, +1.7 inHg}** is applied to the fuel tank.

2. Install the fuel tank. (See FUEL TANK REMOVAL/INSTALLATION.)

3. Drive the vehicle starting from a standstill and brake suddenly **five to six times** at a low speed.

4. Stop the vehicle and verify from outside the vehicle that there is no fuel leakage around the fuel pump unit.

FUEL PUMP UNIT DISASSEMBLY/ASSEMBLY

B3E011413350W02

Note

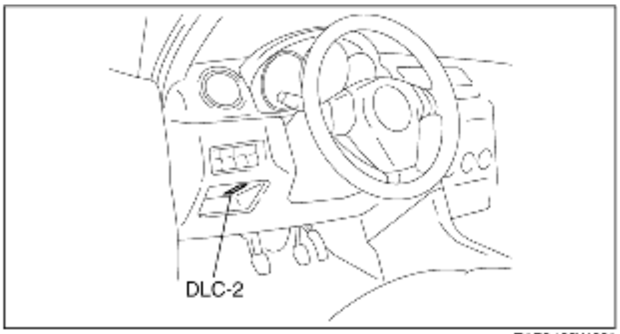
• The fuel pump unit cannot be disassembled.

FUEL PUMP UNIT INSPECTION

B3E011413350W03

Fuel Pump Operation Inspection

1. Connect the WDS or equivalent to the DLC-2.



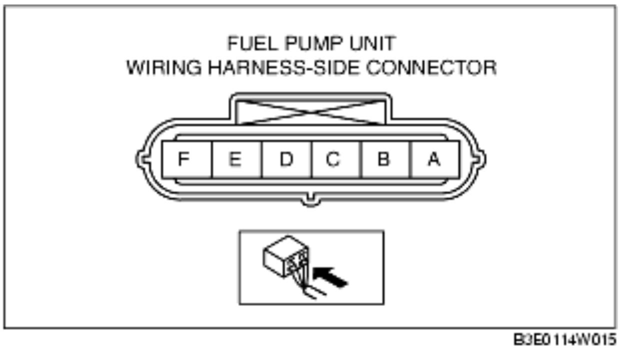
B3E0102W003

2. Remove the fuel-filler cap.

3. Turn the ignition switch to the ON position.

4. Using the simulation function "FP", verify that operation sound is heard from the fuel pump when "FP" is turned from OFF to ON.

• If the operation sound cannot be verified, measure the voltage at fuel pump wiring harness-side connector terminal A.



- If as specified, inspect the following:

• Fuel pump continuity

- If not within the specification, inspect the following:

• Fuel pump relay

• Wiring harnesses and connectors between main relay-fuel pump relay-fuel pump

Standard

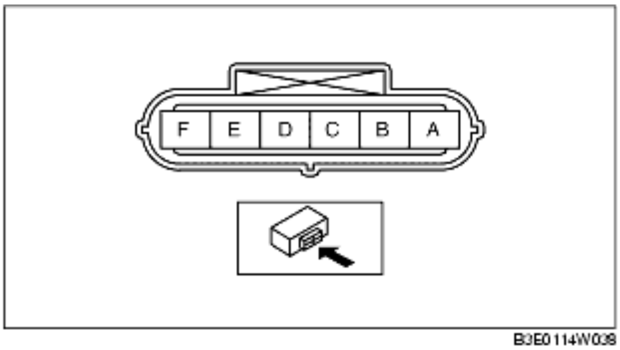
B+ (Ignition switch at ON)

Continuity Inspection

1. Disconnect the negative battery cable.

2. Disconnect the fuel pump unit connector.

3. Inspect for continuity between fuel pump unit terminals A-E.

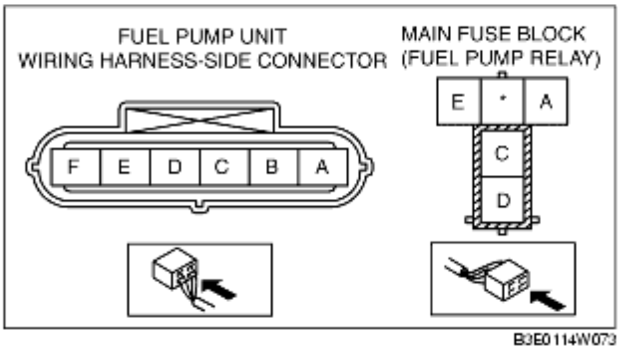


• If there is continuity, perform the "Circuit Open/Short Inspection".

• If there is no continuity, replace the fuel pump.

Circuit Open/Short Inspection

1. Inspect the following wiring harnesses for an open or short circuit (continuity check).



Open circuit

• If there is no continuity, the circuit is open. Repair or replace the harness.

- Fuel pump unit terminal A and fuel pump relay terminal D

- Fuel pump unit terminal E and body GND

Short circuit

• If there is continuity, the circuit is short. Repair or replace the harness.

- Fuel pump unit terminal A and body GND

- Fuel pump unit terminal E and power supply

Fuel Static Pressure Inspection

Note

• The fuel static pressure inspection cannot be performed because the pressure regulator is integrated with the fuel pump unit.

QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION

B3E011442692W01

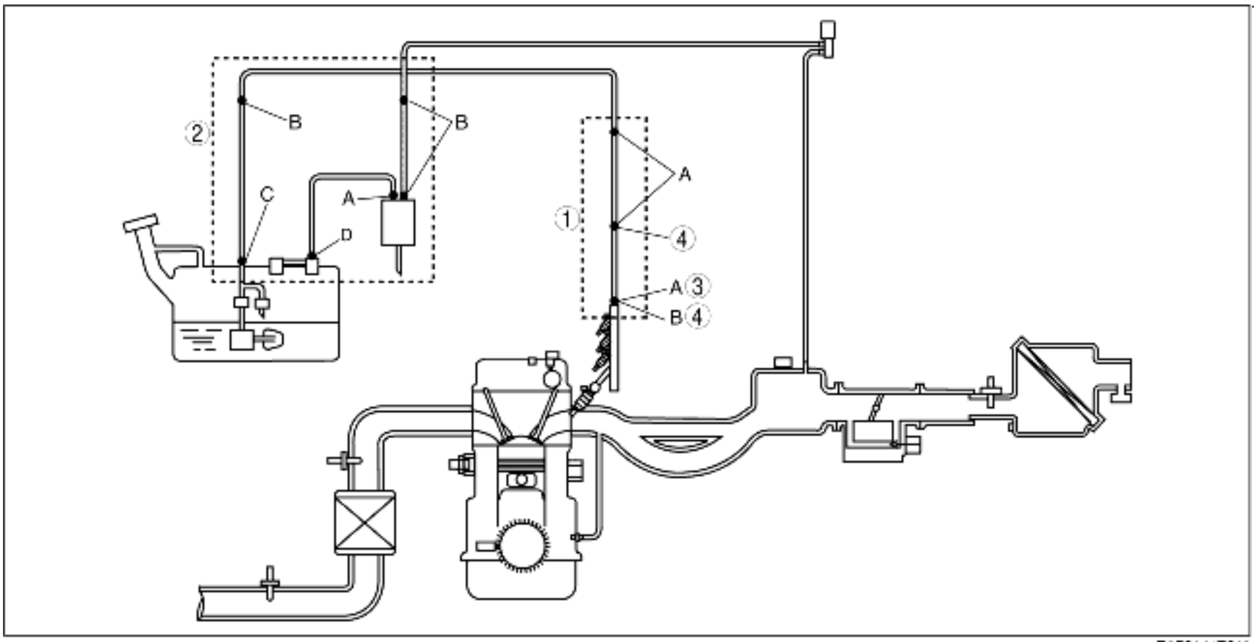
Warning

• Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure", while referring to the "BEFORE SERVICE PRECAUTION".

Quick Release Connector Type

Caution

• There are four types of quick release connectors. Verify the type and location, and install/remove properly.



B3E0114T013

1	Engine compartment side
2	Fuel tank side
3	Only on LF
4	Only on Z6

Type A Removal

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

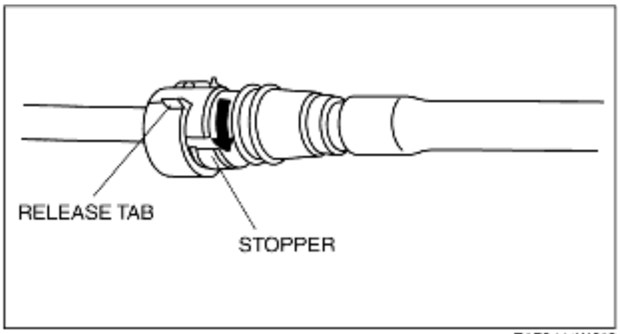
Caution

• The quick release connector may be damaged if the release tab is bent excessively. Do not expand the release tab over the stopper.

Note

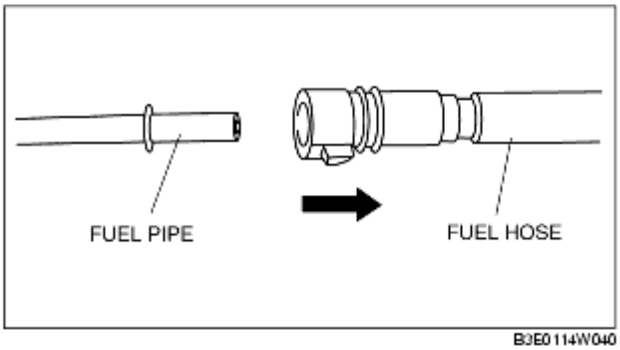
• The fuel hose can be removed by pushing it to the pipe side to release the lock.

2. Rotate the release tab on the quick release connector to the stopper position.

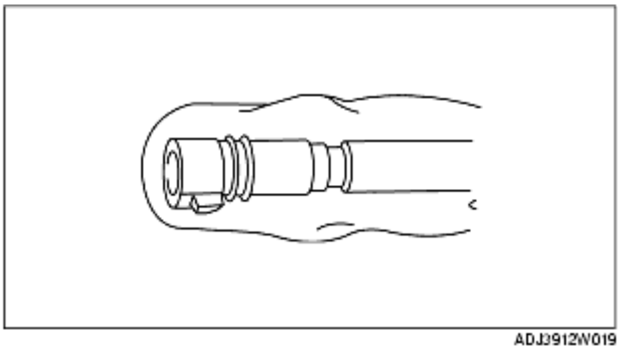


B3E0114W039

3. Pull out the fuel hose straight from the fuel pipe and disconnect it.



4. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from scratches or dirt.



Type B Removal

Note

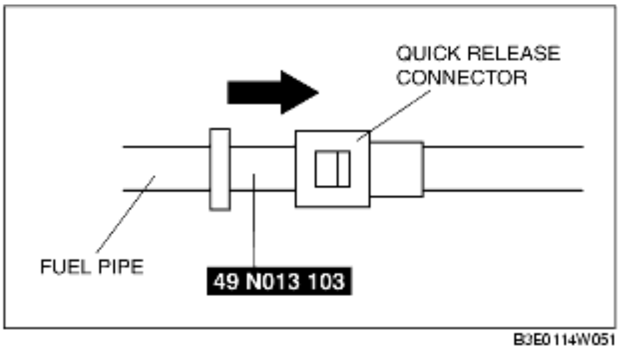
• Use the **SST**.

• For the purge solenoid valve-side of the charcoal canister, do not use the **SST**because it cannot be accessed easily.

Using the SST

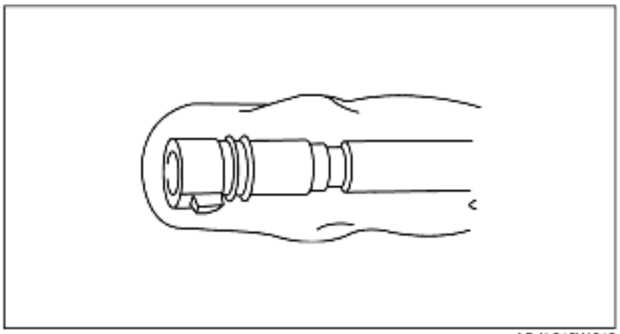
1. Follow " BEFORE SERVICE PRECAUTION" and remove dirt from the connecting surfaces before performing any work operations. (See BEFORE SERVICE PRECAUTION.)

2. Insert the **SST** into the quick release connector.



3. Pull out the fuel hose straight from the fuel pipe and disconnect it.

4. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from scratches or dirt.



ADJ3912W019

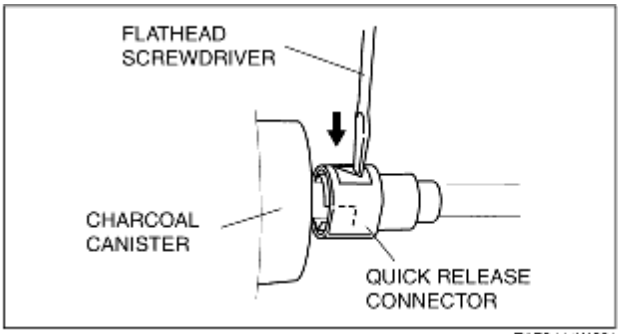
Without using the SST

Caution

- When releasing the retainer locks, take extreme care not to damage the charcoal canister and pipe.

1. Follow " BEFORE SERVICE PRECAUTION" and remove dirt from the connecting surfaces before performing any work operations. (See BEFORE SERVICE PRECAUTION.)

2. Release the locks between the retainer and pipe by pressing each retainer lock one by one using a flathead screwdriver or a similar tool.

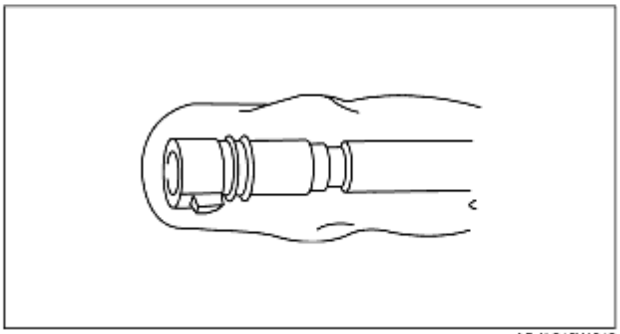


B3E0114W061

3. Pull out the hose straight from the pipe and disconnect it.

- The retainer remains on the charcoal canister pipe.

4. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from scratches or dirt.

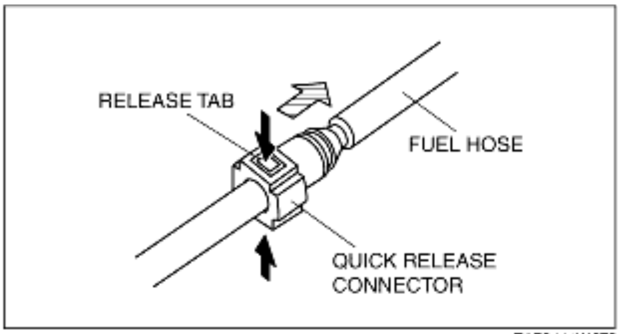


ADJ3912W019

Type C Removal

1. Follow " BEFORE SERVICE PRECAUTION" and remove dirt from the connecting surfaces before performing any work operations. (See BEFORE SERVICE PRECAUTION.)

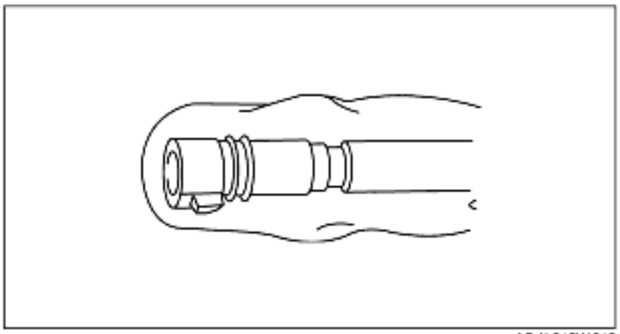
2. Push the release tab on the retainer to unlock.



B3E0114W072

3. Pull out the fuel hose straight from the fuel pipe and disconnect it.

4. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from scratches or dirt.

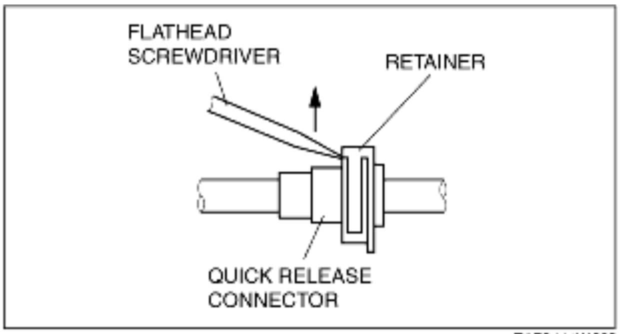


ADJ3912W019

Type D Removal

1. Follow " BEFORE SERVICE PRECAUTION" and remove dirt from the connecting surfaces before performing any work operations. (See BEFORE SERVICE PRECAUTION.)

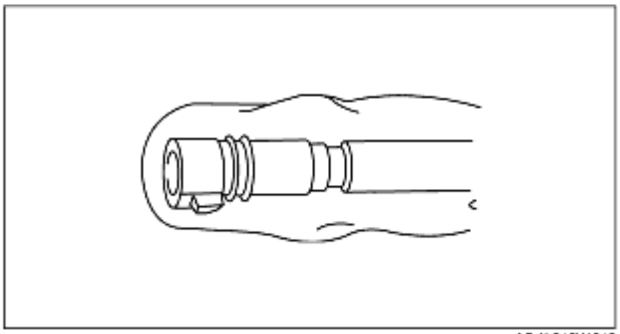
2. Move the retainer upward using a small flathead screwdriver or a similar tool.



B3E0114W062

3. Pull out the fuel hose straight from the fuel pipe and disconnect it.

4. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from scratches or dirt.



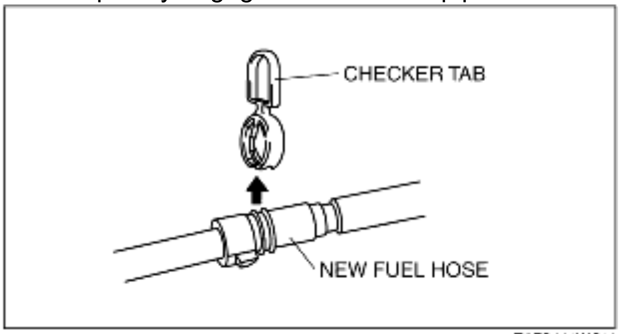
ADJ3912W019

Type A Installation

Note

• If the quick release connector O-ring is damaged or has slipped, replace the fuel hose.

• A checker tab is integrated with the quick release connector for new fuel hoses and evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the fuel pipe.



B3E0114W041

1. Inspect the fuel hose and fuel pipe sealing surface for damage and deformation.

• If there is any malfunction, replace it with a new one.

2. Apply a small amount of clean engine oil to the sealing surface of the fuel pipe.

3. Reconnect the fuel hose straight to the fuel pipe until a click is heard.

Note

• If the quick release connector does not move at all, disconnect it, verify that the O-ring is not damaged or has not slipped, and then reconnect the quick release connector.

4. Lightly pull and push the quick release connector a few times by hand, and then verify that it can move **2.0-3.0 mm {0.08-0.12 in}** and is connected securely.

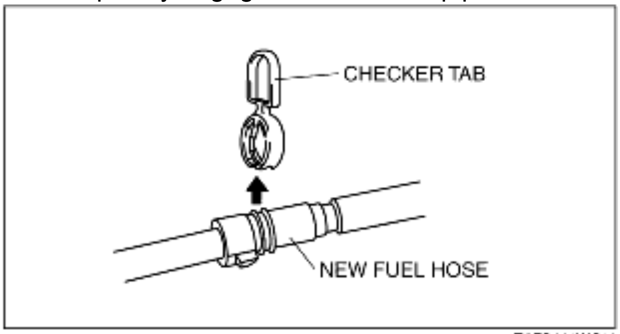
5. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Type B Installation

Note

• If the quick release connector O-ring is damaged or has slipped, replace the fuel hose.

• A checker tab is integrated with the quick release connector for new fuel hoses and evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the fuel pipe.



Using the SST

1. Inspect the fuel hose and fuel pipe sealing surface for damage and deformation.

• If there is any malfunction, replace it with a new one.

2. Reconnect the fuel hose straight to the fuel pipe until a click is heard.

3. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.

4. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Without using the SST

Caution

• Be sure to replace the retainer with a new one to prevent gas leakage.

• To prevent evaporative gas leakage, be sure not to damage the connecting part between the charcoal canister and pipe, and the locks between the quick release connector and retainer. If any of them are damaged, replace the charcoal canister or hose with a new one.

1. Remove the retainer remaining on the charcoal canister pipe.

2. Install a new retainer to the quick release connector.

3. Reconnect the hose straight to the pipe until a click is heard.

4. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.

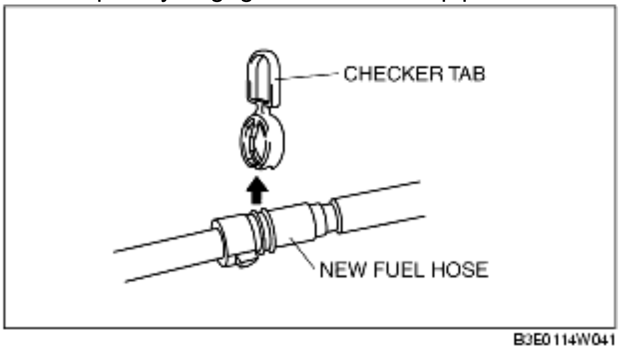
5. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Type C Installation

Note

• If the quick release connector O-ring is damaged or has slipped, replace the fuel hose.

• A checker tab is integrated with the quick release connector for new fuel hoses and evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the fuel pipe.



1. Inspect the fuel hose and fuel pipe sealing surface for damage and deformation.

  - If there is any malfunction, replace it with a new one.

2. When disconnecting and reconnecting the quick release connector, verify if the metal reinforcement pipe protrudes from the resin pipe end while pressing the end with a finger.

  - If the metal pipe protrudes from the resin pipe, insert it flush with the end of the resin pipe.

3. Reconnect the fuel hose straight to the fuel pipe until a click is heard.

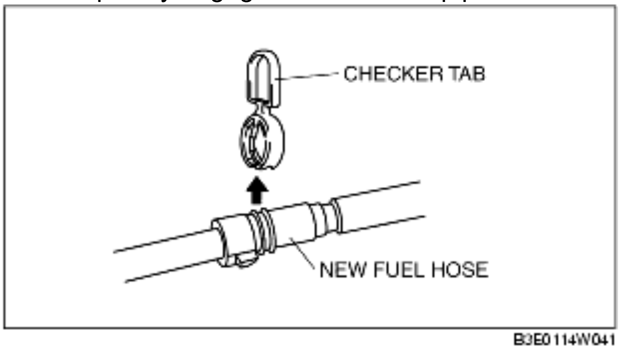
4. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.

5. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Type D Installation

Note

- If the quick release connector O-ring is damaged or has slipped, replace the fuel hose.
- A checker tab is integrated with the quick release connector for new fuel hoses and evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the fuel pipe.



1. Inspect the fuel hose and fuel pipe sealing surface for damage and deformation.

  - If there is any malfunction, replace it with a new one.

2. When disconnecting and reconnecting the quick release connector, verify if the metal reinforcement pipe protrudes from the resin pipe end while pressing the end with a finger.

- If the metal pipe protrudes from the resin pipe, insert it flush with the end of the resin pipe.

3. Insert the fuel pipe straight to the end of the quick release connector.

4. Push down the retainer using a finger.

- If the retainer cannot be pushed down, push the fuel pipe further to the quick release connector.

5. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.

6. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

FUEL INJECTOR REMOVAL/INSTALLATION [LF]

B3E011413250W01

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

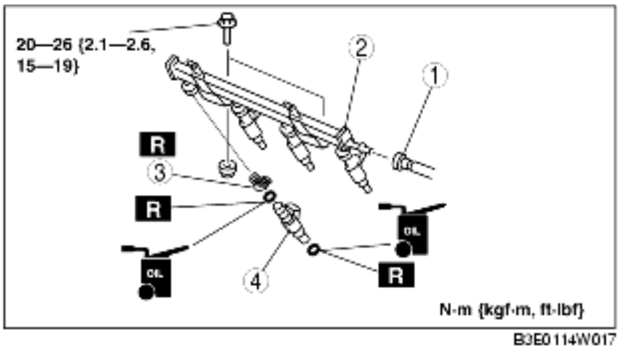
2. Remove the plug hole plate.

3. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

4. Disconnect the negative battery cable.

5. Disconnect the fuel injector connector.

6. Remove in the order indicated in the table.



1	Quick release connector (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)
2	Fuel distributor
3	Injector clip (See Fuel Injector Removal Note [LF].)

4	Fuel injector (See Fuel Injector Installation Note [LF].)

7. Install in the reverse order of removal.

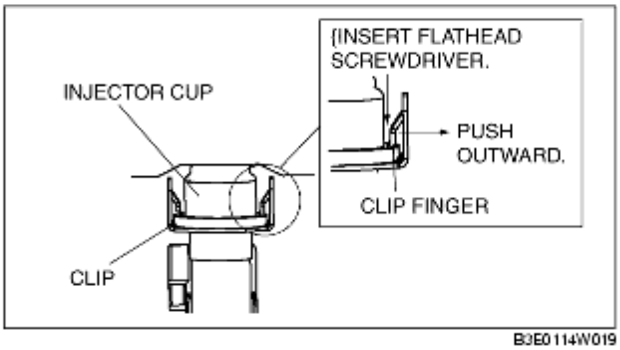
8. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Fuel Injector Removal Note [LF]

Caution

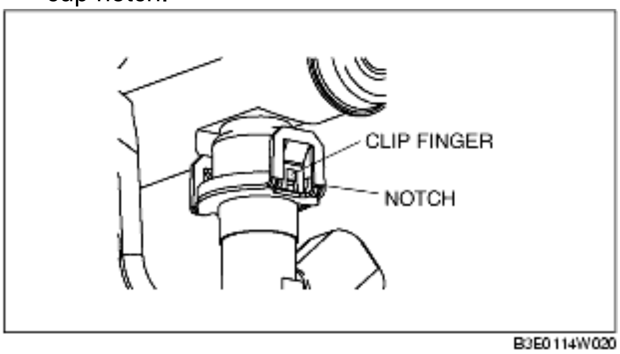
• Use of a deformed injector clip will cause the fuel injector to be connected incorrectly and could result in fuel leakage. It will also cause the injector to rotate. Therefore, always replace the clip when the injector is removed.

1. Insert a flathead screwdriver between the injector cup and clip finger.



Note

• When pushing the clip finger outward, deform the finger until it is removed completely from the cup notch.



2. Push the clip finger outward using a flathead screwdriver.

3. Remove the injector with the clip.

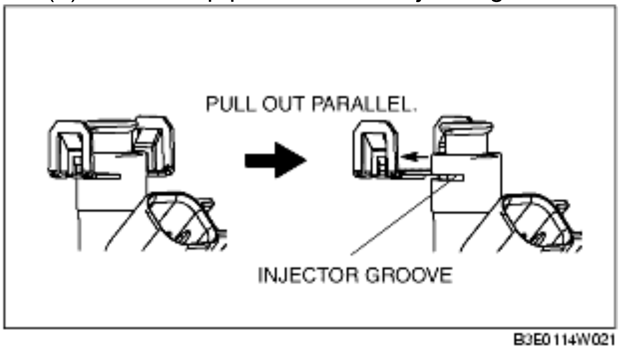
4. Remove the clip from the fuel injector using the following procedure:

Note

• The clip will not be reused.

(1) Hold the clip using pliers.

(2) Pull the clip parallel to the injector groove and remove it from the injector.



Fuel Injector Installation Note [LF]

1. Verify that the O-ring is not damaged.

• If there is any damage, replace the O-ring.

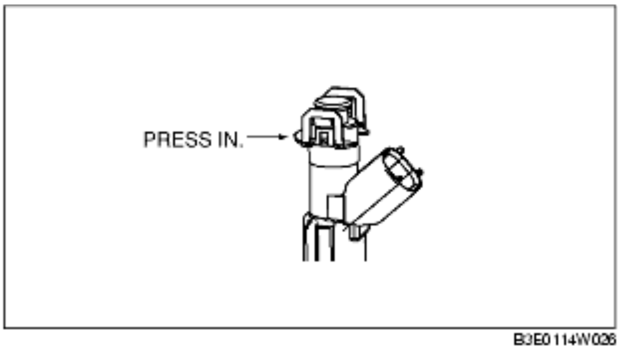
2. Apply a small amount of clean oil to the injector groove and the O-ring.

3. Temporarily attach a new clip to the injector groove.

Note

• When the clip is attached correctly, the central area of the injector and the clip finger positions are aligned.

4. Hold the injector firmly and push the clip into the injector until the clip stops sliding.



5. Verify that the injector connector position is correct.

6. Press the injector into the injector cup. Continue pressing until the clip contacts the lower surface of the injector cup.

7. Verify that the injector and clip are correctly installed with the clip locked onto the injector cup notch.

FUEL INJECTOR REMOVAL/INSTALLATION [Z6]

B3E011413250W02

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

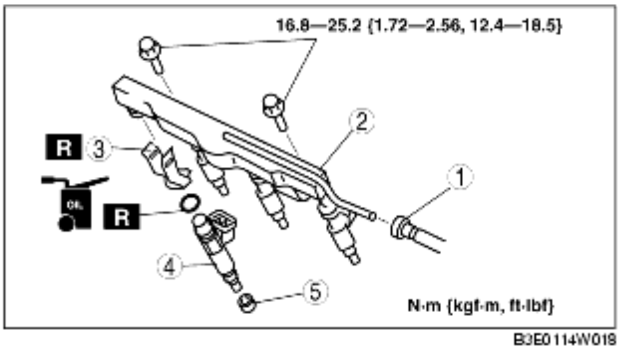
2. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

3. Disconnect the negative battery cable.

4. Remove the air cleaner. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

5. Disconnect the fuel injector connector.

6. Remove in the order indicated in the table.



1	Quick release connector (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)
2	Fuel distributor
3	Injector clip (See Injector Clip Removal Note [Z6].) (See Injector Clip Installation Note [Z6].)
4	Fuel injector (See Fuel Injector Installation Note [Z6].)
5	Insulator

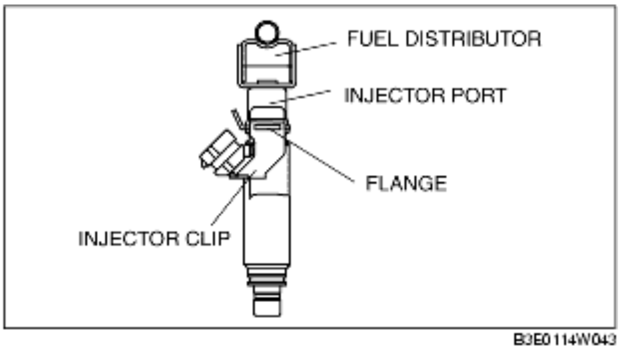
7. Install in the reverse order of removal.

8. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Injector Clip Removal Note [Z6]

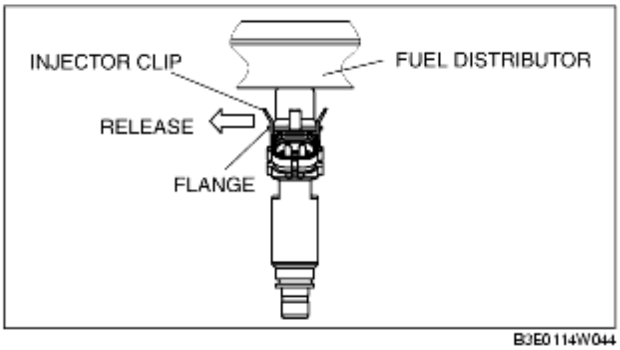
Caution

• If the injector port flange or fuel distributor coated part is damaged, it might cause fuel leakage. To prevent damage, carefully remove the injector clip.

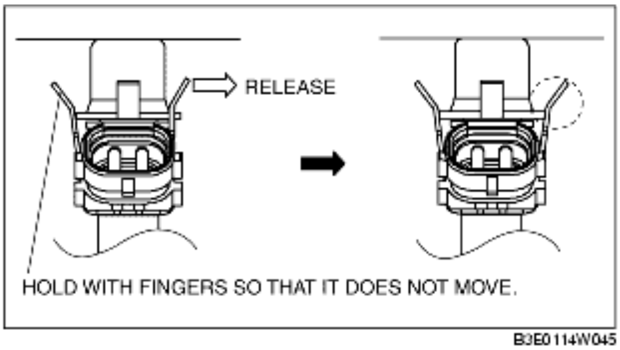


• Use of a deformed injector clip will cause the fuel injector to be connected incorrectly and could result in fuel leakage. Make sure to replace with a new injector clip after removing it.

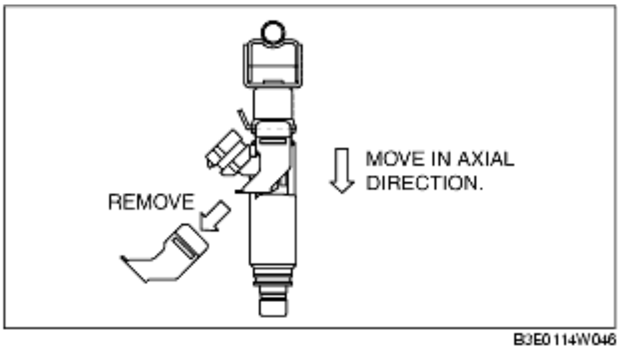
1. Detach one side of the injector clip from the injector port flange.



2. While holding one side of the injector clip removed in Step 1 to prevent it shifting, release the other side of injector clip.



3. Detach the injector clip by sliding it in the axial direction of the fuel injector.



Fuel Injector Installation Note [Z6]

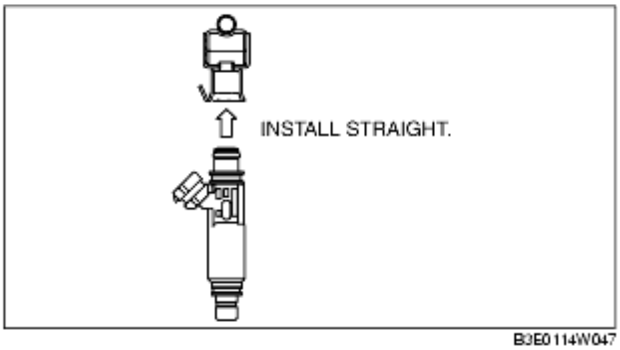
1. Apply a small amount of clean oil to a new O-ring.

Caution

• A damaged O-ring could cause fuel leakage. Be careful not to damage the O-ring when installing the fuel injector.

• If there is foreign material on the fuel injector connecting part, it might damage the fuel injector and fuel distributor. To prevent this, clean the connecting part before connecting the fuel injector.

2. Install the fuel injector straight to the injector port.

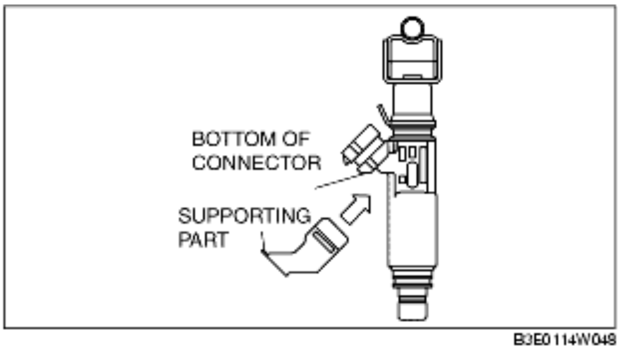


3. Verify that the fuel injector rotates smoothly.

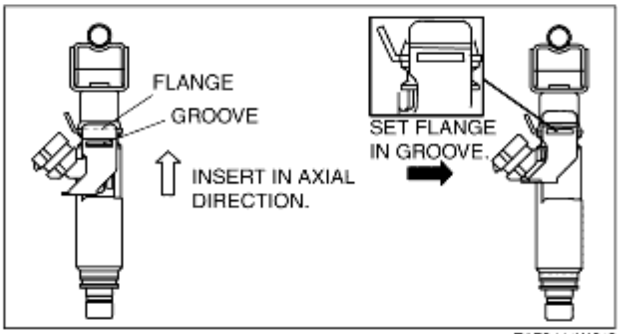
• If it does not rotate smoothly, reinstall the fuel injector.

Injector Clip Installation Note [Z6]

1. Install a new injector clip to the fuel injector and insert the supporting part completely to the lower part of the injector connector.



2. Insert the injector port flange into the injector clip groove, sliding the injector clip along the fuel injector with the injector clip groove and injector port flange parallel.



B3E0114W049

3. Verify that the injector port flange is completely inserted into the groove.

FUEL INJECTOR INSPECTION

B3E011413250W03

Fuel Injector Operation Inspection

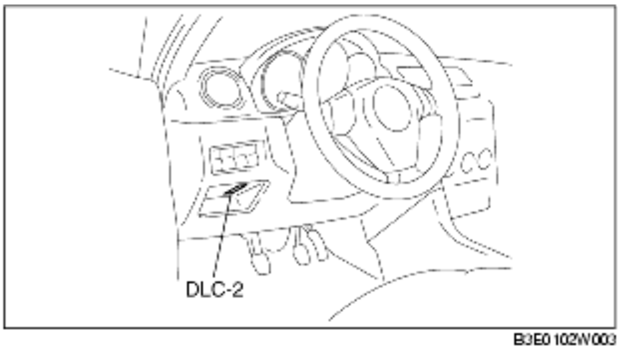
Warning

• To prevent serious injury or damage, always perform diagnosis while referring to the warnings and cautions in each procedure when inspecting or repairing the fuel system.

STEP	INSPECTION	RESULT	ACTION
1	Is there fuel injector operation sound from each cylinder when the engine is cranked? (Use a soundscope or equivalent tool.)	Yes	The fuel injector operation system is normal.
		No	If the operation sound cannot be verified at all cylinders, go to Step 2. If the operation sound cannot be verified at specific cylinders, go to Step 3.
2	Is the main relay operation normal?	Yes	Inspect the following: • Wiring harnesses and connectors related to fuel injector power supply system • PCM connector • Fuel injector ground and related wiring harnesses and connectors
		No	Replace the main relay.
3	Remove the fuel injector where the operation sound cannot be verified, install it to the connector where the operation sound is verified, and then crank the engine again. Is there operation sound?	Yes	Inspect for open or short circuit in the wiring harnesses and connectors, and repair or replace the malfunctioning part.
		No	Replace the fuel injector.

Fuel Cut Control Inspection

1. Connect the WDS or equivalent to the DLC-2.



2. Warm up the engine and idle it.

3. Turn off all the electrical loads and the A/C switch.

4. Using "RPM" of the PID/data monitor function, verify the engine speed.

5. Using a soundscope or a screwdriver, verify the operation sound of the fuel injector at all cylinders.

(1) Open the throttle valve and increase the engine speed to **4,000 rpm**.

(2) Close the throttle valve instantaneously and verify that the fuel injector operation sound stops until the engine speed decreases to approx. **1,200 rpm** and the sound is heard when the engine speed is approx. **1,200 rpm** or less.

• If the sound does not stop at all cylinders, inspect the following:

- PCM input signal circuit (sensor, wiring harness)

• Throttle opening signal (TP sensor)

• If the sound does not stop at specific cylinders, inspect the following:

- Corresponding fuel injector and related wiring harnesses and connectors

• If the operation sound stops at all cylinders but the engine speed at which the operation sound recovers is not within the specification, inspect the following:

- PCM input signal circuit (sensor, wiring harness)

• Load/no load detection signal (neutral/CPP switch (MTX), TR switch (ATX))

• Water temperature signal (ECT sensor)

6. Place the vehicle on a chassis dynamometer.

7. Inspect the following using the WDS or equivalent.

(1) Verify the injector actuation time using the PID/data monitor function.

(2) Depress the accelerator pedal and increase the engine speed to **4,000 rpm**. (Loaded range)

(3) With the accelerator pedal released (without depressing the brake pedal), verify that the injector actuation time of **0 ms** is indicated until the engine speed decreases to **approx. 1,200 rpm**, and then the actuation time **2-5 ms** is indicated when the engine speed decreases to **approx. 1,000 rpm or less**.

• If it cannot be verified, inspect the PCM input signal circuit.

- Load/no load detection signal (neutral/CPP switch (MTX), TR switch (ATX))

Resistance Inspection

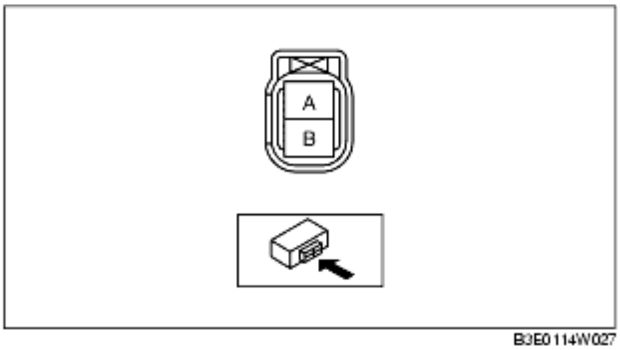
1. Turn the ignition switch to the LOCK position.

2. Disconnect the negative battery cable.

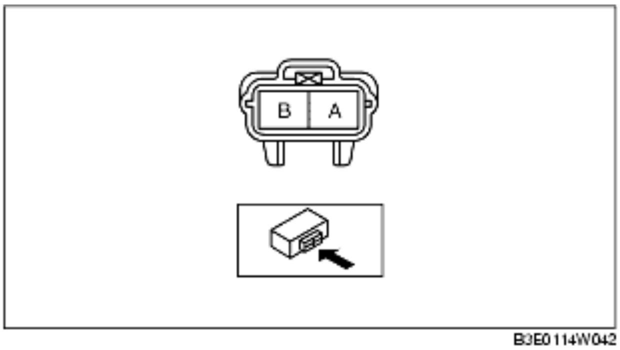
3. Disconnect the fuel injector connector.

4. Inspect the resistance between fuel injector terminals A and B using a tester.

LF



Z6



• If within the specification, perform the "Circuit Open/Short Inspection".

• If not within the specification, replace the fuel injector.

Standard

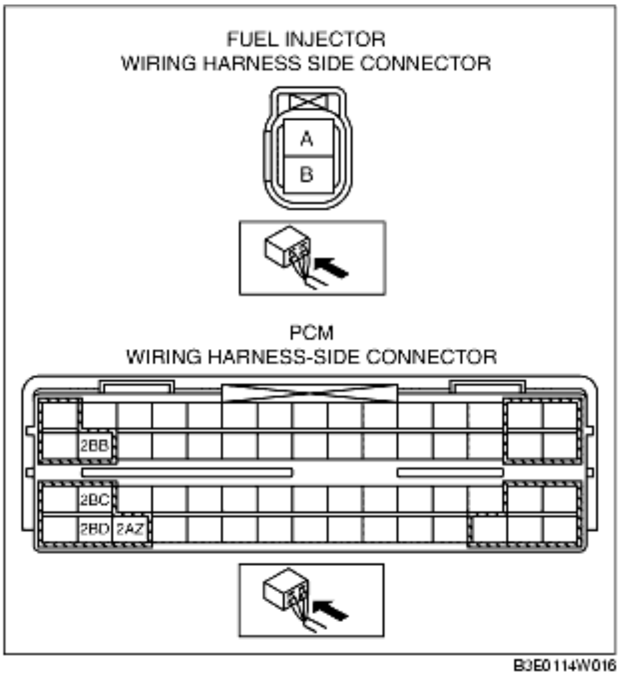
LF: 11.4-12.6 ohms [20 °C {68 °F}]

Z6: Approx. 13.8 ohms [20 °C {68 °F}]

Circuit Open/Short Inspection [LF]

1. Disconnect the PCM connector. (See PCM REMOVAL/INSTALLATION [LF].)

2. Inspect the following wiring harnesses for an open or short circuit (continuity check).



Open circuit

• If there is no continuity, the circuit is open. Repair or replace the harness.

- Fuel injector No.1 terminal A and PCM terminal 2BB

- Fuel injector No.2 terminal A and PCM terminal 2BC

- Fuel injector No.3 terminal A and PCM terminal 2BD

- Fuel injector No.4 terminal A and PCM terminal 2AZ

- Fuel injector No.1 terminal B and main relay terminal A

- Fuel injector No.2 terminal B and main relay terminal A

- Fuel injector No.3 terminal B and main relay terminal A

- Fuel injector No.4 terminal B and main relay terminal A

Short circuit

• If there is continuity, the circuit is short. Repair or replace the harness.

- Fuel injector No.1 terminal A and body GND

- Fuel injector No.2 terminal A and body GND

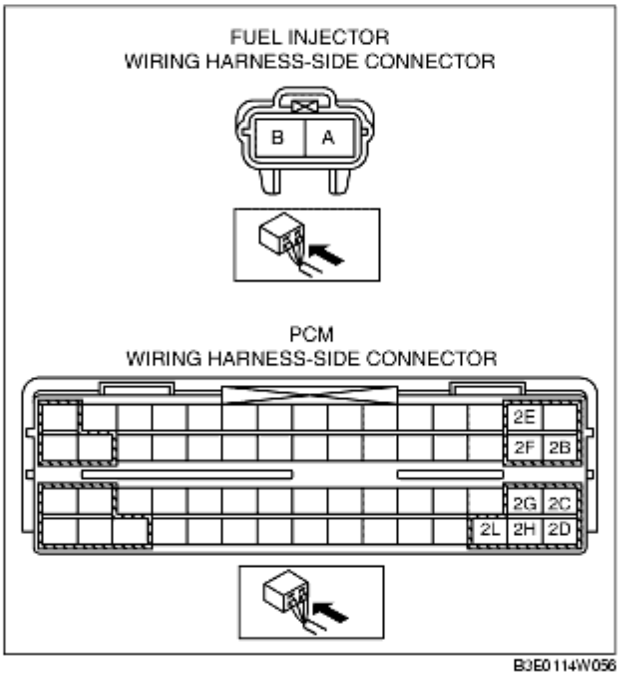
- Fuel injector No.3 terminal A and body GND

- Fuel injector No.4 terminal A and body GND

Circuit Open/Short Inspection [Z6]

1. Disconnect the PCM connector. (See PCM REMOVAL/INSTALLATION [Z6].)

2. Inspect the following wiring harnesses for an open or short circuit (continuity check).



Open circuit

• If there is no continuity, the circuit is open. Repair or replace the harness.

- Fuel injector No.1 terminal A and PCM terminal 2E
- Fuel injector No.2 terminal A and PCM terminal 2F
- Fuel injector No.3 terminal A and PCM terminal 2G
- Fuel injector No.4 terminal A and PCM terminal 2L
- Fuel injector No.1 terminal B and PCM terminal 2B
- Fuel injector No.1 terminal B and PCM terminal 2C
- Fuel injector No.1 terminal B and PCM terminal 2D
- Fuel injector No.1 terminal B and PCM terminal 2H

Short circuit

• If there is continuity, the circuit is short. Repair or replace the harness.

- Fuel injector No.1 terminal A and body GND
- Fuel injector No.2 terminal A and body GND
- Fuel injector No.3 terminal A and body GND
- Fuel injector No.4 terminal A and body GND

Leakage Inspection

Warning

• Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. To prevent this, complete the following inspection with the engine stopped.

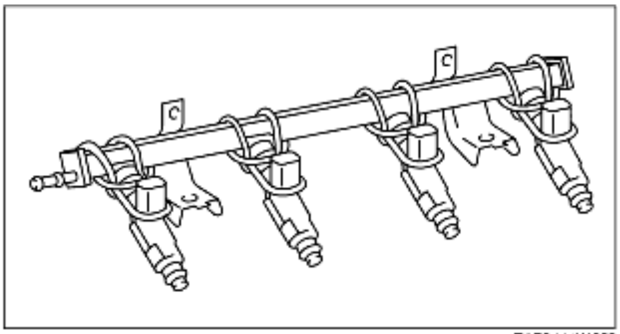
1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

2. Disconnect the negative battery cable.

3. Remove the fuel injector and fuel distributor as a single unit. (See FUEL INJECTOR REMOVAL/INSTALLATION [LF].) (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)

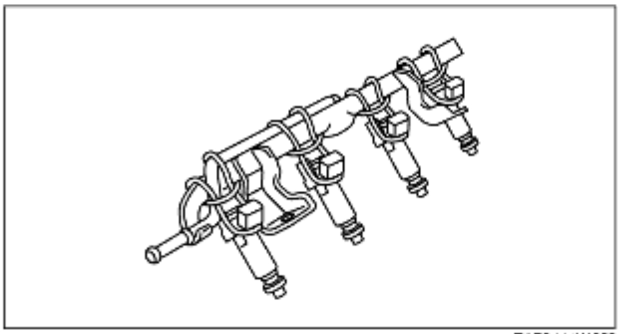
4. Fix the fuel injector to the fuel distributor with a wire or the equivalent.

LF



B3E0114W028

Z6

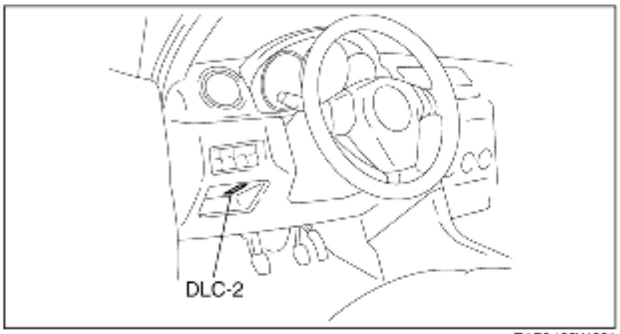


B3E0114W029

5. Connect the fuel hose.

6. Connect the negative battery cable.

7. Connect the WDS or equivalent to the DLC-2.



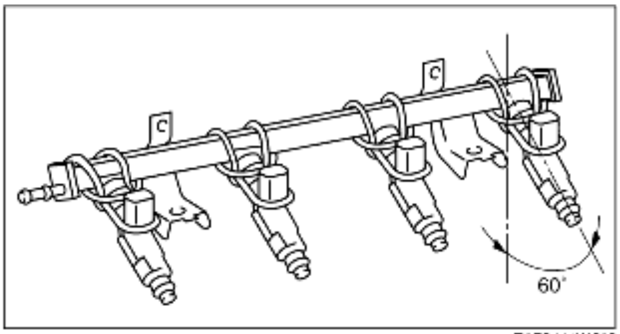
B3E0102W003

8. Turn the ignition switch to the ON position.

9. Using the simulation function "FP", start the fuel pump.

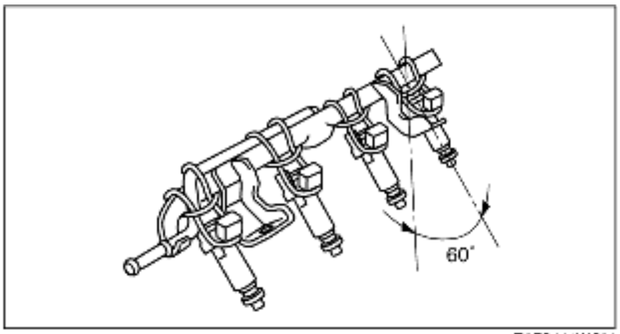
10. Tilt the fuel injector at an angle of **60**° to inspect for leakage.

LF



B3E0114W030

Z6



B3E0114W031

• If not within the specification, replace the fuel injector.

Standard

1 drop or less/2 min

11. Turn the ignition switch to the LOCK position and stop the fuel pump.

12. Remove the wire or the equivalent securing the fuel injector.

13. Install the fuel injector. (See FUEL INJECTOR REMOVAL/INSTALLATION [LF].) (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)

14. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Injection Volume Inspection [LF]

Warning

• Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. To prevent this, complete the following inspection with the engine stopped.

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

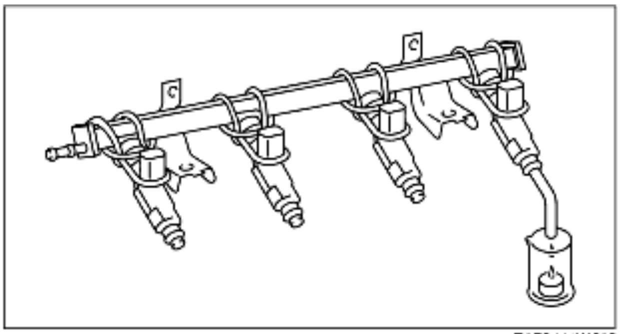
2. Disconnect the negative battery cable.

3. Remove the PCM.

4. Connect the PCM connector.

5. Remove the fuel injector and fuel distributor as a single unit. (See FUEL INJECTOR REMOVAL/INSTALLATION [LF].)

6. Fix the fuel injector to the fuel distributor with a wire or the equivalent.

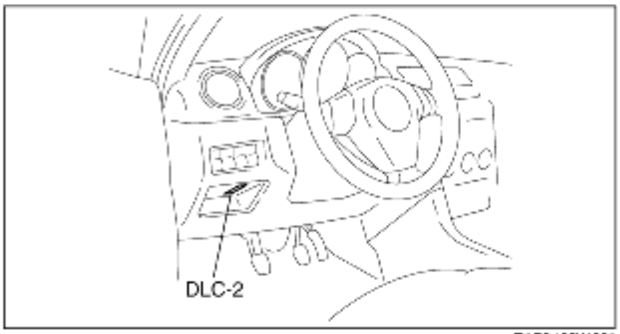


B3E0114W032

7. Connect the corresponding fuel injector connector.

8. Connect the negative battery cable.

9. Connect the WDS or equivalent to the DLC-2.

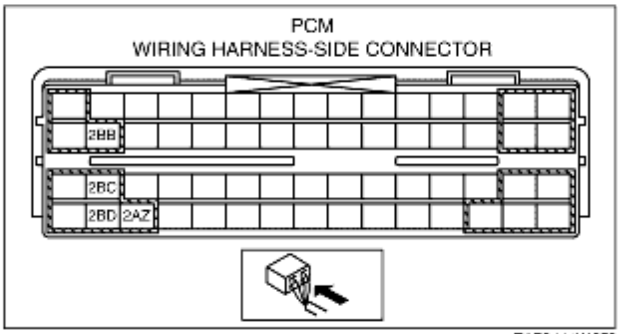


B3E0102W003

10. Turn the ignition switch to the ON position.

11. Using the simulation function "FP", start the fuel pump.

12. Ground the following PCM terminals using a jumper wire and measure the injection volume of each fuel injector.



B3E0114W050

• If not within the specification, replace the fuel injector.

Standard

46-66 ml {44-66 cc, 2.8-4.0 cu in}/15 s

Fuel injector No.	PCM terminal
1	2BB
2	2BC
3	2BD
4	2AZ

13. Turn the ignition switch is to the LOCK position and stop the fuel pump.

14. Remove the wire or the equivalent securing the fuel injector.

15. Install the fuel injector. (See FUEL INJECTOR REMOVAL/INSTALLATION [LF].)

16. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Injection volume Inspection [Z6]

Warning

• Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. To prevent this, complete the following inspection with the engine stopped.

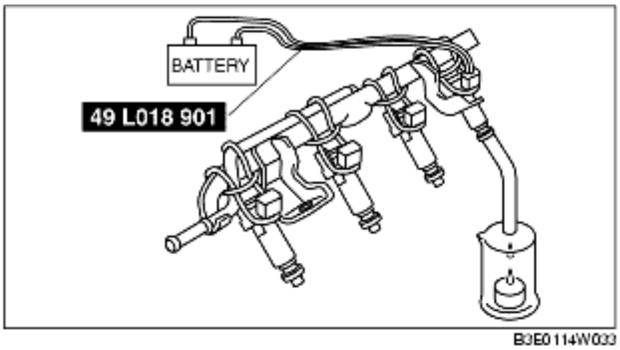
1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See BEFORE SERVICE PRECAUTION.)

2. Disconnect the negative battery cable.

3. Remove the fuel injector and fuel distributor as a single unit. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)

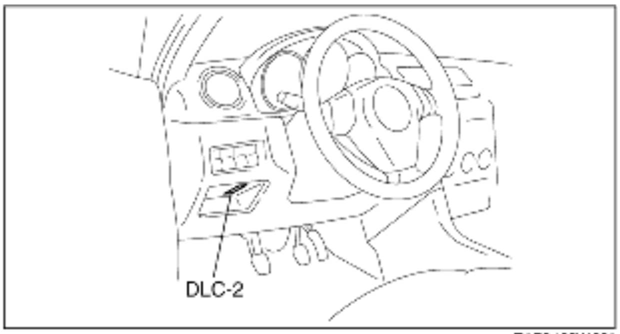
4. Fix the fuel injector to the fuel distributor with a wire or the equivalent.

5. Connect the **SST** to the corresponding fuel injector and battery.



6. Connect the negative battery cable.

7. Connect the WDS or equivalent to the DLC-2.



B3E0102W003

8. Turn the ignition switch to the ON position.

9. Using the simulation function "FP", start the fuel pump.

10. Measure the fuel injection volume.

- If not within the specification, replace the fuel injector.

Standard

64-84 ml {64-84 cc, 3.9-5.1 cu in}/15 s

11. Turn the ignition switch to the LOCK position and stop the fuel pump.

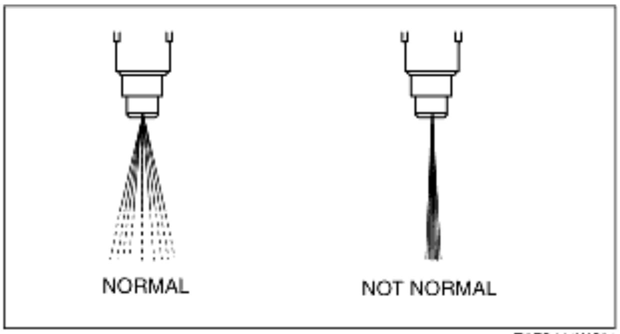
12. Remove the wire or the equivalent securing the fuel injector.

13. Install the fuel injector. (See FUEL INJECTOR REMOVAL/INSTALLATION [Z6].)

14. Inspect all related parts by performing "AFTER SERVICE PRECAUTION". (See AFTER SERVICE PRECAUTION.)

Atomization Inspection

1. Inspect the atomization status.



B3E0114W034

- If not normal, replace the fuel injector.

EXHAUST SYSTEM[Z6]

EXHAUST SYSTEM INSPECTION [Z6]

B3E011500115W01

1. Start the engine and inspect each exhaust system component for exhaust gas leakage.

    • If there is leakage, repair or replace the appropriate component.

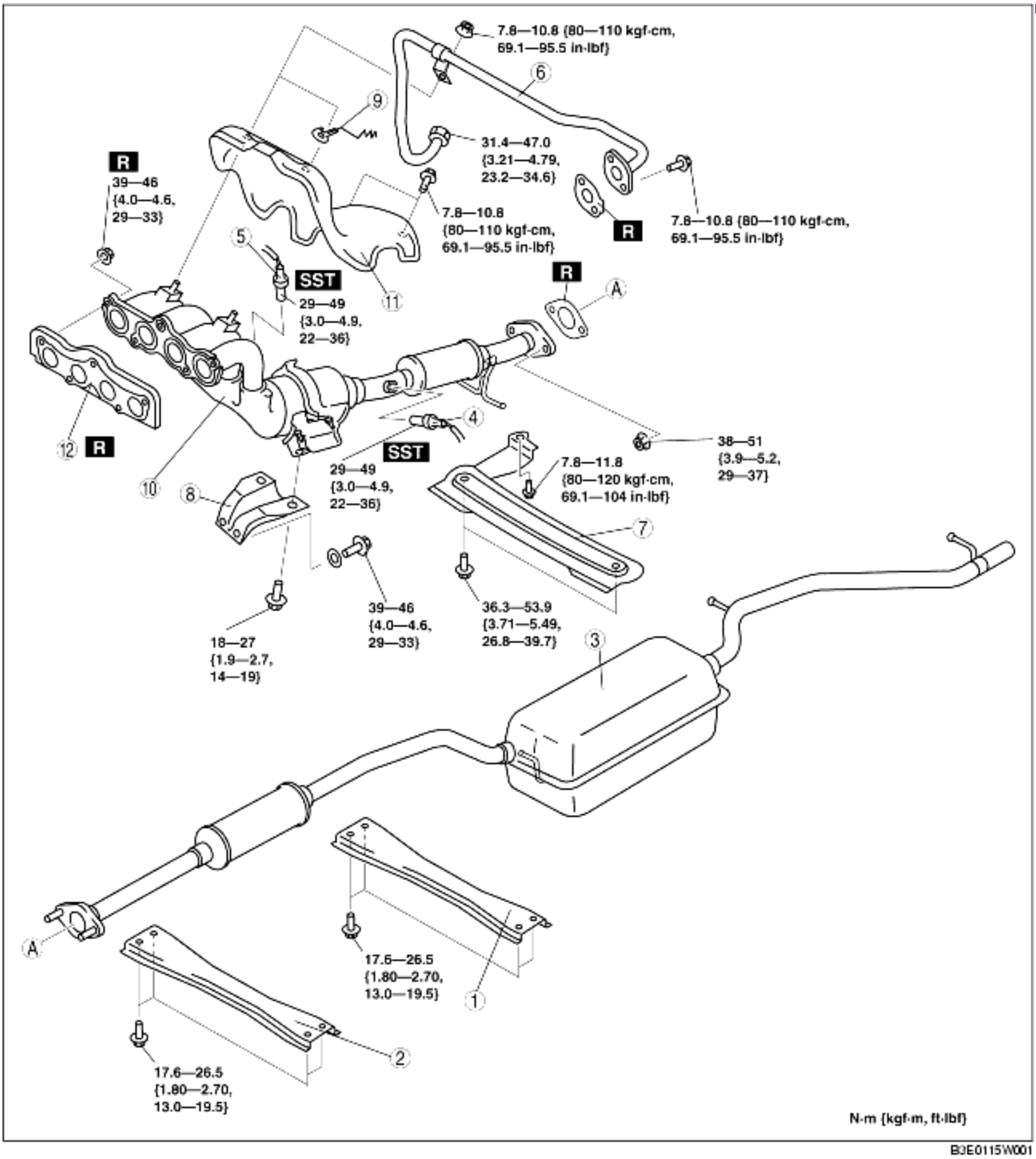
EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6]

B3E011500115W02

Warning

• A hot engine and exhaust system can cause severe burns. Turn off the engine and wait until they are cool before removing the exhaust system.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)
2. Disconnect the negative battery cable.
3. Remove the under cover.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



1	Rear tunnel member
2	Front tunnel member
3	Main silencer
4	Rear heated oxygen sensor (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)
5	Front heated oxygen sensor (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)

6	EGR pipe (Exhaust manifold side) (See EGR Pipe Installation Note.)
7	Member
8	Exhaust manifold bracket
9	Clip
10	WU-TWC (See Exhaust Manifold/Exhaust Manifold Insulator Removal Note.) (See Exhaust Manifold Installation Note.)
11	Exhaust manifold insulator (See Exhaust Manifold/Exhaust Manifold Insulator Removal Note.)
12	Exhaust manifold gasket

Exhaust Manifold/Exhaust Manifold Insulator Removal Note

Caution

• Over bending of the exhaust flexible pipe may cause damage resulting in failure.

Note

• When removing the exhaust manifold, move the exhaust manifold insulator slightly out of the way, loosen the nuts, then remove the exhaust manifold together with the insulator. Refer to the following procedure.

1. Remove the front wheels and tires.

2. Remove the air cleaner cover and the air cleaner case. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Remove the EGR pipe (Intake manifold side). (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

4. Remove the EGR valve component. (See EGR VALVE REMOVAL/INSTALLATION [Z6].)

5. Disconnect the steering shaft from the steering gear and linkage side. (See STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.)

6. Disconnect the pressure hose and the return hose. (See STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.)

7. Remove the No.1 engine mount rubber. (See ENGINE REMOVAL/INSTALLATION [Z6].)

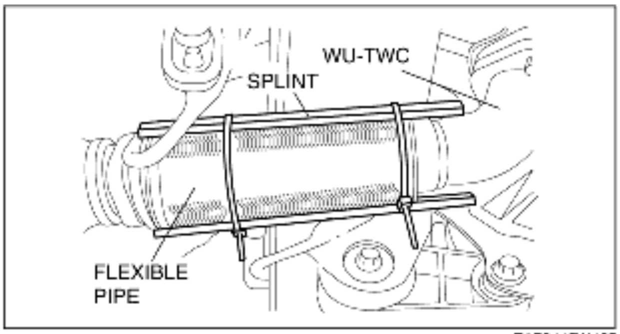
8. Loosen the exhaust manifold insulator bolts.

9. Move the exhaust manifold insulator slightly out of the way and loosen the exhaust manifold nuts.

10. Remove the installation bolts of the front stabilizer and front crossmember component. (See FRONT CROSSMEMBER REMOVAL/INSTALLATION.)

11. Loosen the front crossmember component installation bolts and lower the front crossmember component **approx. 100 mm {3.94 in}**. (See FRONT CROSSMEMBER REMOVAL/INSTALLATION.)

12. Support the flexible pipe with a support wrap or splint as shown in the figure.

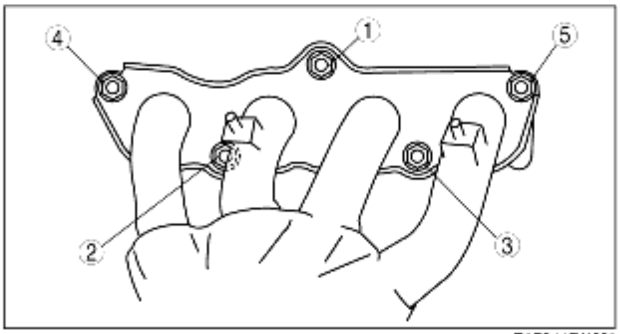


B3E0115W105

13. Remove the exhaust manifold together with the insulator by lowering it to the underside of the vehicle.

Exhaust Manifold Installation Note

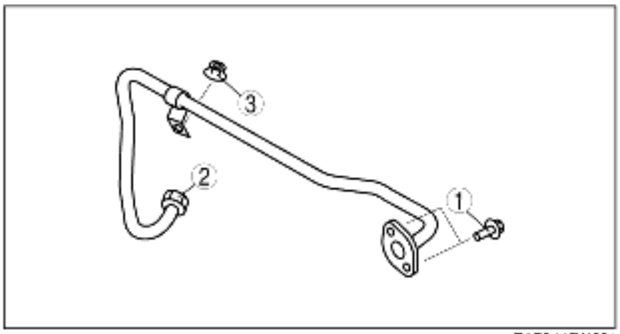
1. Tighten the exhaust manifold installation nuts in the order shown in the figure.



B3E0115W003

EGR Pipe Installation Note

1. Tighten the EGR pipe bolts and nuts in the order shown in the figure.



B3E0115W004

EXHAUST SYSTEM[LF]

EXHAUST SYSTEM INSPECTION [LF]

B3E011500115W03

1. Start the engine and inspect each exhaust system component for exhaust gas leakage.
    - If there is leakage, repair or replace the appropriate component.

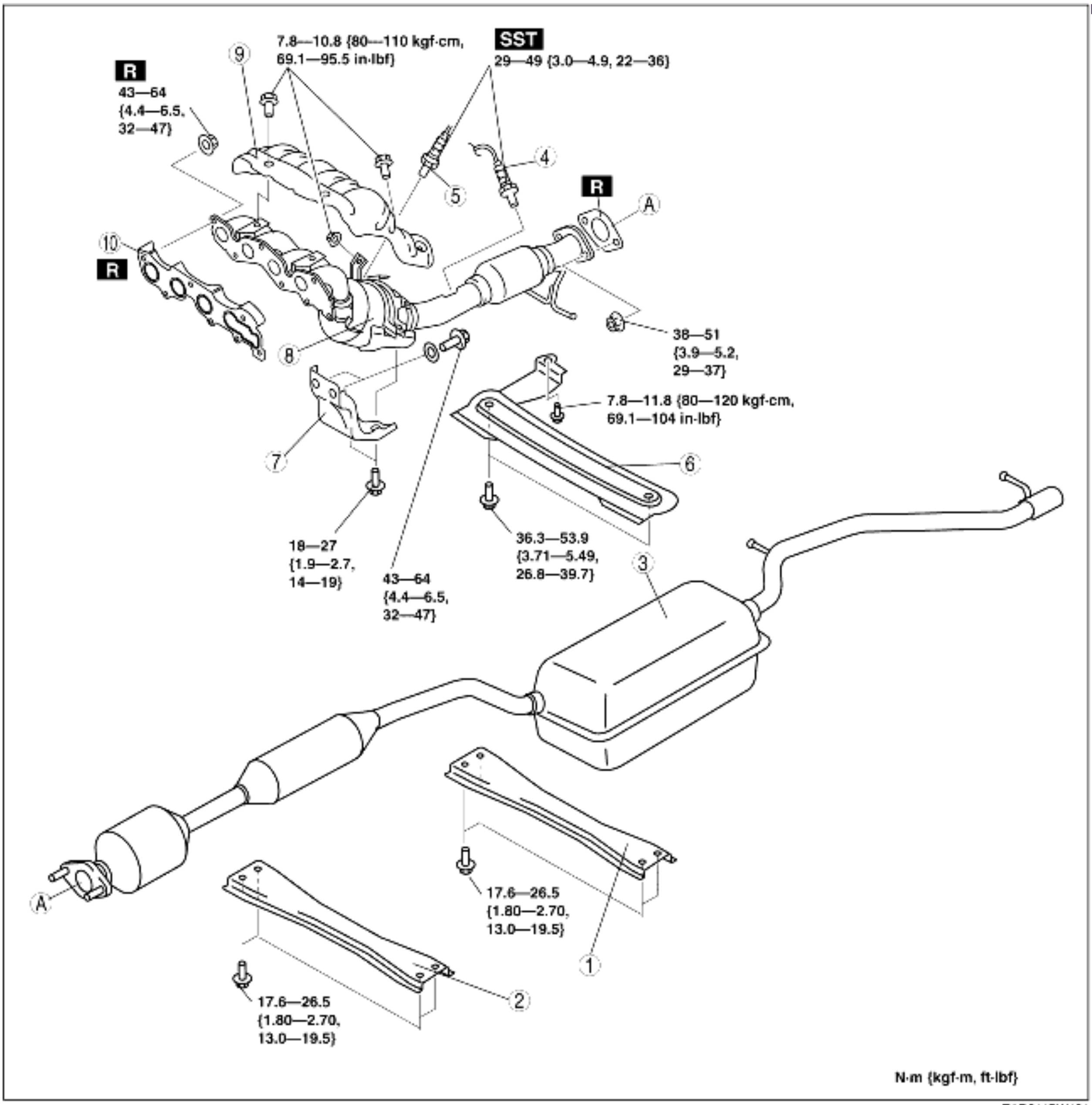
EXHAUST SYSTEM REMOVAL/INSTALLATION [LF]

B3E011500115W04

Warning

- A hot engine and exhaust system can cause severe burns. Turn off the engine and wait until they are cool before removing the exhaust system.

1. Remove the plug hole plate. (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)
2. Remove the battery cover and battery duct. (See BATTERY REMOVAL/INSTALLATION [LF].)
3. Disconnect the negative battery cable.
4. Remove the under cover.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



B3E0115W101

1	Rear tunnel member
2	Front tunnel member
3	Main silencer (See Main Silencer Removal Note.)
4	Rear heated oxygen sensor (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF].)
5	Front heated oxygen sensor (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF].)
6	Member

7	Exhaust manifold bracket
8	WU-TWC (See Exhaust Manifold Removal Note.) (See Exhaust Manifold Installation Note.)
9	Exhaust manifold insulator
10	Exhaust manifold gasket

Main Silencer Removal Note

1. Loosen the lower shock absorber bolt and rear crossmember component installation bolt, and lower the rear crossmember component **approx. 70 mm {2.8 in}**. (See REAR CROSSMEMBER REMOVAL/INSTALLATION.)

Exhaust Manifold Removal Note

Caution

• Over bending of the exhaust flexible pipe may cause damage resulting in failure.

1. Remove the front wheels and tires.

2. Disconnect the steering shaft from the steering gear and linkage side. (See STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.)

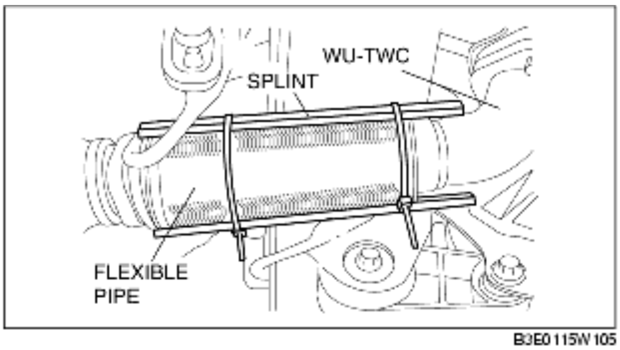
3. Remove the No.1 engine mount rubber. (See ENGINE REMOVAL/INSTALLATION [LF].)

4. Loosen the exhaust manifold bolts.

5. Remove the installation bolts of the front stabilizer and front crossmember component. (See FRONT CROSSMEMBER REMOVAL/INSTALLATION.)

6. Loosen the front crossmember component installation bolts and lower the front crossmember component **approx. 100 mm {3.94 in}**. (See FRONT CROSSMEMBER REMOVAL/INSTALLATION.)

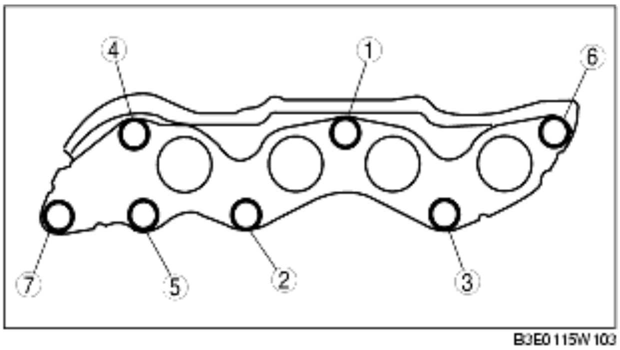
7. Support the flexible pipe with a support wrap or splint as shown in the figure.



8. Remove the exhaust manifold by lowering it to the underside of the vehicle.

Exhaust Manifold Installation Note

1. Tighten the exhaust manifold installation nuts in the order shown in the figure.


4
1
6
7
5
2
3
B3E0115W103

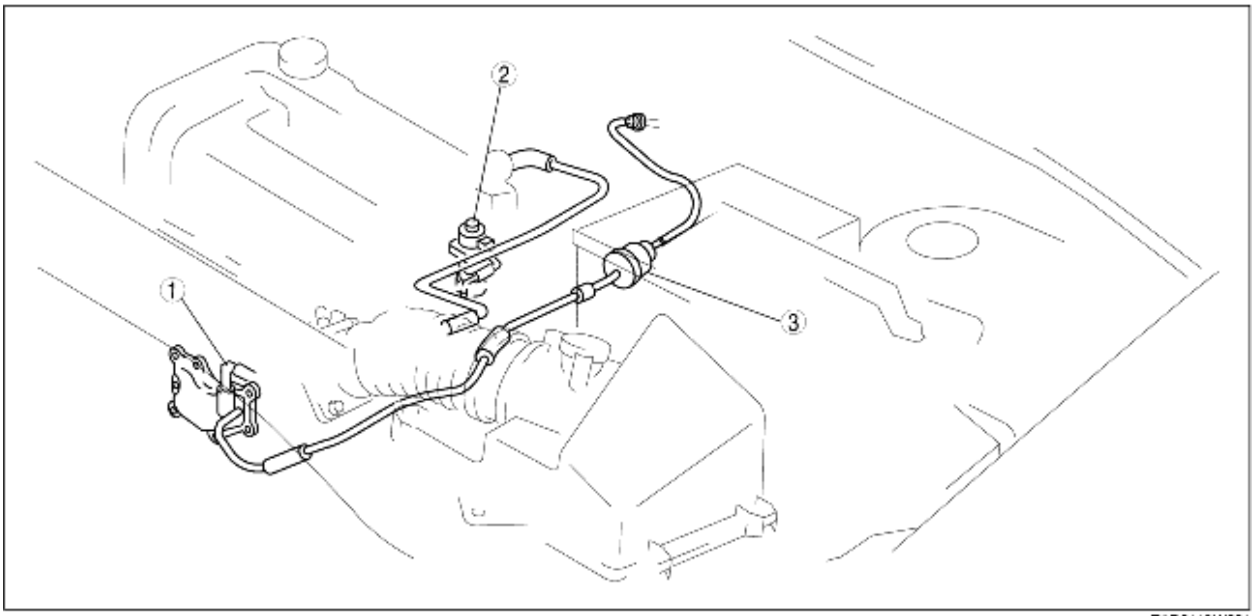
EMISSION SYSTEM

EMISSION SYSTEM LOCATION INDEX

B3E011601074W01

Engine Compartment Side

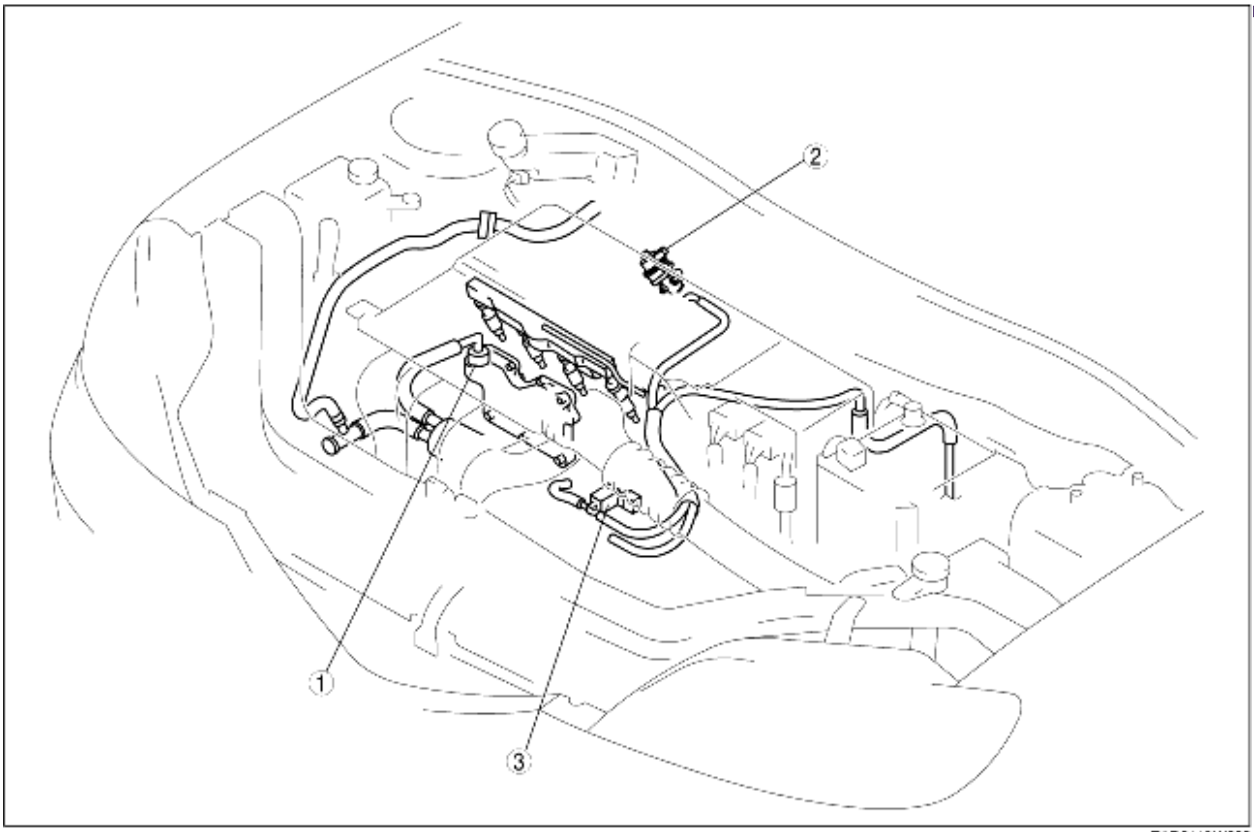
LF



B3E0116W001

1	Positive crankcase ventilation (PCV) valve (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION.)
2	EGR valve (See EGR VALVE REMOVAL/INSTALLATION [LF].) (See EGR VALVE INSPECTION.)
3	Purge solenoid valve (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [LF].) (See PURGE SOLENOID VALVE INSPECTION.)

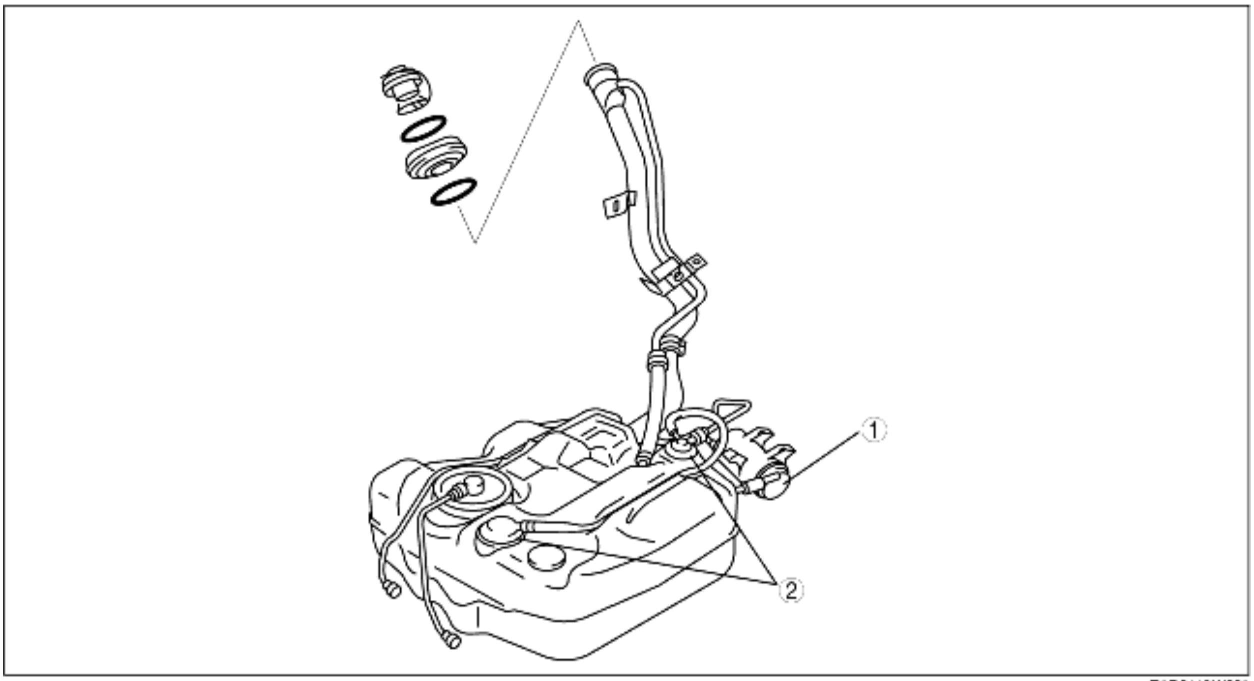
Z6



B3E0116W002

1	Positive crankcase ventilation (PCV) valve (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION.)
2	EGR valve (See EGR VALVE REMOVAL/INSTALLATION [Z6].) (See EGR VALVE INSPECTION.)
3	Purge solenoid valve (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [Z6].) (See PURGE SOLENOID VALVE INSPECTION.)

Fuel Tank Side



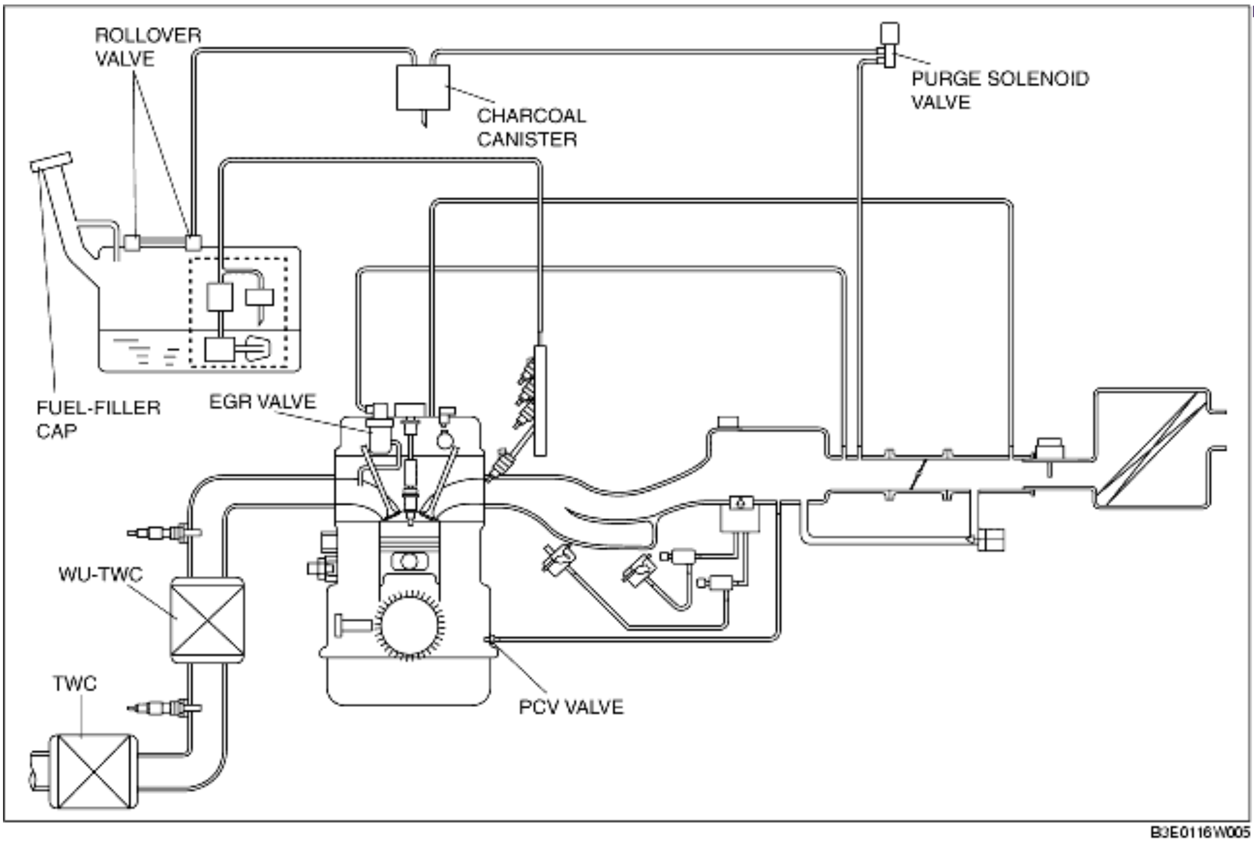
B3E0116W003

1	Charcoal canister (See CHARCOAL CANISTER REMOVAL/INSTALLATION.) (See CHARCOAL CANISTER INSPECTION.)
2	Rollover valve (See ROLLOVER VALVE REMOVAL/INSTALLATION.) (See ROLLOVER VALVE INSPECTION.)

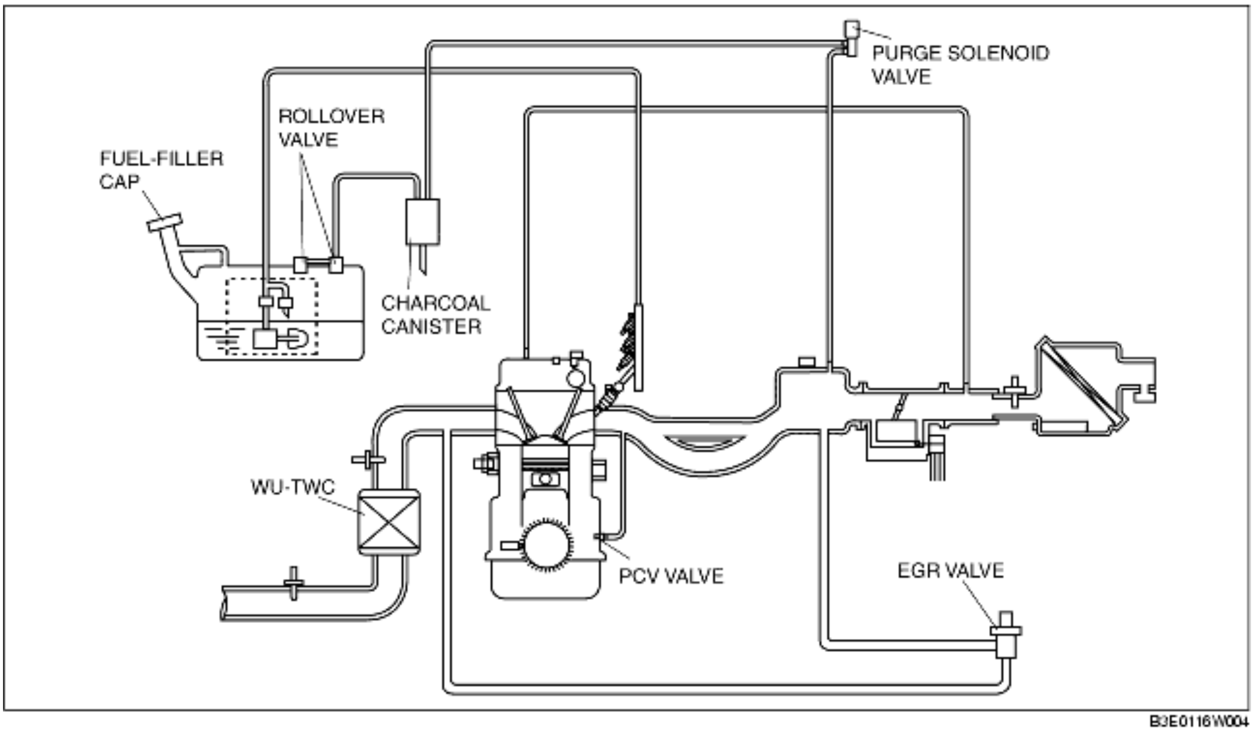
EMISSION SYSTEM DIAGRAM

B3E011601074W02

LF



Z6



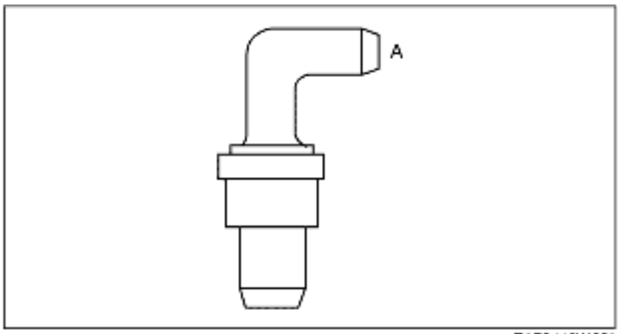
POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION

B3E011613890W01

1. Remove the intake manifold.

2. Remove the PCV valve.

3. Verify that there is no airflow when pressure is applied to port A.



B3E0116W023

• If there is airflow, replace the PCV valve.

4. Verify that there is airflow when vacuum is applied to port A.

• If there is no airflow, replace the PCV valve.

PURGE SOLENOID VALVE REMOVAL/INSTALLATION [LF]

B3E011618740W01

1. Remove the plug hole plate.

2. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

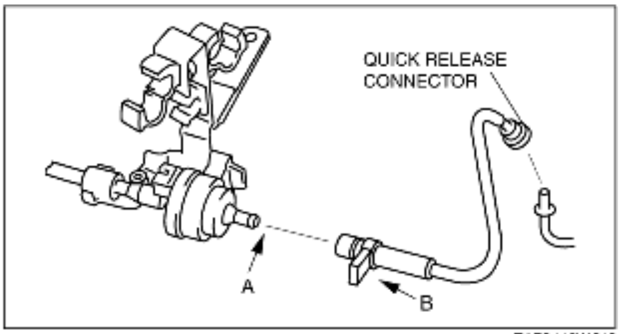
3. Disconnect the negative battery cable.

4. Remove using the following procedure:

Caution

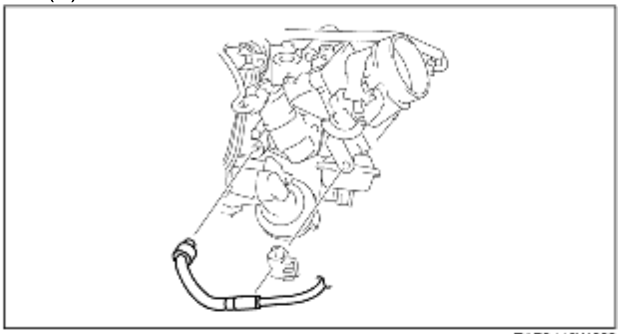
• Do not disconnect the purge solenoid valve and evaporative hose except when replacing the purge solenoid valve because it may cause evaporative gas leakage. When it is necessary to remove the purge solenoid valve for removing/installing other parts, disconnect the valve at the quick release connector.

(1) Disconnect the evaporative hose at the charcoal canister side. (See Evaporative Hose Installation Note.)



B3E0116W010

(2) Pull the vacuum tube from the intake manifold.

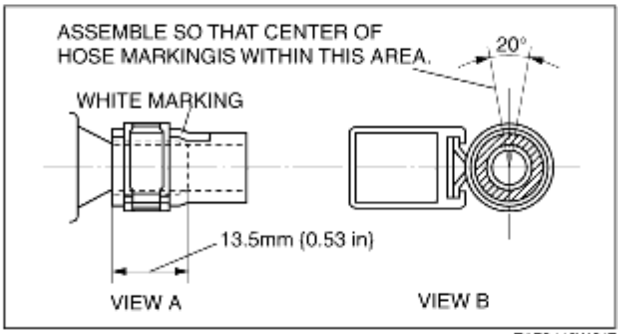


B3E0116W009

5. Install in the reverse order of removal.

Evaporative Hose Installation Note

1. Install the evaporative hose and clamp as shown in the figure.



B3E0116W017

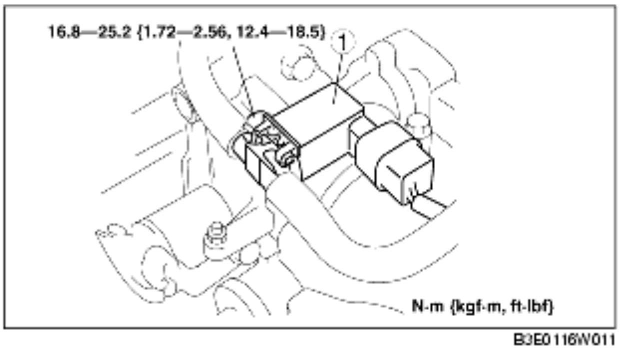
PURGE SOLENOID VALVE REMOVAL/INSTALLATION [Z6]

B3E011618740W02

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Remove in the order indicated in the table.



1	Purge solenoid valve

4. Install in the reverse order of removal.

PURGE SOLENOID VALVE INSPECTION

B3E011618740W03

Evaporative Purge Control Inspection

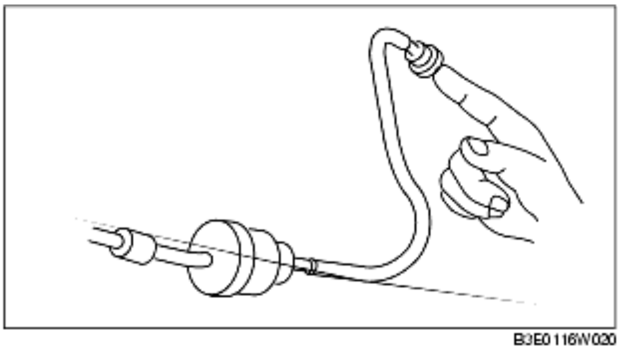
Without using WDS or equivalent

1. Warm up the engine and idle it.

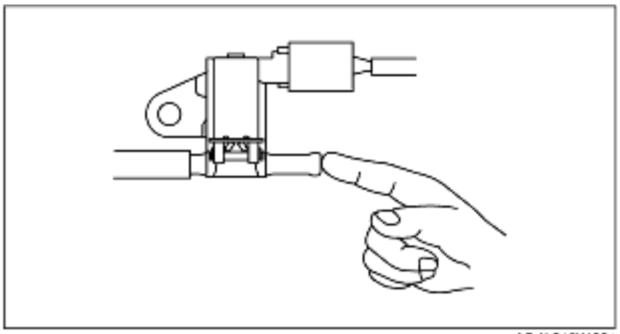
2. Disconnect the vacuum hose which is connected to the charcoal canister from purge solenoid valve.

3. Place your finger onto the purge solenoid valve as shown in the figure and verify that vacuum is applied.

LF



Z6



ADJ3916W004

• If vacuum is not applied, inspect the following:

- PCM output signal circuit (wiring harness, connector)

• Evaporative purge control signal

- Purge solenoid valve

4. Run the vehicle on the chassis dynamometer and maintain the engine speed at **approx. 2,000 rpm**.

5. Verify that vacuum is applied after **approx. 30 s**.

• If the vacuum is not verified, inspect the following:

- PCM input signal circuit (sensor, switch, wiring harness)

• Intake air temperature signal (intake air temperature sensor)

• Evaporative purge control signal (purge solenoid valve)

• Throttle opening signal (throttle position sensor)

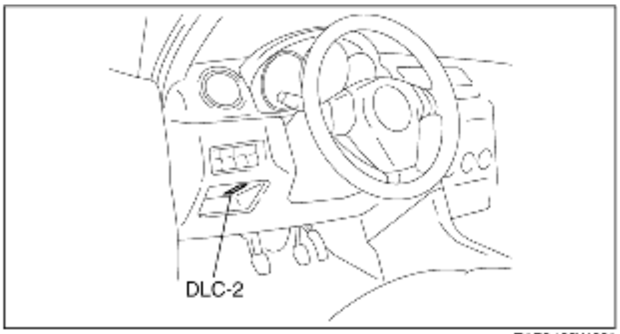
• Load/no load identification signal

Neutral switch/Clutch switch (MTX)/Transaxle range switch (ATX)

- Purge solenoid valve

Using WDS or equivalent

1. Connect the WDS or equivalent to the DLC-2.



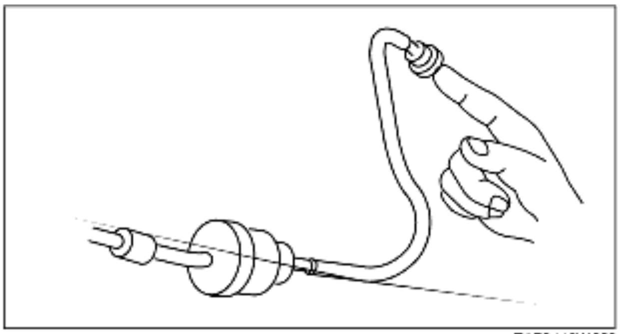
B3E0102W003

2. Warm up the engine and idle it.

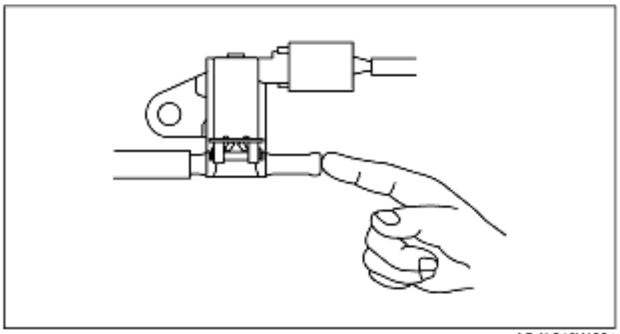
3. Disconnect the vacuum hose which is connected to the charcoal canister from purge solenoid valve.

4. Place your finger onto the purge solenoid valve as shown in the figure and verify that vacuum is applied.

LF



Z6



• If vacuum is not applied, inspect the following:

- PID: EVAPCP

- Purge solenoid valve

5. Disconnect the vacuum hose.

6. Using the "EVAPCP" simulation function, set the present **0%** duty value of the purge solenoid valve to the **100%** duty value and verify that the engine idles roughly or stalls.

• If the idle status does not change, inspect the following:

(1) Turn the ignition switch to the ON position.

(2) Using the "EVAPCP" simulation function, set the present **0%** duty value of the purge solenoid valve to the **50%** duty value and verify purge solenoid valve operation sound.

• If the operation sound is verified, inspect the following:

- Disconnection and damage of the vacuum hose (intake manifold-purge solenoid valve-charcoal canister)

• If the operation sound is not verified, inspect the following:

- Purge solenoid valve

- Wiring harness and connector open circuit (main relay-purge solenoid valve-PCM)

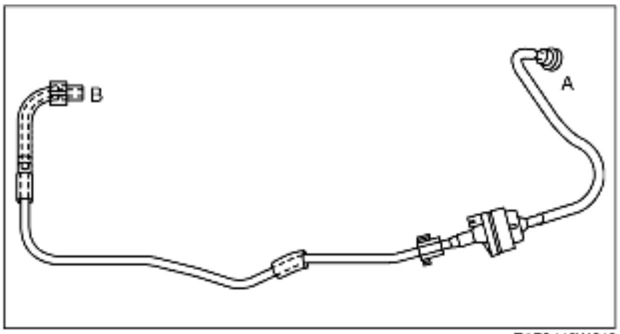
Airflow Inspection

1. Disconnect the negative battery cable.

2. Remove the purge solenoid valve.

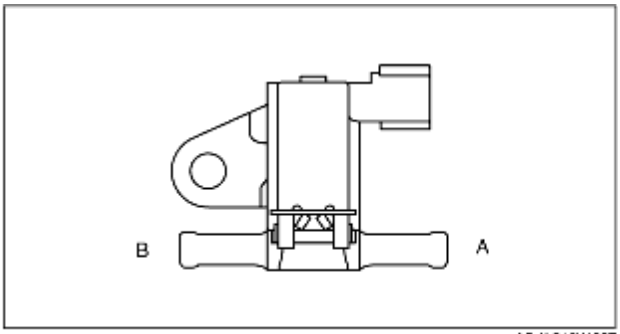
3. Verify that the airflow is as indicated in the table.

LF



B3E0116W016

Z6



ADJ3916W007

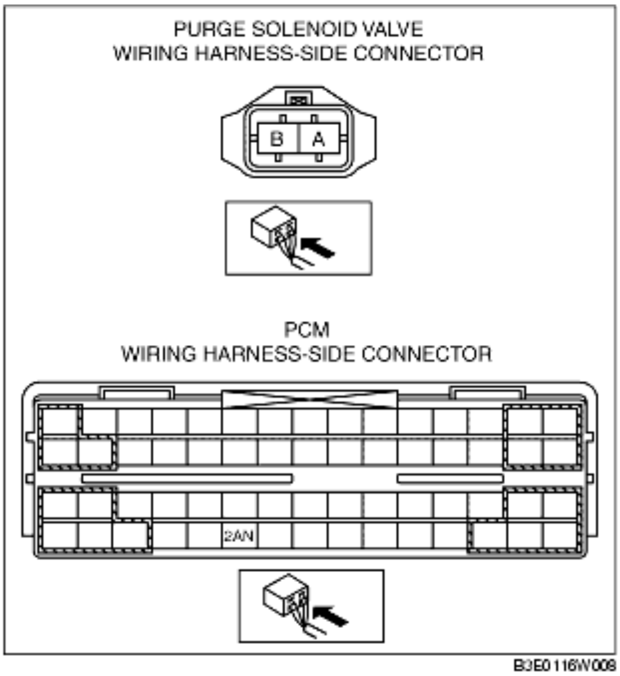
- If as specified in the table, perform the "Circuit Open/Short Inspection".
- If not as specified in the table, inspect the purge solenoid valve.

Measured condition	Continuity between A-B
When voltage is applied between terminals A and B	No airflow
When voltage is not applied between terminals A and B	Airflow detected

Circuit Open/Short Inspection [LF]

1. Disconnect the PCM connector. (See PCM REMOVAL/INSTALLATION [LF].)

2. Inspect the following wiring harness for an open or short circuit (continuity check).



Open circuit

• If there is no continuity, the circuit is open. Repair or replace the harness.

- Purge solenoid valve terminal A and PCM terminal 2AN

- Purge solenoid valve terminal B and main relay terminal A

Short circuit

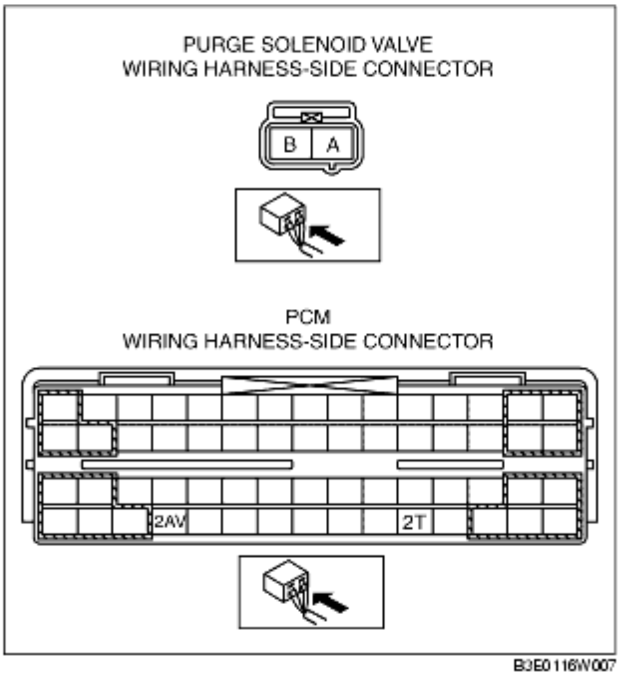
• If there is continuity, the circuit is short. Repair or replace the harness.

- Purge solenoid valve terminal A and body GND

Circuit Open/Short Inspection [Z6]

1. Disconnect the PCM connector. (See PCM REMOVAL/INSTALLATION [Z6].)

2. Inspect the following wiring harness for an open or short circuit (continuity check).



Open circuit

• If there is no continuity, the circuit is open. Repair or replace the harness.

- Purge solenoid valve terminal A and PCM terminal 2T

- Purge solenoid valve terminal B and PCM terminal 2AV

Short circuit

• If there is continuity, the circuit is short. Repair or replace the harness.

- Purge solenoid valve terminal A and body GND

- Purge solenoid valve terminal B and power supply

EGR VALVE REMOVAL/INSTALLATION [LF]

B3E011620300W01

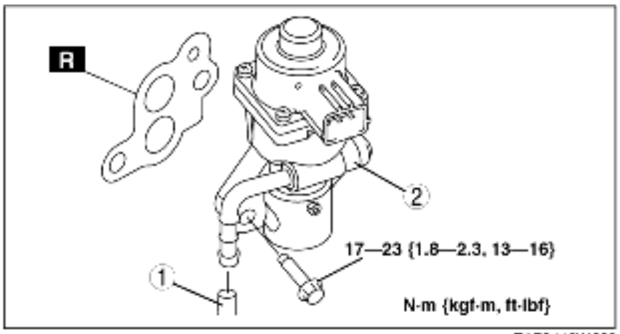
1. Remove the plug hole plate.

2. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

3. Disconnect the negative battery cable.

4. Disconnect the EGR valve connector.

5. Remove in the order indicated in the table.



B3E0116W006

1	Water hose (See Water Hose Removal Note [LF].)
2	EGR valve (See EGR Valve Removal Note [LF].)

6. Install in the reverse order of removal.

Water Hose Removal Note [LF]

1. Drain the engine coolant from the radiator. (See ENGINE COOLANT REPLACEMENT.)

EGR Valve Removal Note [LF]

1. Remove the air cleaner and air hose. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF].)

2. Remove the radiator hose (upper). (See RADIATOR REMOVAL/INSTALLATION.)

EGR VALVE REMOVAL/INSTALLATION [Z6]

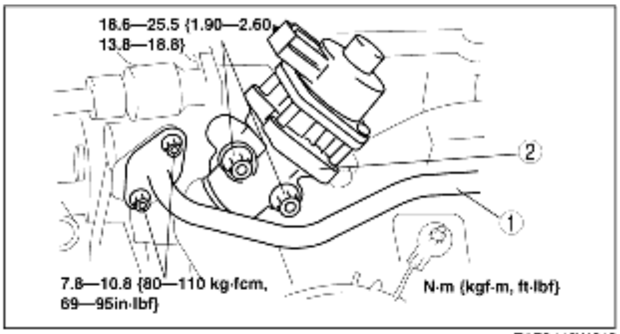
B3E011620300W02

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Disconnect the EGR valve connector.

4. Remove in the order indicated in the table.



B3E0116W012

1	EGR pipe (Exhaust manifold side) (See EXHAUST SYSTEM REMOVAL/INSTALLATION [Z6].)
2	EGR valve

5. Install in the reverse order of removal.

EGR VALVE INSPECTION

B3E011620300W03

EGR Control Inspection

Without using WDS or equivalent

1. Inspect the following:

• EGR pipe clogging

• PCM terminal voltage

- EGR valve signal

- Vehicle speed signal

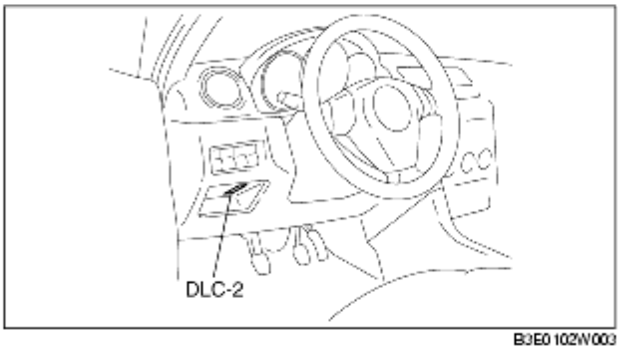
- Throttle opening signal

- Engine coolant temperature signal

• EGR valve (If it is stuck or not moving smoothly, replace it with a new one.)

Using WDS or equivalent

1. Connect the WDS or equivalent to the DLC-2.



2. Start the engine.

3. Using the "SEGRP" simulation function, operate with Steps **0** (idling) to **52** and verify that the engine speed becomes unstable or the engine stalls.

• If the engine speed does not change, perform the following procedure:

(1) Stop the engine.

(2) Remove the EGR valve.

(3) Connect the EGR valve connector.

(4) Turn the ignition switch to the ON position.

(5) Using the "SEGRP" simulation function, verify that it operates with Steps **0** (idling) to **52**.

• If the EGR valve operates, inspect the following:

- EGR pipe clogging

• If the EGR valve does not operate, inspect the following:

- PCM terminal voltage

• EGR valve signal

- EGR valve (If it is stuck or not moving smoothly, replace it with a new one.)

4. Warm up the engine to normal operating temperature.

5. Place the vehicle on the chassis dynamometer.

6. Monitor the following signals using the PID/data monitor.

• EGR valve step number (SEGRP)

• Engine speed (RPM)

• Vehicle speed (VSS)

• Throttle position (TP)

• Engine coolant temperature (ECT)

7. Verify that the EGR valve step number is **0** during idle.

8. Verify that the EGR valve step number increases when the accelerator pedal is depressed to increase the vehicle speed.

• If it does not increase, inspect the following using the PID/data monitor.

- Vehicle speed (VSS)

- Throttle position (TP)

- Engine coolant temperature (ECT)

9. Stop the vehicle and verify that the EGR valve step number is **0** during idle.

On-vehicle Inspection

1. Verify that the buzzing sound (valve operation sound) is heard from the EGR valve when engine cranking.

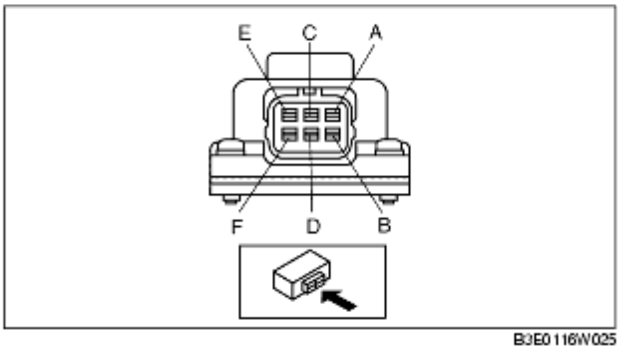
• If the buzzing sound is not heard, perform the resistance inspection.

Resistance Inspection

1. Disconnect the negative battery cable.

2. Disconnect the EGR valve connector.

3. Measure the resistance between the EGR valve terminals.



• If within the specification, perform out the "Circuit Open/Short Inspection".

• If not within the specification, replace the EGR valve.

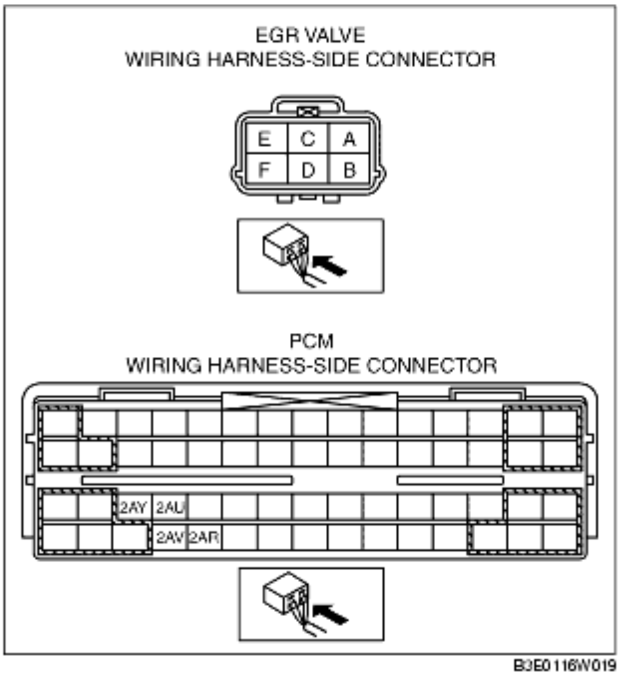
Standard

Terminal	Resistance (ohm)	
	LF	Z6
C-E C-A D-B D-F	12-16	20-24

Circuit Open/Short Inspection [LF]

1. Disconnect the PCM connector. (See PCM REMOVAL/INSTALLATION [LF].)

2. Inspect the following wiring harnesses for an open or short circuit (continuity check).



Open circuit

• If there is no continuity, the circuit is open. Repair or replace the wiring harness.

- EGR valve terminal A and PCM terminal 2AR
- EGR valve terminal B and PCM terminal 2AY
- EGR valve terminal E and PCM terminal 2AU
- EGR valve terminal F and PCM terminal 2AV
- EGR valve terminal C and main relay terminal A
- EGR valve terminal D and main relay terminal A

Short circuit

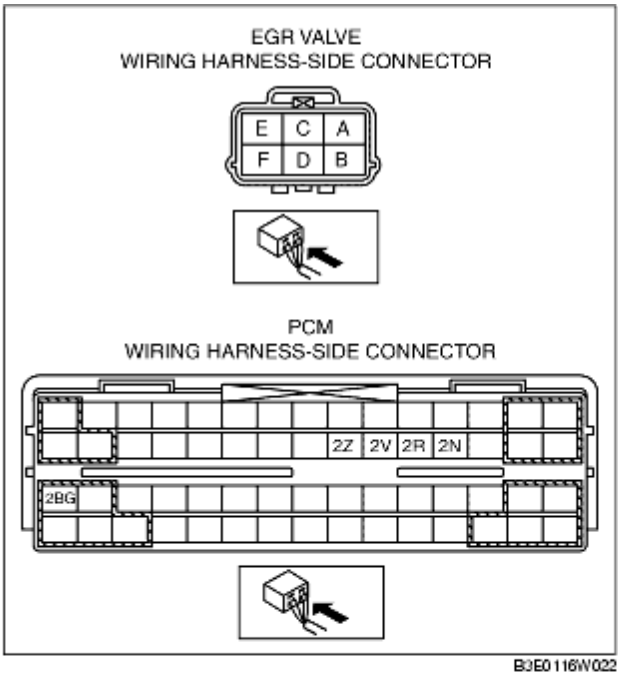
• If there is continuity, the circuit is short. Repair or replace the wiring harness.

- EGR valve terminal A and body GND
- EGR valve terminal B and body GND
- EGR valve terminal E and body GND
- EGR valve terminal F and body GND

Circuit Open/Short Inspection [Z6]

1. Disconnect the PCM connector. (See PCM REMOVAL/INSTALLATION [Z6].)

2. Inspect the following wiring harnesses for an open or short circuit (continuity check).



Open circuit

• If there is no continuity, the circuit is open. Repair or replace the wiring harness.

- EGR valve terminal A and PCM terminal 2V
- EGR valve terminal B and PCM terminal 2R
- EGR valve terminal C and PCM terminal 2BG
- EGR valve terminal D and PCM terminal 2BG

- EGR valve terminal E and PCM terminal 2Z

- EGR valve terminal F and PCM terminal 2N

Short circuit

• If there is continuity, the circuit is short. Repair or replace the wiring harness.

- EGR valve terminal A and body GND

- EGR valve terminal B and body GND

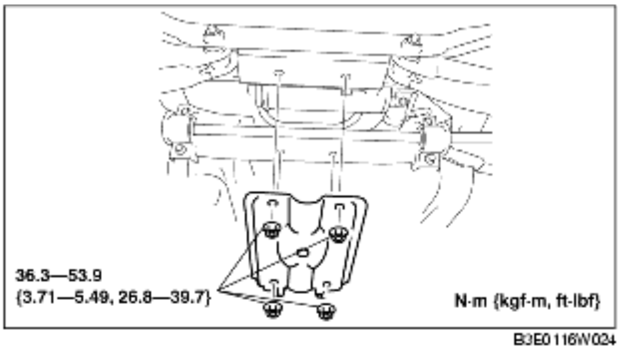
- EGR valve terminal E and body GND

- EGR valve terminal F and body GND

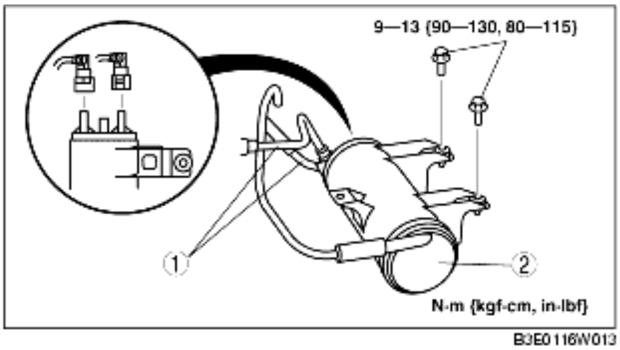
CHARCOAL CANISTER REMOVAL/INSTALLATION

B3E011613970W01

1. Remove the charcoal canister protector.



2. Remove in the order indicated in the table.



1	Evaporative hose (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION.)
2	Charcoal canister

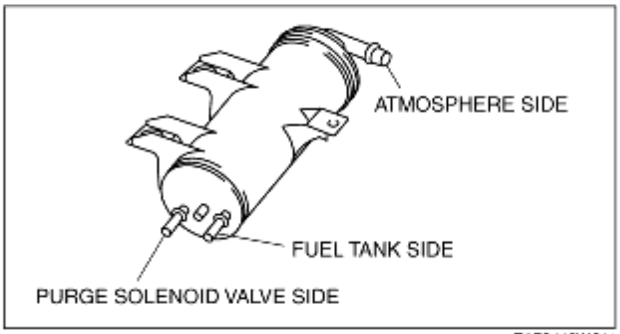
3. Install in the reverse order of removal.

CHARCOAL CANISTER INSPECTION

B3E011613970W02

1. Remove the charcoal canister.

2. Plug the atmosphere side and purge solenoid valve side of the charcoal canister.



B3E0116W014

3. Inspect for air leakage when blowing air by mouth from the fuel tank side.

   • If air leaks, replace the charcoal canister.

ROLLOVER VALVE REMOVAL/INSTALLATION

B3E011642720W01

Note

• The rollover valve cannot be removed as it is built into the fuel tank.

ROLLOVER VALVE INSPECTION

B3E011642720W02

Note

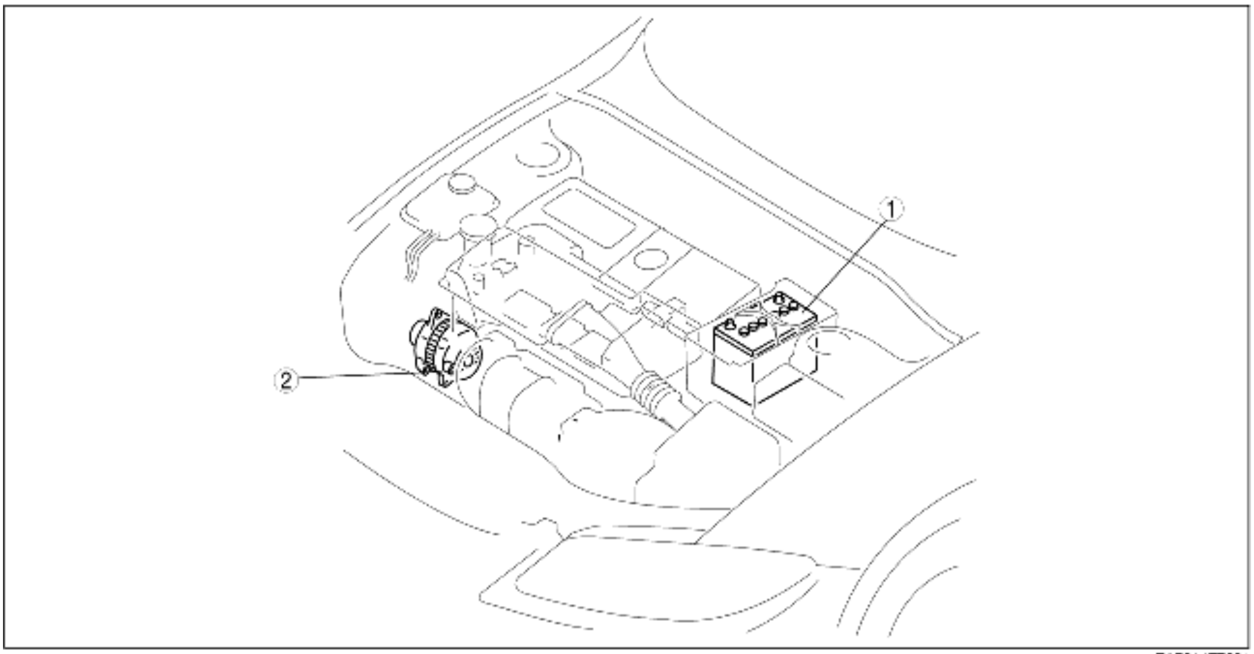
• The rollover valve cannot be disassembled and inspected as it is built into the fuel tank.

1. Perform the fuel tank inspection. (See FUEL TANK INSPECTION.)

CHARGING SYSTEM

CHARGING SYSTEM LOCATION INDEX [Z6]

B3E011701098W01

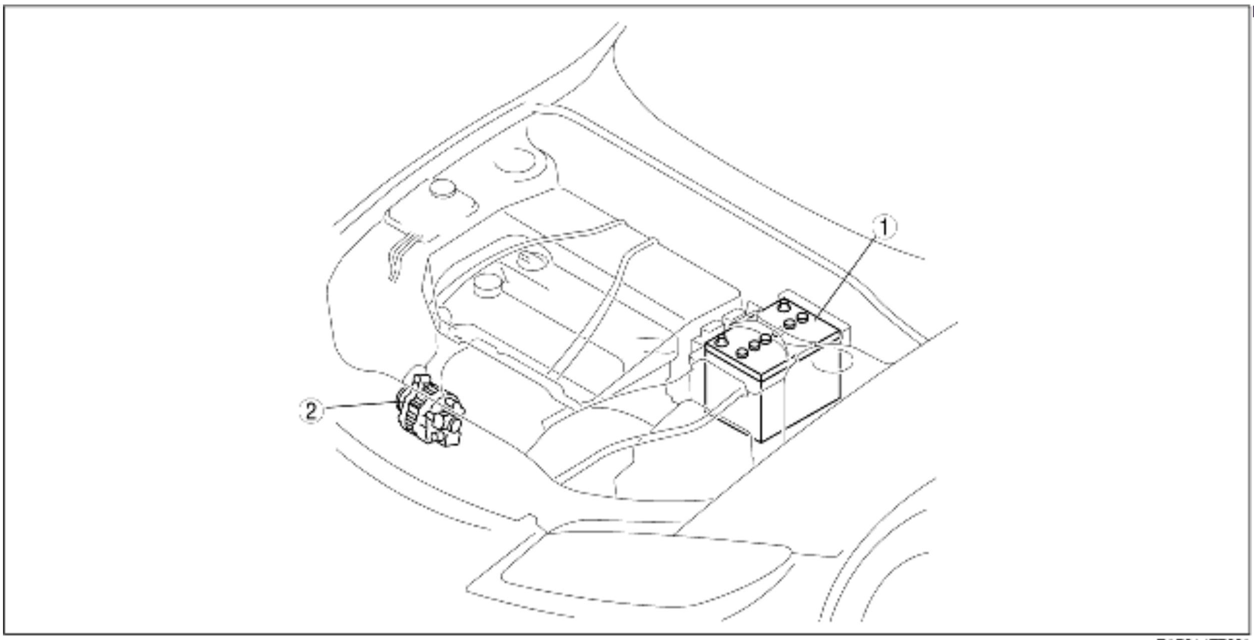


B3E0117T004

1	Battery (See BATTERY REMOVAL/INSTALLATION [Z6].) (See BATTERY INSPECTION.) (See BATTERY RECHARGING.)
2	Generator (See GENERATOR REMOVAL/INSTALLATION [Z6].) (See GENERATOR INSPECTION.)

CHARGING SYSTEM LOCATION INDEX [LF]

B3E011701098W02



B3E0117T003

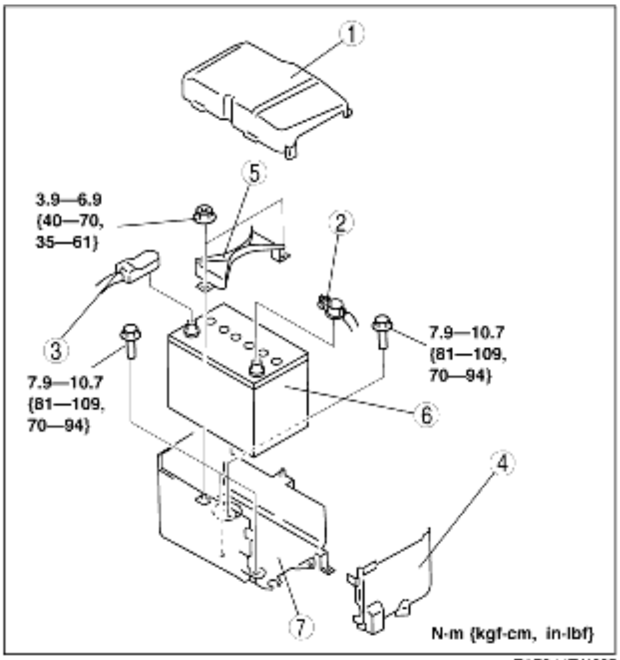
1	Battery (See BATTERY REMOVAL/INSTALLATION [LF].) (See BATTERY INSPECTION.) (See BATTERY RECHARGING.)
2	Generator (See GENERATOR REMOVAL/INSTALLATION [LF].) (See GENERATOR INSPECTION.)

BATTERY REMOVAL/INSTALLATION [Z6]

B3E011718520W01

1. Remove in the order indicated in the table.

2. Install in the reverse order of removal.

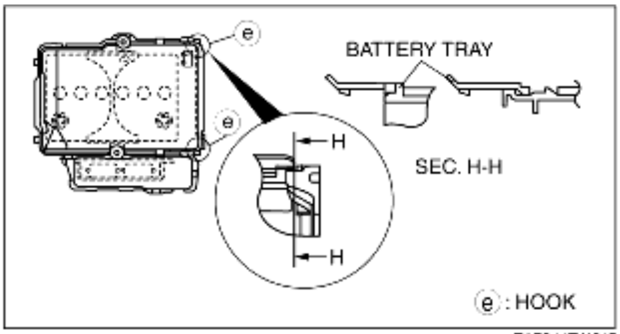


B3E0117W005

1	Battery cover (See Battery Cover Installation Note.)
2	Negative battery cable
3	Positive battery cable
4	Battery box (See Battery Box Installation Note.)
5	Battery clamp
6	Battery
7	Battery tray

Battery Box Installation Note

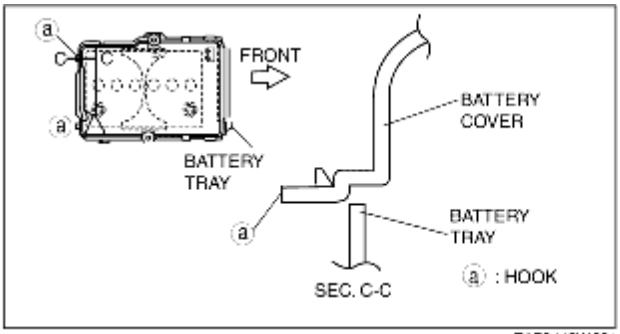
1. Assemble with the battery box hooks E aligned with the battery tray holes at two points.



B3E0117W015

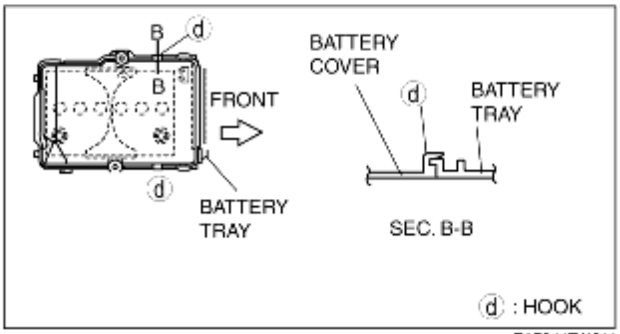
Battery Cover Installation Note

1. Install with the battery cover hooks A aligned with the battery tray holes at two points.



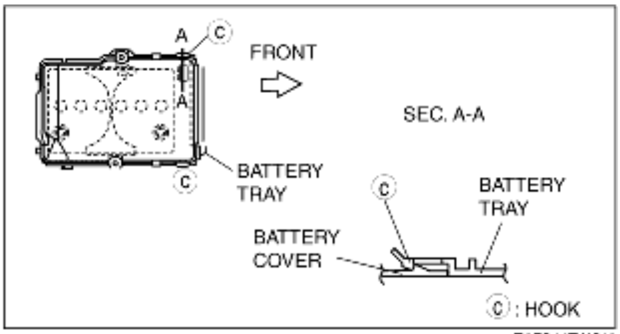
B3E0118W004

2. Install with the battery cover hooks D aligned with the battery tray flange at two points.



B3E0117W011

3. Set the battery cover to the battery tray hooks C at two points.



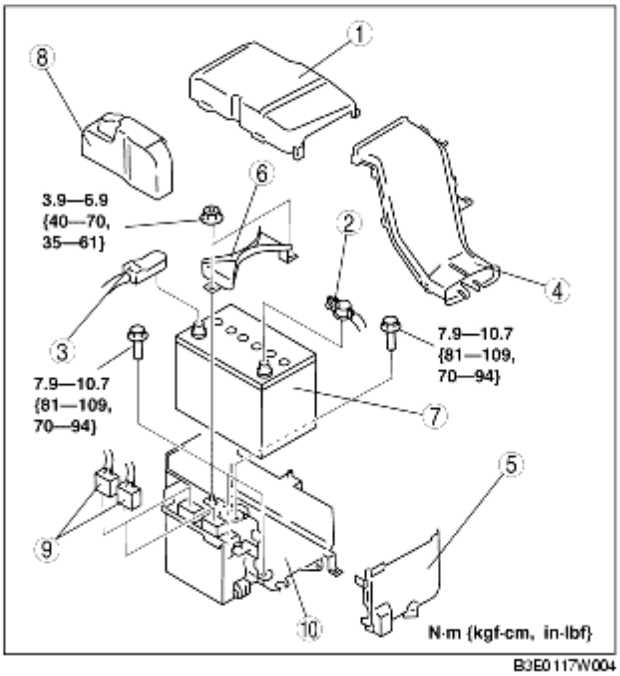
B3E0117W013

BATTERY REMOVAL/INSTALLATION [LF]

B3E011718520W02

1. Remove in the order indicated in the table.

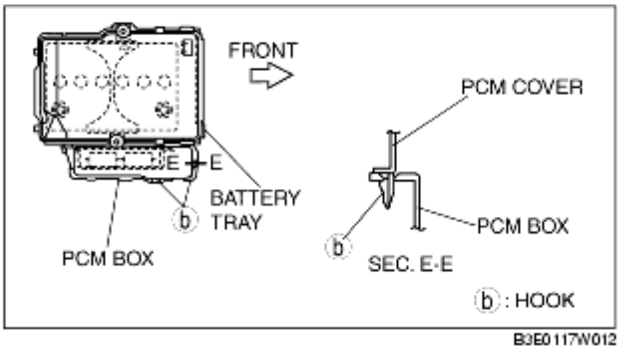
2. Install in the reverse order of removal.



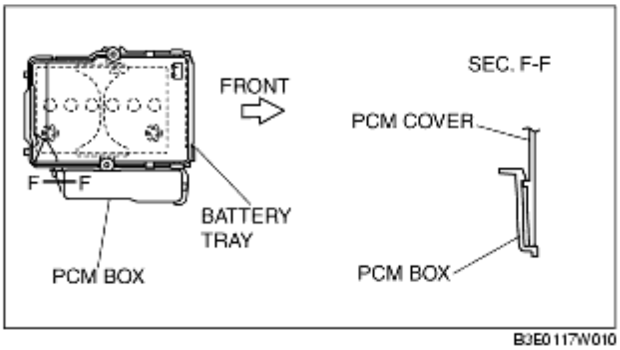
1	Battery cover (See Battery Cover Installation Note.)
2	Negative battery cable
3	Positive battery cable
4	Battery duct (See Battery Duct Installation Note.)
5	Battery box (See Battery Box Installation Note.)
6	Battery clamp
7	Battery
8	PCM cover (See PCM Cover Installation Note.)
9	Connectors
10	Battery tray and PCM component

PCM Cover Installation Note

1. Install with the PCM cover hooks B aligned with the PCM box holes.

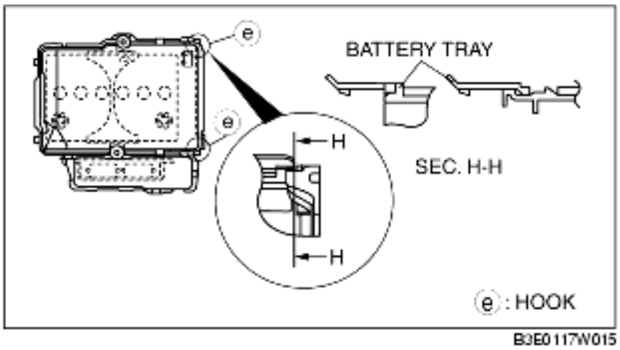


2. Install the PCM cover to the PCM box hook.



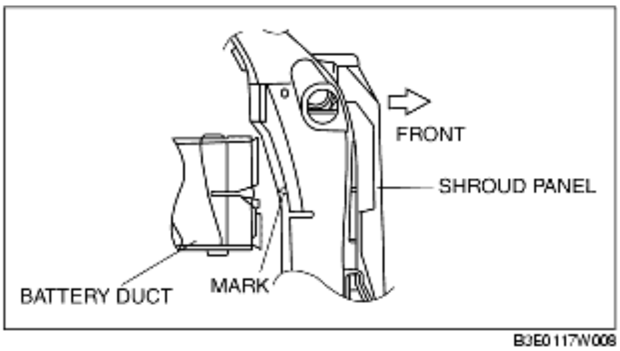
Battery Box Installation Note

1. Assemble with the battery box hooks E aligned with the battery tray holes at two points.



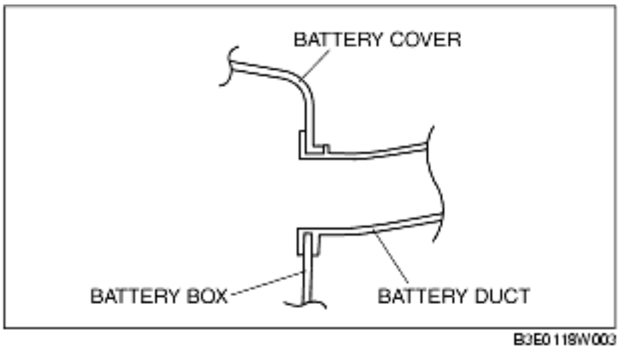
Battery Duct Installation Note

1. Match the mark of the shroud panel and notch in the battery duct, and install the battery duct to the shroud panel.

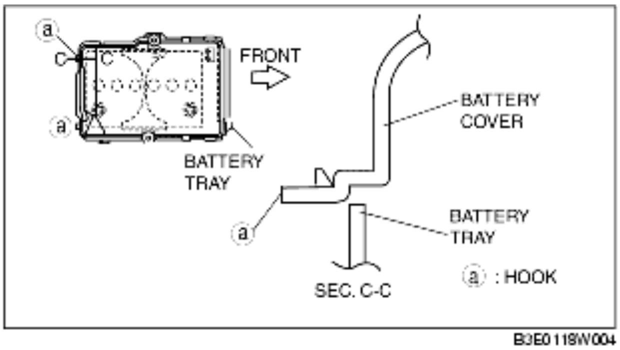


Battery Cover Installation Note

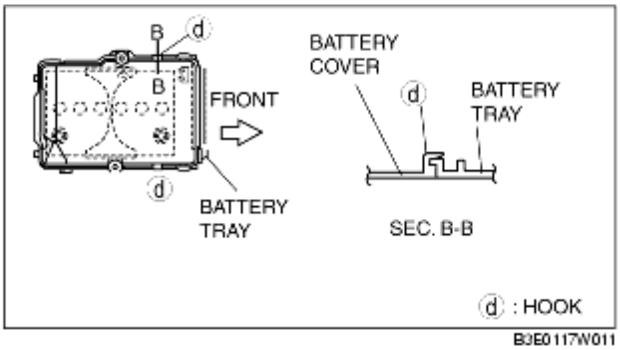
1. Install the battery duct between the battery cover and the battery box.



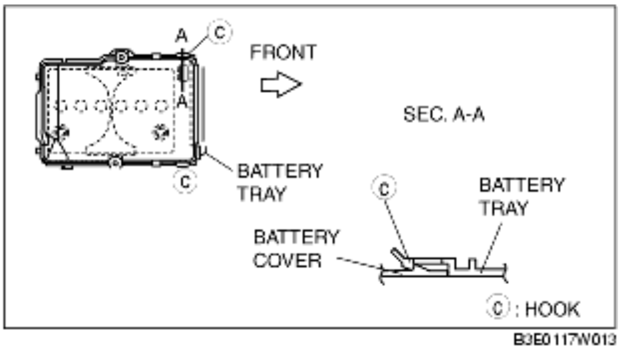
2. Install with the battery cover hooks A aligned with the battery tray holes at two points.



3. Install with the battery cover hooks D aligned with the battery tray flange at two points.



4. Set the battery cover to the battery tray hooks C at two points.



BATTERY INSPECTION

B3E011718520W03

Warning

• Since battery acid is toxic, be careful when handling the battery.

• Since battery acid is highly corrosive, be careful not to allow it to contact clothing or the vehicle.

• In case battery acid contacts skin, eyes, or clothing, flush it immediately with running water. Especially if the acid gets in the eyes, flush with water for more than 15 min and get prompt medical attention.

Electrolyte gravity

1. Measure the electrolyte gravity using a hydrometer.

• If it is less than the specification, recharge the battery. (See BATTERY RECHARGING.)

Standard electrolyte gravity

1.22-1.29 [20 °C {68 °F}]

Battery voltage

1. Inspect the battery as follows:

Step	Inspection		Action
1	Measure the battery positive voltage.	12.4 V or more	Go to Step 3.
		Less than 12.4 V	Go to the next step.
2	Quick charge for 30 min and recheck voltage.	12.4 V or more	Go to the next step.
		Less than 12.4 V	Replace the battery.
3	Using the battery load tester, apply load current (see load test chart) and record battery voltage after 15 s. Is voltage more than specification?	Yes	Normal
		No	Replace the battery.

Load test chart

Battery	Current load (A)
50D20L	150
75D26L	195
80D26L	195

Standard specification

Battery temp. (°C {°F})	Minimum voltage (V)
4 {39}	9.3
10 {50}	9.4
16 {61}	9.5
21 {70}	9.6

Back-up current

1. Verify that the ignition switch is off and that the key has been removed.

2. Disconnect the negative battery cable.

3. Measure the back-up current between the negative battery terminal and the negative battery cable.

    • If not within the specification, measure the back-up current while removing the fuses one by one from the inside of the main fuse block and the inside of the fuse block.

    Caution

    • Operating electrical loads while the back-up current is being measured can damage the tester.

    Standard current

    20 mA max.

4. Inspect and repair wiring harnesses and connectors of the fuse where the current decreased.

BATTERY RECHARGING

B3E011718520W04

Warning

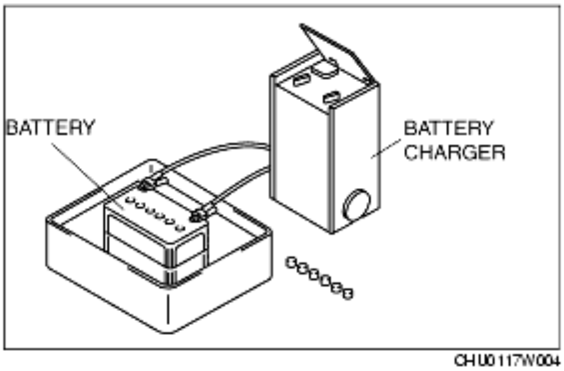
• Keep all flames away from the battery, otherwise evaporated gas from the battery fluid may catch fire, and cause serious injury.

• Remove the battery filler caps when recharging to prevent battery deformation or damage.

Caution

• Do not quick charge for over 30 min. It will damage the battery.

1. Remove the battery and then place it in a pan of water.



2. Connect a battery charger to the battery and adjust the charging current as follows.

Standard specification

Battery type (5-h rate)	Recharge current (A)	Quick charge (A/30 min)
50D20L (40)	4.0-5.0	25
75D26L (52)	5.0-6.0	35
80D26L (55)	5.5-6.5	35

3. After the battery is recharged, verify that the voltage is within the specification and remains at the same value for **1 h or more** after the recharging was completed.

- If not within the specification, replace the battery.

Standard voltage

12.4 V or more

GENERATOR REMOVAL/INSTALLATION [Z6]

B3E011718300W01

Warning

- When the battery cables are connected, touching the vehicle body with generator terminal B generates sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the negative battery cable before performing the following operation.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Remove the under cover and splash shield as a single unit.

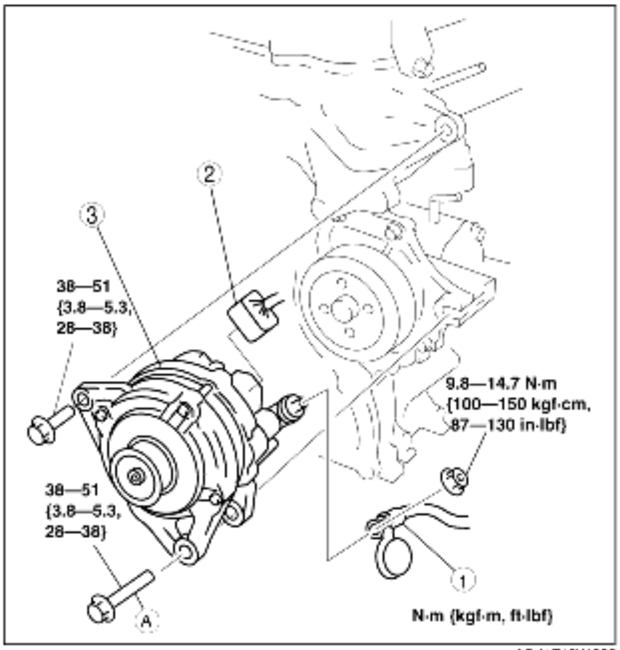
4. Remove the drive belt. (See DRIVE BELT REPLACEMENT [Z6].)

5. Position the coolant reserve tank out of the way.

6. Position the power steering fluid tank out of the way.

7. Remove in the order indicated in the table.

8. Install in the reverse order of removal.



ADJ4710W002

1	Terminal B cable
2	Generator connector
3	Generator (See Generator Removal Note.)

Generator Removal Note

1. Remove bolt A with the generator since there is not enough space.

GENERATOR REMOVAL/INSTALLATION [LF]

B3E011718300W02

Warning

• When the battery cables are connected, touching the vehicle body with generator terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the battery negative cables before performing the following operation.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

2. Disconnect the negative battery cable.

3. Remove the under cover and splash shield as a single unit.

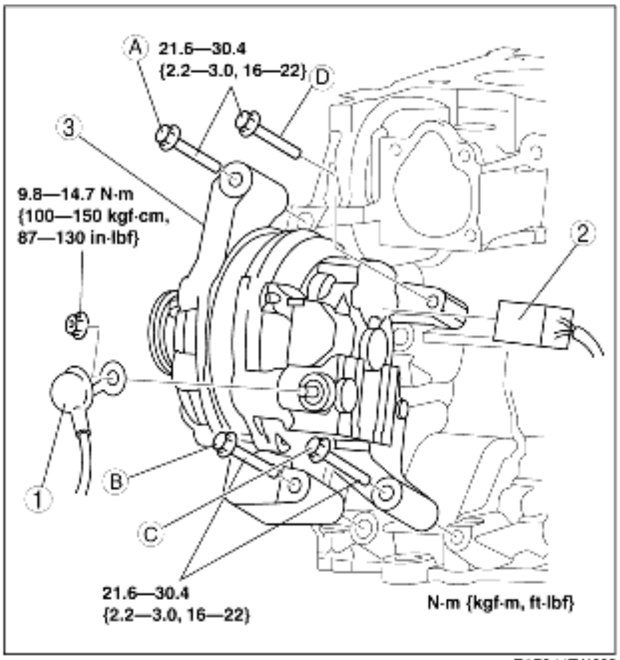
4. Remove the plug hole plate. (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

5. Position the drive belt out of the way. (See DRIVE BELT REPLACEMENT [LF].)

6. Position the coolant reserve tank out of the way.

7. Remove in the order indicated in the table.

8. Install in the reverse order of removal.



B3E0117W002

1	B terminal cable
2	Generator connector
3	Generator (See Generator Installation Note.)

Generator Installation Note

1. Match the generator fixing hole and engine side hole, then temporarily tighten the generator installation bolts in the order A, B, C, and D.

2. Securely tighten the generator installation bolts in the order A, B, C, and D.

GENERATOR INSPECTION

B3E011718300W03

Caution

• Do not apply direct battery positive voltage to the generator terminal D, otherwise it could cause damage to the internal parts (power transistor) of the generator.

Generator warning light

1. Verify that the battery is fully charged.

2. Verify that the drive belt deflection/tension is correct. (See DRIVE BELT INSPECTION [Z6].)
(See DRIVE BELT INSPECTION [LF].)

3. With the ignition switch at ON, verify that the generator warning light illuminates.

- If it does not illuminate, inspect the generator warning light and the wiring harness.

- If the generator warning light and the wiring harness are normal, inspect the PCM.

4. Verify that the generator warning light goes off after the engine is started.

- If it does not goes out, check if any one of the following DTCs in the on-board diagnostic system are displayed: P0112, P0113, P2502, P2503, P2504. (See DTC TABLE [Z6].) (See DTC TABLE [LF].)

Generator

Voltage

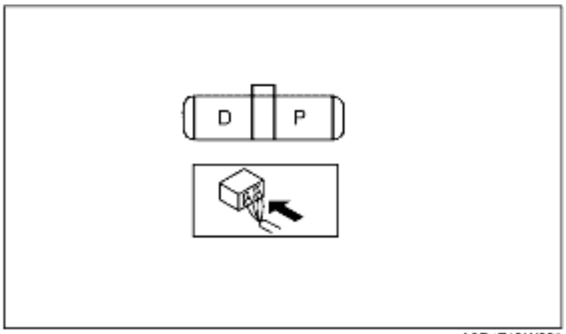
1. Verify that the battery is fully charged.

2. Verify that the drive belt deflection/tension is correct. (See DRIVE BELT INSPECTION [Z6].) (See DRIVE BELT INSPECTION [LF].)

3. Turn off all electrical loads.

4. Start the engine and verify that the generator rotates smoothly without any noise while the engine is running.

5. Measure the voltage at each terminal using a tester.



A6E4710W003

Standard specification

Terminal	IG-ON (V)	Idle (V) [20°C {68 °F}]
B	B+	13.0-15.0
P	Approx. 1.0 or less	Approx. 3.0-8.0
D	Approx. 0	*

* :

Turn the following electrical loads on and verify that the voltage reading increases.

- Headlights
- Blower motor
- Rear defroster

Current

1. Verify that the battery is fully charged.

2. Verify that the drive belt deflection/tension is correct. (See DRIVE BELT INSPECTION [Z6].) (See DRIVE BELT INSPECTION [LF].)

3. Disconnect the negative battery cable.

4. Connect a tester capable of reading **120 A or above** between generator terminal B and the wiring harness.

5. Connect the negative battery cable.

6. Turn off all electrical loads.

7. Start the engine.

8. Increase engine speed from **2,000-2,500 rpm**.

9. Turn the following electrical loads on and verify that the current reading increases.

- Headlights
- Blower motor
- Rear window defroster

Note

- Current required for generating power varies with electrical loads applied.

Reference value

Current possible for power generation (differs according to load)

[Conditions] ambient temperature 20°C {68 °F}, voltage 13.0-15.0 V, engine warm

Engine speed (rpm)	Terminal B current (A)	
	Z6	LF
1,000	0*-65	0*-80
2,000	0*-85	0*-95

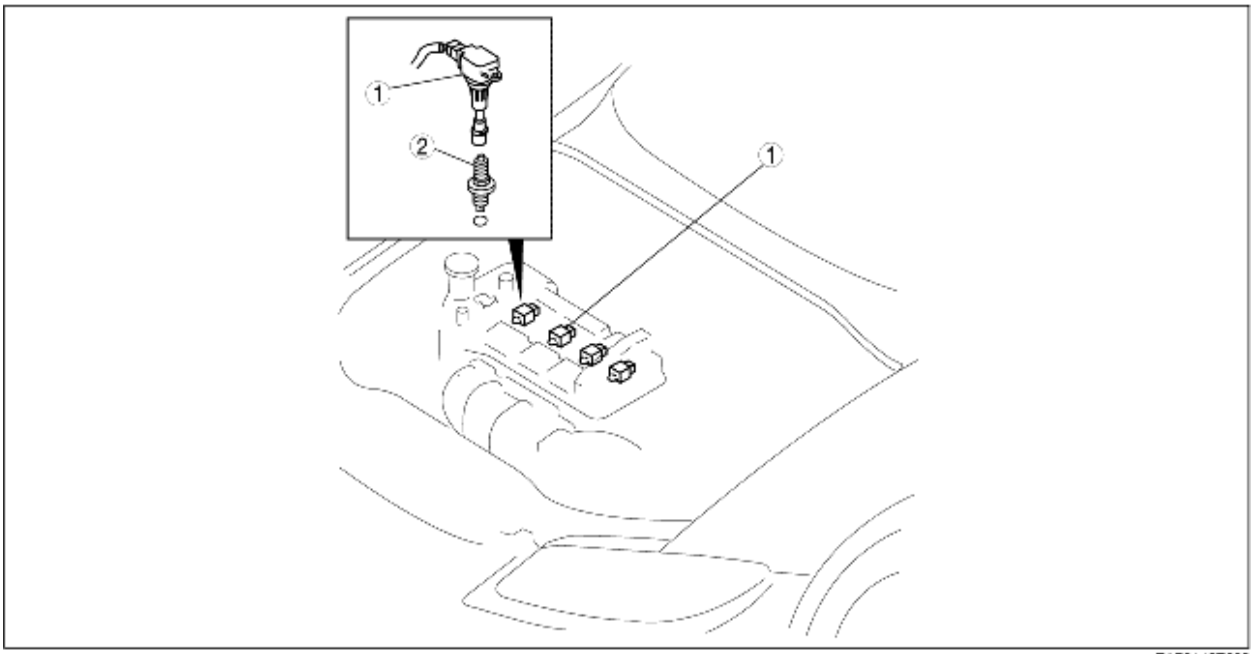
* :

The lower limit must be more than 0 A.

IGNITION SYSTEM

IGNITION SYSTEM LOCATION INDEX [Z6]

B3E011801009W01

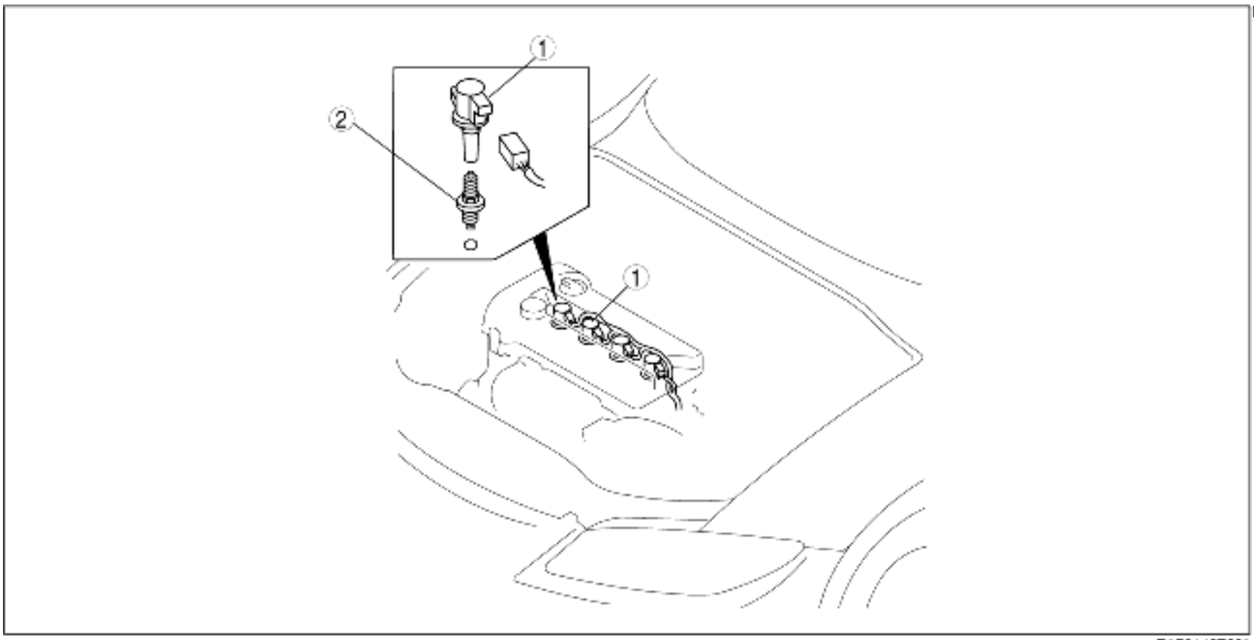


B3E0118T002

1	Ignition coil (See IGNITION COIL REMOVAL/INSTALLATION [Z6].) (See IGNITION COIL INSPECTION [Z6].)
2	Spark plug (See SPARK PLUG REMOVAL/INSTALLATION [Z6].) (See SPARK PLUG INSPECTION.)

IGNITION SYSTEM LOCATION INDEX [LF]

B3E011801009W02



B3E0118T003

1	Ignition coil (See IGNITION COIL REMOVAL/INSTALLATION [LF].) (See IGNITION COIL INSPECTION [LF].)
2	Spark plug (See SPARK PLUG REMOVAL/INSTALLATION [LF].) (See SPARK PLUG INSPECTION.)

IGNITION COIL REMOVAL/INSTALLATION [Z6]

B3E011801009W03

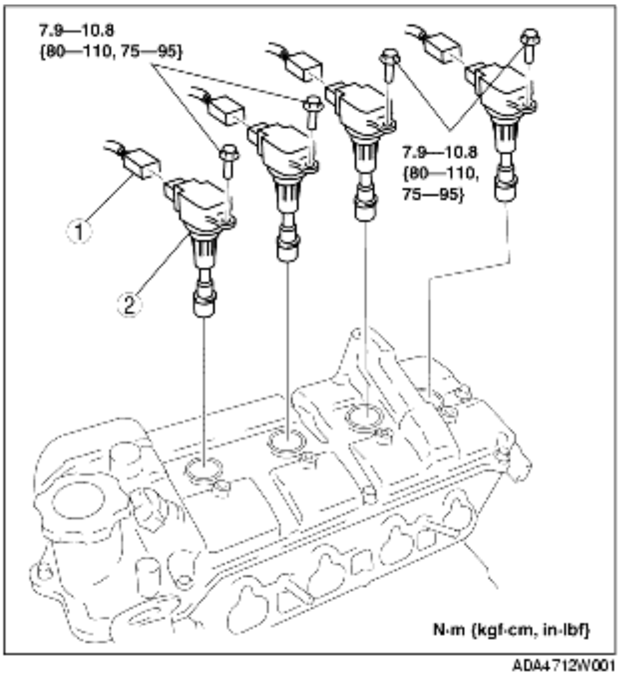
1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Remove the air cleaner. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

4. Remove in the order indicated in the table.

5. Install in the reverse order of removal.



1	Connector
2	Ignition coil

IGNITION COIL REMOVAL/INSTALLATION [LF]

B3E011801009W04

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

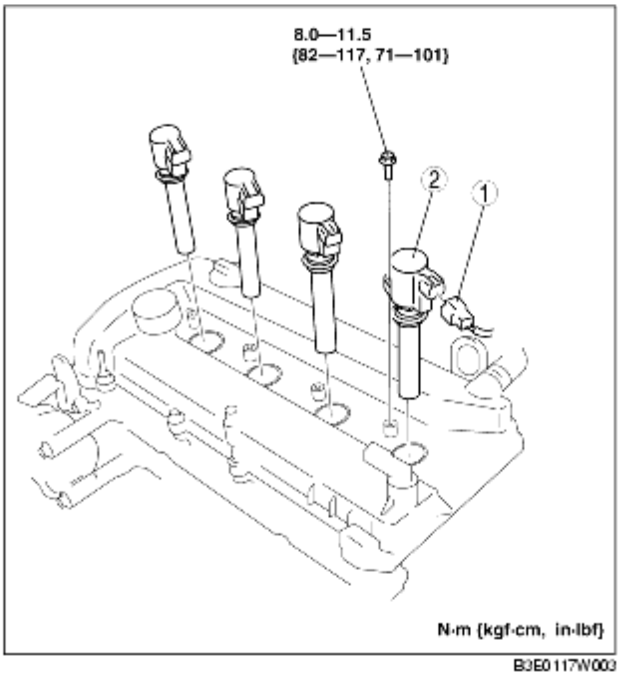
2. Disconnect the negative battery cable.

3. Remove the plug hole plate.

(See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)

4. Remove in the order indicated in the table.

5. Install in the reverse order of removal.



1	Connector
2	Ignition coil

IGNITION COIL INSPECTION [Z6]

B3E011801009W05

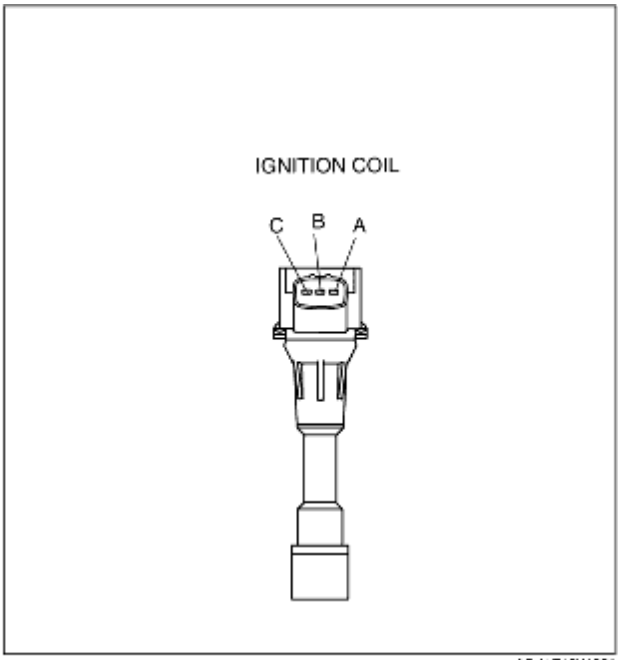
IGNITION COIL WITH BUILT-IN POWER SWITCH INSPECTION

1. Remove the ignition coil connector.

2. Measure the resistance between each terminal on the ignition coil connector.

  • If the measurement corresponds to the table, replace the ignition coil.

Item	Tester Connection Position		Condition
	Positive	Negative	
Terminal	C	B	∞ or 0 ohm is not normal
	A	B	
	A	C	0 to several kilohm (continuity) is not normal



ADJ4710W003

IGNITION COIL INSPECTION [LF]

B3E011801009W06

Primary Coil Winding

1. Disconnect the ignition coil connector.

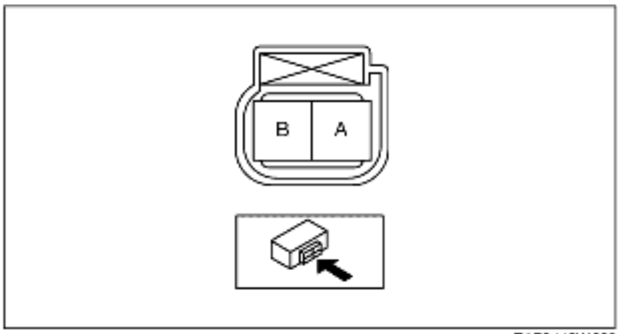
2. Measure the resistance between the following terminals using an ohmmeter:

• A and B

- If not as specified, replace the ignition coil.

Resistance (Reference)

0.45-1.15 ohms [25 °C {77 °F}]



B3E0118W006

Secondary Coil Winding

1. Disconnect the ignition coil connector.

2. Remove the ignition coil. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)

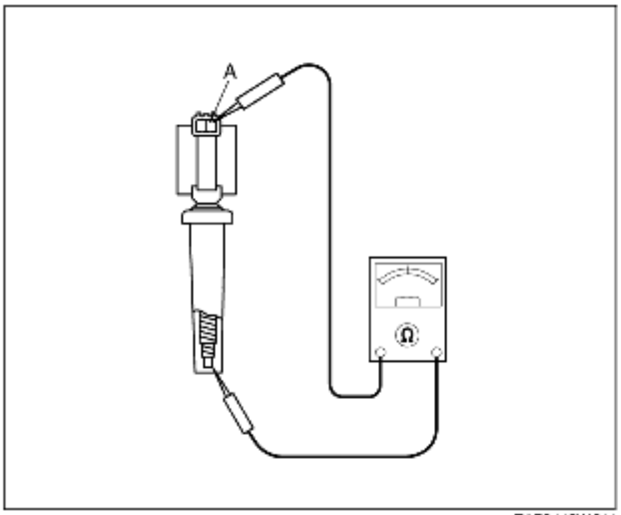
3. Measure the resistance between the following using an ohmmeter.

- Terminal A to coil boot socket

- If not as specified, replace the ignition coil.

Resistance (Reference)

5.0-6.0 kilohms [25 °C {77 °F}]



B3E0118W011

Insulation Resistance of Case

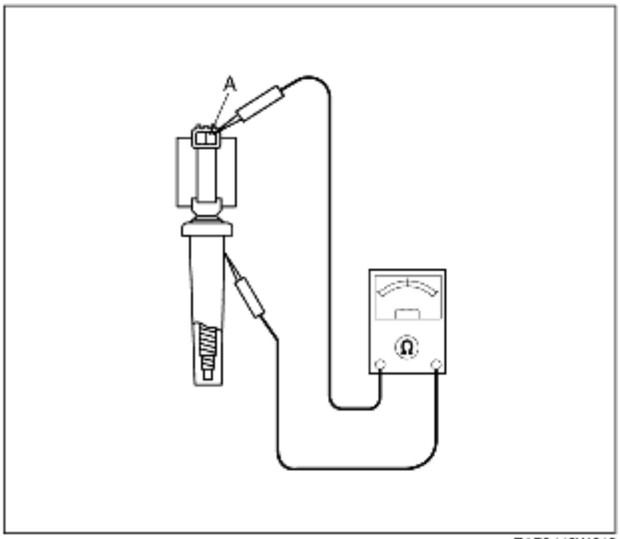
1. Disconnect the ignition coil connector.

2. Measure the insulation resistance from terminal A to ignition coil case using an ohmmeter.

- If not as specified, replace the ignition coil.

Resistance (Reference)

Above 10 megohms [25 °C {77 °F}]



B3E0118W012

SPARK PLUG REMOVAL/INSTALLATION [Z6]

B3E011801009W07

Caution

• If a spark plug that is not as specified is installed, sealing performance will be deteriorated. Install only the specified spark plug when replacing.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)
2. Disconnect the negative battery cable.
3. Remove the air cleaner. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)
4. Remove the ignition coil. (See IGNITION COIL REMOVAL/INSTALLATION [Z6].)
5. Remove the spark plugs using a plug-wrench.
6. Install in the reverse order of removal.

Tightening torque

1422 N·m {1.52.3 kgf·m, 1116 ft·lbf}

SPARK PLUG REMOVAL/INSTALLATION [LF]

B3E011801009W08

Caution

• If a spark plug that is not as specified is installed, sealing performance will be deteriorated. Install only the specified spark plug when replacing.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)
2. Disconnect the negative battery cable.
3. Remove the plug hole plate. (See PLUG HOLE PLATE REMOVAL/INSTALLATION [LF].)
4. Remove the ignition coil. (See IGNITION COIL REMOVAL/INSTALLATION [LF].)
5. Remove the spark plugs using a plug-wrench.
6. Install in the reverse order of removal.

Tightening torque

10-14 N·m {1.1-1.4kgf·m, 8-10 ft·lbf}

SPARK PLUG INSPECTION

B3E011801009W09

Specification

Item	Engine

		Z6	LF
Type	NGK	-	ITR6F13
	DENSO	SK16PR-E11	-

Plug Gap Inspection

Caution

• To avoid possible damage to the tip, do not adjust the plug gap.

• To prevent damaging the tip, use wire type plug gap gauge when inspecting the plug gap.

1. Measure the spark plug gap using the wire type plug gap gauge.

• If it is more than the maximum specification, replace the spark plug.

Standard plug gap

Z6: 1.0-1.1 mm {0.039-0.043 in}

LF: 1.25-1.35 mm {0.049-0.053 in}

Cleaning

Caution

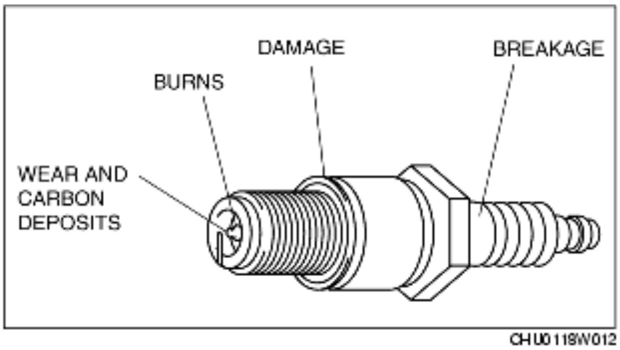
• To avoid possible damage to the tip, do not use a wire brush to clean the plug.

Note

• To avoid possible damage to the tip, use gasoline to clean the spark plugs after removing dirt.

Visual inspection

1. Inspect the following items:



• If there is any malfunction, replace the spark plug.

- Insulator breakage

- Worn electrode

- Damaged gasket

- Badly burned insulator (sparking side)

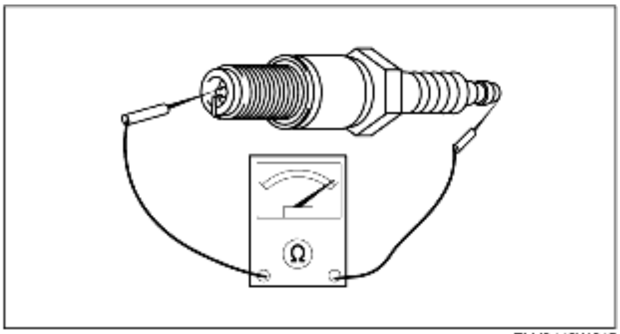
Resistance Inspection

1. Measure the resistance of the spark plug using a tester as shown in the figure.

• If not within the specification, replace the spark plug.

Resistance

3.0-7.5 kilohms [25°C {77 °F}]

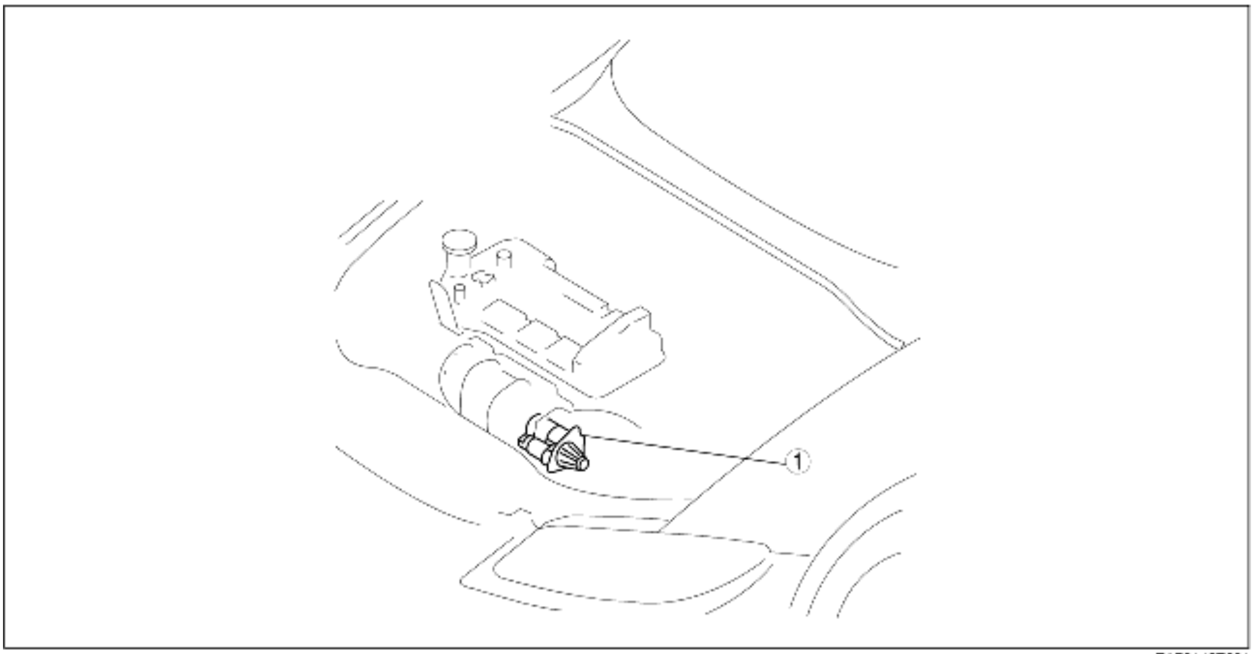


BHJ0118W015

STARTING SYSTEM

STARTING SYSTEM LOCATION INDEX [Z6]

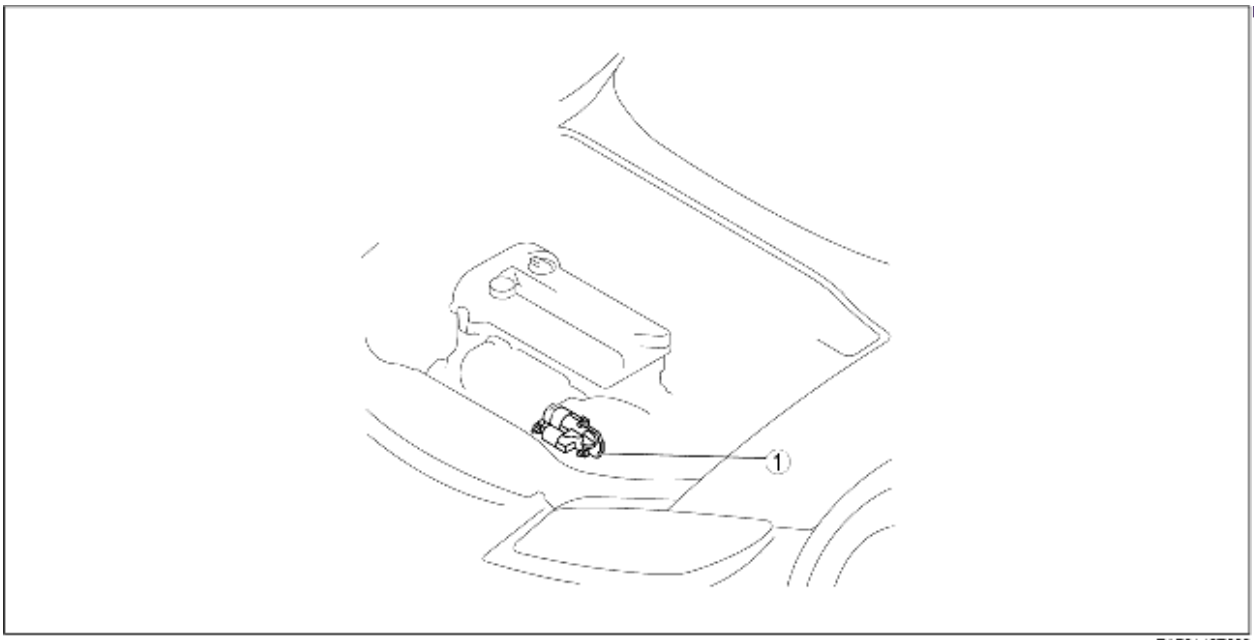
B3E011918400W01



1	Starter (See STARTER REMOVAL/INSTALLATION [Z6].) (See STARTER INSPECTION.)

STARTING SYSTEM LOCATION INDEX [LF]

B3E011918400W02



B3E0119T002

1	Starter (See STARTER REMOVAL/INSTALLATION [LF].) (See STARTER INSPECTION.)

STARTER REMOVAL/INSTALLATION [Z6]

B3E011918400W03

Warning

• When the battery cables are connected, touching the vehicle body with starter terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the negative battery cable before performing the following operation.

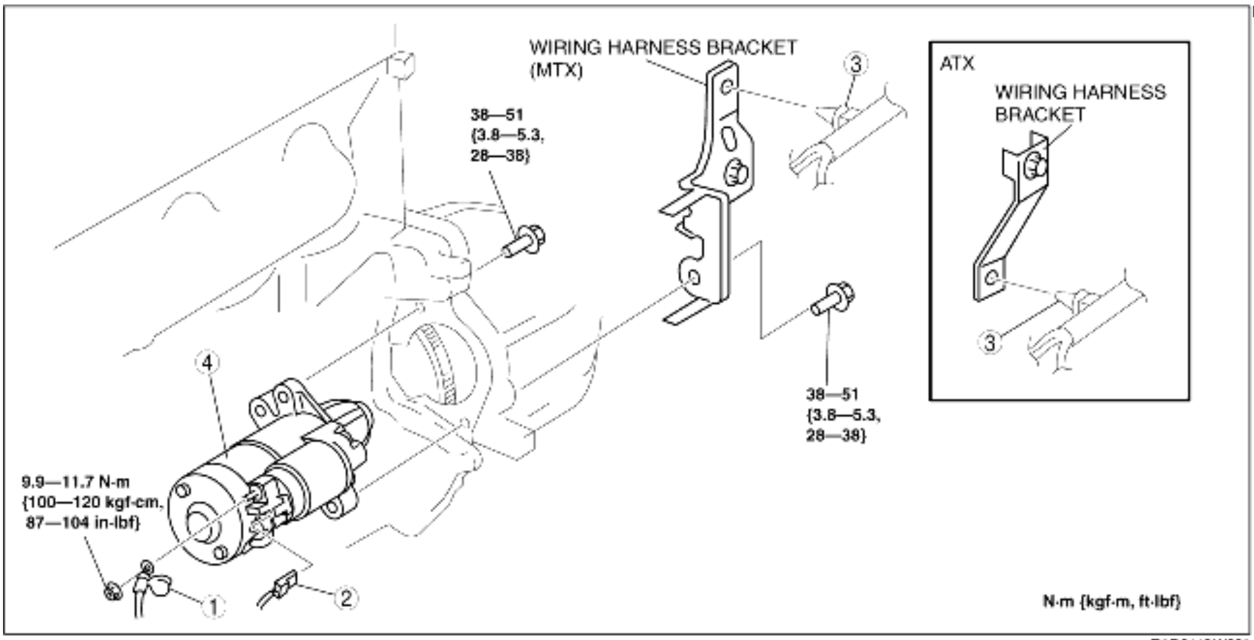
1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Remove the under cover.

4. Remove in the order indicated in the table.

5. Install in the reverse order of removal.



B3E0119W003

1	Terminal B cable
2	Terminal S connector
3	Wiring harness clip
4	Starter

STARTER REMOVAL/INSTALLATION [LF]

B3E011918400W04

Warning

• When the battery cables are connected, touching the vehicle body with starter terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the negative battery cable before performing the following operation.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [LF].)

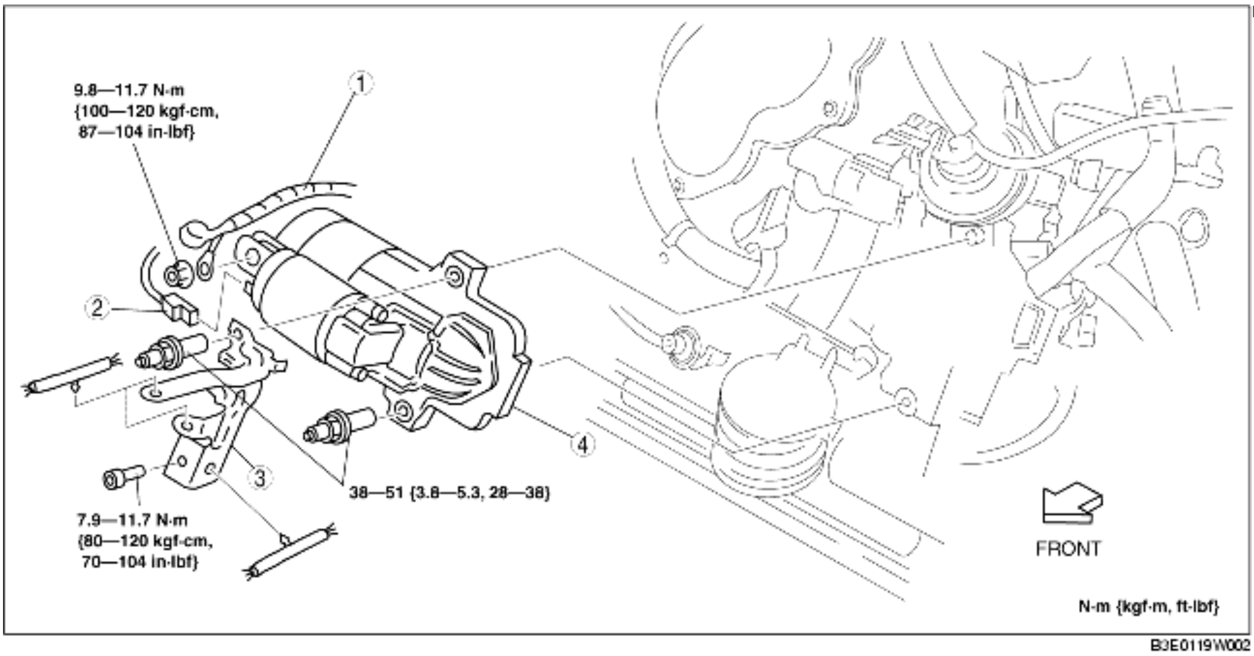
2. Disconnect the negative battery cable.

3. Remove the under cover.

4. Remove the clutch release cylinder. (MTX) (See MANUAL TRANSAXLE REMOVAL/INSTALLATION [F35M-R].)

5. Remove in the order indicated in the table.

6. Install in the reverse order of removal.



1	Terminal B cable
2	Terminal S connector
3	Wiring harness bracket
4	Starter

STARTER INSPECTION

B3E011918400W05

On-vehicle Inspection

1. Verify that the battery is fully charged.

2. The starter is normal if it rotates smoothly and without any noise when the engine is cranked.

• If the starter does not operate, inspect the following:

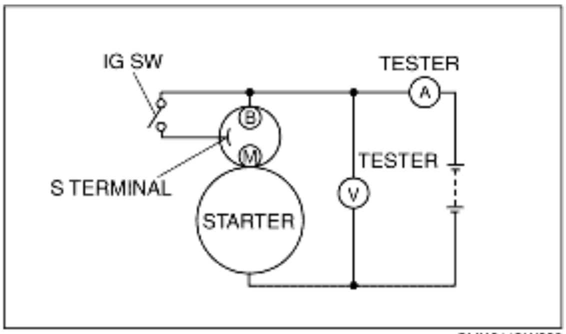
- Remove the starter, and inspect the starter unit.

- Inspect the related wiring harnesses, the ignition switch, and the transaxle range switch (ATX).

No-load test

1. Verify that the battery is fully charged.

2. Connect the starter, battery, and a tester as shown in the figure.



3. Operate the starter and verify that it rotates smoothly.

• If the starter does not rotate smoothly, inspect the starter unit.

4. Measure the voltage and current while the starter is operating.

• If not within the specification, replace the starter.

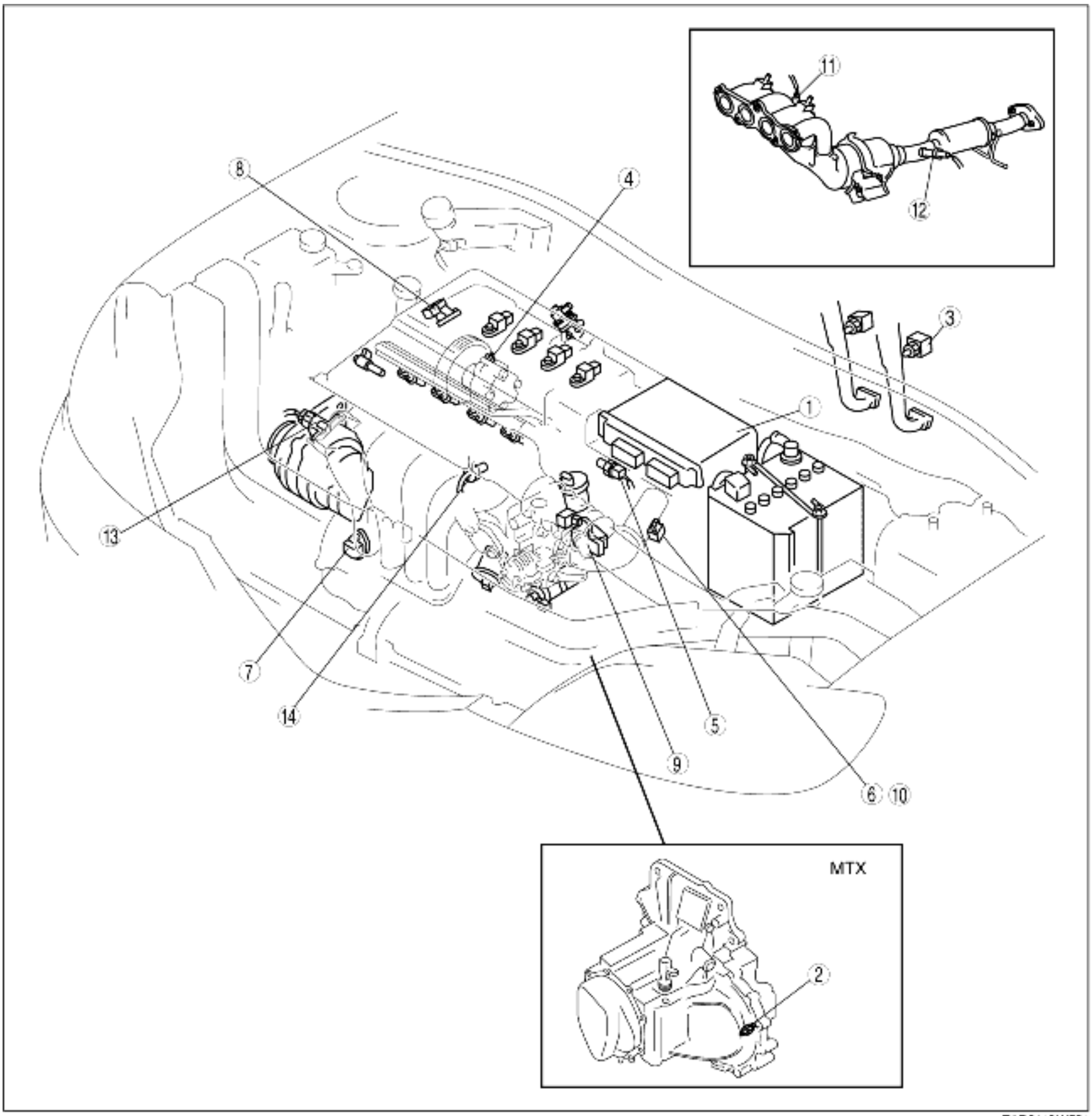
Standard current

Item	
Voltage (V)	**Current (A)**
11	90 or less

CONTROL SYSTEM[Z6]

CONTROL SYSTEM LOCATION INDEX [Z6]

B3E014018880W04



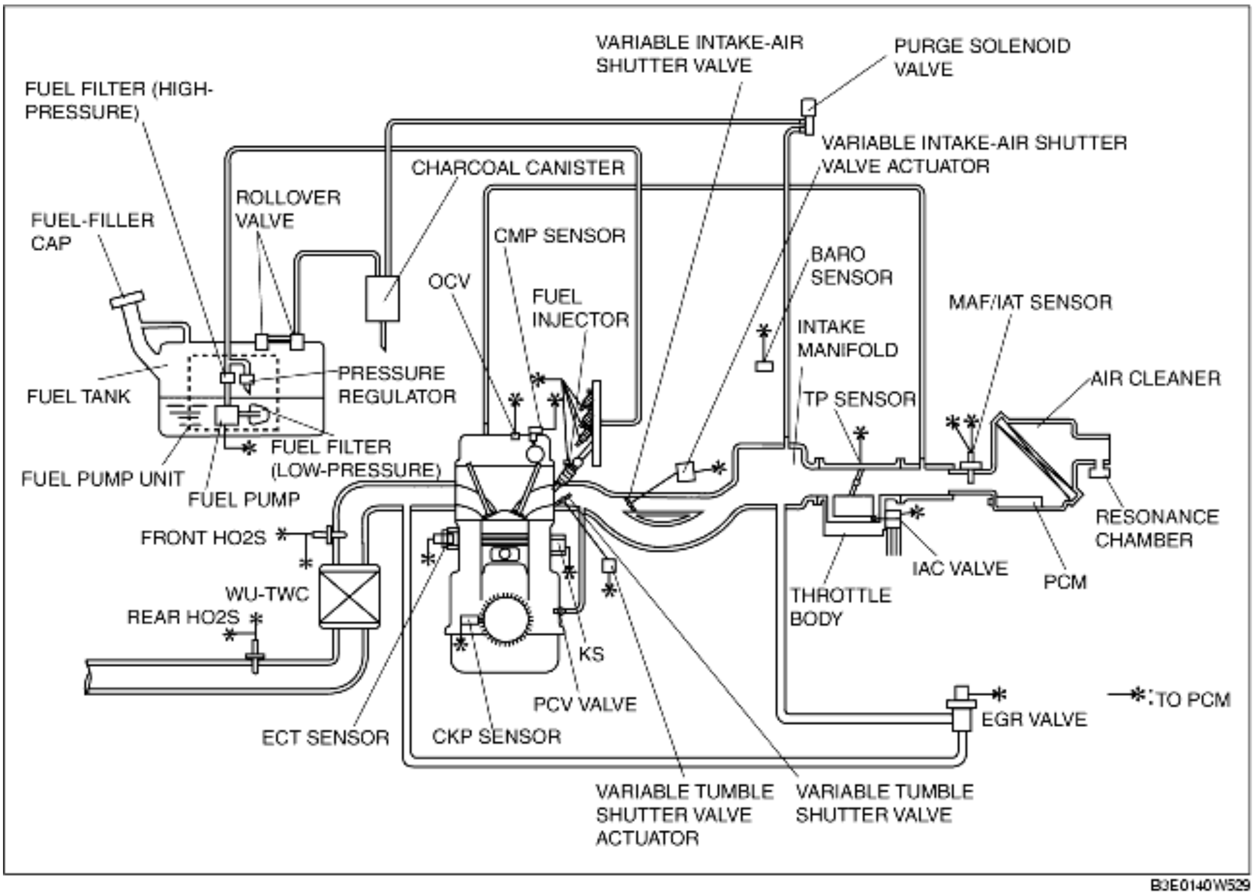
1	PCM (See PCM REMOVAL/INSTALLATION [Z6]) (See PCM INSPECTION [Z6]) (See PCM CONFIGURATION [Z6])

2	Neutral switch (See NEUTRAL SWITCH INSPECTION [Z6])
3	CPP switch (MTX) (See CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [Z6])
4	PSP switch (See POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [Z6])
5	ECT sensor (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [Z6]) (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6])
6	IAT sensor (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6]) (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [Z6])
7	CKP sensor (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6]) (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [Z6])
8	CMP sensor (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [Z6]) (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [Z6])
9	TP sensor (See THROTTLE POSITION (TP) SENSOR REMOVAL/INSTALLATION [Z6]) (See THROTTLE POSITION (TP) SENSOR INSPECTION [Z6])
10	MAF sensor (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6]) (See MASS AIR FLOW (MAF) SENSOR INSPECTION [Z6])
11	Front HO2S (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6]) (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6])
12	Rear HO2S (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6]) (See REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6])
13	BARO sensor

	(See BAROMETRIC PRESSURE (BARO) SENSOR INSPECTION [Z6])
14	KS (See KNOCK SENSOR (KS) REMOVAL/INSTALLATION [Z6]) (See KNOCK SENSOR (KS) INSPECTION [Z6])

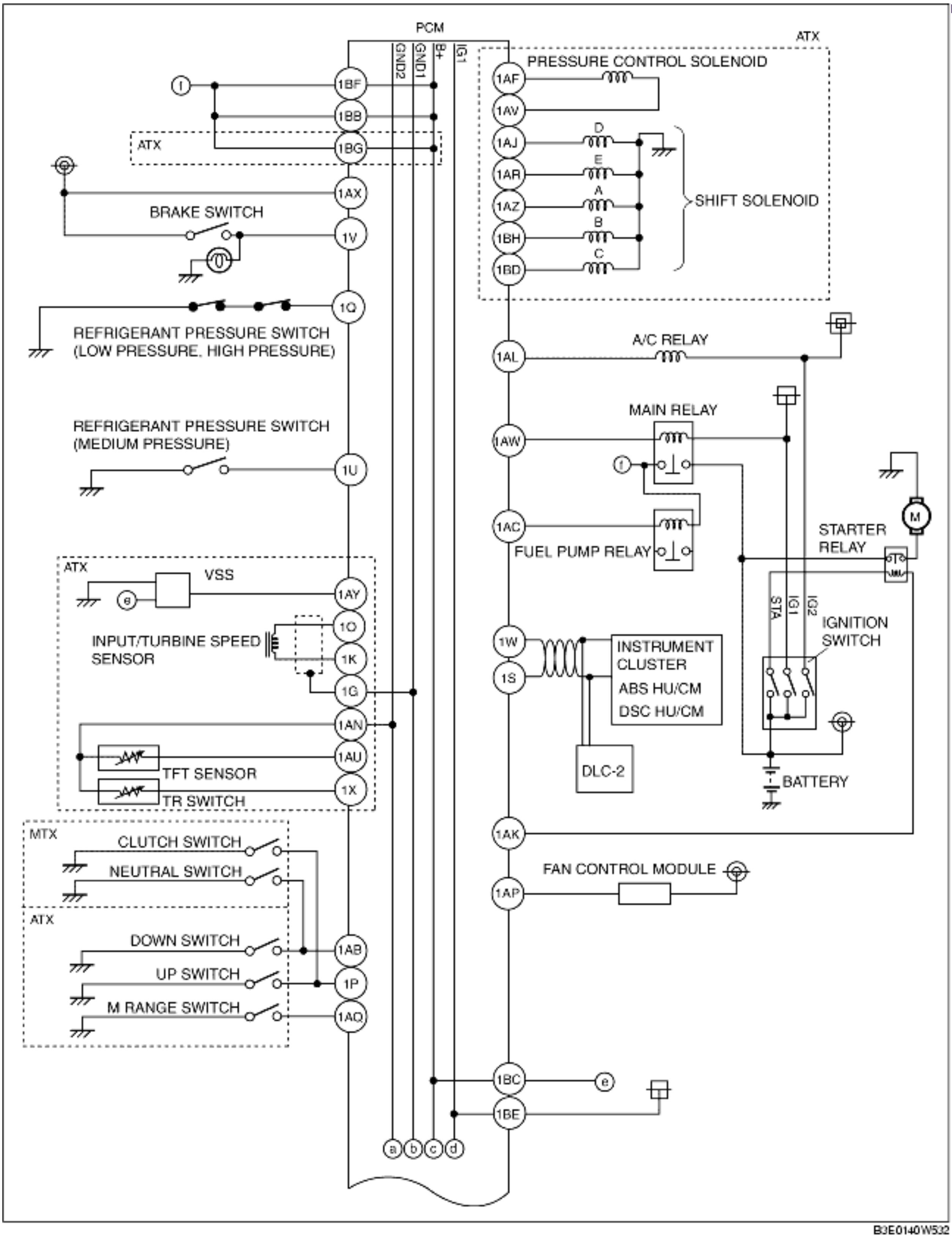
CONTROL SYSTEM DIAGRAM [Z6]

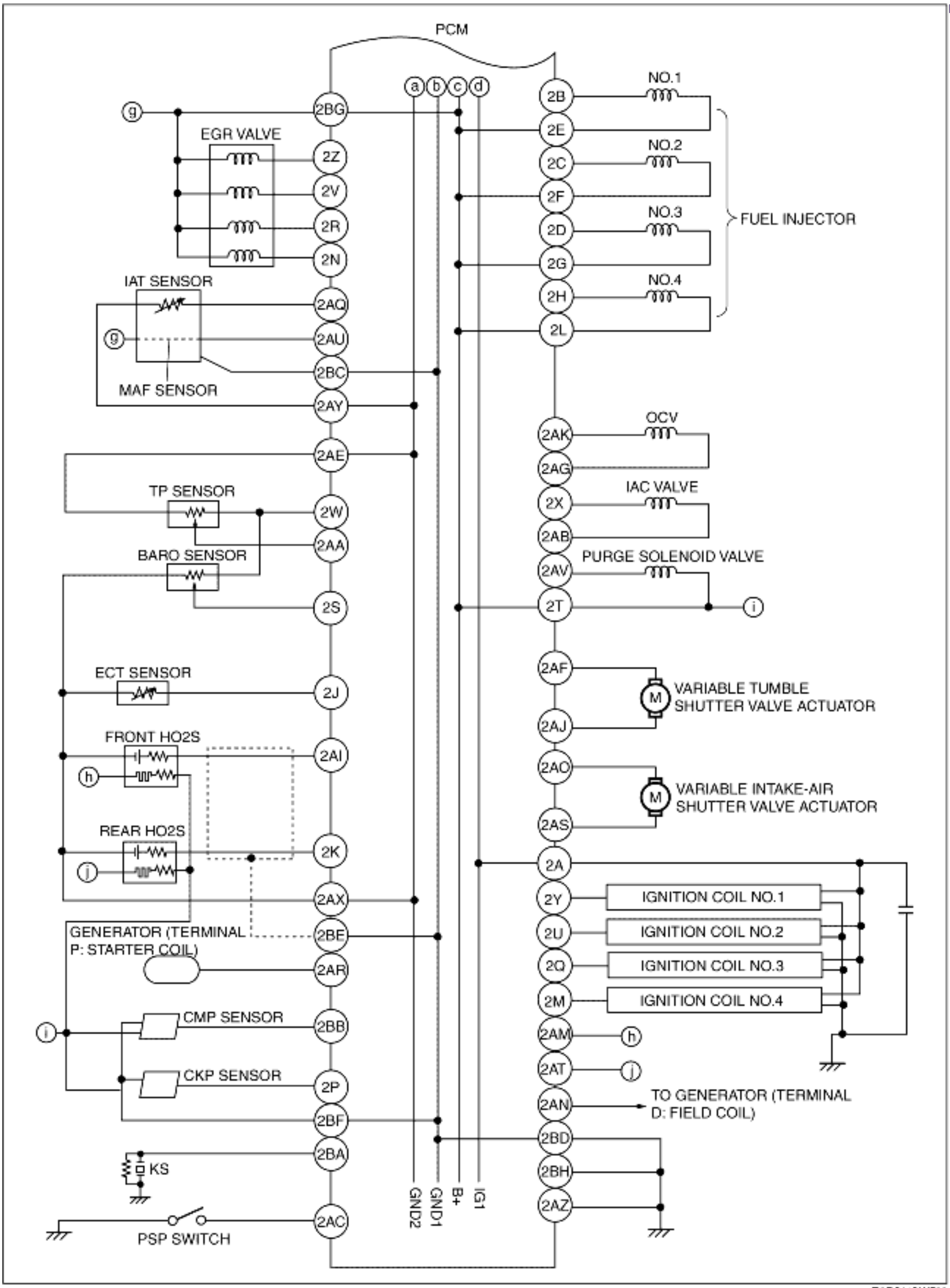
B3E014018880W05



CONTROL SYSTEM WIRING DIAGRAM [Z6]

B3E014018880W06


PCM
ATX
GND2
GND1
B+
IG1
PRESSURE CONTROL SOLENOID
1BF
1BB
1BG
1AF
1AV
1AJ
1AR
1AZ
1BH
1BD
D
E
A
B
C
SHIFT SOLENOID
ATX
1AX
BRAKE SWITCH
1V
1Q
REFRIGERANT PRESSURE SWITCH
(LOW PRESSURE, HIGH PRESSURE)
A/C RELAY
1AL
MAIN RELAY
1AW
REFRIGERANT PRESSURE SWITCH
(MEDIUM PRESSURE)
1U
1AC
FUEL PUMP RELAY
STARTER
RELAY
ATX
VSS
1AY
INPUT/TURBINE SPEED
SENSOR
1O
1K
1G
1W
1S
INSTRUMENT
CLUSTER
ABS HU/CM
DSC HU/CM
STA
IG1
IG2
IGNITION
SWITCH
1AN
1AU
TFT SENSOR
1X
TR SWITCH
DLC-2
BATTERY
MTX
CLUTCH SWITCH
NEUTRAL SWITCH
1AK
FAN CONTROL MODULE
1AP
ATX
DOWN SWITCH
1AB
UP SWITCH
1P
M RANGE SWITCH
1AQ
1BC
1BE
a
b
c
d
e
f
M
B3E0140W532



PCM REMOVAL/INSTALLATION [Z6]

B3E014018880W07

Note

- The PCM is integrated with the air cleaner cover and cannot be removed.

1. When replacing the PCM, perform the following:
    - PCM configuration (See PCM CONFIGURATION [Z6].)
2. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)
3. Disconnect the negative battery cable.
4. Remove the air cleaner cover. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)
5. When replacing the PCM on the vehicles, perform the following:
    - PCM parameter reset (See IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING.)
6. Install in the reverse order of removal.

PCM INSPECTION [Z6]

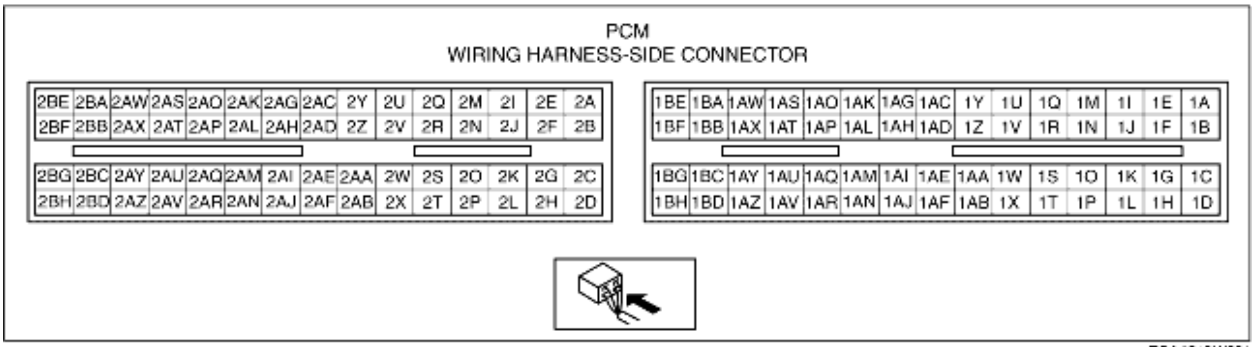
B3E014018880W08

Not Using the WDS or Equivalent

Note

- The PCM terminal voltage can vary with conditions when measuring and changes due to age deterioration on the vehicle, causing false diagnosis. Therefore a comprehensive inspection of the input and output systems, and the PCM is necessary to determine where the malfunction occurs.

PCM terminal voltage table (Reference)



BDA3940W001

Terminal voltage table (Reference)

Terminal	Signal name	Connected to	Measurement condition	Voltage (V)	Inspection item(s)
1A	-	-	-	-	-
1B	-	-	-	-	-

1C	-	-	-	-	-
1D	-	-	-	-	-
1E	-	-	-	-	-
1F	-	-	-	-	-
1G*1	Internal GND	Input/turbine speed sensor shield wire	Under any condition	1.0 or less	• Related wiring harness
1H	-	-	-	-	-
1I	-	-	-	-	-
1J	-	-	-	-	-
1K*1	Input/turbine speed sensor (-)	Input/turbine speed sensor	(See Inspection Using An Oscilloscope (Reference).)		• Input/turbine speed sensor • Related wiring harness
1L	-	-	-	-	-
1M	-	-	-	-	-
1N	-	-	-	-	-
1O*1	Input/turbine speed sensor (+)	Input/turbine speed sensor	(See Inspection Using An Oscilloscope (Reference).)		• Input/turbine speed sensor • Related wiring harness
1P	*3CPP switch	CPP switch	Ignition switch is turned to the ON position. Clutch pedal depressed	1.0 or less	• CPP switch • Related wiring harness
			Ignition switch is turned to the ON position. Clutch pedal released	B+	
	*1Manual 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
			Ignition switch is turned to the ON position. Others	B+	
1Q	Refrigerant pressure (low, high)	Refrigerant pressure switch (low pressure switch, high pressure switch)	Refrigerant pressure is more than the specification or less than the specification. (Refrigerant pressure switch (low pressure switch, high pressure switch) is off.)	B+	• Refrigerant pressure switch (low pressure switch, high pressure switch) • Related wiring harness
			Others	1.0 or less	

1R	-	-	-		-	-
1S	CAN_L	Instrument cluster, ABS HU/CM, DSC HU/CM, DLC-2	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			-
1T	-	-	-		-	-
1U	Refrigerant pressure (middle)	Refrigerant pressure switch (middle)	Idle	Refrigerant pressure is 1.52 MPa {15.5 kgf/cm², 221 psi} or more	1.0 or less	• Refrigerant pressure switch (middle) • Related wiring harness
				Refrigerant pressure is 12.3 MPa {125 kgf/cm², 1783 psi} or less	B+	
1V	Brake switch	Brake switch	Brake pedal depressed		B+	• Brake switch • Related wiring harness
			Brake pedal released		1.0 or less	
1W	CAN_H	Instrument cluster, ABS HU/CM, DSC HU/CM, DLC-2	Because this terminal is for CAN, good/no good judgment by terminal voltage is not possible.			-
1X*1	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	
1Y	-	-	-		-	-
1Z	-	-	-		-	-
1AA	-	-	-		-	-
1AB	*3Neutral switch	Neutral switch	Ignition switch is turned to the ON position.	Neutral	1.0 or less	• Neutral switch • Related wiring harness
				Except above	B+	

	*1Manual 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+	
1AC	Fuel pump control	Fuel pump relay	Immediately after ignition switch is turned to the ON position.		1.0 or less	• Fuel pump relay • Related wiring harness
			Ignition switch is turned to the ON position.		B+	
			Cranking		1.0 or less	
			Idle			
1AD	-	-	-		-	-
1AE	-	-	-		-	-
1AF*1	Pressure control solenoid (+)	Pressure control solenoid	(See Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
1AG	-	-	-		-	-
1AH	-	-	-		-	-
1AI	-	-	-		-	-
1AJ*1	Shift solenoid D	Shift solenoid D	P or N position		B+	• Shift solenoid D • Related wiring harness
			Except above		1.0 or less	
1AK	Starter relay control	Starter relay	Cranking		1.0 or less	• Starter relay • Related wiring harness
1AL	The A/C cut-off control.	A/C relay	The A/C is operating.		1.0 or less	• A/C relay • Related wiring harness
			The A/C is not operating.		B+	
1AM	-	-	-		-	-
1AN*1	Internal GND	TFT sensor, TR switch	Under any condition		1.0 or less	• Related wiring harness
1AO	-	-	-		-	-
1AP	Fan control			CTP	B+	

		Fan control module	Test mode is on.*2	WOT	1.0 or less	• Fan control module • Related wiring harness
1AQ*1	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+	
1AR*1	Shift solenoid E	Shift solenoid E	During TCC operation		B+	• Shift solenoid E • Related wiring harness
			Except above		1.0 or less	
1AS	-	-	-		-	-
1AT	-	-	-		-	-
1AU*1	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	
1AV*1	Pressure control solenoid (-)	Pressure control solenoid	(See Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
1AW	Main relay	Main relay	Ignition switch is off.		B+	• Main relay • Related wiring harness
			Ignition switch is turned to the ON position.		1.0 or less	
1AX	Back-up power supply	Battery	Under any condition		B+	• Battery • Related wiring harness
1AY*1	Vehicle speed	VSS	(See Inspection Using An Oscilloscope (Reference).)			• VSS • Related wiring harness
1AZ*1	Shift solenoid A	Shift solenoid A	(See Inspection Using An Oscilloscope (Reference).)			• Shift solenoid A • Related wiring harness
1BA	-	-	-		-	-
1BB		Main relay	Ignition switch is off.		1.0 or less	• Main relay

	Battery voltage		Ignition switch is turned to the ON position.	B+	• Battery • Related wiring harness
1BC[*1]	VSS power supply	VSS	Ignition switch is turned to the ON position.	B+	• Related wiring harness
1BD[*1]	Shift solenoid C	Shift solenoid C	(See Inspection Using An Oscilloscope (Reference).)		• Shift solenoid C • Related wiring harness
1BE	Ignition switch	Ignition switch	Ignition switch is off.	1.0 or less	• Ignition switch • Related wiring harness
			Ignition switch is turned to the ON position.	B+	
1BF	Battery voltage	Main relay	Ignition switch is off	1.0 or less	• Main relay • Battery • Related wiring harness
			Ignition switch is turned to the ON position.	B+	
1BG[*1]	Battery voltage	Main relay	Ignition switch is off.	1.0 or less	• Main relay • Battery • Related wiring harness
			Ignition switch is turned to the ON position.	B+	
1BH[*1]	Shift solenoid B	Shift solenoid B	(See Inspection Using An Oscilloscope (Reference).)		• Shift solenoid B • Related wiring harness
2A	Ignition coil power supply	Ignition coil	Ignition switch is turned to the ON position.	B+	• Related wiring harness
2B	Fuel injection control	Fuel injector No.1	(See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.1 • Related wiring harness
2C	Fuel injection control	Fuel injector No.2	(See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.2 • Related wiring harness
2D	Fuel injection control	Fuel injector No.3	(See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.3 • Related wiring harness

2E	Fuel injector No.1 power supply	Fuel injector No.1	Ignition switch is turned to the ON position.	B+	• Related wiring harness
2F	Fuel injector No.2 power supply	Fuel injector No.2	Ignition switch is turned to the ON position.	B+	• Related wiring harness
2G	Fuel injector No.3 power supply	Fuel injector No.3	Ignition switch is turned to the ON position.	B+	• Related wiring harness
2H	Fuel injection control	Fuel injector No.4	(See Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.4 • Related wiring harness
2I	-	-	-	-	-
2J	ECT	ECT sensor	Ignition switch is turned to the ON position. ECT is 20 °C {68 °F}	Approx. 3.0	• ECT sensor • Related wiring harness
			ECT is 60 °C {140 °F}	Approx. 1.4	
			ECT is 80 °C {176 °F}	Approx. 0.9	
2K	Rear HO2S	Rear HO2S	Idle	Alternates between 0 and 1.0	• Rear HO2S • Related wiring harness
2L	Fuel injector No.4 power supply	Fuel injector No.4	Ignition switch is turned to the ON position.	B+	• Related wiring harness
2M	ESA control	Ignition coil No.4	(See Inspection Using An Oscilloscope (Reference).)		• Ignition coil No.4 • Related wiring harness
2N	EGR control	EGR valve	Idle (EGR control operating)	1.0 or less	• EGR valve • Related wiring harness
2O	-	-	-	-	-
2P	CKP	CKP sensor	(See Inspection Using An Oscilloscope (Reference).)		• CKP sensor • Related wiring harness
2Q	ESA control	Ignition coil No.3	(See Inspection Using An Oscilloscope (Reference).)		• Ignition coil No.3

					• Related wiring harness
2R	EGR control	EGR valve	Idle (EGR control operating)	B+	• EGR valve • Related wiring harness
2S	BARO sensor	BARO sensor	Ignition switch is turned to the ON position. Altitude:0 m {0 ft})	2.3-2.8[*4]	• BARO sensor • Related wiring harnesses
			Altitude:500 m {1,640 ft}	2.2-2.8[*4]	
			Altitude:1,000 m {3,281 ft}	2.1-2.8[*4]	
			Altitude:1,500 m {4921 ft}	2.0-2.8[*4]	
			Altitude: 2,000 m {6,562 ft}	1.9-2.7[*4]	
			Altitude: 2,500 m {8,202 ft}	1.8-2.6[*4]	
2T	Input/output device power supply	CKP sensor, CMP sensor, front HO2S, rear HO2S, purge solenoid valve	Ignition switch is turned to the ON position.	B+	• Related wiring harness
2U	ESA control	Ignition coil No.2	(See Inspection Using An Oscilloscope (Reference).)		• Ignition coil No.2 • Related wiring harness
2V	EGR control	EGR valve	Idle (EGR control operating)	B+	• EGR valve • Related wiring harness
2W	Constant voltage (vref)	TP sensor, BARO sensor	Ignition switch is turned to the ON position.	Approx. 5.0	• TP sensor • BARO sensor • Related wiring harness
2X	IAC (+)	IAC valve	(See Inspection Using An Oscilloscope (Reference).)		• IAC valve • Related wiring harness
2Y	ESA control	Ignition coil No.1	(See Inspection Using An Oscilloscope (Reference).)		• Ignition coil No.1

						• Related wiring harness
2Z	EGR control	EGR valve	Idle (EGR control operating)		1.0 or less	• EGR valve • Related wiring harness
2AA	TP	TP sensor	Ignition switch is turned to the ON position.	CTP	0.3-1.0	• TP sensor • Related wiring harness
				WOT	3.1-4.5	
2AB	IAC (-)	IAC valve	(See Inspection Using An Oscilloscope (Reference).)			• IAC valve • Related wiring harness
2AC	PSP switch	PSP switch	Idle	Steering wheel at straight ahead position	B+	• PSP switch • Related wiring harness
				While turning steering wheel	1.0 or less	
2AD	-	-	-		-	-
2AE	Internal GND	TP sensor	Under any condition		1.0 or less	• Related wiring harness
2AF	Variable tumble control (open)	Variable tumble shutter valve actuator	The engine is hot.	When the ignition switch turned to the ON position.	B+[*5]	• Variable tumble shutter valve actuator • Related wiring harness
			Idle after cold start	When the ECT reaches 60 °C {140 °F}		
			Except above		1.0 or less	
2AG	Variable valve timing control (-)	OCV	Under any condition		1.0 or less	• OCV • Related wiring harness
2AH	-	-	-		-	-
2AI	Front HO2S	Front HO2S	(See Inspection Using An Oscilloscope (Reference).)			• Front HO2S • Related wiring harness
2AJ	Variable tumble control (close)	Variable tumble shutter valve actuator	The engine is cold.	When the ignition switch turned to the ON position.	B+[*5]	• Variable tumble shutter valve actuator • Related wiring harness
			Except above		1.0 or less	

2AK	Variable valve timing control (+)	OCV	(See Inspection Using An Oscilloscope (Reference).)		• OCV • Related wiring harness
2AL	-	-	-	-	-
2AM	Front HO2S heater control	Front HO2S heater	(See Inspection Using An Oscilloscope (Reference).)		• Front HO2S • Related wiring harness
2AN	Generator control	Generator (terminal D)	(See Inspection Using An Oscilloscope (Reference).)		• Generator • Related wiring harness
2AO	Variable intake-air control (open)	Variable intake-air shutter valve actuator	When the ignition switch turned to the ON position.	1.0 or less	• Variable intake-air shutter valve actuator • Related wiring harness
			When the engine speed is increased gradually and reaches 4,100 rpm.	B+[*5]	
			Except above	1.0 or less	
2AP	-	-	-	-	-
2AQ	IAT	IAT sensor	Ignition switch is turned to the ON position. IAT is 20 °C {68 °F}	Approx. 2.2	• IAT sensor • Related wiring harness
			IAT is 30 °C {86 °F}	Approx. 1.8	
2AR	Generator output voltage	Generator (terminal P)	(See Inspection Using An Oscilloscope (Reference).)		• Generator • Related wiring harness
2AS	Variable intake-air control (close)	Variable intake-air shutter valve actuator	When the ignition switch is turned to the ON position.	B+[*5]	• Variable intake-air shutter valve actuator • Related wiring harness
			When the engine speed is decreased gradually and reaches 4,100 rpm.		
			Except above	1.0 or less	
2AT	Rear HO2S	Rear HO2S	After fixed period of time from engine start	1.0 or less	• Rear HO2S • Related wiring harness
			Engine speed is 2,700 or more.	B+	
2AU	MAF	MAF sensor	Ignition switch is turned to the ON position.	Approx. 0.7	• MAF sensor • Related wiring harness
			Idle	Approx. 1.3	

2AV	Purge control	Purge solenoid valve	(See Inspection Using An Oscilloscope (Reference).)		• Purge solenoid valve • Related wiring harness
2AW	-	-	-	-	-
2AX	Internal GND	ECT sensor, front HO2S, rear HO2S, BARO sensor	Under any condition	1.0 or less	• Related wiring harness
2AY	Internal GND	IAT sensor	Under any condition	1.0 or less	• Related wiring harness
2AZ	GND	GND	Under any condition	1.0 or less	• Related wiring harness
2BA	Knocking	Knock sensor	Ignition switch is turned to the ON position. (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)	Approx. 2.4	• Knock sensor • Related wiring harness
2BB	CMP	CMP sensor	(See Inspection Using An Oscilloscope (Reference).)		• CMP sensor • Related wiring harness
2BC	Internal GND	MAF sensor	Under any condition	1.0 or less	• Related wiring harness
2BD	GND	GND	Under any condition	1.0 or less	• Related wiring harness
2BE	Internal GND	HO2S shield wire	Under any condition	1.0 or less	• Related wiring harness
2BF	Internal GND	CKP sensor, CMP sensor	Under any condition	1.0 or less	• Related wiring harness
2BG	Power supply	MAF sensor, EGR valve	Under any condition	B+	• Related wiring harness
2BH	GND	GND	Under any condition	1.0 or less	• Related wiring harness

*1 :

ATX

*2 :

Turn the test mode on using the WDS simulation test.

*3 :

MTX

*4 :

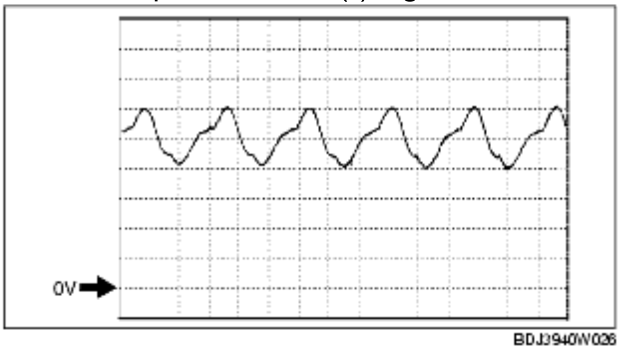
The voltage may vary excessively depending on the weather or battery conditions.

*5 :

The voltage changes for a specified time.

Inspection Using An Oscilloscope (Reference)

Input/turbine speed sensor (-) signal



PCM terminals

- 1K (+)-Negative battery terminal (-)

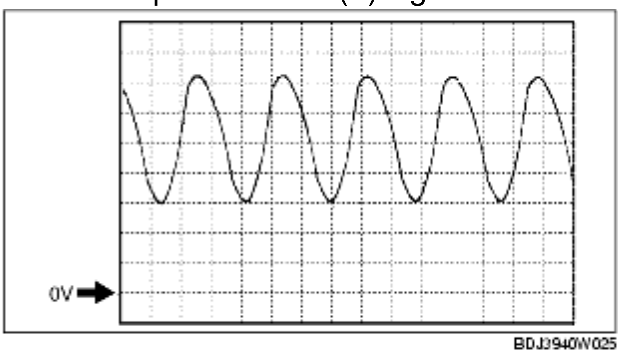
Oscilloscope setting

- 500 mV/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition

- Idle after warm-up

Input/turbine speed sensor (+) signal



PCM terminals

- 1O (+)-Negative battery terminal (-)

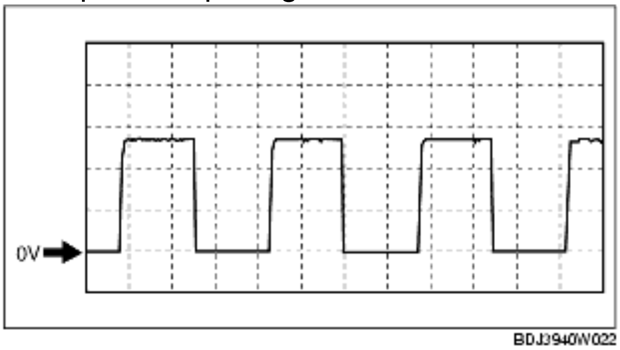
Oscilloscope setting

- 500 mV/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition

• Idle after warm-up

Vehicle speed output signal



PCM terminals

• 1Z (+)-Negative battery terminal (-)

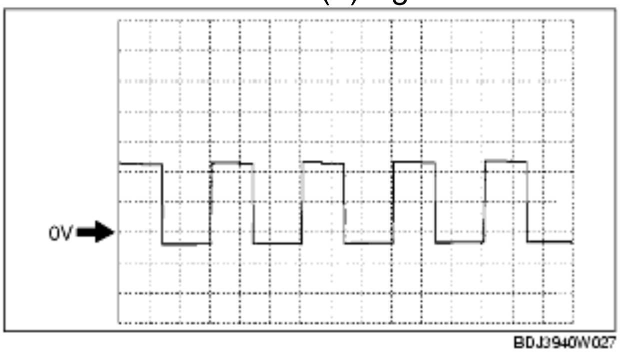
Oscilloscope setting

• 5 V/DIV (Y), 20 ms/DIV (X), DC range

Vehicle condition

• Vehicle speed is 20 km/h {12 mph}.

Pressure control solenoid (+) signal



PCM terminals

• 1AF (+)-Negative battery terminal (-)

Oscilloscope setting

• 5 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition

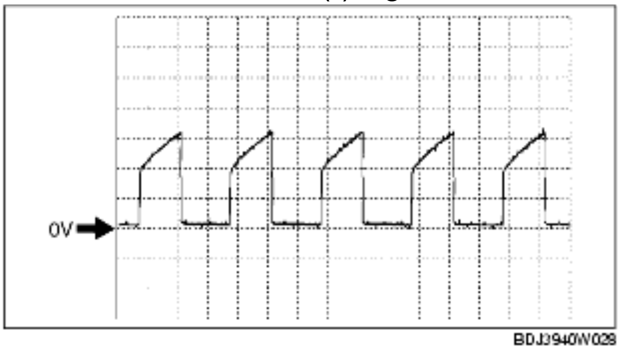
• All of the following conditions are met.

- Ignition switch is turned to the ON position. (engine off)

- P or N position

- CTP

Pressure control solenoid (-) signal



PCM terminals

• 1AV (+)-Negative battery terminal (-)

Oscilloscope setting

• 200 mV/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition

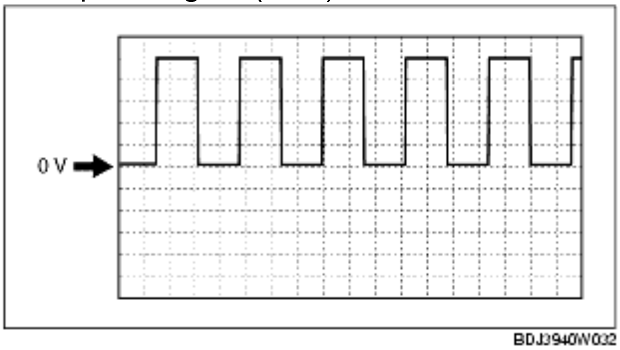
• All of the following conditions are met.

- Ignition switch is turned to the ON position. (engine off)

- P or N position

- CTP

Vehicle speed signal (ATX)



PCM terminals

• 1AY (+)-Negative battery terminal (-)

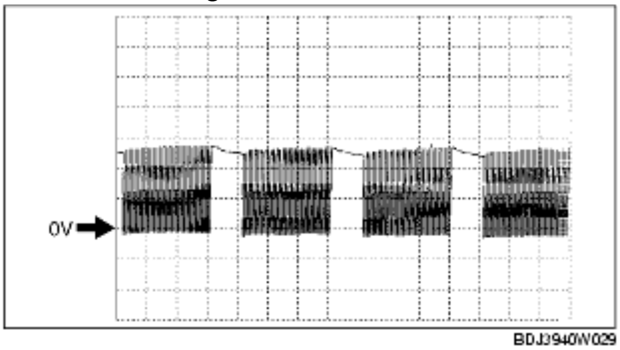
Oscilloscope setting

• 1 V/DIV (Y), 2.5 ms/DIV (X), DC range

Vehicle condition

• Vehicle speed is 32 km/h {20 mph}.

Shift solenoid A signal



PCM terminals

- 1AZ (+)-Negative battery terminal (-)

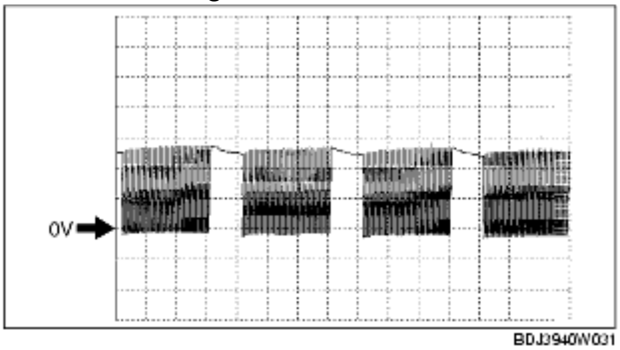
Oscilloscope setting

- 5 V/DIV (Y), 5 ms/DIV (X), DC range

Vehicle condition

- 4GR

Shift solenoid C signal



PCM terminals

- 1BD (+)-Negative battery terminal (-)

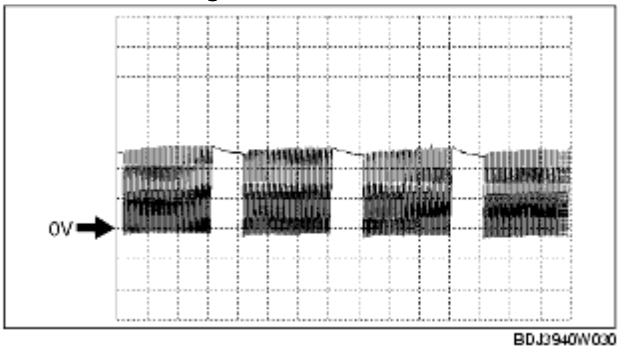
Oscilloscope setting

- 5 V/DIV (Y), 5 ms/DIV (X), DC range

Vehicle condition

- 1GR or 2GR

Shift solenoid B signal



PCM terminals

- 1BH (+)-Negative battery terminal (-)

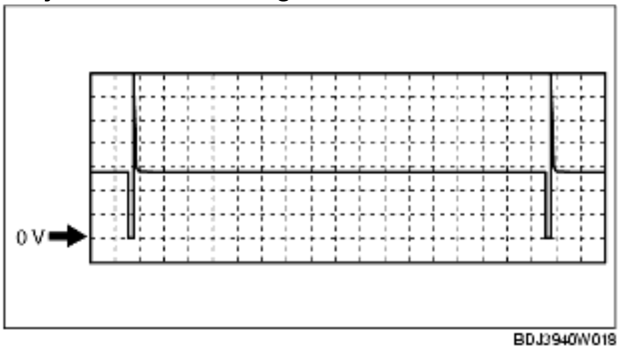
Oscilloscope setting

- 5 V/DIV (Y), 5 ms/DIV (X), DC range

Vehicle condition

- 1GR (except L range (HOLD))

Fuel injection control signal



PCM terminals

- No.1: 2B (+)-Negative battery terminal (-)
- No.2: 2C (+)-Negative battery terminal (-)
- No.3: 2D (+)-Negative battery terminal (-)
- No.4: 2H (+)-Negative battery terminal (-)

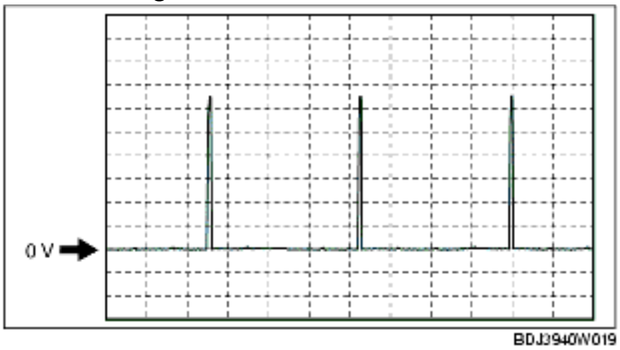
Oscilloscope setting

- 5 V/DIV (Y), 10 ms/DIV (X), DC range

Vehicle condition

- Idle after warm-up

ESA control signal



PCM terminals

- No.1: 2Y (+)-Negative battery terminal (-)
- No.2: 2U (+)-Negative battery terminal (-)
- No.3: 2Q (+)-Negative battery terminal (-)
- No.4: 2M (+)-Negative battery terminal (-)

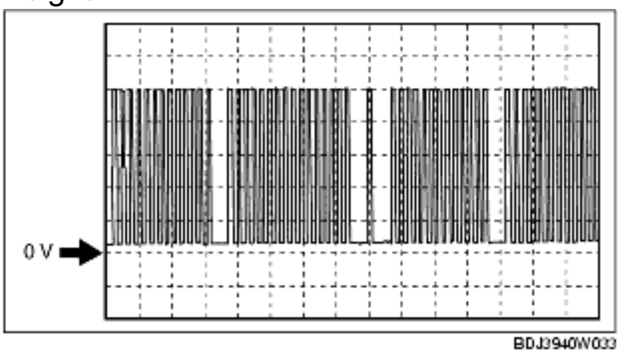
Oscilloscope setting

- 0.5 V/DIV (Y), 40 ms/DIV (X), DC range

Vehicle condition

- Idle after warm-up

CKP signal



PCM terminals

- 2P (+)-Negative battery terminal (-)

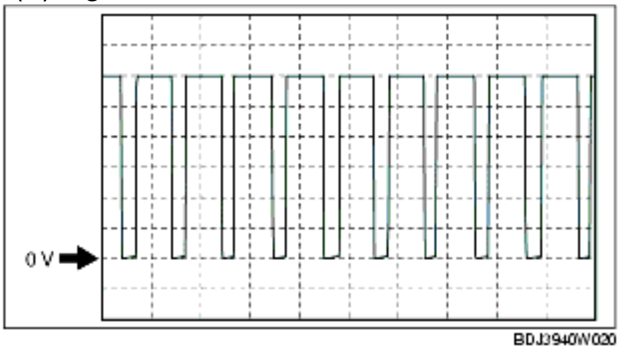
Oscilloscope setting

- 1 V/DIV (Y), 10 ms/DIV (X), DC range

Vehicle condition

- Idle after warm-up

IAC (+) signal



PCM terminals

- 2X (+)-Negative battery terminal (-)

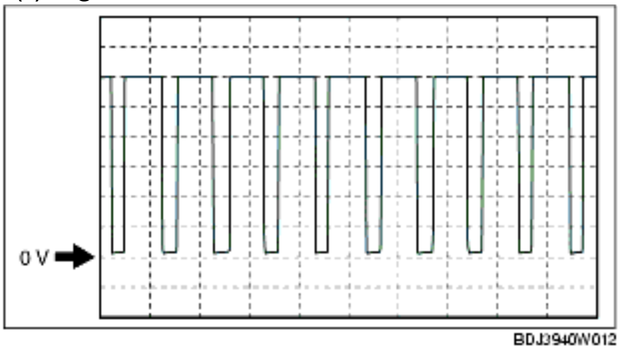
Oscilloscope setting

- 2 V/DIV (Y), 2 ms/DIV (X), DC range

Vehicle condition

- Idle after warm-up

IAC (-) signal



PCM terminals

- 2AB (+)-Negative battery terminal (-)

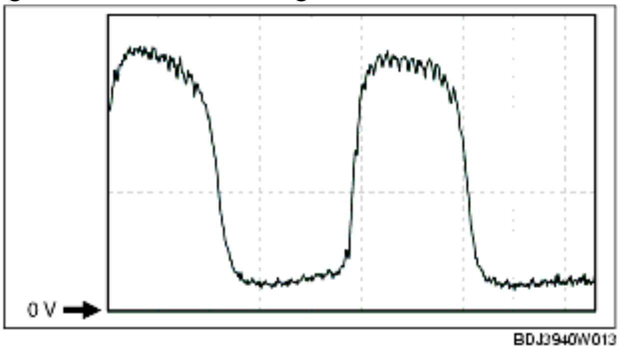
Oscilloscope setting

- 2 V/DIV (Y), 2 ms/DIV (X), DC range

Vehicle condition

- Idle after warm-up

Oxygen concentration signal



PCM terminals

- 2AI (+)-Negative battery terminal (-)

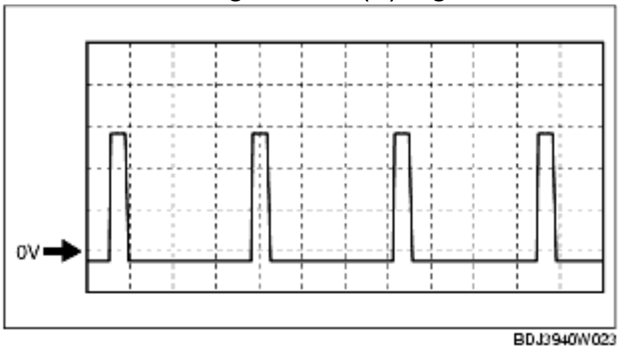
Oscilloscope setting

- 0.2 V/DIV (Y), 1 s/DIV (X), DC range

Vehicle condition

- Idle after warm-up

Variable valve timing control (+) signal



PCM terminals

- 2AK (+)-Negative battery terminal (-)

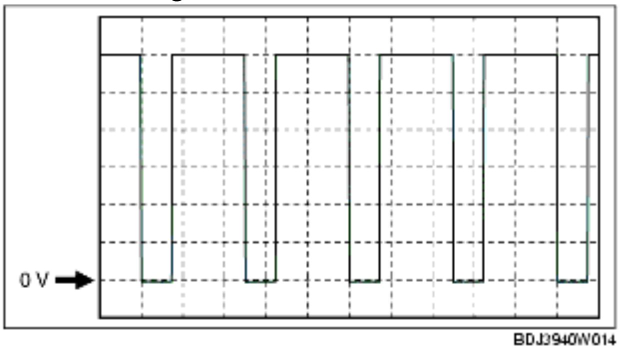
Oscilloscope setting

- 5 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition

- Idle after warm-up

HO2S heater signal



PCM terminals

- 2AM (+)-Negative battery terminal (-)

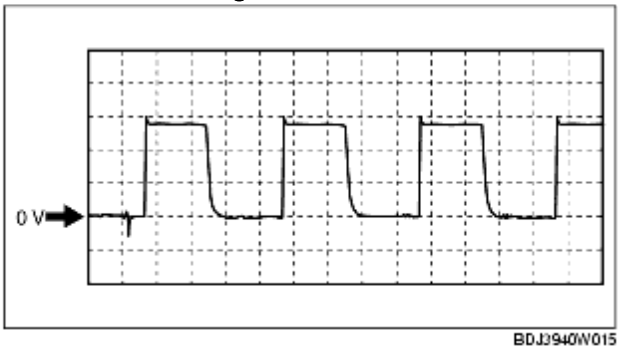
Oscilloscope setting

- 2 V/DIV (Y), 0.1 s/DIV (X), DC range

Vehicle condition

- Idle after warm-up

Generator control signal



PCM terminals

- 2AN (+)-Negative battery terminal (-)

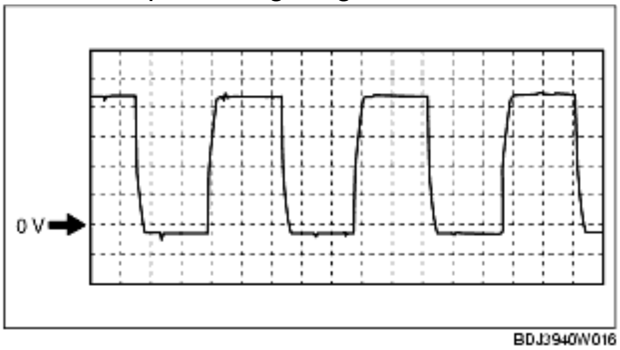
Oscilloscope setting

- 0.5 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition

- Idle after warm-up

Generator output voltage signal



PCM terminals

- 2AR (+)-Negative battery terminal (-)

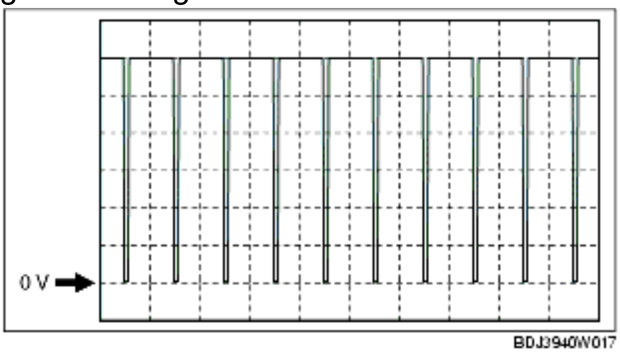
Oscilloscope setting

- 2 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition

- Idle after warm-up

Purge control signal



PCM terminals

- 2AV (+)-Negative battery terminal (-)

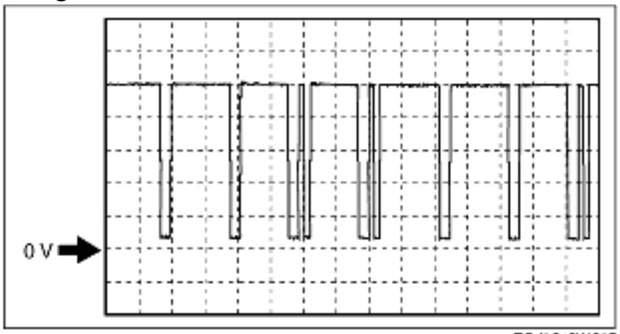
Oscilloscope setting

- 2 V/DIV (Y), 0.1 s/DIV (X), DC range

Vehicle condition

- Idle after warm-up

CMP signal



PCM terminals

• 2BB (+)-Negative battery terminal (-)

Oscilloscope setting

• 1 V/DIV (Y), 20 ms/DIV (X), DC range

Vehicle condition

• Idle after warm-up

Using the WDS or Equivalent

Note

• PIDs for the following parts are not available on this model. Go to the appropriate part inspection page.

- CMP sensor (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [Z6].)

- Main relay (See RELAY INSPECTION.)

1. Connect the WDS or equivalent to the DLC-2.

2. Turn the ignition switch to the ON position.

3. Measure the PID value.

• If PID value is not within the specification, follow the instructions in Action column.

Note

• The PID/DATA MONITOR function monitors the calculated value of the input/output signals in the PCM. Therefore, an output device malfunction is not directly indicated as a malfunction of the monitored value for the output device. If a monitored value of an output device is out of specification, inspect the monitored value of the input device related to the output control.

• The simulation items that are used in the ENGINE CONTROL SYSTEM OPERATION INSPECTION are as follows.

- ACCS, ALTF, ARPMDES, EVAPCP, FAN_DUTY, FP, FUELPW1, GENVDSD, HTR11, HTR12, IAC, IMRC, IMTV, INJ_1, INJ_2, INJ_3, INJ_4, SEGRP, test, VT ACT1, VT DUTY1

Item (definition)	Unit/Condition	Condition/Specification (Reference)	Inspection item(s)	PCM terminal

AC_REQ (Refrigerant pressure switch (low pressure switch, high pressure switch))	On/Off	• Refrigerant pressure is more than the specification or less than the specification. (Refrigerant pressure switch (low pressure switch, high pressure switch) is off.): Off • Others: On	• Refrigerant pressure switch (low pressure switch, high pressure switch)	1Q
ACCS (A/C relay)	On/Off	• A/C is operating: On • A/C is not operating: Off	• The following PIDs - CPP, CPP/PNP, PSP, ECT, PCM_T, RPM, TP, TR, AC_REQ, COLP	1AL
ALTF (Generator field coil control duty value)	%	• Ignition switch is turned to the ON position: 0% • Idling, E/L is operating: Duty value increases.	• The following PIDs - ECT, IAT, RPM, VSS, ALTT V, VPWR • Generator	2AN
ALTT V (Generator output voltage)	V	• Ignition switch is turned to the ON position: Approx. 1.0 V or less • Idling (no electrical load): Approx. 14 V (This is an internal calculation value and differs from the terminal voltage.)	• Generator	2AR
ARPMDES (Target engine speed)	RPM	**MTX (neutral position)** • No load: 690 RPM • E/L on*4 (34-42 A): 700 RPM • E/L on*4 (42 A or more): 750 RPM • A/C on*5 (low load): 700 RPM • A/C on*5 (high load): 750 RPM • P/S on: 750 RPM **ATX (N range)** • No load: 750 RPM • E/L on*4 (34-42 A): 750 RPM	• The following PIDs - CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP, MAF, BARO, VSS, AC_REQ, COLP • IAC valve	-

		• E/L on[*4] (42 A or more): 750 RPM • A/C on[*5] (low load): 750 RPM • A/C on[*5] (high load): 750 RPM • P/S on: 750 RPM		
BARO (Barometric pressure)	kPa / Bar / psi	• Ignition switch is turned to the ON position: Indicate the atmospheric pressure	• BARO sensor	2S
	V	• Ignition switch is turned to the ON position - Altitude: 0 m {0 ft}: 2.3-2.8[*1] - Altitude:500 m {1,640 ft}: 2.2-2.8[*1] - Altitude:1,000 m {3,281 ft}: 2.1-2.8[*1] - Altitude:1,500 m {4921 ft}: 2.0-2.8[*1] - Altitude: 2,000 m {6,562 ft}: 1.9-2.7[*1] - Altitude: 2,500 m {8,202 ft}: 1.8-2.6[*1]		
BOO (Brake switch)	On/Off	• Brake pedal is depressed: On • Brake pedal is released: Off	• Brake switch	1V
CATT11_DSD (Estimated catalytic converter temperature)	°C / °F	• Idling after warm up: approx. 440 °C {824 °F}	• The following PIDs - BARO, ECT, IAT, MAF, RPM	-
CHRGLP (Generator warning light)	On/Off	• Ignition switch is turned to the ON position: On • Idling: Off	• Generator warning light	-
COLP (Refrigerant pressure switch (medium pressure switch))	On/Off	• Refrigerant pressure is 1.52 MPa {15.5 kgf/cm^2, 221 psi} or more: On • Refrigerant pressure is 12.3 MPa {125 kgf/cm^2, 1783 psi} or less: Off	• Refrigerant pressure switch (medium-pressure switch)	1U

CPP*2 (Clutch pedal position)	On/Off	• Clutch pedal is depressed: On • Clutch pedal is released: Off	• CPP switch	1P
CPP/PNP*2 (Shift lever position)	Drive/Neutral	• Neutral: Neutral • Other than neutral: Drive	• Neutral switch	1AB
DTCCNT (Number of DTC detected)	No unit	• Number of DTCs stored	-	-
DWN SW*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
ECT (Engine coolant temperature)	°C / °F	• Ignition switch is turned to the ON position: Indicate the ECT	• ECT sensor	2J
	V	• ECT is 20 °C {68 °F}: Approx. 3.0 V • ECT is 60 °C {140 °F}: Approx. 1.4 V • ECT is 80 °C {176 °F}: Approx. 0.9 V		
EQ_RAT_DSD (Theoretical air/fuel ratio coefficient to calculate target air/fuel ratio)	No unit	• Idling after warm-up: Approx.1	• Front HO2S	-
EVAPCP (Purge solenoid valve duty value)	%	• Ignition switch is turned to the ON position: 0 % • Increase the engine speed: Duty value rises	• The following PIDs - ECT, IAT, RPM, TP, MAF, O2S11, BOO, VPWR	2AV
FAN_DUTY (Fan control duty value)	%	• When all of following condition are met: 90 % - Test mode On - WOP	• The following PIDs - test, TP	-
FP (Fuel pump relay)	On/Off	• Immediately after ignition switch is turned to the ON position: On • Ignition switch is turned to the ON position: Off • Idling: On	• Fuel pump relay	1AC

		• Cranking: On		
FUELPW (Fuel injector duration)	ms	• Idling: Approx. 2.0 ms	• The following PIDs - CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP, MAF, O2S11, O2S12, BARO, VSS, TR, BOO, AC_REQ, COLP, VPWR	2B, 2C, 2D, 2H
FUELSYS (Fuel system status)	OL/CL/OL Drive/OL Fault/CL Fault	• Idling after warm-up: CL	• The following PIDs - CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP, MAF, O2S11, O2S12, BARO, VSS, TR, BOO, AC_REQ, COLP, VPWR	-
GEAR*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
GENVDSD (Target generator voltage)	V	• Ignition switch is turned to the ON position: Approx. 1.0 V or less • Idling (no electrical load): Approx. 14 V (This is an internal calculation value and differs from the terminal voltage.)	• The following PIDs - ECT, IAT, RPM, VSS, ALTT V, VPWR • Generator	-
HTR11 (Front HO2S heater control)	On/Off	• Ignition switch is turned to the ON position: Off • When the vehicle is driving at engine speed less than 4,300 rpm: On	• The following PIDs - ECT, IAT, RPM, TP, MAF, BARO, VPWR	2AM
HTR12 (Rear HO2S heater control)	On/Off	• After fixed period of time from engine start: On • Engine speed is 2,700 or more: Off	• The following PIDs - ECT, IAT, RPM, TP, MAF, BARO, VPWR	2AT
IAC (IAC duty value)	%	• Ignition switch is turned to the ON position: 0 %	• The following PIDs - CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP,	2X, 2AB

		• Idling (ECT is 88 °C {190 °F}, no load condition): Approx. 25 %	MAF, BARO, VSS, AC_REQ, COLP	
IAT (Intake air temperature)	°C / °F	• Ignition switch is turned to the ON position: Indicate the IAT	• IAT sensor	2AQ
	V	• IAT is 20°C {68°F}: Approx. 2.2 V • IAT is 30°C {86°F}: Approx. 1.8 V		
IMRC (Variable tumble control)	%	• Cold start and 3,250 rpm or less: 12.5-50 • Hot start or 3,250 rpm or more: 12.5-42	• The following PIDs - ECT, RPM, TP	2AF, 2AJ
	On/Off	• Cold start and 3,250 rpm or less: On • Hot start or 3,250 rpm or more: Off		
IMTV (Variable intake-air control)	%	• Engine speed is less than 4,100 rpm: 12.5-50 • Engine speed is 4,100 rpm or more: 12.5-42	• The following PIDs - RPM	2AO, 2AS
	On/Off	• Engine speed is less than 4,100 rpm: On • Engine speed is 4,100 rpm or more: Off		
INGEAR (Gears are engaged.)	On/Off	**MTX** • When the following conditions are satisfied: On - Not neutral - Clutch pedal released • Except above: Off	• CPP switch • Neutral switch	1P, 1AB
		ATX • Driving range: On • Except above: Off	• TR switch	-
IVS (CTP condition)	Idle/Off Idle	• Idling: Idle • Other than idling: Off Idle	• The following PIDs - TP	-

KNOCKR (Knocking retard)	°	• Ignition switch is turned to the ON position: 0 ° • Idling: 0 °	• KS	2BA
LINEDES[*3]	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
LOAD (Engine load)	%	• Idling (after warm-up): Approx. 23 %	• The following PIDs - BARO, IAT, MAF, RPM	-
LONGFT1 (Long term fuel trim)	%	• Idling (after warm-up): Approx. -15-+15 %	• The following PIDs - CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP, MAF, O2S11, O2S12, BARO, VSS, TR, BOO, AC_REQ, COLP, VPWR	-
LPS[*3]	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
MAF (Mass air flow)	g/s	• Ignition switch is turned to the ON position: Approx. 0 g/s • Idling: Approx. 2.7 g/s	• MAF sensor	2AU
	V	• Ignition switch is turned to the ON position: Approx. 0.7 V • Idling: Approx. 1.3 V		
MIL (Malfunction indicator lamp)	On/Off	• Ignition switch is turned to the ON position: On • Idling: Off (If there is a malfunction in emission control related system: On)	• MIL	-
MIL_DIS (Travelled distance since MIL illuminated)	km / mile	Indicate the travelled distance since the MIL illuminated		
MNL SW[*3]	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
O2S11 (Front HO2S)	V	• Ignition switch is turned to the ON position: 1.0 V or less • Idling (after warm-up): Alternates between 0 and 1.0 V	• Front HO2S	2AI

O2S12 (Rear HO2S)	V	• Idling (after warm-up): Alternates between 0 and 1.0 V	• Rear HO2S	2K
OP_SW_B*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
PCM_T (PCM temperature sensor)	V	• Ignition switch is turned to the ON position: Indicate the PCM temperature sensor output voltage	• PCM	-
PCM_T_Max (Maximum PCM temperature)	V	• Ignition switch is turned to the ON position: Indicate the maximum PCM temperature sensor output voltage	• PCM	-
PSP (PSP switch)	High/Low	• Steering wheel is in straight ahead position: Low • Steering wheel is fully turned: High	• PSP switch	2AC
RFCFLAG (PCM adaptive memory produce verification)	Learnt/Not Learnt	• Idling (after running PCM adaptive memory procedure drive mode): Learnt • Right after the negative battery cable is disconnected (before running PCM adaptive memory procedure drive mode): Not Learnt	• Perform "DRIVE MODE".	-
RO2FT1 (Rear oxygen sensor fuel trim)	No unit	• Idling after warm-up: Approx. -0.03-+0.03	• The following PID - O2S12	2K
RPM (Engine speed)	RPM	**MTX** • Idling (no load), neutral position: 640-740 RPM **ATX** • Idling (no load), N range: 700-800 RPM	• CKP sensor	2P
SEGRP (EGR control)	Step	• Ignition switch is turned to the ON position: 0 step • Idling: 0 step • Vehicle driving when engine speed is 1,000-4,700 rpm: 0-52 step	• EGR valve	2N, 2R, 2V, 2Z
SEGRP DSD (EGR valve position desired)	%	• Ignition switch is turned to the ON position: 0 % • Idling: 0 %	• The following PID	-

		• Vehicle driving when engine speed is 1,000-4,700 rpm: 0-100 %	- MAF, TP, ECT, RPM, VSS	
SHRTFT1 (Short term fuel trim (front))	%	• Idling (after warm-up): -25-+25%	• The following PIDs - CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP, MAF, O2S11, O2S12, BARO, VSS, TR, BOO, AC_REQ, COLP, VPWR	-
SHRTFT11 (Short term fuel trim (front))	%	• Idling (after warm-up): -25-+25%	• The following PIDs - CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP, MAF, O2S11, O2S12, BARO, VSS, TR, BOO, AC_REQ, COLP, VPWR	2AI
SHRTFT12 (Short term fuel trim (rear))	%	• Idling after warm-up: Approx. 99 %	• The following PIDs - CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP, MAF, O2S11, O2S12, BARO, VSS, TR, BOO, AC_REQ, COLP, VPWR	2K
SPARKADV (Ignition timing)	° (BTDC)	• During test mode on at idling: BTDC 9-11 ° (BTDC) • Idling: BTDC 6-18 ° (BTDC)	• The following PIDs - CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP, MAF, KNOCKR, TR, BOO, AC_REQ, COLP	2BB
SSA/SS1*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
SSB/SS2*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			

SSC/SS3*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
TCS*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
test (Test mode)	On/Off	• During test mode: On • Other than test mode: Off	-	-
TFT*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
TFTV*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
TIRESIZE (Tire revolution per mile)	No unit	• Indicate the tire revolution per a mile		
TP (TP)	%	• CTP: Approx. 12 % • WOT: Approx. 75 %	• TP sensor	2AA
	V	• CTP: 0.31.0 V • WOT: 3.14.5 V		
TP REL (Throttle position signal (relative value))	%	• CTP: Approx. 0 % • WOT: Approx. 100 %	• TP sensor	2AA
TPCT (TP sensor voltage at CTP)	V	0.31.0 V	• TP sensor	2AA
TR*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
TR_SENS*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
TSS*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
UP SW*3	(See PID/DATA MONITOR INSPECTION [FN4A-EL])			
VPWR (Battery positive voltage)	V	• Ignition switch is turned to the ON position.: B+ • Idling: B+	• Battery • Main relay	1AX, 1BB, 1BF 1BG*3
Vref (Constant voltage)	V	• Ignition switch is turned to the ON position.: Approx. 5 V	• Battery	2W
VSS (Vehicle speed)	KPH MPH	• Vehicle running: Indicate the vehicle speed	• VSS	*2- *31AY

VT ACT1 (Actual valve timing)	°	• Idling: 0 ° • Racing: 025 °	• The following PIDs - ECT, RPM, TP, MAF • OCV	2AG, 2AK
VT DIFF1 (Difference between target valve timing and actual valve timing)	°	• Idling: 0 °	• The following PIDs - ECT, RPM, TP, MAF • OCV	-
VT DUTY1 (OCV control)	%	• Idling: Approx. 10 %	• The following PIDs - ECT, RPM, TP, MAF	2AG, 2AK

*1 :

The voltage may vary excessively depending on the weather or battery conditions.

*2 :

MTX

*3 :

ATX

*4 :

Alternator generating current value

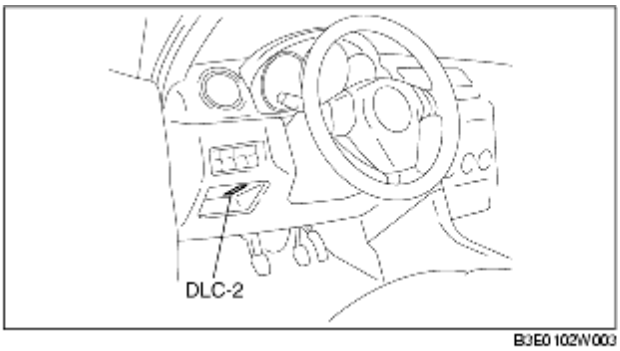
*5 :

A/C compressor pressure switch

PCM CONFIGURATION [Z6]

B3E014018880W09

1. Connect the WDS or equivalent to DLC-2.



2. Set up the WDS or equivalent (including the vehicle recognition).

3. Select "Module Programming".

4. Select "Programmable Module Installation".

5. Select "PCM" and perform procedures according to directions on the WDS or equivalent screen.

Note

• If the PCM is replaced with a new one, the PCM stores DTC P0602 and illuminates the MIL even though no malfunction is detected. This means the PCM has not been configured yet.

6. Retrieve DTC's by the WDS or equivalent, then verify that there in no DTC present.

• If DTC is present, perform applicable DTC inspection. (See DTC TABLE [Z6].)

NEUTRAL SWITCH INSPECTION [Z6]

B3E014017640W02

Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Continuity Inspection

1. Remove the neutral switch.

2. Verify that the continuity between neutral switch terminals A and B is as indicated in the table.

• If not as indicated in the table, replace the neutral switch. (See NEUTRAL SWITCH REMOVAL/INSTALLATION [F35M-R].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

○—○ : Continuity

Condition	Terminal	
	A	B
Rod pushed	○—	—○
Normal condition		

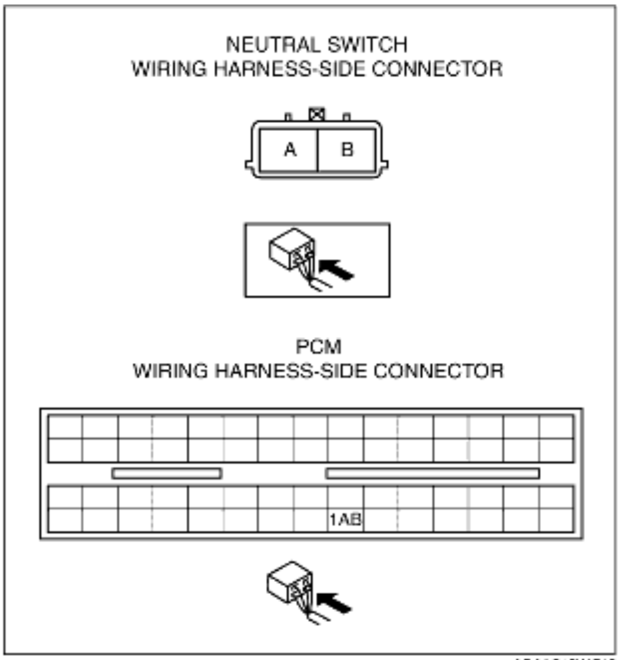
B3E0140W527

Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



ADA3940W510

Open circuit

• If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- Neutral switch terminal A and PCM terminal 1AB

- Neutral switch terminal B and body GND

Short circuit

• If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- Neutral switch terminal A and body GND

- Neutral switch terminal B and power supply

CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [Z6]

B3E014018660W02

Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Continuity Inspection

1. Remove the CPP switch.

2. Verify that the continuity between CPP switch terminals A and B is as indicated in the table.

• If not as indicated in the table, replace the CPP switch. (See CLUTCH PEDAL REMOVAL/INSTALLATION.)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

○—○ : Continuity

Condition	Terminal	
	A	B
Normal condition	○—	—○
Rod pushed		

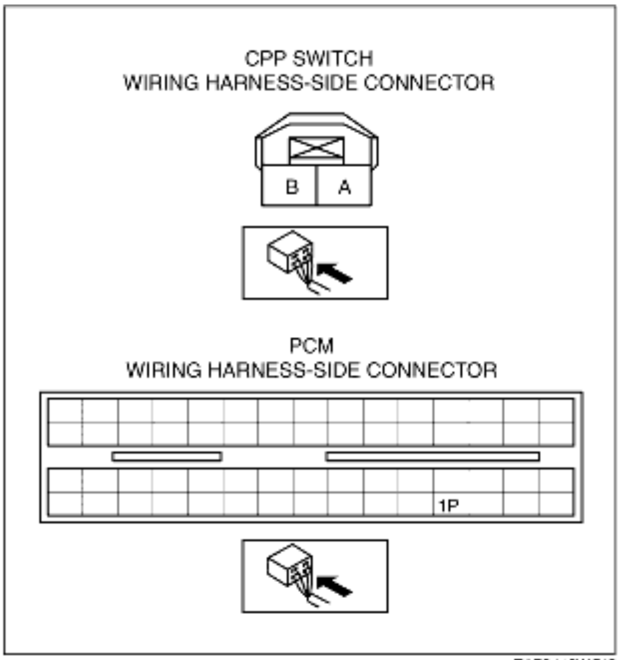
B3E0140W528

Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



B3E0140W518

Open circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

  - CPP switch terminal A and PCM terminal 1P

  - CPP switch terminal B and body GND

Short circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.

  - CPP switch terminal A and body GND

  - CPP switch terminal B and power supply

POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [Z6]

B3E014032230W01

Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Continuity Inspection

1. Inspect the following items:

• Power steering fluid amount (See POWER STEERING FLUID INSPECTION.)

• Power steering-related inspection (See STEERING LOCATION INDEX.)

2. Disconnect the PSP switch connector.

3. Start the engine.

4. Verify that the continuity between PSP switch terminal A and body GND is as indicated in the table.

• If not as indicated in the table, replace the CPP switch. (See POWER STEERING OIL PUMP (Z6) DISASSEMBLY/ASSEMBLY.)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

○—○ : Continuity

Condition	Terminal A	GND
Steering wheel in straight ahead position		
While turning sttering wheel	○	○

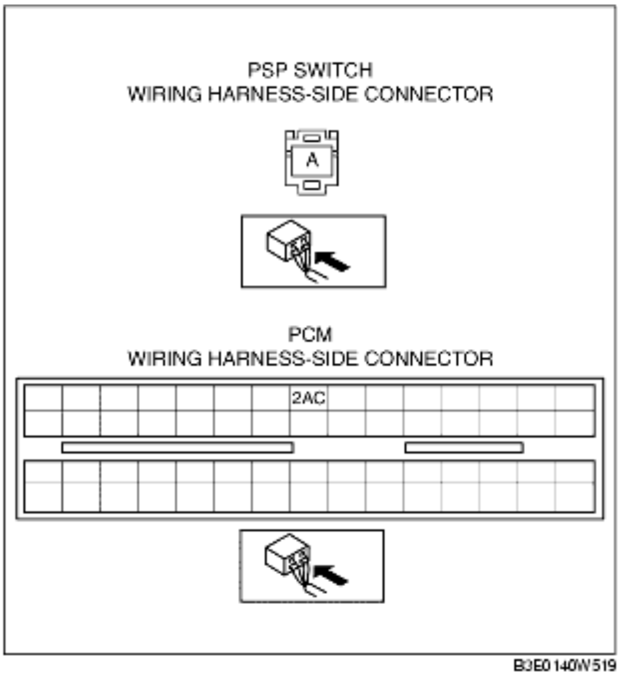
B3E0140W526

Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- PSP switch terminal A and PCM terminal 2AC

Short circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- PSP switch terminal A and body GND

ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [Z6]

B3E014018840W04

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

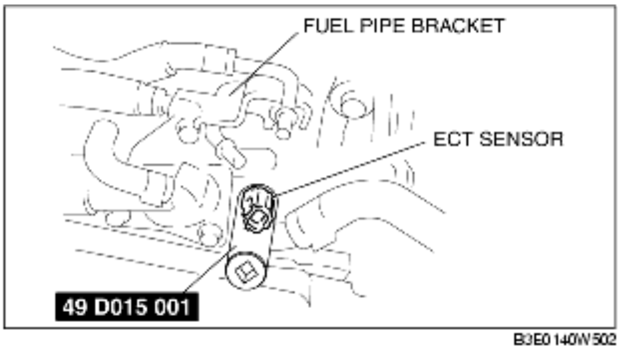
3. Perform the following procedure for easier access.

   (1) Remove the air cleaner. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

   (2) Set the EGR pipe (intake manifold side) out of the way. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

4. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT.)

5. Install the **SST** to the ECT sensor.



6. Remove the ECT sensor.

7. Replace the gasket.

8. Install in the reverse order of removal.

ECT sensor tightening torque

15.7-23.5 N·m {1.7-2.3 kgf·m, 12.3-16.6 ft·lbf}

ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [Z6]

B3E014018840W05

Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Continuity Inspection

1. Disconnect the ECT sensor connector.

2. Remove the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [Z6].)

3. Place the ECT sensor in the water and while increasing water temperature, measure the resistance between terminals A and B.

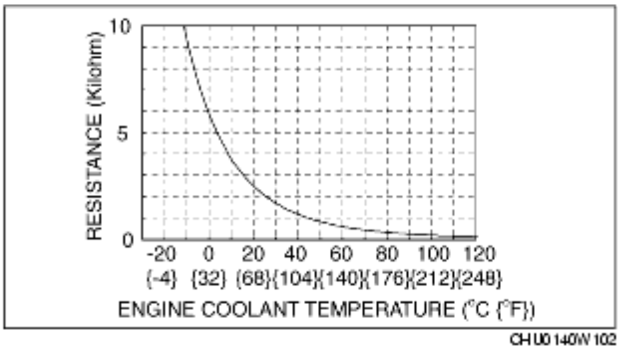
• If not within the specification, replace the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [Z6].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

ECT sensor resistance

Water temperature (°C {°F})	Resistance (kilohm)
20 {68}	2.212.69
80 {176}	0.2870.349

ECT sensor characteristics graph (reference)

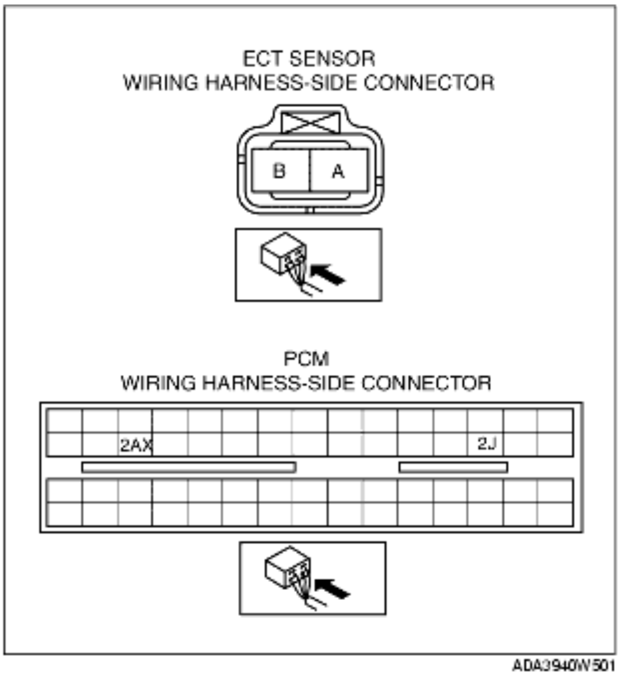


Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

• If there is no continuity, the circuit is open. Repair or replace the wiring harness.

- ECT sensor terminal A and PCM terminal 2J

- ECT sensor terminal B and PCM terminal 2AX

Short circuit

• If there is continuity, the circuit is shorted. Repair or replace the wiring harness.

- ECT sensor terminal A and power supply

- ECT sensor terminal A and body GND

- ECT sensor terminal B and power supply

INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [Z6]

B3E014018840W06

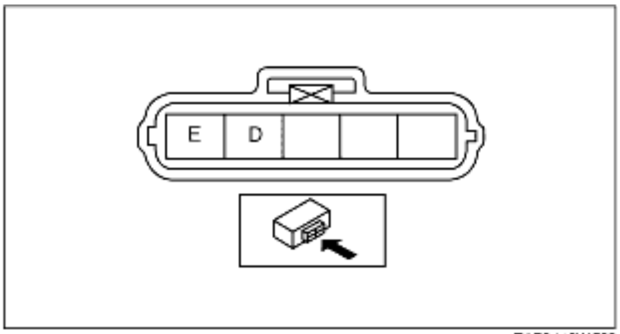
Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Resistance Inspection

1. Disconnect the MAF/IAT sensor connector.

2. Verify that the resistance between terminals D and E is within the specification.



B3E0140W509

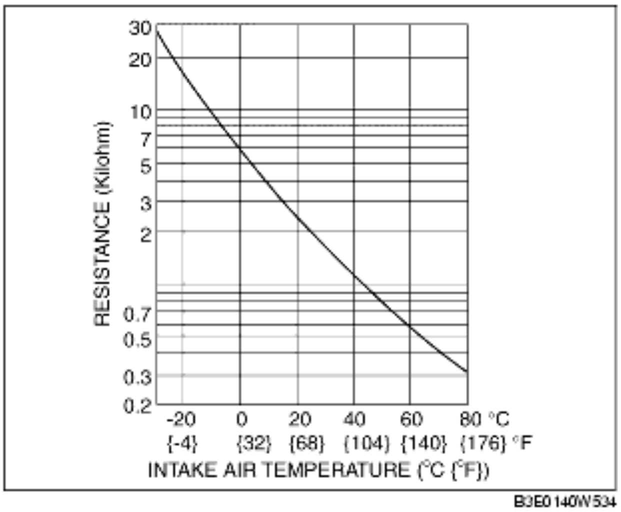
• If not within the specification, replace the MAF/IAT sensor. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

IAT sensor resistance

Ambient temperature (°C {°F})	Resistance (kilohm)
-20 {-4}	13.618.4
20 {68}	2.212.69
60 {140}	0.4930.667

IAT sensor characteristics graph (reference)

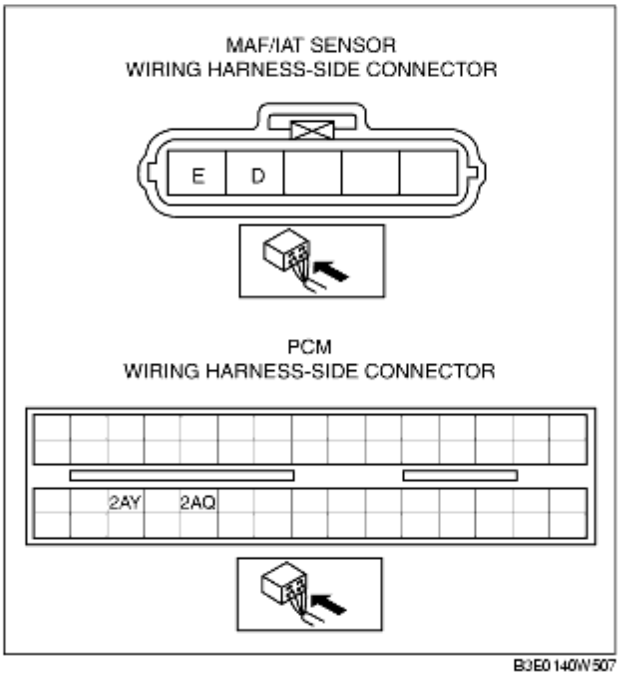


Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- MAF/IAT sensor terminal D and PCM terminal 2AQ

- MAF/IAT sensor terminal E and PCM terminal 2AY

Short circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- MAF/IAT sensor terminal D and power supply

- MAF/IAT sensor terminal D and body GND

- MAF/IAT sensor terminal E and power supply

CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6]

B3E014018220W01

Caution

• When replacing the CKP sensor, make sure there is no foreign material on it such as metal shavings. If it is installed with foreign material, the sensor output signal will malfunction resulting from fluctuation in magnetic flux and cause a deterioration in engine control.

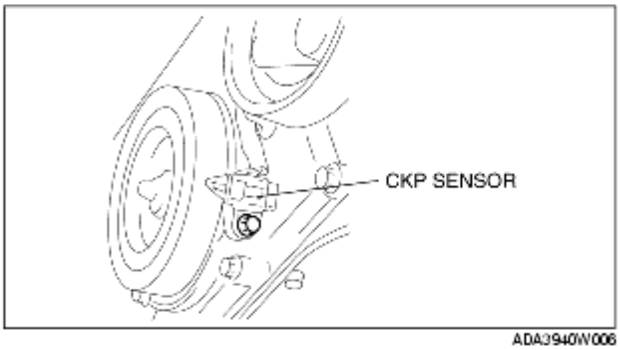
1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Perform the following procedure for easier access.

   (1) Remove the under cover.

4. Remove the CKP sensor.



5. Install in the reverse order of removal.

CKP sensor tightening torque

7.8-10.8 N·m {80-110 kgf·cm, 70-94 in·lbf}

CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [Z6]

B3E014018220W02

Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Visual inspection

1. Remove the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6].)

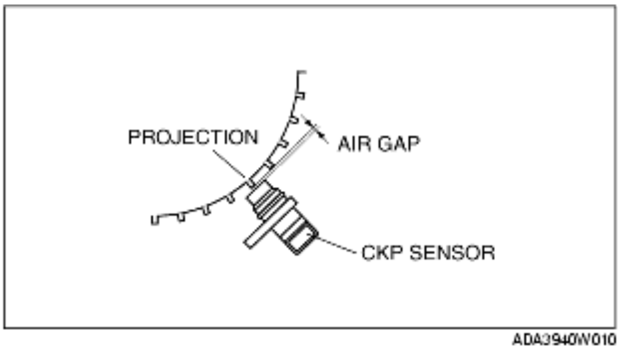
2. Verify that there are no metal shavings on the sensor.

3. Install the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6].)

Air Gap Inspection

1. Verify that the CKP sensor is securely installed.

2. Using a thickness gauge, measure the air gap between the plate projections at the back of crankshaft pulley and the CKP sensor.



• If not within the specification, inspect the plate projections for cracks or bending.

- If not within the specification, replace the plate. (See FRONT OIL SEAL REPLACEMENT [Z6].)

Air gap

0.5-1.5 mm {0.02-0.05 in}

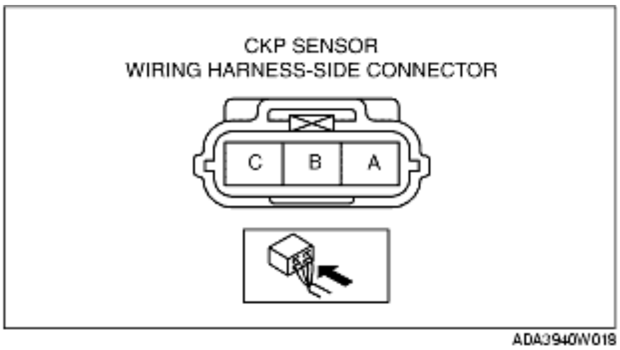
Voltage inspection

1. Idle the engine.

Caution

• Water penetrating the connector will cause sensor malfunction. To prevent this, be careful not to damage the wiring harnesses or the waterproof connector so as to cause water penetration.

2. Measure the output voltage using a oscilloscope.



• If not within the specification, replace the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [Z6].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

CKP sensor voltage

Terminal	Voltage (V)	Condition
A	B+	Under any condition
B	4.8 or more	High output*
	0.8 or less	Low output*
C	0	Under any condition

* :

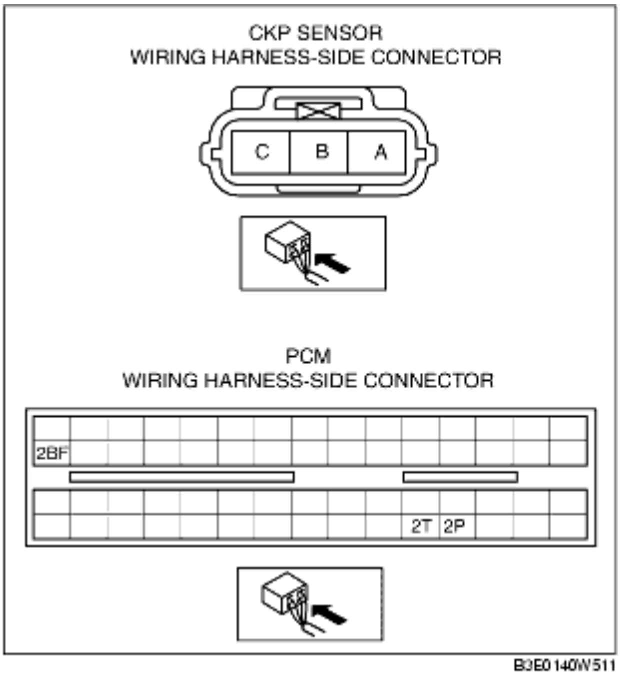
Output voltage varies with camshaft rotation.

Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

• If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- CKP sensor terminal A and PCM terminal 2T

- CKP sensor terminal B and PCM terminal 2P

- CKP sensor terminal C and PCM terminal 2BF

Short circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- CKP sensor terminal A and body GND

- CKP sensor terminal B and power supply

- CKP sensor terminal B and body GND

- CKP sensor terminal C and power supply

CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [Z6]

B3E014018200W01

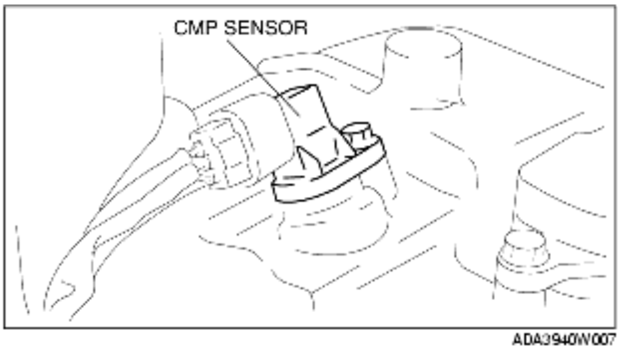
Caution

- When replacing the CKP sensor, make sure there is no foreign material on it such as metal shavings. If it is installed with foreign material, the sensor output signal will malfunction resulting from fluctuation in magnetic flux and cause a deterioration in engine control.

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Remove the CMP sensor.



4. Verify that the O-ring is not damaged.

- If there is a damage, replace the CMP sensor.

5. Apply a small amount of clean oil to the O-ring and the head cover.

6. Install in the reverse order of removal.

CMP sensor tightening torque

7.8-10.8 N·m {80-110 kgf·cm, 70-94 in·lbf}

CAMSHAFT POSITION (CMP) SENSOR INSPECTION [Z6]

B3E014018200W02

Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Visual inspection

1. Remove the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [Z6].)

2. Verify that there are no metal shavings on the sensor.

3. Install the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [Z6].)

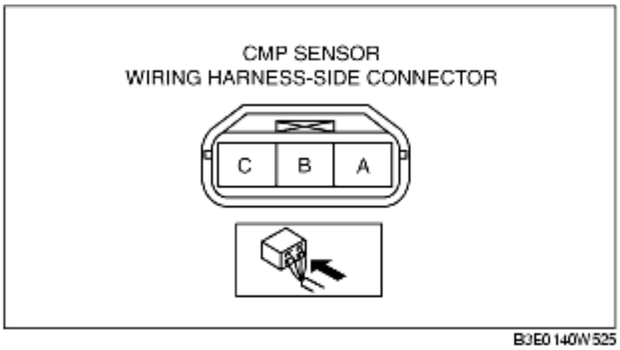
Voltage inspection

1. Idle the engine.

Caution

• Water penetrating the connector will cause sensor malfunction. To prevent this, be careful not to damage the wiring harnesses or the waterproof connector so as to cause water penetration.

2. Measure the output voltage using a oscilloscope.



• If not within the specification, replace the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [Z6].)

CMP sensor voltage

Terminal	Voltage (V)	Condition
A	B+	Under any condition
B	4.8 or more	High output*
	0.8 or less	Low output*
C	0	Under any condition

* :

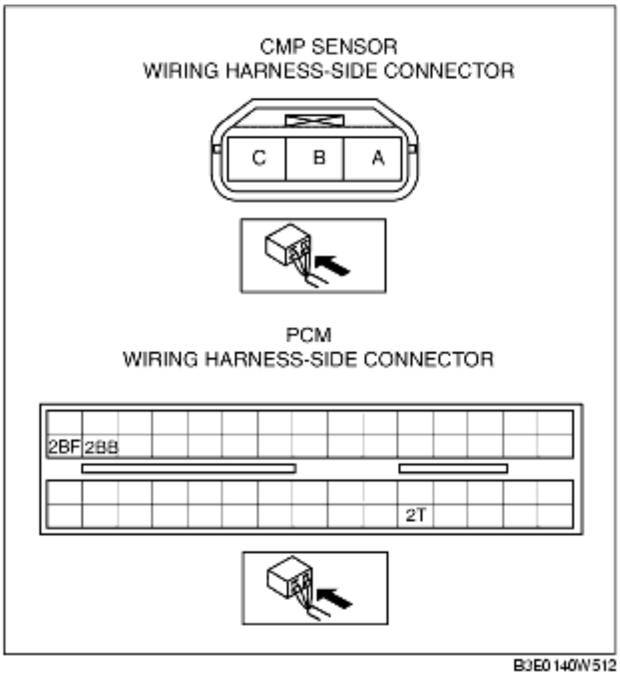
Output voltage varies with camshaft rotation.

Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- CMP sensor terminal A and PCM terminal 2T

- CMP sensor terminal B and PCM terminal 2BB

- CMP sensor terminal C and PCM terminal 2BF

Short circuit

- If there is continuity, there is an short circuit. Repair or replace the wiring harness.

- CMP sensor terminal A and body GND

- CMP sensor terminal B and power supply

- CMP sensor terminal B and body GND

- CMP sensor terminal C and power supply

THROTTLE POSITION (TP) SENSOR REMOVAL/INSTALLATION [Z6]

B3E014018910W03

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

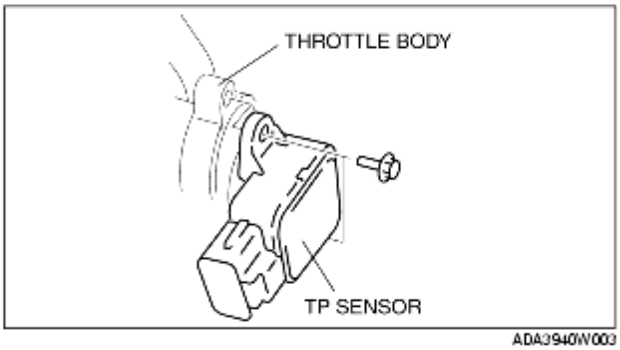
2. Disconnect the negative battery cable.

3. Perform the following procedure for easier access.

  • Remove the air cleaner. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

  • Remove the air hose.

4. Remove the TP sensor.



5. Verify that the throttle valve is fully closed.

6. Install the TP sensor to the throttle body.

  Tightening torque

  1.6-2.4 N·m {17-24 kgf·cm, 15-21 in·lbf}

7. Verify that the throttle valve moves smoothly.

8. Connect the TP sensor connector.

9. Verify that the TP sensor output voltage (WDS PID: TP) is within the specification when it is open or closed. (See PCM INSPECTION [Z6].)

  • If not within the specification, inspect the TP sensor. (See THROTTLE POSITION (TP) SENSOR INSPECTION [Z6].)

THROTTLE POSITION (TP) SENSOR INSPECTION [Z6]

B3E014018910W04

Note

  • Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Resistance Inspection

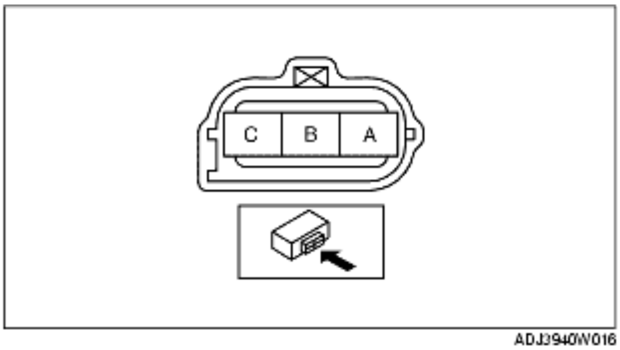
1. Verify the following.

  • Throttle valve closed status

  • Accelerator cable play (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [Z6])

2. Disconnect the TP sensor connector.

3. Verify that the resistance between terminals B and C changes moderately corresponding to the throttle valve openings.



• If the resistance change is verified, go to the next step.

• If the resistance change is not verified, replace the TP sensor. (See THROTTLE POSITION (TP) SENSOR REMOVAL/INSTALLATION [Z6].)

4. Measure the resistance between terminals A and B.

• If not within the specification, replace the TP sensor. (See THROTTLE POSITION (TP) SENSOR REMOVAL/INSTALLATION [Z6].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

TP sensor resistance

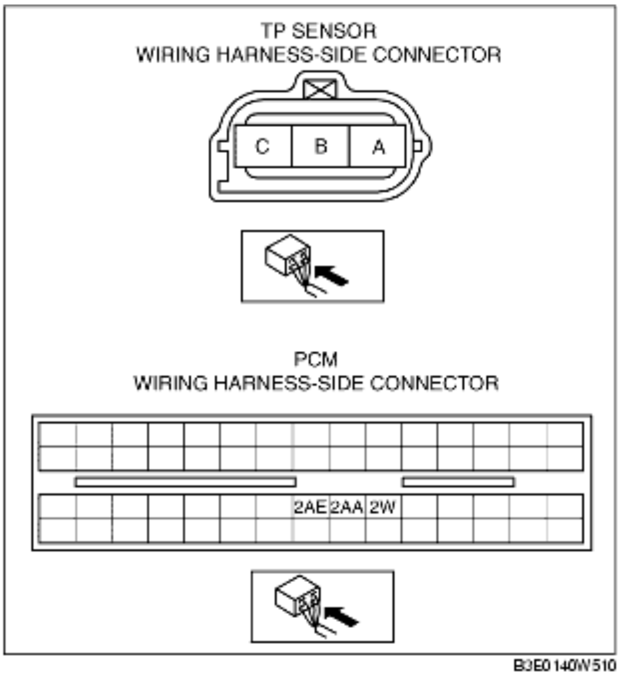
2.5-6.0 kilohms [25 °C {77 °F}]

Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

• If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- TP sensor terminal A and PCM terminal 2W
- TP sensor terminal B and PCM terminal 2AE
- TP sensor terminal C and PCM terminal 2AA

Short circuit

• If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- TP sensor terminal A and body GND
- TP sensor terminal B and power supply
- TP sensor terminal C and power supply
- TP sensor terminal C and body GND

MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6]

B3E014013215W02

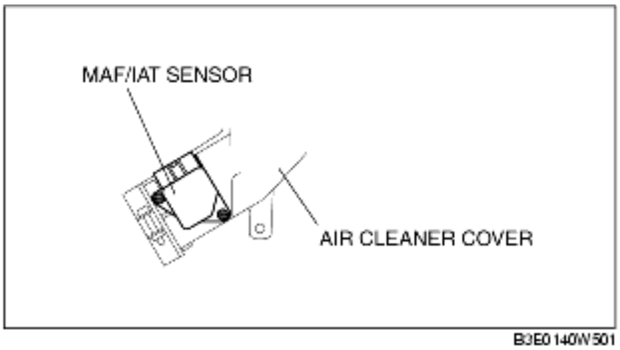
1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Perform the following procedure for easier access

   (1) Remove the battery box. (See BATTERY REMOVAL/INSTALLATION [Z6].)

4. Remove the MAF/IAT sensor.



5. Install in the reverse order of removal.

MAF/IAT sensor tightening torque

0.55-0.82 N·m {5.7-8.3 kgf·cm, 4.9-7.2 in·lbf}

MASS AIR FLOW (MAF) SENSOR INSPECTION [Z6]

B3E014013215W03

Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Visual inspection

1. Visually inspect the MAF sensor for the following:

• Damage, cracks

• Rusted sensor terminal

• Bent sensor terminal

- If there is any malfunction, replace the MAF/IAT sensor. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)

Voltage Inspection

1. Remove the MAF/IAT sensor without disconnecting the MAF/IAT sensor connector.

2. Turn the ignition switch to the ON position.

3. As the air gradually approaches the MAF detection part of the MAF/IAT sensor, verify that the MAF sensor output voltage (WDS PID: MAF) varies.

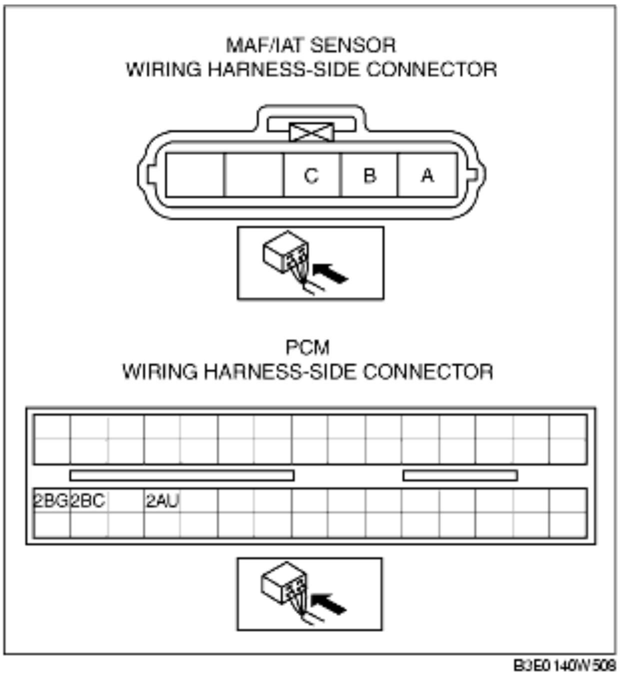
• If it cannot be verified even though the related wiring harnesses have no malfunction, replace the MAF/IAT sensor. (See MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [Z6].)

Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

• If there is no continuity, there is an open circuit . Repair or replace the wiring harness.

- MAF/IAT sensor terminal A and PCM terminal 2BG
- MAF/IAT sensor terminal B and PCM terminal 2BC
- MAF/IAT sensor terminal C and PCM terminal 2AU

Short circuit

• If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- MAF/IAT sensor terminal A and power supply
- MAF/IAT sensor terminal A and body GND
- MAF/IAT sensor terminal B and power supply
- MAF/IAT sensor terminal C and power supply
- MAF/IAT sensor terminal C and body GND

FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6]

B3E014018860W05

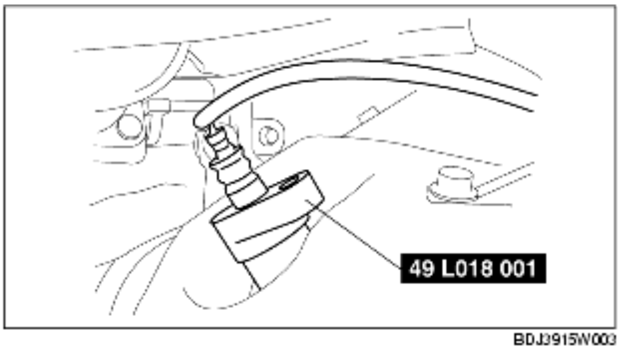
1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Perform the following procedure for easier access.

(1) Remove the air cleaner cover. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

4. Install the **SST** to the front HO2S.



5. Remove the front HO2S.

6. Install in the reverse order of removal.

Front HO2S tightening torque

29-49 N·m {3.0-4.9 kgf·m, 22-35 ft·lbf}

FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6]

B3E014018860W06

Note

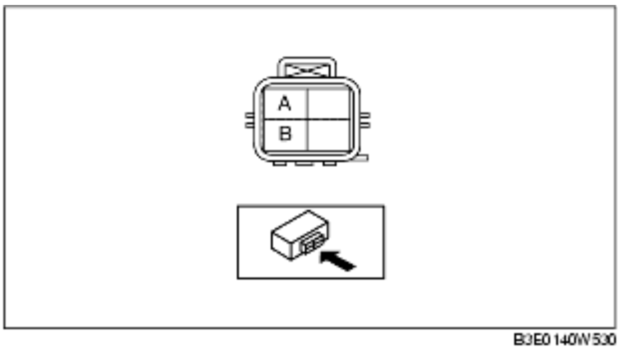
• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Front Heated Oxygen Sensor (HO2S) Voltage Inspection

1. Warm up the engine to normal operating temperature.

2. Disconnect the front HO2S connector.

3. Connect the positive probe of the tester (digital type) to front HO2S terminal A, and the negative probe to front HO2S terminal B and measure the voltage.



4. Maintain the engine speed at **3,000 rpm** until the voltage indicates **approx. 0.5-0.7 V**.

5. Verify that the voltage is as indicated in the table when the engine is raced repeatedly.

• If it cannot be verified, replace the front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

Front HO2S Voltage Inspection

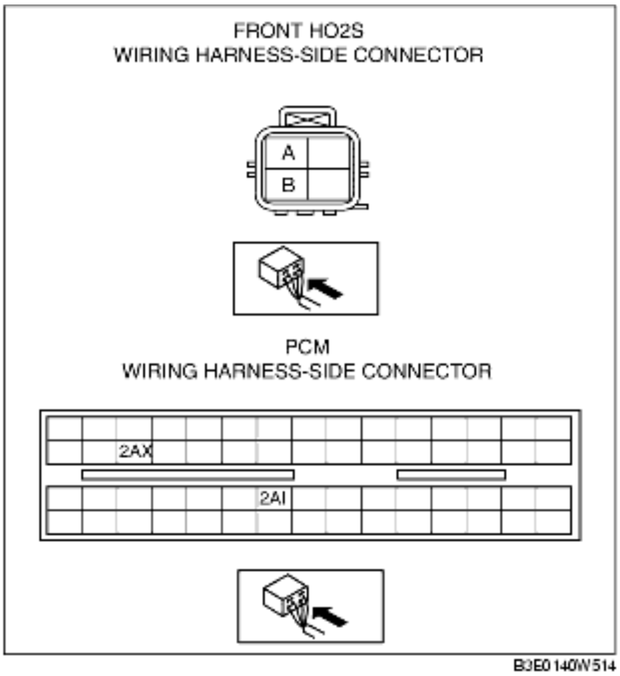
Engine condition	Voltage (V)
Accelerated	0.5-1.0
Decelerated	0-0.5

Front Heated Oxygen Sensor (HO2S) Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

• If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- Front HO2S terminal A and PCM terminal 2AI

- Front HO2S terminal B and PCM terminal 2AX

Short circuit

• If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- Front HO2S terminal A and power supply

- Front HO2S terminal A and body GND

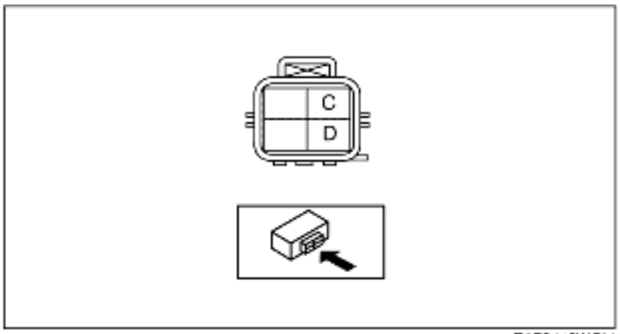
- Front HO2S terminal B and power supply

- Front HO2S terminal B and body GND

Front Heated Oxygen Sensor (HO2S) Heater Resistance Inspection

1. Disconnect the front HO2S connector.

2. Measure the resistance between front HO2S terminals C and D.



B3E0140W531

• If not within the specification, replace the front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

Front HO2S heater resistance

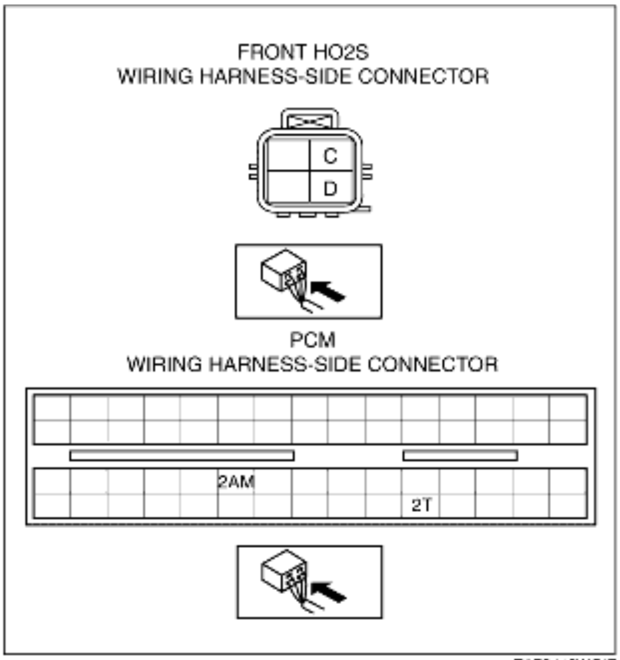
5.0-6.8 ohms [20 °C {68 °F}]

Front Heated Oxygen Sensor (HO2S) Heater Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



B3E0140W517

Open circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- Front HO2S terminal C and PCM terminal 2T

- Front HO2S terminal D and PCM terminal 2AM

Short circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- Front HO2S terminal C and body GND

- Front HO2S terminal D and power supply

- Front HO2S terminal D and body GND

REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6]

B3E014018860W07

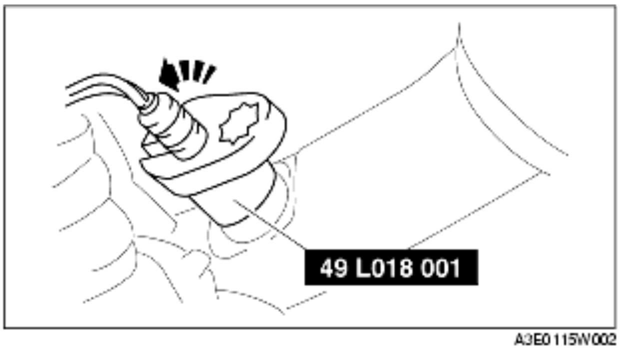
1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Perform the following procedure for easier access.

(1) Remove the air cleaner cover. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

4. Install the **SST** to the rear HO2S.



5. Remove the rear HO2S.

6. Install in the reverse order of removal.

Front HO2S tightening torque

29-49 N·m {3.0-4.9 kgf·m, 22-35 ft·lbf}

REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [Z6]

B3E014018860W08

Note

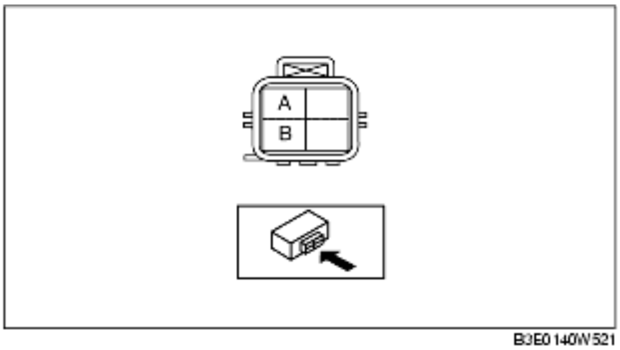
• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Rear Heated Oxygen Sensor (HO2S) Voltage Inspection

1. Warm up the engine to normal operating temperature.

2. Disconnect the rear HO2S connector.

3. Connect the positive probe of the tester (digital type) to rear HO2S terminal A, and the negative probe to rear HO2S terminal B and measure the voltage.



4. Maintain the engine speed at **3,000 rpm** until the voltage indicates **approx. 0.5-0.7 V**.

5. Verify that the voltage is as indicated in the table when the engine is raced repeatedly.

• If it cannot be verified, replace the rear HO2S. (See REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

Rear HO2S Voltage Inspection

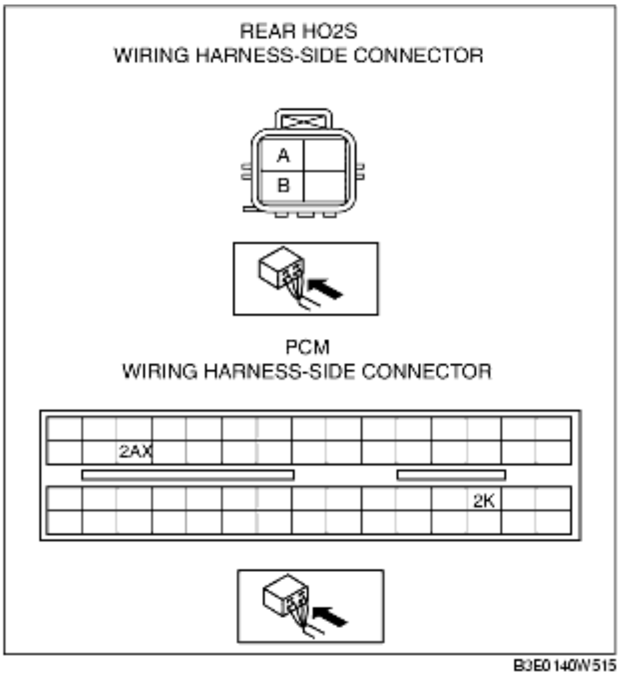
Engine condition	Voltage (V)
Accelerated	0.5-1.0
Decelerated	0-0.5

Rear Heated Oxygen Sensor (HO2S) Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

• If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- Rear HO2S terminal A and PCM terminal 2K

- Rear HO2S terminal B and PCM terminal 2AX

Short circuit

• If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- Rear HO2S terminal A and power supply

- Rear HO2S terminal A and body GND

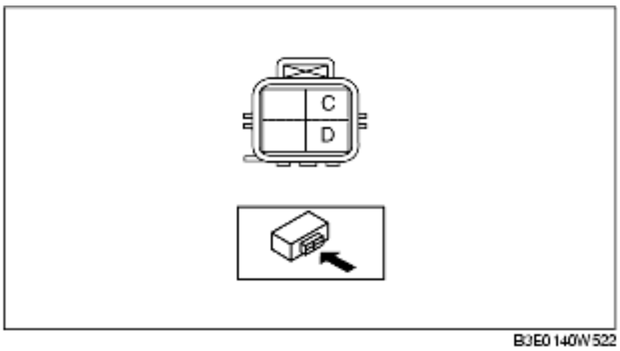
- Rear HO2S terminal B and power supply

- Rear HO2S terminal B and body GND

Rear Heated Oxygen Sensor (HO2S) Heater Resistance Inspection

1. Disconnect the rear HO2S connector.

2. Measure the resistance between rear HO2S terminals C and D.



• If not within the specification, replace the rear HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [Z6].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

Rear HO2S heater resistance

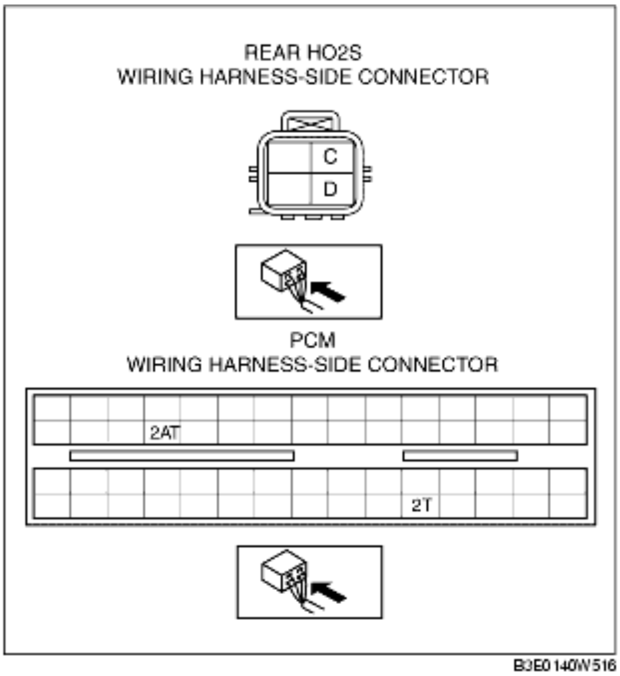
14.1-18.9 ohms [20 °C {68 °F}]

Rear Heated Oxygen Sensor (HO2S) Heater Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

• If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- Rear HO2S terminal C and PCM terminal 2T

- Rear HO2S terminal D and PCM terminal 2AT

Short circuit

• If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- Rear HO2S terminal C and body GND

- Rear HO2S terminal D and power supply

- Rear HO2S terminal D and body GND

BAROMETRIC PRESSURE (BARO) SENSOR INSPECTION [Z6]

B3E014018210W03

Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

Voltage Inspection

1. Remove the BARO sensor with the connector still connected.

2. Remove the BARO sensor hose.

3. Turn the ignition switch to the ON position.

4. Verify that the BARO sensor output voltage (WDS PID: BARO) is within the specification. (See PCM INSPECTION [Z6].)

• If not within the specification even though the related wiring harnesses have no malfunction, replace the BARO sensor.

5. Install the vacuum pump to the BARO sensor.

6. Verify that the change in the BARO sensor output voltage (WDS PID: BARO) is within the specification when a vacuum of **30 kPa {0.30 kgf/cm^2, 4.4 psi}** is applied.

• If not within the specification, replace the BARO sensor.

BARO sensor output voltage variance

0.5-0.7 V

Note

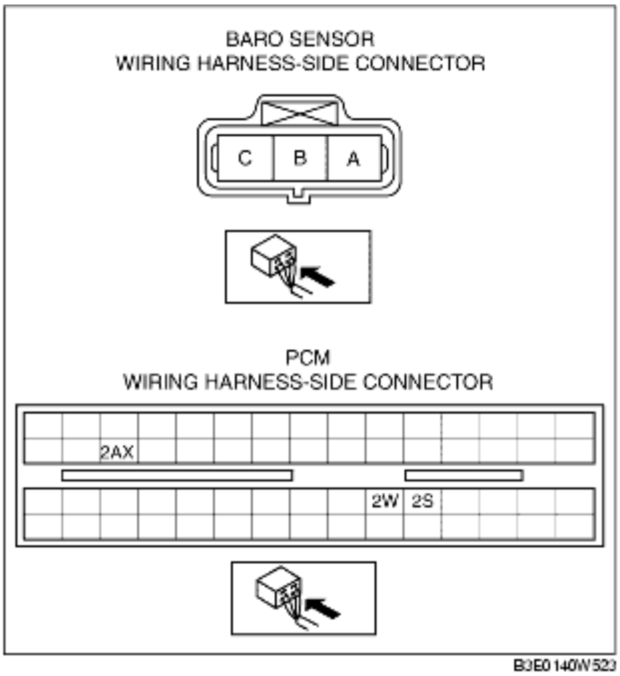
• The voltage shown in the figure may vary excessively depending on the weather or battery conditions.

Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



Open circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

- BARO sensor terminal C and PCM terminal 2W

- BARO sensor terminal A and PCM terminal 2AX

- BARO sensor terminal B and PCM terminal 2S

Short circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.

- BARO sensor terminal C and body GND

- BARO sensor terminal A and body power supply

- BARO sensor terminal B and body GND

- BARO sensor terminal B and body power supply

KNOCK SENSOR (KS) REMOVAL/INSTALLATION [Z6]

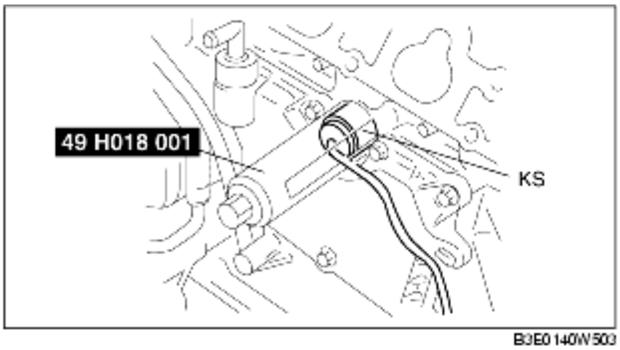
B3E014018920W03

1. Remove the battery cover. (See BATTERY REMOVAL/INSTALLATION [Z6].)

2. Disconnect the negative battery cable.

3. Remove the intake manifold. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

4. Install the **SST** to the KS.



5. Remove the KS.

6. Install in the reverse order of removal.

KS tightening torque

19.6-34.3 N·m {2.0-3.4 kgf·m, 14.5-24.5 ft·lbf}

KNOCK SENSOR (KS) INSPECTION [Z6]

B3E014018920W04

Note

• Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See Troubleshooting Procedure.)

1. Disconnect the KS connector.

2. Measure the resistance between KS terminal A and body GND.

• If not within the specification, replace the KS. (See KNOCK SENSOR (KS) REMOVAL/INSTALLATION [Z6].)

• If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the "Circuit Open/Short Inspection".

KS resistance

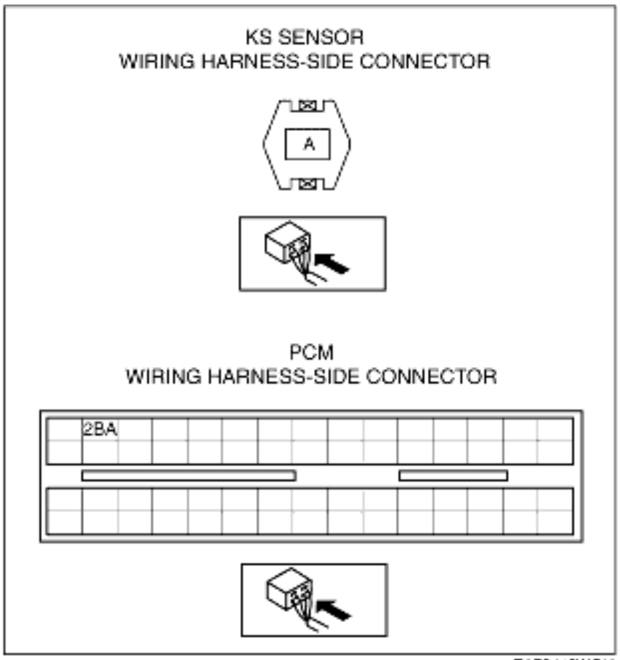
532-588 kilohms [20 °C {68 °F}]

Circuit Open/Short Inspection

1. Remove the PCM connector cover.

2. Disconnect the PCM connector. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [Z6].)

3. Inspect the following wiring harness for open or short circuit (continuity check).



B3E0140W513

Open circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.

  - Knock sensor terminal A and PCM terminal 2BA

Short circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.

  - Knock sensor terminal A and body GND

  - Knock sensor terminal A and power supply

ENGINE TECHNICAL DATA

B3E015001001W01

Item			Specifications	
			Z6	LF
MECHANICAL				
Valve clearance [engine cold]	(mm {in})	IN	0.27-0.33 {0.0107-0.0129}	0.22-0.28 {0.0087-0.0110}
		EX		0.27-0.33 {0.0107-0.0129}
Compression pressure	(kPa {kgf/cm^2, psi}) [rpm]	Standard	1,470 {14.99, 213.2} [250]	1.720 {17.54, 294.4} [300]

		Minimum			1,029 {10.49, 149.2} [250]	1.204 {12.28, 174.6} [300]
		Maximum difference between cylinders			196.1 {2.0, 28.5}	196.1 {2.0, 28.5}
Cylinder head bolt length	(mm {in})	Standard			128.9-129.5 {5.075-5.098}	145.2-145.8 {5.72-5.74}
		Maximum			130.2 {5.125}	146.5 {5.77}
Pushing distance of the front oil seal		(mm {in})			0-0.5 {0-0.019} (from the edge of the engine front cover)	
Pushing distance of the rear oil seal		(mm {in})			0-0.5 {0-0.019} (from the edge of the cylinder block)	-
Oil control valve (OCV)	Resistance (ohm) [20°C {68°F}]				6.9-7.9	-
Idle speed	(rpm)	ATX			700-800	-
		MTX			640-740	600-700
Ignition timing (test mode on)				(BTDC°)	9-11	8
Idle-up speed	(rpm)	No load	ATX	N position	700-800	-
				D position	650-750	-
			MTX	Neutral position	640-740	600-700
		Electrical loads ON*1	ATX	N position	700-800 [34-42 A] 700-800 [Above 42 A]	-
				D position	650-750 [34-42 A] 670-770 [Above 42 A]	-
			MTX	Neutral position	650-750 [34-42 A] 700-800 [Above 42 A]	650-750 [38-48 A] 700-800 [Above 48 A]
			ATX	N position	700-800	-

		A/C ON	Low load*2		D position	650-750	-
				MTX	Neutral position	650-750	700-800
			High load*3			700-800	
		P/S ON				700-800	-
CO concentration						Within the regulation	
HC concentration							
LUBRICATION SYSTEM							
Oil pressure (approx. quantity) [oil temperature: 100 °C {212 °F}]			(kPa {kgf/cm², psi}) [rpm]			330-380 {3.36-3.87, 47.8-55.0} [3,000]	234-521 {2.39-5.31, 33.9-75.5} [3,000]
Oil capacity (approx. quantity)	Oil replacement			(L {US qt, Imp qt})		3.7 {3.9, 3.3}	3.9 {4.1, 3.4}
	Oil and oil filter replacement			(L {US qt, Imp qt})		3.9 {4.1, 3.4}	4.3 {4.5, 3.8}
	Total (dry engine)			(L {US qt, Imp qt})		4.2 {4.4, 3.7}	4.6 {4.9, 4.0}
COOLING SYSTEM							
Coolant capacity				(L {US qt, Imp qt})		With heater: 6.0 {6.3, 5.3} Without heater: 5.5 {5.8, 4.8}	With heater: 7.5 {7.9, 6.6} Without heater: 6.9 {7.3, 6.1}
Cooling system cap valve opening pressure				(kPa {kgf/cm², psi})		90-110 {0.92-1.12, 13.1-15.9}	135-155 {1.38-1.58, 19.6-22.4}
Thermostat	Initial-opening temperature				(°C {°F})	80-84 {176-183}	
	Full-opening temperature				(°C {°F})	95 {203}	97 {207}
	Full-open amount				(mm {in})	8.5 {0.33} or more	8.0 {0.31} or more
FUEL SYSTEM							
Fuel line pressure (kPa {kgf/cm², psi})				Fuel hold pressure		250 {2.55, 36.2} or more	
				Fuel pressure		350-410 {3.57-4.18, 50.8-59.4}	
Fuel injector	Resistance			(ohm) [20°C {68°F}]		Approx. 13.8	11.4-12.6
	Leakage amount			(drop/2 min)		1 or less	

	Injection volume			(ml {cc, cu in}/15 s)		64-84 {64-84, 3.9-5.1}	46-66 {46-66, 2.8-4.0}
CHARGING SYSTEM							
Battery	Electrolyte gravity					1.22-1.29 [20 °C {68 °F}]	
	Back-up current*4				(mA)	Max. 20	
	Test load chart (A)		Battery type (5-hour rate)	50D20L (40)		150	
				75D26L (52)		195	
				80D26L (55)*5		195	-
	Slow charge (A)		Battery type (5-hour rate)	50D20L (40)		4.0-5.0	
				75D26L (52)		5.0-6.0	
				80D26L (55)*5		5.5-6.5	-
	Quick charge (A/30 min.)		Battery type (5-hour rate)	50D20L (40)		25	
				75D26L (52)		35	
				80D26L (55)*5		35	-
Generator	Standard voltage	(V)	Ignition switch ON	Terminal	B	B+	
					P	Approx. 1.0 or less	
					D	Approx. 0	
			Idle [20 °C {68 °F}]	Terminal	B	13.0-15.0	
					P	Approx. 3.0-8.0	
					D	*7	
	Generated current (Reference)	(A)	Terminal B current [Engine speed 1,000 rpm]			0*6-65	0*6-80
			Terminal B current [Engine speed 2,000 rpm]			0*6-85	0*6-95
IGNITION SYSTEM							
Ignition coil	Resistance (Reference) [25 °C {77 °F}]		Primary coil winding		(ohm)	-	0.45-1.15
			Secondary coil winding		(kilohm)	-	5.0-6.0
			Insulation resistance of case		(megohm)	-	Above 10
Spark plug	Type		DENSO			SK16PR-E11	-

		NGK		-	ITR6F13
	Plug gap	Standard	(mm {in})	1.0-1.1	1.25-1.35
	Resistance [25°C {77°F}]		(kilohm)	3.0-7.5	
STARTING SYSTEM					
Starter	No load test	Voltage	(V)	11	
		Current	(A)	90 or less	

Recommended engine oil

Item	Specifications			
	Europe			Except Europe
Grade	API SL, ACEA A3			API SG, SH, SJ, SL ILSAC GF-2, GF-3
Viscosity (SAE)	5W-30	10W-40	5W-20	40, 30, 20, 20W-20, 10W-30, 10W-40, 10W-50, 20W-40, 15W-40, 20W-50, 15W-50, 5W-20, 5W-30
Remarks	**Mazda genuine Dexelia oil e.g.**		-	-

*1 :

Generator generating current value.

*2 :

Refrigerant pressure switch (middle pressure switch) is off.

*3 :

Refrigerant pressure switch (middle pressure switch) is on.

*4 :

Back-up current is the constant flow of current present (for the audio unit, clock, PCM, etc.) when the ignition switch is off and with the ignition key removed.

*5 :

For intensely hot area.

*6 :

The lower limit must be more than 0 A.

*7 :

Turn the following electrical loads on and verify that the voltage reading increases.

• Headlights

• Blower motor

• Rear window defroster

SERVICE TOOLS

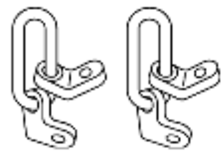
ENGINE SST [Z6]

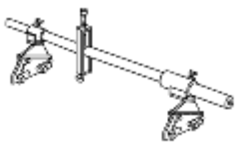
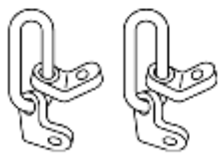
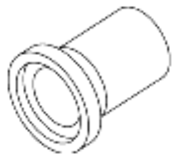
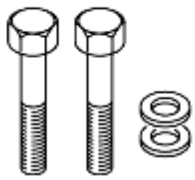
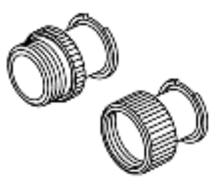
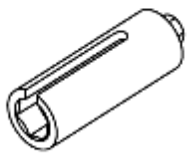
B3E016001001W01

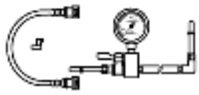
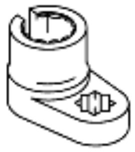
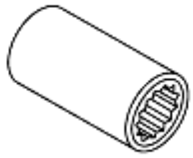
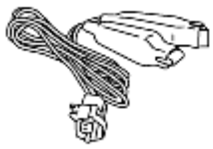
1: Mazda **SST** number

2: Global **SST** number

Example

1:49 UN30 3050 2:303-050 Engine lifting bracket	

49 E017 5A0 2: - Engine support set		1:49 UN30 3050 2:303-050 Engine lifting bracket		1:49 H010 401 2: - Oil seal installer	
1:49 S120 710 2: - Coupling flange holder		1:49 G011 103 2: - Bolts		1:49 E033 101 2: - Dust cover installer	
1:49 G014 001 2: - Oil filter wrench		1:49 B015 0A0 2:- Adapter set		1:49 H018 001 2: - Knock sensor wrench	

1: - 2: - WDS		1:49 N013 1A0C 2:- Fuel pressure gauge set		1:49 0187 280A 2: - Oil pressure gauge	
1:49 L018 001 2: - O2 sensor wrench		1:49 D015 001 2: - Box wrench		1: 49 F042 001 2: - Wrench	
1:49 L018 901 2: - Injector checker		-		-	

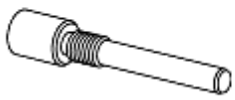
ENGINE SST [LF]

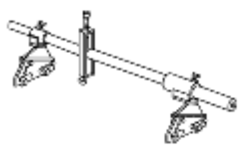
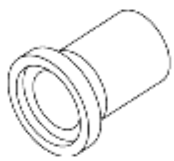
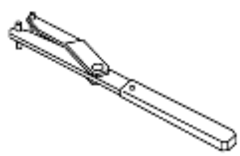
B3E016001001W02

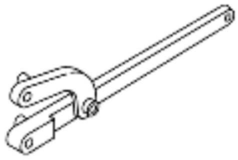
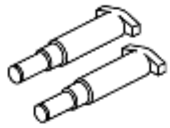
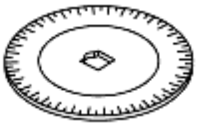
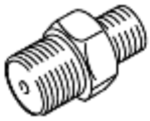
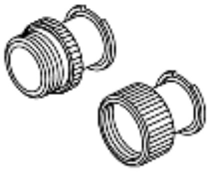
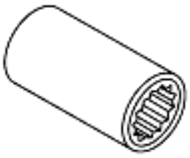
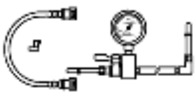
1: Mazda **SST** number

2: Global **SST** number

Example

1:49 JE01 061 2:303-507 Crankshaft TDC setting pin	

49 E017 5A0 2: -		1:49 H010 401 2: -		1:49 G032 354 2: -	

Engine support set		Oil seal installer		Adjusting wrench	
1:49 JE01 061 2:303-507 Crankshaft TDC setting pin		1:49 UN20 5072 2:205-072 Holder		1:49 B011 105 2: - Adapter	
1:49 D032 316 2: - Protractor		1:49 JE01 054 2: - Camshaft Alignment Timing Tool (Europe)		1:49 UN30 3376 2: 303-376 Camshaft Alignment Timing Tool (Except Europe)	
1:49 0187 280A 2: - Oil pressure gauge		1:49 E019 001 2: - Adapter		1: - 2: - WDS	
1:49 B015 0A0 2:- Adapter set		1:49 D015 001 2: - Box wrench		1: 49 F042 001 2: - Wrench	
1:49 N013 1A0C 2:- Fuel pressure gauge set		1:49 L018 001 2: - O2 sensor wrench		-	