Please change. [L8,LF] ⇒ [LF]

ENGINE

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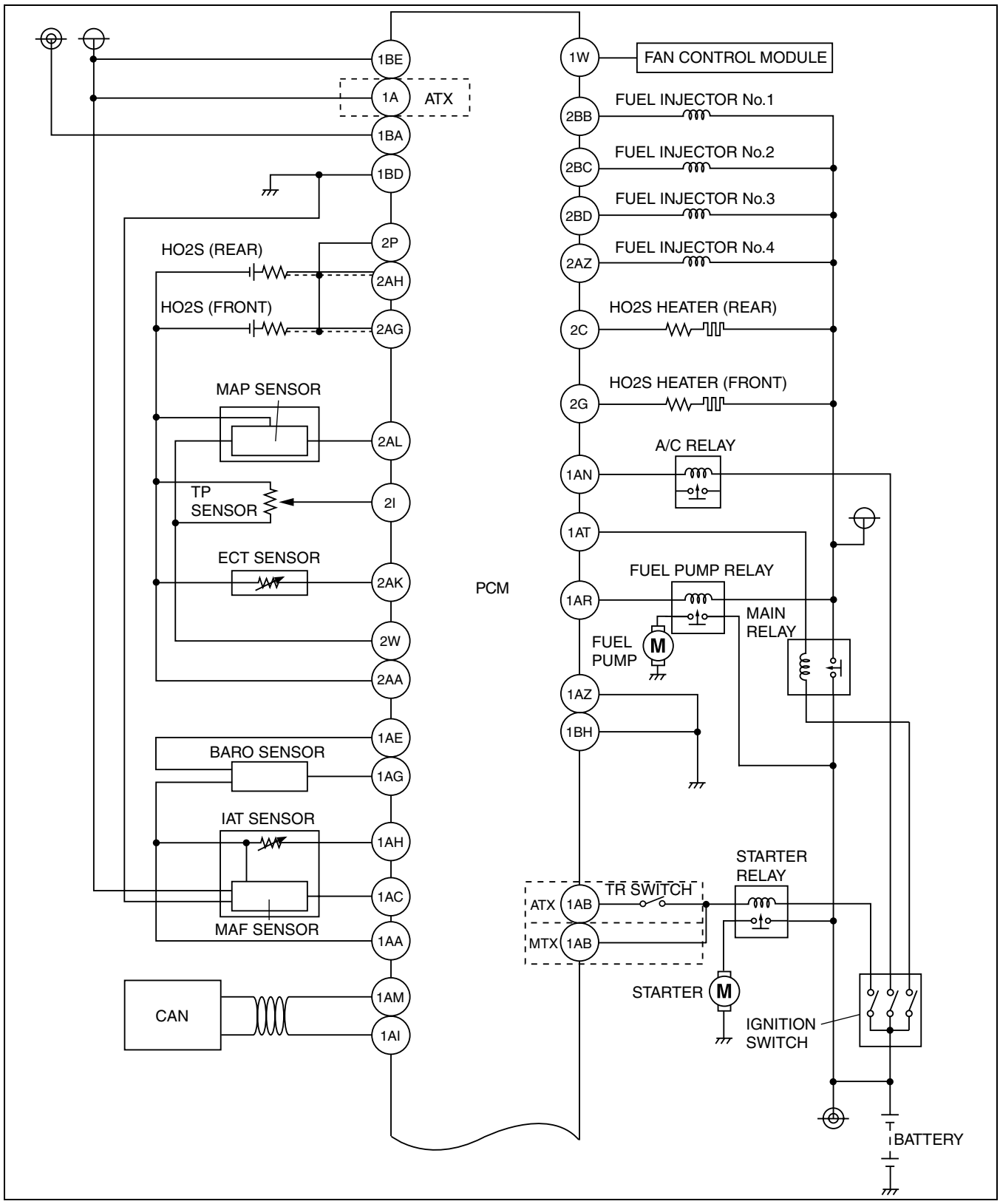
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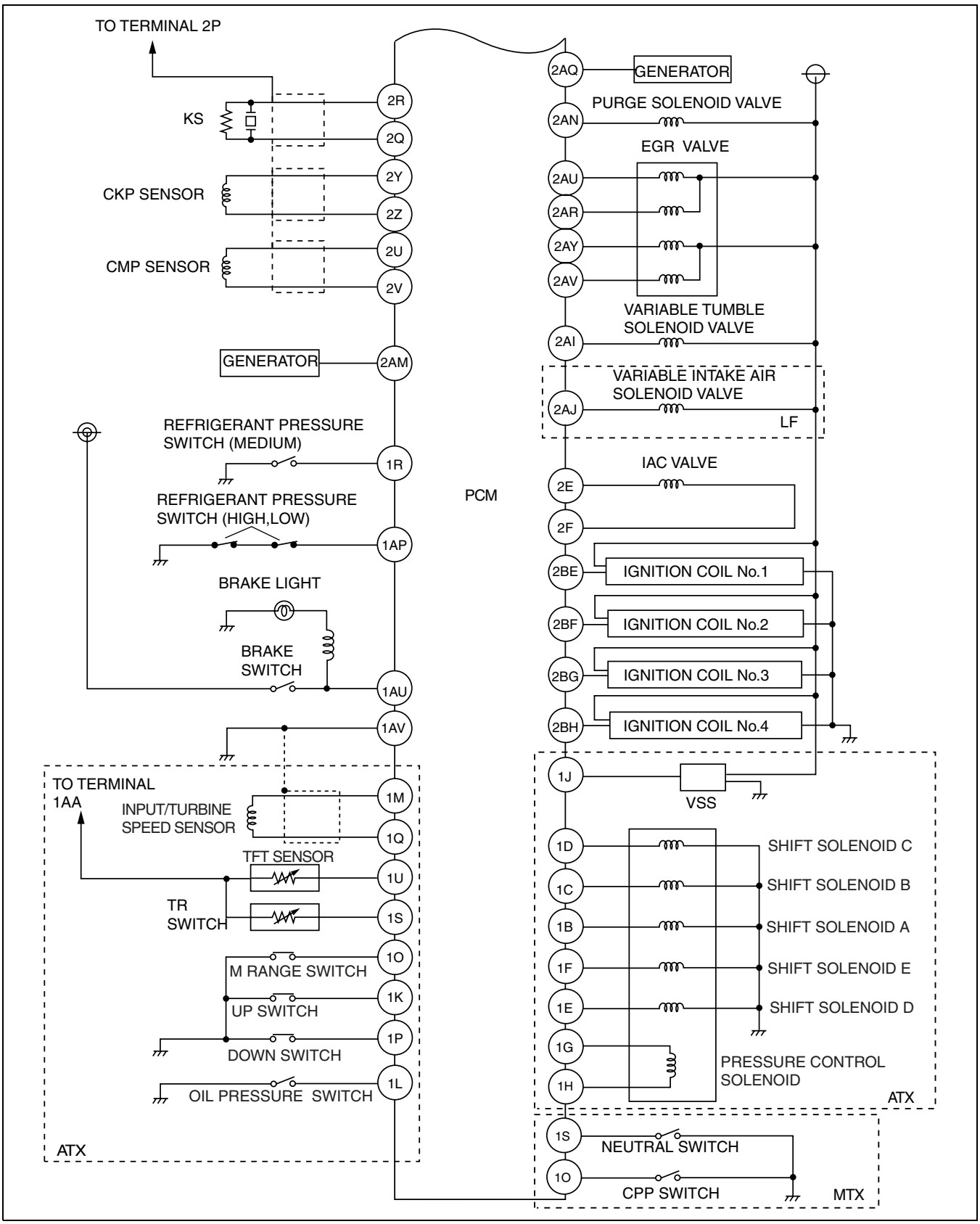
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CONTROL SYSTEM WIRING DIAGRAM [L8, LF]

DPE010200000W34



DPE102ZW2002



DPE102ZW2003

MONITORING SYSTEM AND CONTROL SYSTEM DEVICE RELATIONSHIP CHART [L8, LF]

DPE010200000W35

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 (Vehicles equipped with BARO sensor built into PCM)	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 [L8, LF]

DPE010200000W36

- These appear when a problem is detected in a monitored system. The code for a failed system is stored in the PCM memory in the first drive cycle. This code is called the pending code. If the PCM determines that the system has returned to normal or the problem was mistakenly detected, it deletes the pending code. If the problem is found in a second drive cycle too, the PCM determines that the system has failed, and the DTC is stored.

OBD FREEZE FRAME DATA [L8, LF]

DPE010200000W37

- 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 [L8, LF]

DPE010200000W38

- This shows the OBD systems operating status. If any monitor function is incomplete, the 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 these 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 [L8, LF]

DPE010200000W39

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

OBD PARAMETER IDENTIFICATION (PID) ACCESS [L8, LF]

DPE010200000W40

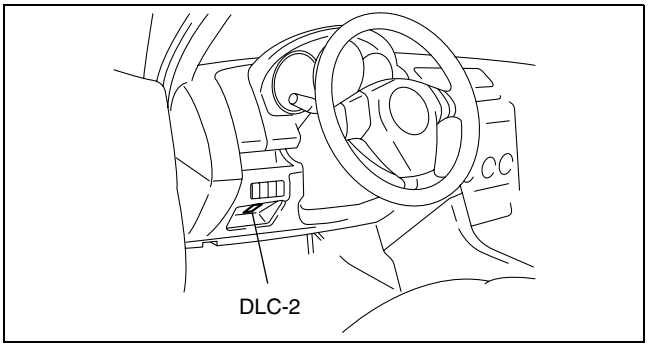
- The PID mode allows access to certain data values, analog and digital inputs and outputs, calculated values and system status information. Since the PID values for output devices are the PCM internal data values, inspect each device to identify which output devices are malfunctioning.

ON-BOARD DIAGNOSTIC TEST [L8, LF]

DPE010200000W41

DTC Reading Procedure

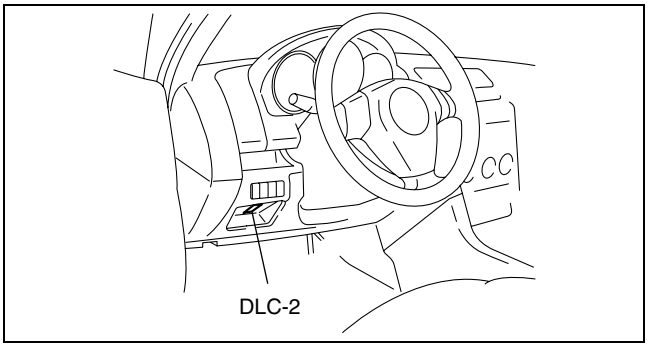
1. Perform the necessary vehicle preparation and visual inspection.
2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.
3. Retrieve the DTCs using the WDS or equivalent.



DPE102ZW2001

Pending Trouble Code Access Procedure

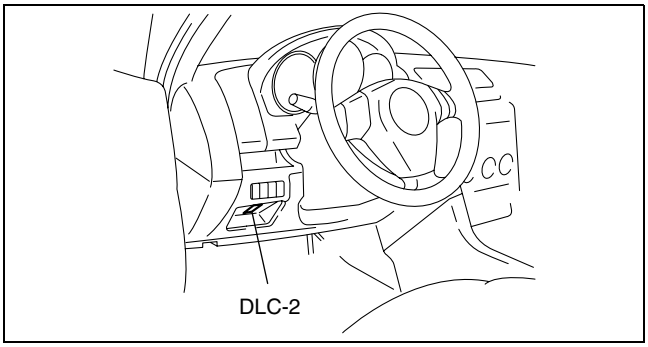
1. Perform the necessary vehicle preparation and visual inspection.
2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.
3. Retrieve the pending trouble codes using the WDS or equivalent.



DPE102ZW2001

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

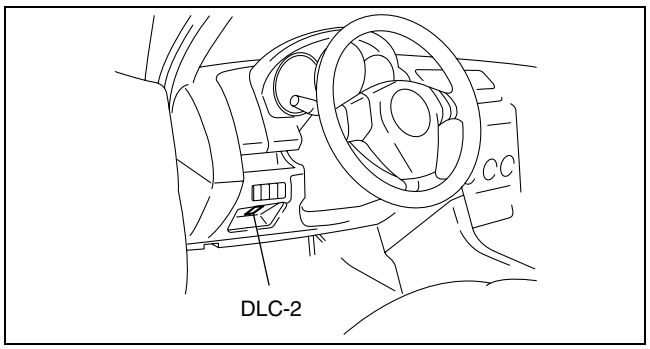


DPE102ZW2001

On-Board System Readiness Tests Access Procedure

1. Perform the necessary vehicle preparation and visual inspection.

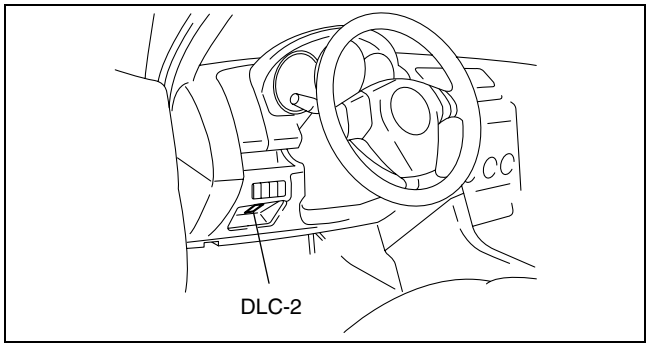
2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.
3. Monitor the OBD-II systems operating status using the WDS or equivalent.



DPE102ZW2001

PID/DATA Monitor and Record Procedure

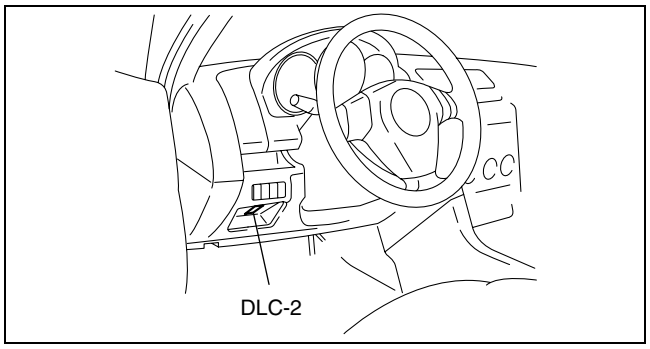
1. Perform the necessary vehicle preparation and visual inspection.
2. Connect the WDS or equivalent to the vehicle DLC-2 16-pin connector located in the driver compartment.
3. Access and monitor the PIDs using the WDS or equivalent.



DPE102ZW2001

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.

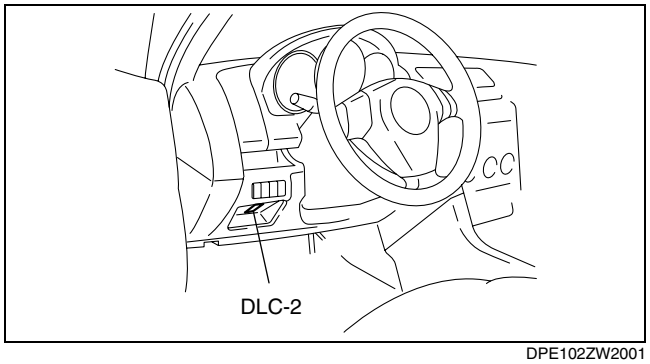


DPE102ZW2001

AFTER REPAIR PROCEDURE [L8, LF]

DPE010200000W42

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 one is retrieved.
4. Clear all diagnostic data using the WDS or equivalent.



DPE102ZW2001

OBD DRIVE MODE [L8, LF]

DPE010200000W43

- 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

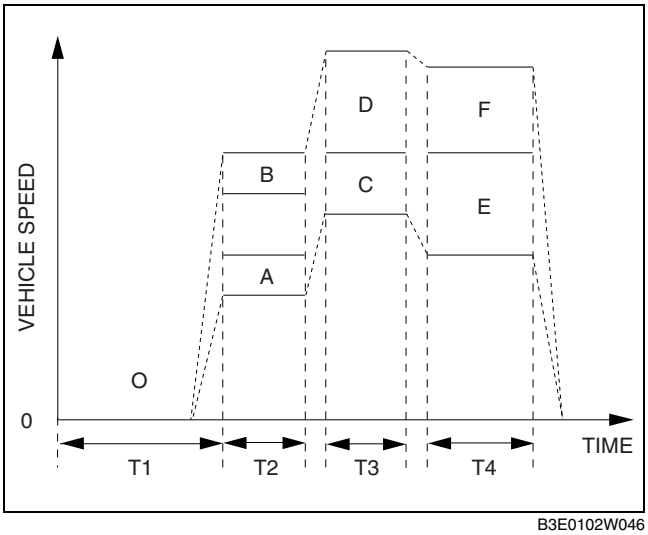
— TWC
— Fuel system and Misfire

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.
- 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 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 conditions before driving at constant speed are not specified.



B3E0102W046

For MTX

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}	

For ATX

Zone	Shift Position	Vehicle Speed (km/h {mph})	Time (s)
O	P or N	0 {0}	T1: above 455
A	M (2GR)	40—65 {25—40}	T2: above 30
B	M (3GR)	65—100 {41—62}	
C	M (2GR)	60—75 {38—46}	T3: above 20
D	M (3GR)	85—100 {53—62}	
E	M (3GR)	50—75 {32—46}	T4: above 120
F	D	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 [L8, LF]

DPE010200000W44

×: Applicable
—: Not applicable

DTC No.	Condition	MIL	DC	Monitor item	Self - test type*1	Memory function	Page
B1342	(See 08–02–29 DTC B1342)						
P0031	Front HO2S heater circuit low input	ON	2	HO2S heater	C, O, R	×	(See 01–02A–14 DTC P0031 [L8, LF])
P0032	Front HO2S heater circuit high input	ON	2	HO2S heater	C, O, R	×	(See 01–02A–16 DTC P0032 [L8, LF])
P0037	Rear HO2S heater circuit low input	ON	2	HO2S heater	C, O, R	×	(See 01–02A–17 DTC P0037 [L8, LF])
P0038	Rear HO2S heater circuit high input	ON	2	HO2S heater	C, O, R	×	(See 01–02A–20 DTC P0038 [L8, LF])
P0101	MAF sensor circuit range/performance problem	ON	2	CCM	C	×	(See 01–02A–22 DTC P0101 [L8, LF])
P0102	MAF sensor circuit low input	ON	1	CCM	C, O, R	×	(See 01–02A–24 DTC P0102 [L8, LF])
P0103	MAF sensor circuit high input	ON	1	CCM	C, O, R	×	(See 01–02A–27 DTC P0103 [L8, LF])
P0107	MAP sensor circuit low input	ON	1	CCM	C, O, R	×	(See 01–02A–28 DTC P0107 [L8, LF])
P0108	MAP sensor circuit high input	ON	1	CCM	C, O, R	×	(See 01–02A–31 DTC P0108 [L8, LF])

DTC No.	Condition	MIL	DC	Monitor item	Self - test type*1	Memory function	Page
P0111	IAT sensor circuit range/performance problem	ON	2	CCM	C	×	(See 01–02A–33 DTC P0111 [L8, LF])
P0112	IAT sensor circuit low input	ON	1	CCM	C, O, R	×	(See 01–02A–34 DTC P0112 [L8, LF])
P0113	IAT sensor circuit high input	ON	1	CCM	C, O, R	×	(See 01–02A–35 DTC P0113 [L8, LF])
P0117	ECT sensor circuit low input	ON	1	CCM	C, O, R	×	(See 01–02A–38 DTC P0117 [L8, LF])
P0118	ECT sensor circuit high input	ON	1	CCM	C, O, R	×	(See 01–02A–39 DTC P0118 [L8, LF])
P0121	TP sensor stuck closed	ON	2	CCM	C	×	(See 01–02A–42 DTC P0121 [L8, LF])
P0122	TP sensor circuit low input	ON	1	CCM	C, O, R	×	(See 01–02A–45 DTC P0122 [L8, LF])
P0123	TP sensor circuit high input	ON	1	CCM	C, O, R	×	(See 01–02A–46 DTC P0123 [L8, LF])
P0125	Excessive time to enter closed loop fuel control	ON	2	CCM	C	×	(See 01–02A–49 DTC P0125 [L8, LF])
P0132	Front HO2S circuit high input	ON	2	HO2S	C, O, R	×	(See 01–02A–51 DTC P0132 [L8, LF])
P0133	Front HO2S circuit problem	ON	2	HO2S	C	×	(See 01–02A–53 DTC P0133 [L8, LF])
P0134	Front HO2S no activity detected	ON	2	HO2S	C, R	×	(See 01–02A–55 DTC P0134 [L8, LF])
P0138	Rear HO2S circuit high input	ON	2	HO2S	C, O, R	×	(See 01–02A–58 DTC P0138 [L8, LF])
P0140	Rear HO2S no activity detected	ON	2	HO2S	C, R	×	(See 01–02A–60 DTC P0140 [L8, LF])
P0300	Random misfire detected	Flash/ ON	1 or 2	Misfire	C, R	×	(See 01–02A–62 DTC P0300 [L8, LF])
P0301	Cylinder No.1 misfire detected	Flash/ ON	1 or 2	Misfire	C, R	×	(See 01–02A–66 DTC P0301, P0302, P0303, P0304 [L8, LF])
P0302	Cylinder No.2 misfire detected	Flash/ ON	1 or 2	Misfire	C, R	×	
P0303	Cylinder No.3 misfire detected	Flash/ ON	1 or 2	Misfire	C, R	×	
P0304	Cylinder No.4 misfire detected	Flash/ ON	1 or 2	Misfire	C, R	×	
P0327	KS circuit low input	ON	1	CCM	C, O, R	×	(See 01–02A–68 DTC P0327 [L8, LF])
P0328	KS circuit high input	ON	1	CCM	C, O, R	×	(See 01–02A–71 DTC P0328 [L8, LF])
P0335	CKP sensor circuit problem	ON	1	CCM	C	×	(See 01–02A–72 DTC P0335 [L8, LF])

DTC No.	Condition	MIL	DC	Monitor item	Self - test type[*1]	Memory function	Page
P0340	CMP sensor circuit problem	ON	1	CCM	C	×	(See 01–02A–75 DTC P0340 [L8, LF])
P0403	EGR valve (stepper motor) circuit problem	ON	2	CCM	C, O, R	×	(See 01–02A–78 DTC P0403 [L8, LF])
P0421	Warm up three way catalyst system efficiency below threshold	ON	2	Catalyst	C	×	(See 01–02A–81 DTC P0421 [L8, LF])
P0443	Purge solenoid valve circuit problem	ON	2	CCM	C, O, R	×	(See 01–02A–82 DTC P0443 [L8, LF])
P0480	Cooling fan control circuit problem	OFF	1	Other	C, O, R	×	(See 01–02A–85 DTC P0480 [L8, LF])
P0500	VSS circuit problem	ON	2	CCM	C	×	(See 01–02A–87 DTC P0500 [L8, LF])
P0505	IAC system problem	OFF	—	Other	R	—	(See 01–02A–87 DTC P0505 [L8, LF])
P0506	Idle control system RPM lower than expected	ON	2	CCM	C	×	(See 01–02A–89 DTC P0506 [L8, LF])
P0507	Idle control system RPM higher than expected	ON	2	CCM	C	×	(See 01–02A–91 DTC P0507 [L8, LF])
P0511	IAC valve circuit problem	ON	1	CCM	C, O, R	×	(See 01–02A–92 DTC P0511 [L8, LF])
P0602	PCM programming error	ON	1	CCM	C, O, R	×	(See 01–02A–95 DTC P0602 [L8, LF])
P0610	PCM vehicle options error	ON	1	CCM	C, O, R	×	(See 01–02A–95 DTC P0610 [L8, LF])
P0661[*2]	Variable intake air solenoid valve circuit low input	OFF	1	Other	C, O, R	×	(See 01–02A–96 DTC P0661 [LF])
P0662[*2]	Variable intake air solenoid valve circuit high input	OFF	1	Other	C, O, R	×	(See 01–02A–99 DTC P0662 [LF])
P0703	Brake switch input circuit problem	ON	2	CCM	C	×	(See 01–02A–101 DTC P0703 [L8, LF])
P0704[*3]	CPP switch input circuit problem	ON	2	CCM	C	×	(See 01–02A–103 DTC P0704 [L8, LF])
P0706[*4]	Transaxle range (TR) switch circuit range/performance	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0707[*4]	Transaxle range (TR) switch circuit low input	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0708[*4]	Transaxle range (TR) switch circuit high input	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0711[*4]	Transaxle fluid temperature (TFT) sensor circuit range/performance (stuck)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0712[*4]	Transaxle fluid temperature (TFT) sensor circuit malfunction (short to ground)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0713[*4]	Transaxle fluid temperature (TFT) sensor circuit malfunction (open circuit)	(See 05–02–8 DTC TABLE [FN4A-EL].)					

DTC No.	Condition	MIL	DC	Monitor item	Self - test type*1	Memory function	Page
P0715*4	Input/turbine speed sensor circuit malfunction	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0720*4		(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0731*4	Gear 1 incorrect (incorrect gear ratio detected)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0732*4	Gear 2 incorrect (incorrect gear ratio detected)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0733*4	Gear 3 incorrect (incorrect gear ratio detected)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0734*4	Gear 4 incorrect (incorrect gear ratio detected)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0741*4	Torque converter clutch (TCC) (stuck off)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0742*4	Torque converter clutch (TCC) (stuck on)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0745*4	Pressure control solenoid malfunction	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0751*4	Shift solenoid A stuck off	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0752*4	Shift solenoid A stuck on	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0753*4	Shift solenoid A malfunction (electrical)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0756*4	Shift solenoid B stuck off	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0757*4	Shift solenoid B stuck on	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0758*4	Shift solenoid B malfunction (electrical)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0761*4	Shift solenoid C stuck off	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0762*4	Shift solenoid C stuck on	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0763*4	Shift solenoid C malfunction (electrical)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0766*4	Shift solenoid D stuck off	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0767*4	Shift solenoid D stuck on	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0768*4	Shift solenoid D malfunction (electrical)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0771*4	Shift solenoid E stuck off	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0772*4	Shift solenoid E stuck on	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0773*4	Shift solenoid E malfunction (electrical)	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0841*4	Oil pressure switch circuit malfunction	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P0850*3	Neutral switch input circuit problem	ON	2	CCM	C	×	(See 01–02A–106 DTC P0850 [L8, LF])
P0894*4	Forward clutch torque transmission	(See 05–02–8 DTC TABLE [FN4A-EL].)					
P1260	Immobilizer system problem	OFF	1	Other	C, O	×	(See 01–02A–109 DTC P1260 [L8, LF])
P2009	Variable tumble solenoid valve circuit low input	ON	2	CCM	C, O, R	×	(See 01–02A–110 DTC P2009 [L8, LF])
P2010	Variable tumble solenoid valve circuit high input	ON	2	CCM	C, O, R	×	(See 01–02A–113 DTC P2010 [L8, LF])
P2096	Target A/F feedback system too lean	ON	2	Fuel system	C	×	(See 01–02A–115 DTC P2096 [L8, LF])
P2097	Target A/F feedback system too rich	ON	2	Fuel system	C	×	(See 01–02A–118 DTC P2097 [L8, LF])
P2177	Fuel system too lean at off idle	ON	2	Fuel system	C, R	×	(See 01–02A–120 DTC P2177 [L8, LF])

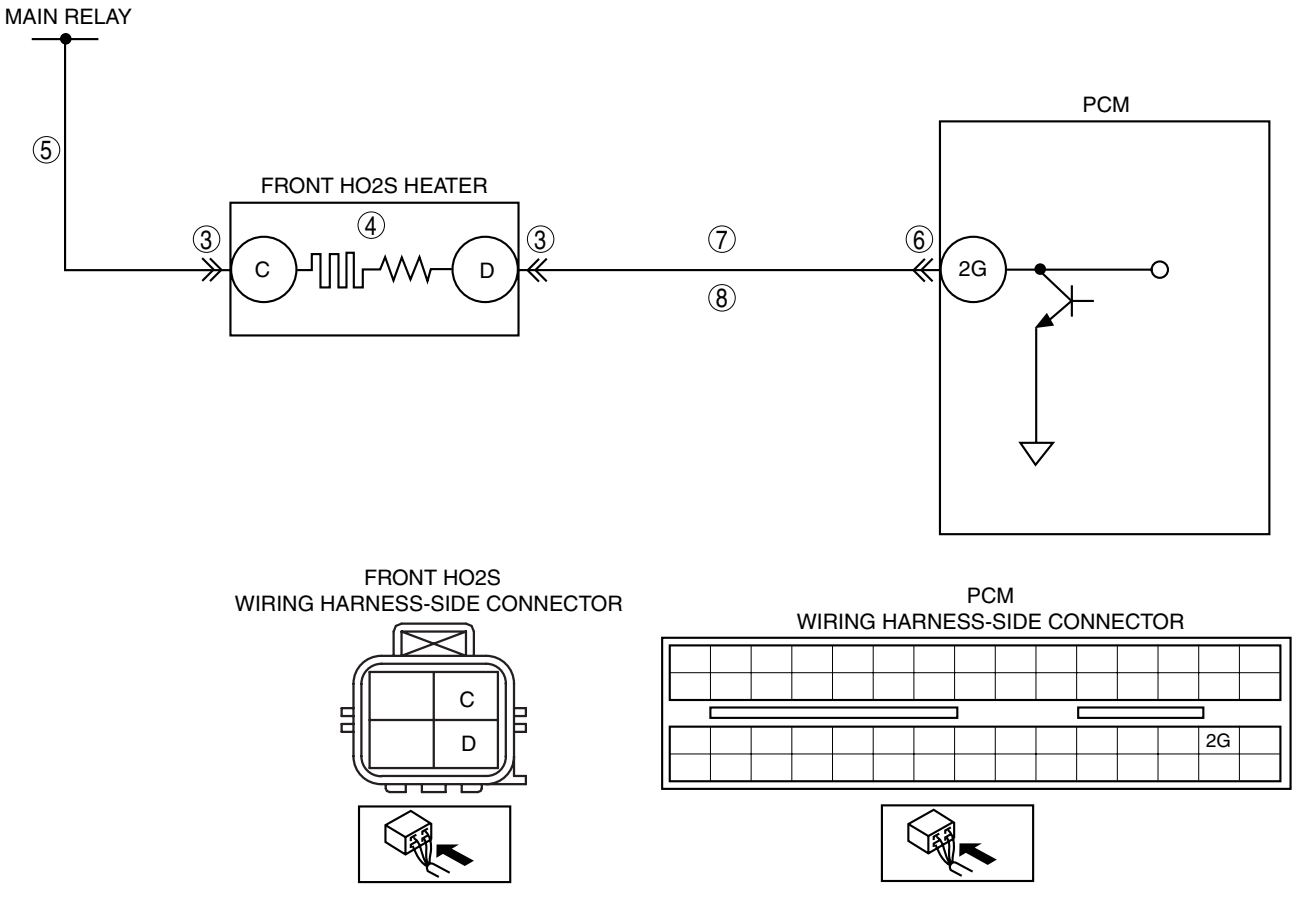
DTC No.	Condition	MIL	DC	Monitor item	Self - test type*1	Memory function	Page
P2178	Fuel system too rich at off idle	ON	2	Fuel system	C, R	×	(See 01–02A–122 DTC P2178 [L8, LF])
P2187	Fuel system too lean at idle	ON	2	Fuel system	C, R	×	(See 01–02A–125 DTC P2187 [L8, LF])
P2188	Fuel system too rich at idle	ON	2	Fuel system	C, R	×	(See 01–02A–127 DTC P2188 [L8, LF])
P2195	Front HO2S signal stuck lean	ON	2	HO2S	C	×	(See 01–02A–130 DTC P2195 [L8, LF])
P2196	Front HO2S signal stuck rich	ON	2	HO2S	C	×	(See 01–02A–132 DTC P2196 [L8, LF])
P2228*5	BARO sensor circuit low input	ON	1	CCM	C, O, R	×	(See 01–02A–134 DTC P2228 [LF (Vehicles equipped with BARO sensor built into PCM)])
P2229*5	BARO sensor circuit high input	ON	1	CCM	C, O, R	×	(See 01–02A–134 DTC P2229 [LF (Vehicles equipped with BARO sensor built into PCM)])
P2502	Charging system voltage problem	OFF	1	Other	C, R	×	(See 01–02A–135 DTC P2502 [L8, LF])
P2503	Charging system voltage low	OFF	1	Other	C, R	×	(See 01–02A–137 DTC P2503 [L8, LF])
P2504	Charging system voltage high	OFF	1	Other	C, R	×	(See 01–02A–140 DTC P2504 [L8, LF])
P2507	PCM B+ voltage low	ON	1	CCM	C, O, R	×	(See 01–02A–142 DTC P2507 [L8, LF])
U0073	CAN system communication error	(See 09–02–5 DTC TABLE [MULTIPLEX COMMUNICATION SYSTEM])					
U0121	Communication error to ABS HU/CM	(See 09–02–5 DTC TABLE [MULTIPLEX COMMUNICATION SYSTEM])					
U0155	Communication error to instrument cluster	(See 09–02–5 DTC TABLE [MULTIPLEX COMMUNICATION SYSTEM])					

*1 : C; CMDTC Self test, O; KOEO self test, R; KOER self test
*2 : LF
*3 : MTX
*4 : ATX
*5 : Vehicles equipped with BARO sensor built into PCM

DTC P0031 [L8, LF]

DPE010200001W20

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 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 • 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



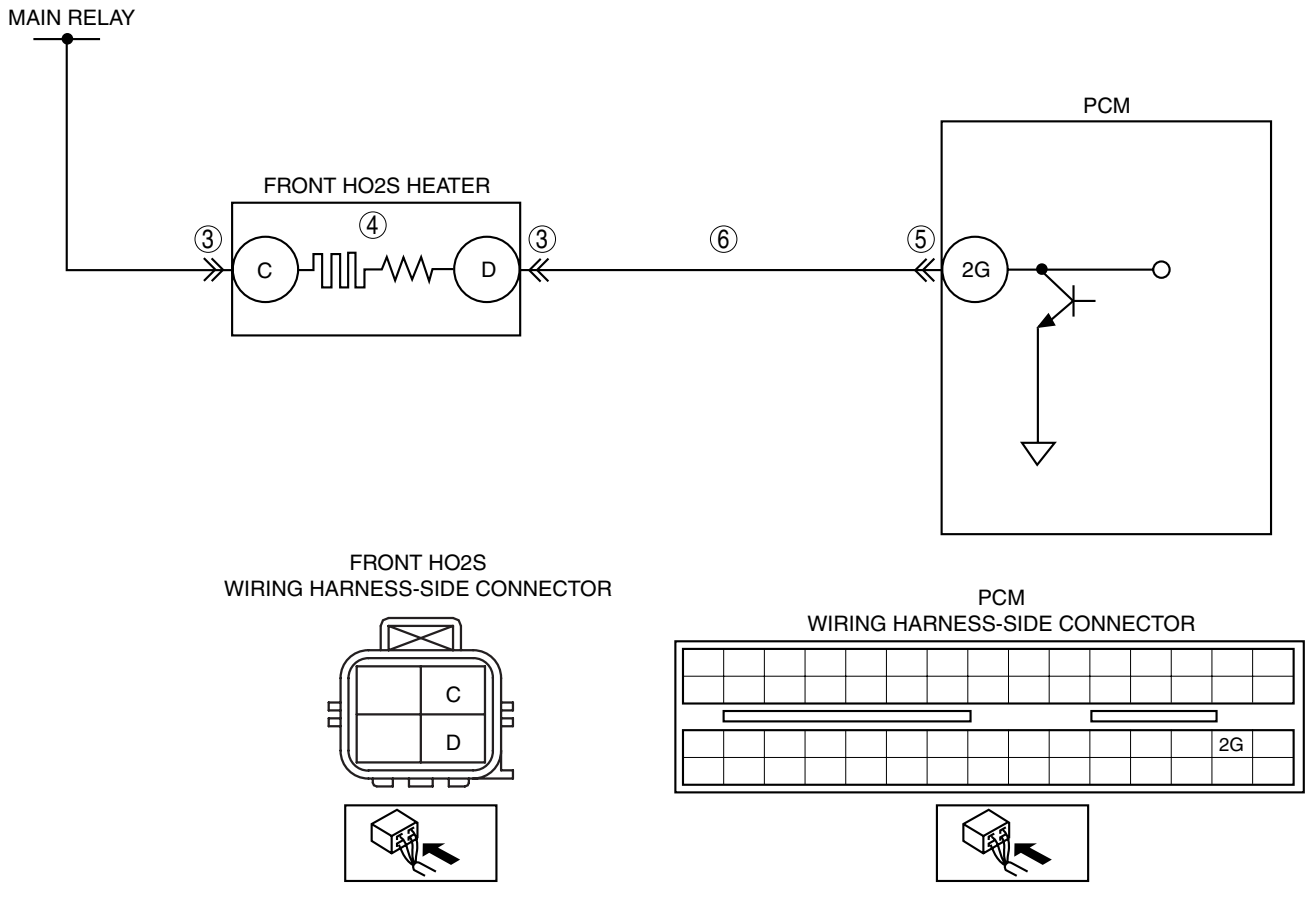
Diagnostic procedure

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 AVAILABILITYINSPECT FRONT HO2S CONNECTOR FOR POOR CONNECTION** • 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** • Inspect the front HO2S heater. (See 01–40–35 FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF].) • Is the front HO2S heater normal?	Yes	Go to the next step.
		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 an 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 a 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 an 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0032 [L8, LF]

DPE010200001W21

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, the PCM determines that the front HO2S heater circuit has a malfunction. **Note** • The 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 the wiring harness between front HO2S terminal D and PCM terminal 2G • Short circuit in the front HO2S or the PCM terminal • Font HO2S heater malfunction • PCM malfunction



Diagnostic procedure

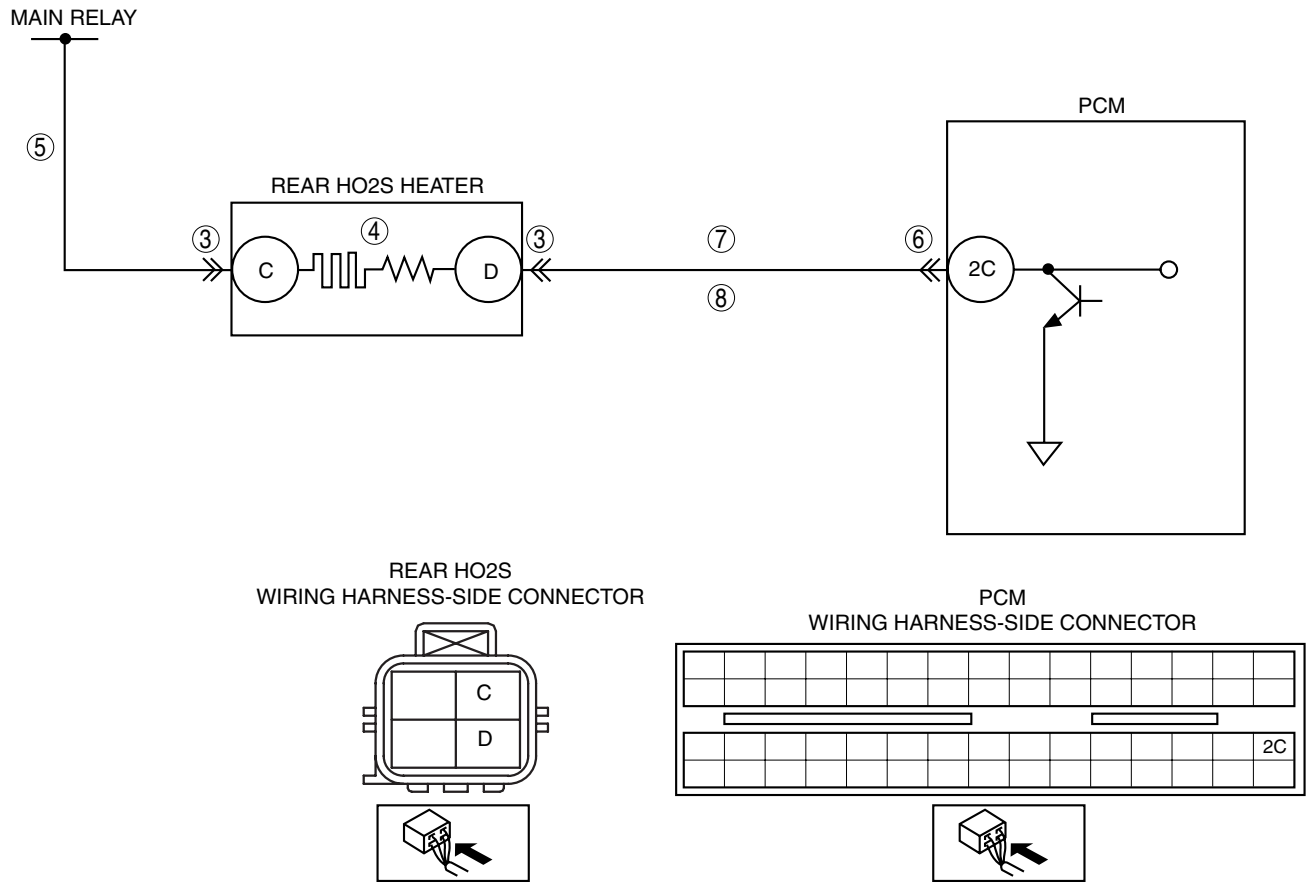
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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. (See 01–40–35 FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF].) • Is the front HO2S heater normal?	Yes	Go to the next step.
		No	Replace the front 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 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 a short to the 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0037 [L8, LF]

DPE010200001W22

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 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.

DTC P0037	Rear HO2S heater circuit low input
POSSIBLE CAUSE	• Rear HO2S malfunction • Open circuit in the wiring harness between the main relay and rear HO2S terminal C • Open circuit in the wiring harness between rear HO2S terminal D and PCM terminal 2C • Short to ground in the wiring harness between rear HO2S terminal D and PCM terminal 2C • Poor connection at the rear HO2S or the PCM connector • PCM malfunction



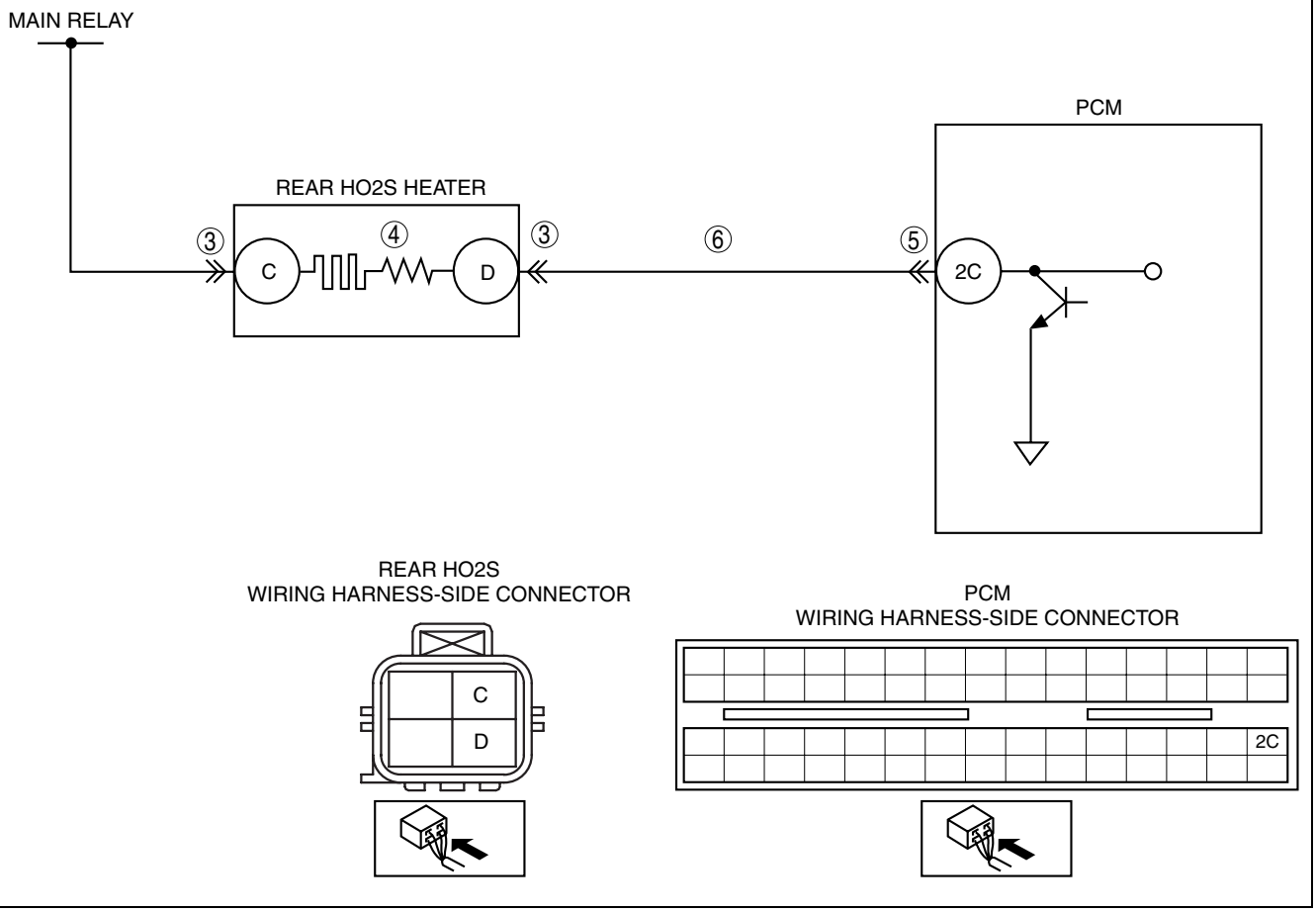
Diagnostic procedure

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 01–40–37 REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, 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 an 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 the terminal, then go to Step 9.
		No	Go to the next step.
7	**INSPECT REAR HO2S HEATER CONTROL CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between rear HO2S terminal D (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for a short to ground, then go to Step 9.
		No	Go to the next step.
8	**INSPECT REAR 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 an 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0038 [L8, LF]

DPE010200001W23

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 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 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 the rear HO2S heater. (See 01–40–37 REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF].) • Is the 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 a shot to the 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0101 [L8, LF]

DPE010200100W49

DTC P0101	MAF sensor circuit range/performance problem
DETECTION CONDITION	• The PCM compares actual MAF amount with the 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 the throttle opening angle is **above 50%** with the engine running, the PCM determines that the 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 the 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 the 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 the MAF signal circuit • Electrical corrosion in the MAF RETURN circuit • Voltage drop in the MAF signal circuit • Voltage drop in the 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	**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 the MAF PID when the TP PID is **above 50%**. • Is the 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 the ECT, MAF and RPM PIDs. • Warm up the engine until the ECT PID is **above 80°C {176 °F}**. • Read the 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 the INTERMITTENT CONCERNS TROUBLESHOOTING procedure. (See 01–03–55 INTERMITTENT CONCERN TROUBLESHOOTING [L8, 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. • Inspect for poor connection (damaged/pulled-out pins, corrosion, etc.). • Is there any malfunction?	Yes	Repair the terminal, then go to the next step.
		No	Replace the MAF/IAT sensor, then go to the next step.
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 the ECT, TP and RPM PIDs. • Warm up the engine until the ECT PID is reading **above 80°C {176°F}**. • Drive the vehicle while the TP PID is **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.

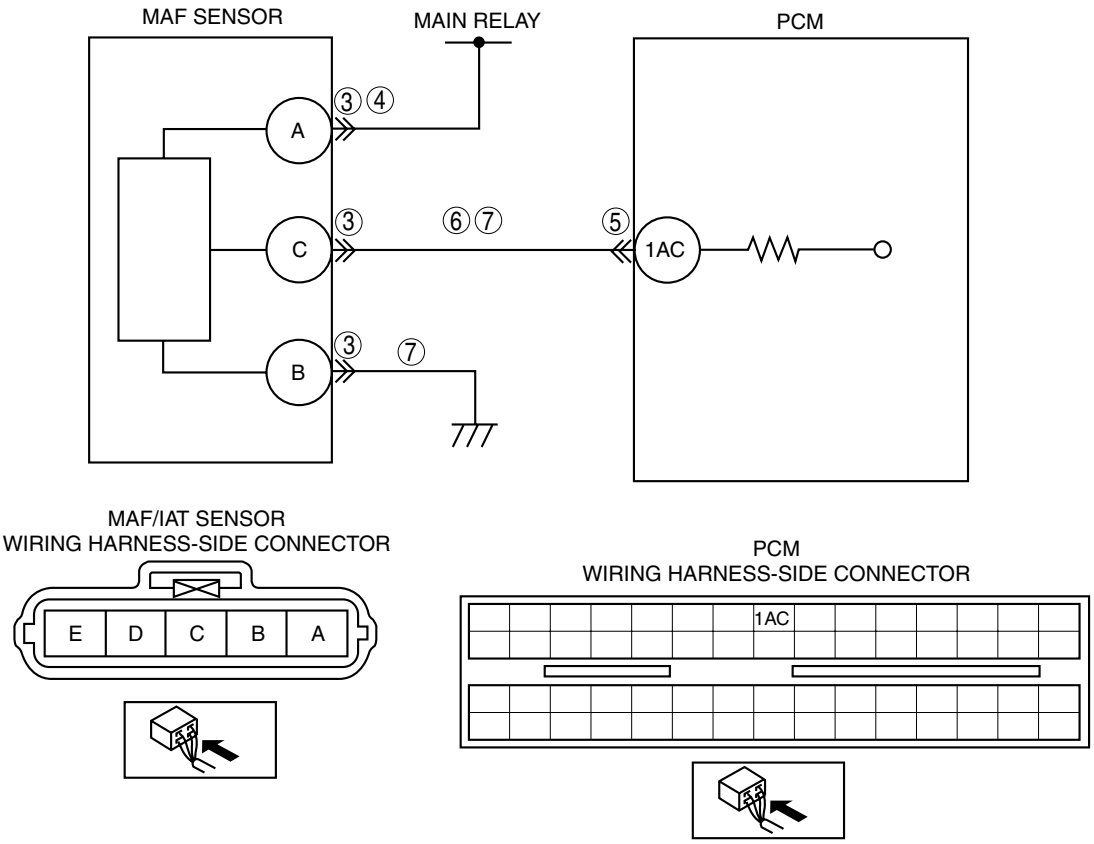
STEP	INSPECTION		ACTION
9	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion.) • Is there any malfunction?	Yes	Repair the terminal, then go to the next step.
		No	Go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P0101 COMPLETED** • Make sure to reconnect all disconnected connectors. • Turn the ignition switch to the ON position (Engine off). • Clear the DTC from the memory using the WDS or equivalent. • Start the engine. • Warm up the engine until the ECT PID is **above 80 °C {176 °F}**. • Drive the vehicle while the RPM PID is at **2,000 rpm** for **50 s**. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0102 [L8, LF]

DPE010200100W50

DTC P0102	MAF sensor circuit low input
DETECTION CONDITION	• The PCM monitors input voltage from the MAF sensor when the engine is running. If the input voltage at PCM terminal 1AC is **below 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 during the first drive cycle. • 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 the wiring harness between MAF/IAT sensor terminal C and PCM terminal 1AC • Open circuit in the wiring harness between MAF/IAT sensor terminal C and PCM terminal 1AC • Open circuit in the wiring harness between the main relay and MAF/IAT sensor terminal A • PCM malfunction

DTC P0102	MAF sensor circuit low input



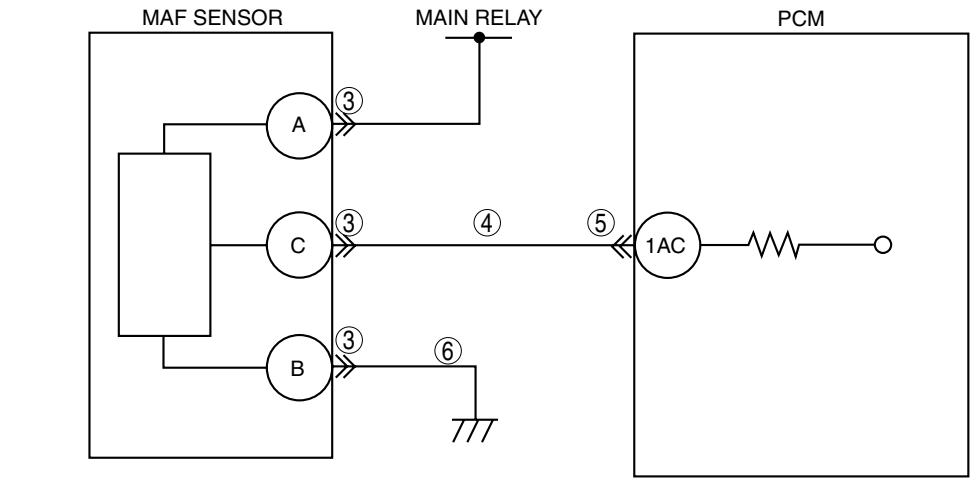
Diagnostic procedure

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	**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+**?	Yes	Go to the next step.
		No	Inspect for an open circuit in the wiring harness between MAF/IAT sensor terminal A (wiring harness-side) and the main relay. Repair or replace the 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 the 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

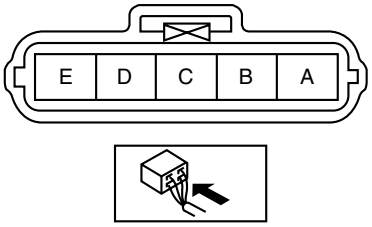
DTC P0103 [L8, LF]

DPE010200100W51

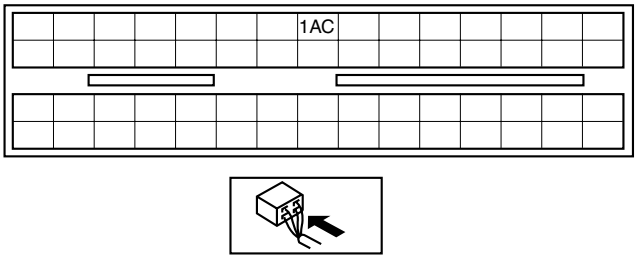
DTC P0103	MAF sensor circuit high input
DETECTION CONDITION	• The PCM monitors the input voltage from the MAF sensor when the engine is running. If the input voltage at PCM terminal 1AC is **above 4.9 V**, the PCM determines that the MAF circuit has a malfunction. **Diagnostic support note** • This is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



MAF/IAT SENSOR
WIRING HARNESS-SIDE CONNECTOR



PCM
WIRING HARNESS-SIDE CONNECTOR



Diagnostic procedure

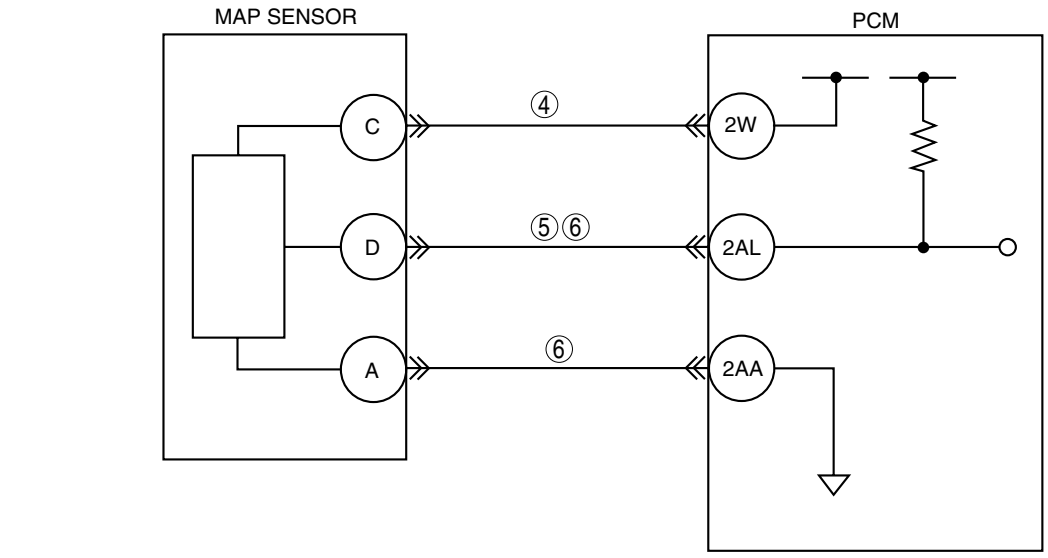
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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). • Measure the voltage between MAF/IAT sensor terminal C (wiring harness-side) and body ground. • Is the voltage **0 V**?	Yes	Go to the next step.
		No	Repair or replace the wiring harness, then go to Step 7.
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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

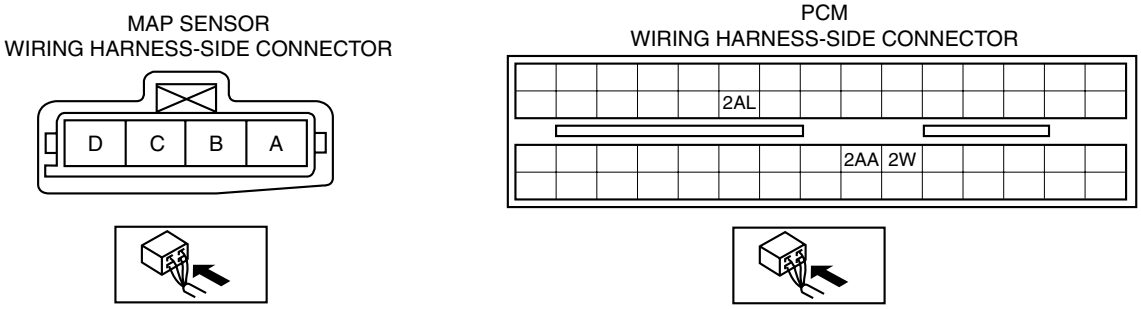
DTC P0107 [L8, LF]

DPE010200100W52

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 the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.

DTC P0107	MAP sensor circuit low input
POSSIBLE CAUSE	• MAP sensor malfunction • Connector or terminal malfunction • Short to ground in the wiring harness between MAP sensor terminal D and PCM terminal 2AL • Open circuit in the wiring harness between MAP sensor terminal C and PCM terminal 2W • MAP sensor signal circuit and MAP sensor ground circuit are shorted to each other • PCM malfunction





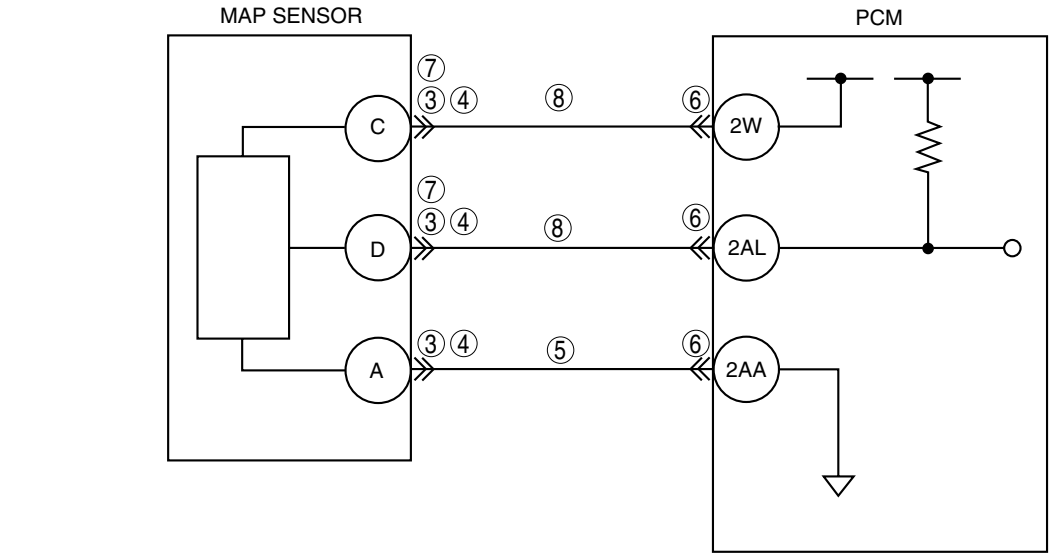
Diagnostic procedure

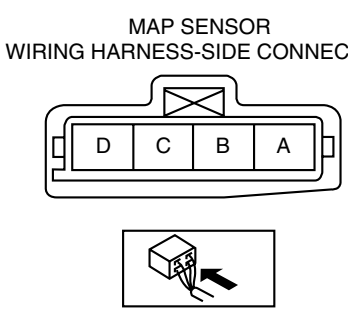
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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 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 the 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 an open circuit in the wiring harness between PCM terminal 2W (wiring harness-side) and MAP sensor terminal C (wiring harness-side). Repair or replace the 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	**INSPECT MAP SENSOR SIGNAL AND GROUND CIRCUIT FOR SHORT TO EACH OTHER** • Inspect for continuity between MAP sensor terminals D and A (wiring harness-side). • Is there continuity?	Yes	Repair or replace the wiring harness, then go to the next step.
		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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

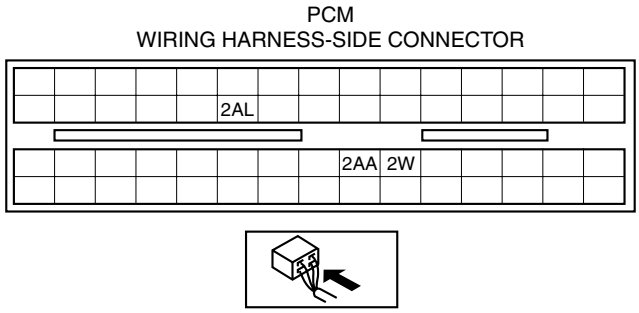
DTC P0108 [L8, LF]

DPE010200100W53

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 the input voltage at PCM terminal 2AL is **above 4.9V**, 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 the first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• MAP sensor malfunction • Connector or terminal malfunction • Open circuit in the wiring harness between MAP sensor terminal A and PCM terminal 2AA • Open circuit in the 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 the suspected wiring 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** • 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0111 [L8, LF]

DPE010200100W54

DTC P0111	IAT circuit range/performance problem
DETECTION CONDITION	• If the intake air temperature is higher than the engine coolant temperature by **40 °C {72 °F}** with the ignition switch in the ON position, the PCM determines that there is a IAT sensor performance 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 the 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

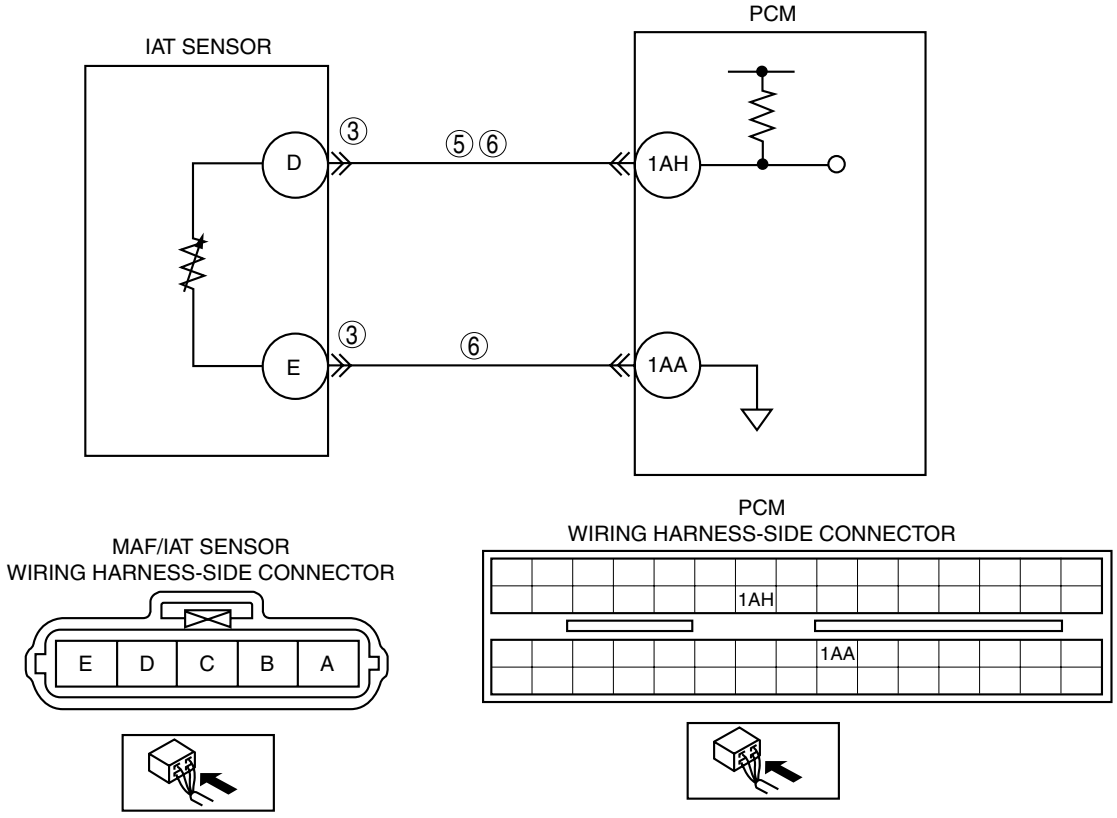
Diagnostic procedure

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 the 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 01–40–27 INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [L8, 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 the FREEZE FRAME DATA condition. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
7	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0112 [L8, LF]

DPE010200100W55

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 is **below 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 during the first drive cycle. • FREEZE FRAME DATA is available. • DTCs are stored in the PCM memory.
POSSIBLE CAUSE	• IAT sensor malfunction • Poor connection at MAF/IAT sensor or PCM connection • Short to ground in the wiring harness between MAF/IAT sensor terminal D and PCM terminal 1AH • Short to each wiring harness at IAT signal circuit and IAT ground circuit • PCM malfunction



Diagnostic procedure

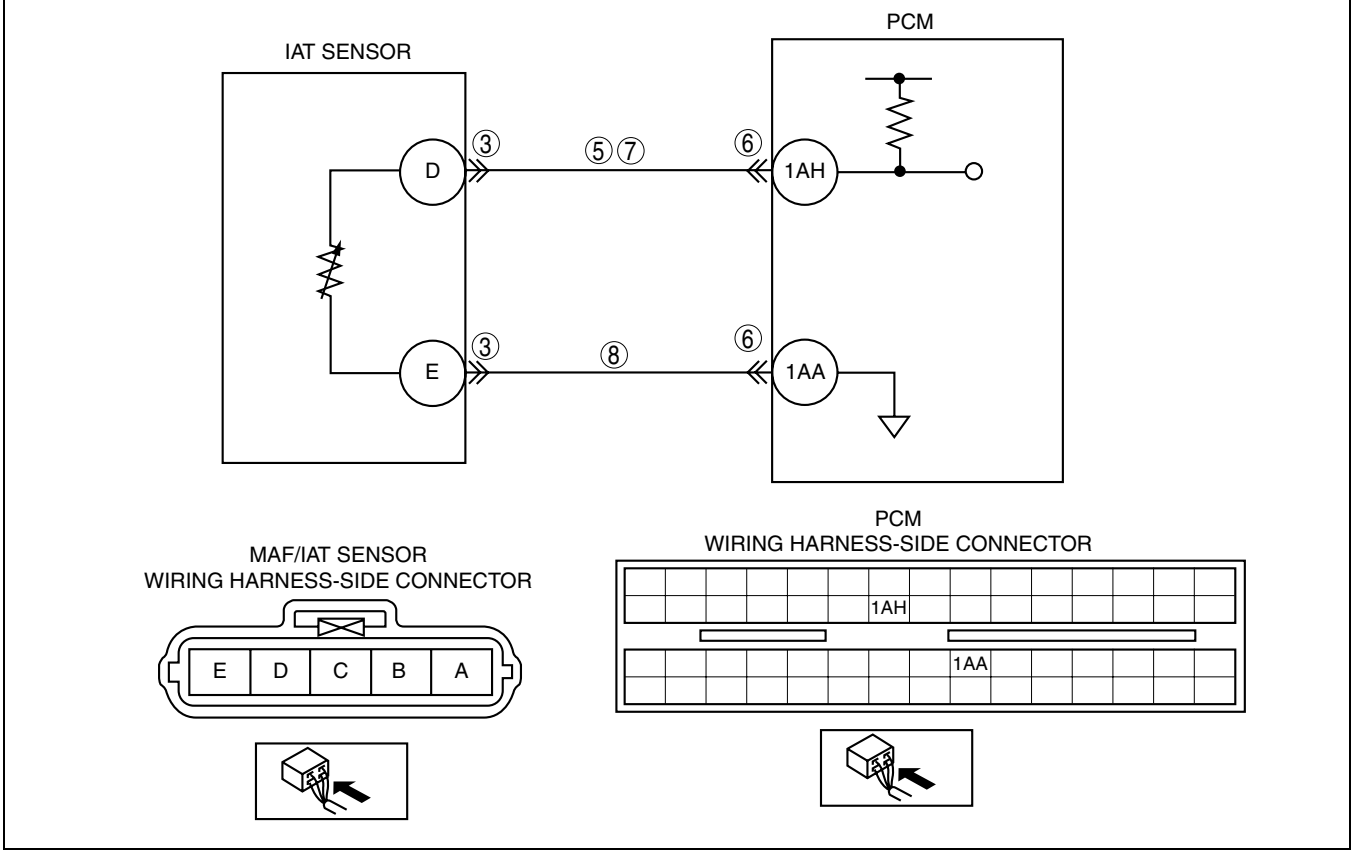
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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 terminals at 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 the IAT PID. • Verify IAT value when disconnecting the MAF/IAT sensor connector. • Does the IAT value change?	Yes	Replace the MAF/IAT sensor, then go to Step 7.
		No	Go to the next step.
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 a 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 a 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0113 [L8, LF]

DPE010200100W56

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

DTC P0113	IAT sensor circuit high input



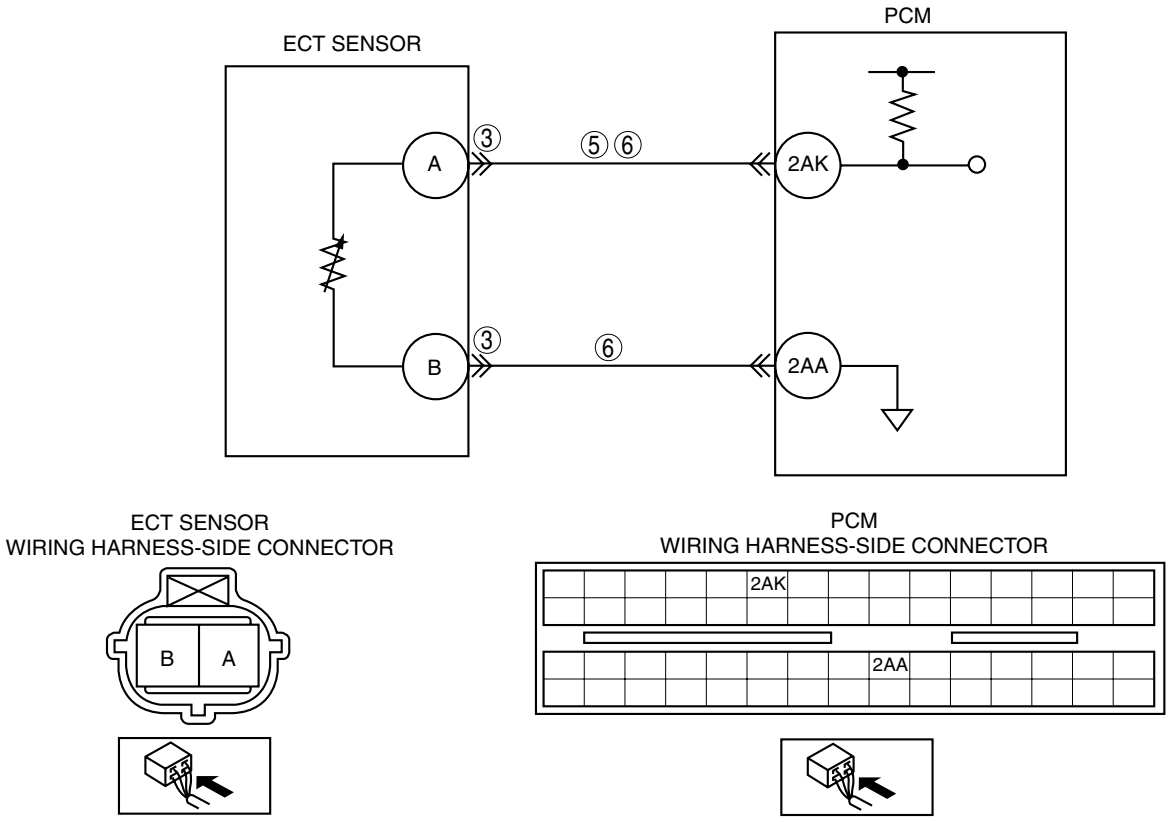
Diagnostic procedure

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 the IAT PID. • Connect a jumper wire between MAF/IAT sensor terminals D and E. • Verify the 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 a 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 a 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** • Inspect for continuity between MAF/IAT sensor terminal D (wiring harness-side) and PCM terminal 1AH. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for an open circuit, then go to Step 10.
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 an 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0117 [L8, LF]

DPE010200100W57

DTC P0117	ECT sensor circuit low input
DETECTION CONDITION	• The PCM monitors the ECT sensor signal at PCM terminal 2AK. If the PCM detects that the ECT sensor voltage is **below 0.2 V**, the PCM determines that the ECT sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (Engine Cooling System). • The MIL illuminates 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 • Connection or terminal malfunction • Short to ground in the wiring harness between ECT sensor terminal A and PCM connector terminal 2AK • Short to each wiring harness at the ECT signal circuit and the ECT ground circuit • PCM malfunction



Diagnostic procedure

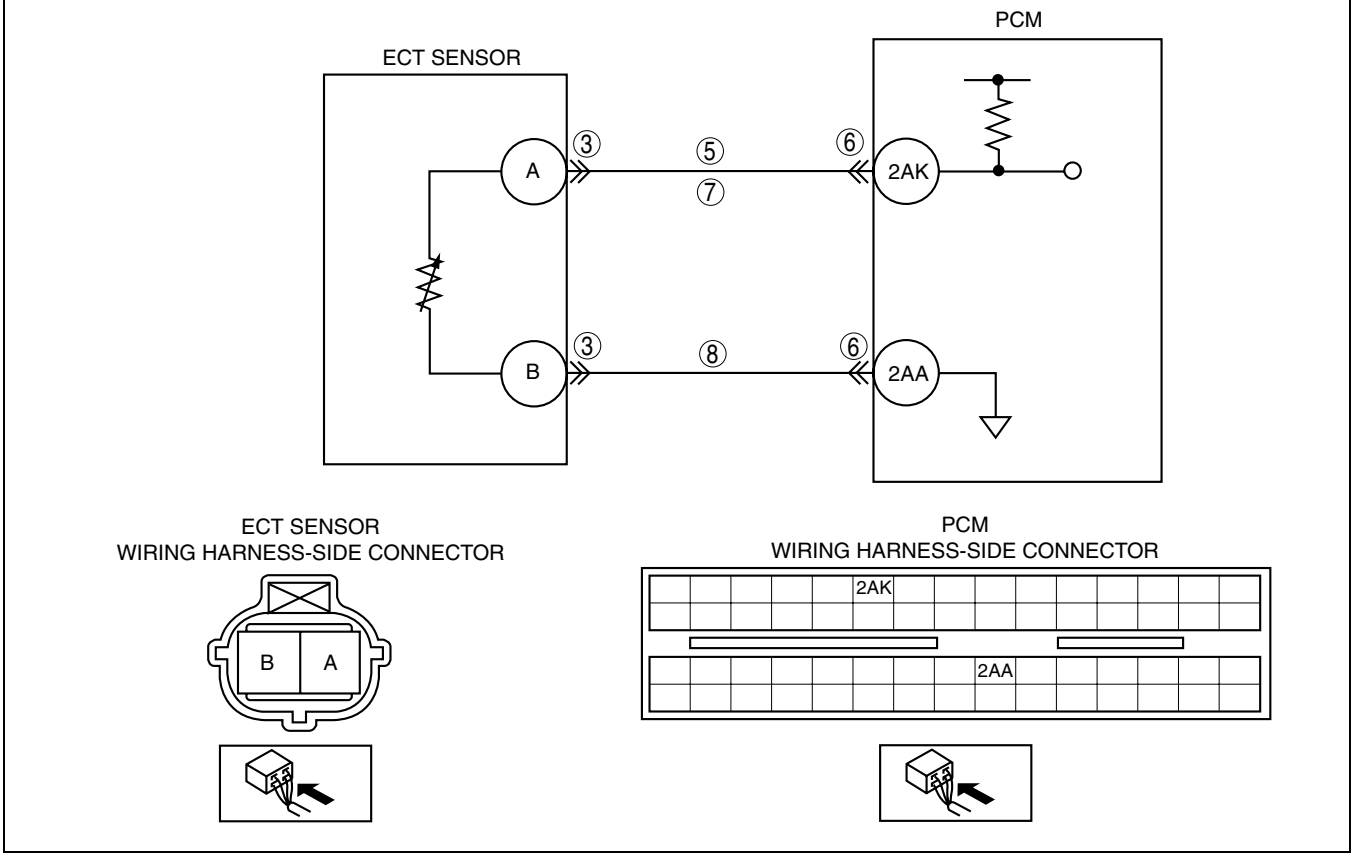
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform 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 FOR TERMINAL BENDING** • Turn the ignition switch off. • Disconnect the ECT sensor connector. • Inspect for bending of ECT sensor terminals A and B (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 ECT SENSOR MALFUNCTION OR WIRING HARNESS MALFUNCTION** • Connect the WDS or equivalent to DLC-2. • Access the ECT PID. • Verify the ECT value when disconnecting the 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 for continuity between ECT sensor terminal A (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for a 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 a 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0118 [L8, LF]

DPE010200100W58

DTC P0118	ECT sensor circuit high input
DETECTION CONDITION	• The PCM monitors the ECT sensor signal at PCM terminal 2AK. If the PCM detects that the ECT sensor voltage is **above 4.6 V**, the PCM determines that the ECT sensor circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (Engine Cooling System). • The MIL illuminates 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 • Connection or terminal malfunction • Open circuit in the wiring harness between ECT sensor terminal A and PCM terminal 2AK • Short to power supply in the wiring harness between ECT sensor terminal A and PCM terminal 2AK • Open circuit in the wiring harness between ECT sensor terminal B and PCM terminal 2AA • PCM malfunction

DTC P0118	ECT sensor circuit high input



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 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 a 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 an 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 an 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0121 [L8, LF]

DPE010200100W59

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 the 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 the PCM detects that the throttle valve opening angle is **above 50%** for **5 s** after the following conditions are met, the PCM determines that the TP is stuck open: **MONITORING CONDITION** — Engine speed is **above 500 rpm** — MAF sensor signal is **below 5 g/s {0.66 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 PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TP sensor malfunction • Electrical corrosion in the TP signal circuit • Voltage drop in the constant voltage supply circuit • Voltage drop in the 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 the 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 the available repair information. • If the 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. • Access the ECT, TP and the MAF PIDs using the WDS or equivalent. • Warm up the engine until the ECT PID is **above 70 °C {158 °F}** • Drive the vehicle. • Read the TP PID while the MAF PID is **above 32.0 g/s {4.2 lb/min.}**. • Is the TP PID **above 12.5%**?	Yes	Go to Step 7.
		No	Go to the next step.
5	**VERIFY TP PID** • Start the engine. • Access the TP, MAF and RPM PIDs using the WDS or equivalent. • Read the TP PID while the MAF PID is **below 5 g/s {0.7 lb/min}** and the RPM PID is **above 500 rpm**. • Is the 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 the MAF PID change according to driving conditions?	Yes	Intermittent concern exists. Go to INTERMITTENT CONCERNS troubleshooting procedure.
		No	Inspect the mass airflow sensor, related circuits and terminals. (See 01–40–32 MASS AIR FLOW (MAF) SENSOR INSPECTION [L8, 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 the male and female 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 smoothly while gradually opening the 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. • Is there any electrical corrosion?	Yes	Repair the terminal, then go to Step 11.
		No	Go to the next step.

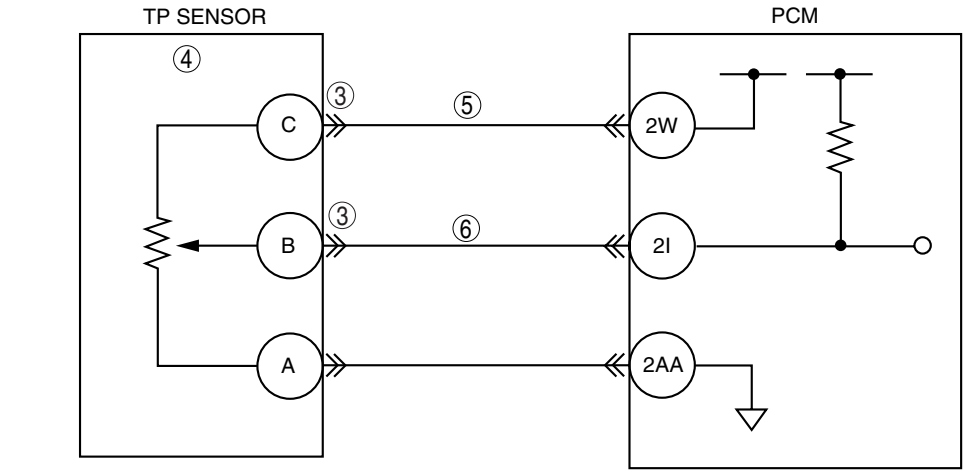
STEP	INSPECTION		ACTION
10	**INSPECT CONSTANT VOLTAGE SUPPLY AND TP SIGNAL CIRCUITS FOR VOLTAGE DROP** • Turn the ignition switch to the ON position (Engine off). • Inspect the voltage between the following terminals: — TP sensor terminal C (wiring harness-side) and PCM terminal 2W — TP sensor terminal B (wiring harness-side) and PCM terminal 2I • Is the voltage **approx. 0 V**?	Yes	Go to the next step.
		No	Inspect PCM terminals 2I and 2W (wiring harness-side) for rust or corrosion. • 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 the ECT, TP and MAF PIDs using the WDS or equivalent. • Warm up the engine until the ECT PID is **above 70 °C {158°F}**. • Drive the vehicle and read the TP and MAF PIDs. • Verify that the 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 the 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** • Inspect the resistance between TP sensor terminal A (wiring harness-side) and body ground. • Is the resistance **approx. 0 ohm**?	Yes	Go to the next step.
		No	Inspect the PCM terminal 2AA (wiring harness-side) for rust or corrosion. • Repair or replace the terminal. Go to Step 16.
14	**VERIFY TP SENSOR** • Does the resistance change smoothly while gradually opening the 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 the RPM, TP and MAF PIDs using the WDS or equivalent. • Verify that the TP PID reading is **below 50%** while the MAF PID is **below 4.8 g/s {0.6 lb/min}** and the 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.

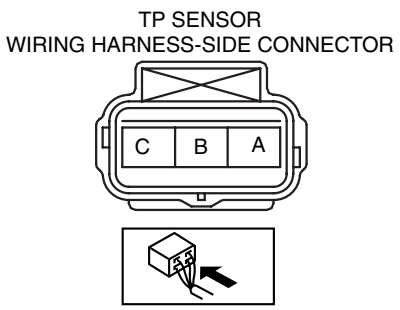
STEP	INSPECTION		ACTION
17	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

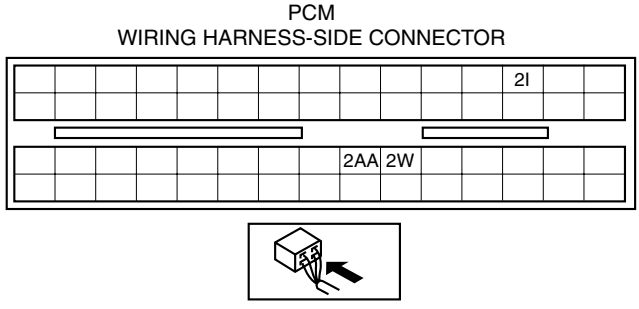
DTC P0122 [L8, LF]

DPE010200100W60

DTC P0122	TP sensor circuit low input
DETECTION CONDITION	• If the PCM detects that the TP sensor voltage at PCM terminal 2I is **below 0.1 V** while the engine is running, the PCM determines that the TP circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (CCM). • The MIL illuminates if the PCM detects the above malfunction conditions in the first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• TP sensor malfunction • Connector or terminal malfunction • Open circuit in the wiring harness between TP sensor terminal B and PCM terminal 2I • Short to ground in the wiring harness between TP sensor terminal B and PCM terminal 2I • Open circuit in the wiring harness between TP sensor terminal C and PCM terminal 2W • PCM malfunction







Diagnostic procedure

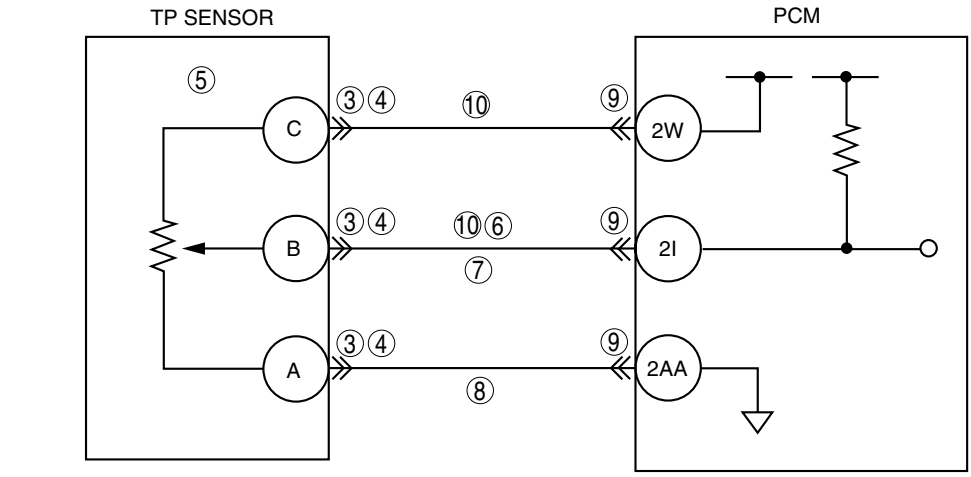
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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	**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 the TP sensor inspection. (See 01–40–31 THROTTLE POSITION (TP) SENSOR INSPECTION [L8, LF].) • Is the 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 the 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 the open circuit in the 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	**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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0123 [L8, LF]

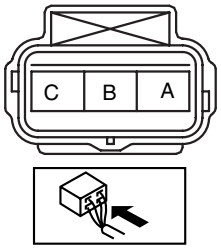
DPE010200100W61

DTC P0123	TP sensor circuit high input
DETECTION CONDITION	• If the PCM detects that 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 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. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.

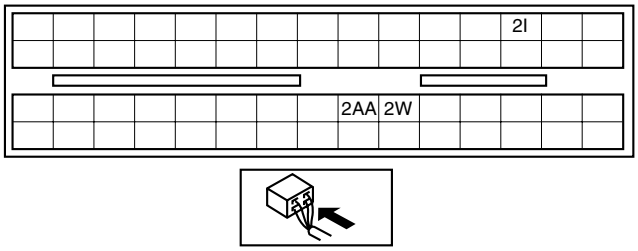
DTC P0123	TP sensor circuit high input
POSSIBLE CAUSE	• TP sensor malfunction • Connector or terminal malfunction • Open circuit in the wiring harness between TP sensor terminal A and PCM terminal 2AA • Short to the constant voltage supply circuit in the wiring harness between TP sensor terminal B and PCM terminal 2I • PCM malfunction



TP SENSOR
WIRING HARNESS-SIDE CONNECTOR



PCM
WIRING HARNESS-SIDE CONNECTOR



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. • 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 11.
		No	Go to the next step.
5	**INSPECT TP SENSOR** • Perform TP sensor inspection. (See 01–40–31 THROTTLE POSITION (TP) SENSOR INSPECTION [L8, 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 the open circuit in the 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. • Is there continuity?	Yes	Repair or replace the wiring harness, then go to the next step.
		No	Go to the next step.
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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.

STEP	INSPECTION		ACTION
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0125 [L8, LF]

DPE010200100W62

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 a 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 (Engine Cooling 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. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• ECT sensor malfunction • Cooling system malfunction • Poor connection of connectors • PCM malfunction

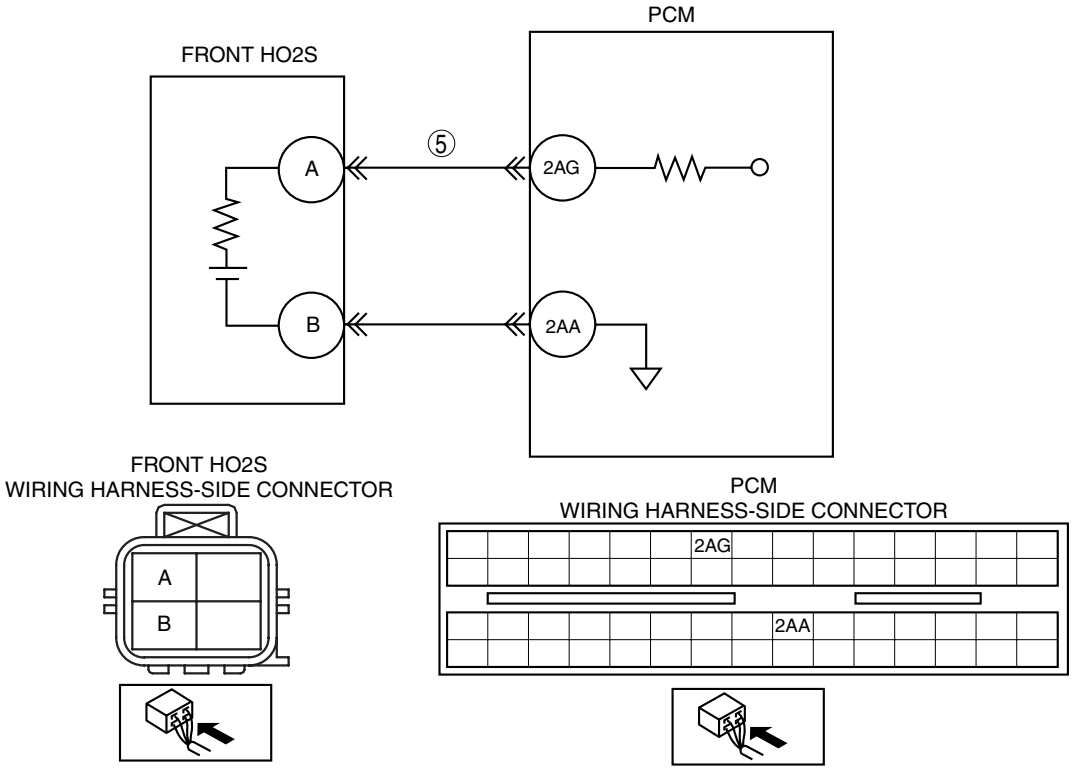
Diagnostic procedure

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 the available repair information. • If the 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 the ECT PID using the WDS or equivalent. • Is the ECT PID **above 60 °C {140 °F}**?	Yes	Intermittent concern exists. Go to INTERMITTENT CONCERNS TROUBLESHOOTING procedure. (See 01–03–55 INTERMITTENT CONCERN TROUBLESHOOTING [L8, 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 the 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 01–40–26 ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [L8, 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	**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 the ECT PID using the WDS or equivalent. • Wait until the ECT PID is **below 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0132 [L8, LF]

DPE010200100W63

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 the 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 the first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S malfunction • Short to power in the wiring harness between front HO2S terminal A and PCM terminal 2AG • Front HO2S or PCM terminal is 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 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	**VERIFY RELATED PENDING OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the pending code or stored DTCs using the WDS or equivalent. • Are other DTCs present?	Yes	Go to the appropriate DTC troubleshooting procedures. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P0132 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedures for the DTC on the FREEZE FRAME DATA. (See 01–02A–9 DTC TABLE [L8, 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 the PID while racing the engine at least **10 times** in PARK or NEUTRAL. • Does the 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 the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0133 [L8, LF]

DPE010200100W64

DTC P0133	Front HO2S circuit problem
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 the circuit has a malfunction. **MONITORING CONDITIONS** — HO2S heater, HO2S, and TWC Repair Verification Drive Mode — The 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. (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. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S deterioration • Front HO2S malfunction • Looseness of the 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 • Exhaust system leakage • Purge solenoid valve malfunction • Improper connection of purge solenoid hoses • Insufficient compression • Engine malfunction (Engine coolant leakage)

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	**VERIFY RELATED PENDING AND STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the pending and /or stored DTCs using the WDS or equivalent. • Is DTC P0443 also present?	Yes	Go to the 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 the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedures for the DTC on the FREEZE FRAME DATA. (See 01–02A–9 DTC TABLE [L8, LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Warm up the engine. • Access the O2S11 PID using the WDS or equivalent. • Inspect the PID under the following accelerator pedal conditions in PARK or NEUTRAL. • Is the PID normal? — **More than 0.55 V** when the accelerator is suddenly depressed (rich condition). — **Less than 0.55 V** just after the accelerator pedal is released (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	Retighten the sensor, then go to Step 13.
7	**INSPECT GAS LEAKAGE FROM EXHAUST SYSTEM** • Visually inspect if there is any gas leakage between the exhaust manifold and the front HO2S. • Is there any gas leakage?	Yes	Repair or replace the malfunctioning exhaust part, then go to Step 13.
		No	Replace the sensor, then go to Step 13.
8	**INSPECT LONG TERM FUEL TRIM** • Access the LONGFT1 PIDs. • Compare it with the FREEZE FRAME DATA recorded at Step 1. • Is it below the 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 the fuel line pressure. (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • Is the fuel line pressure normal?	Yes	Go to step 12.
		No	Inspect the fuel pump maximum pressure and the fuel return pipe for clogging. (See 01–14–9 FUEL PUMP UNIT INSPECTION [L8, LF].) • If there is any problem, repair or replace the parts. • If all the items above are normal, replace the fuel pump unit. Then go to Step 13.
10	**INSPECT FUEL LINE PRESSURE (Low fuel line pressure)** • Turn the ignition switch off. • Inspect the fuel line pressure. (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • Is the fuel line pressure normal?	Yes	Go to step 12.
		No	Go to the next step.

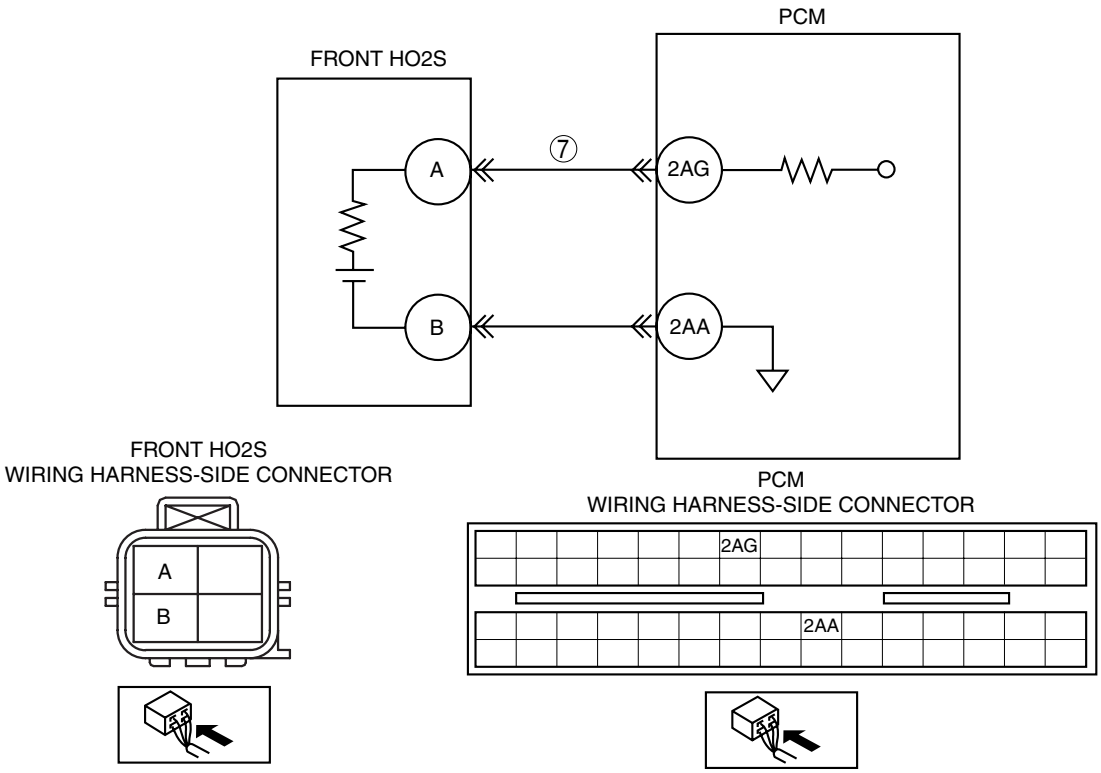
STEP	INSPECTION		ACTION
11	**INSPECT FUEL LINE FROM FUEL PUMP TO FUEL DELIVERY PIPE** • Visually inspect the fuel line for any leakage. • Is there any fuel leakage?	Yes	Replace the fuel line, then go to Step 13.
		No	Inspect the fuel filters for the following: • Foreign materials or staining inside the fuel filter (low-pressure side) Perform the following actions according to the result. • If foreign material or staining is found inside the 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** • Inspect for engine coolant leakage. (See 01–12–4 ENGINE COOLANT LEAKAGE INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the 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 the WDS or equivalent. • Perform the HO2S heater, HO2S, and TWC Repair Verification Drive Mode. (See 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0134 [L8, LF]

DPE010200100W65

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 — The 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 the first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Front HO2S deterioration • Front HO2S heater malfunction • Exhaust system leakage • Open circuit or short to ground in the wiring harness between front HO2S terminal A and PCM terminal 2AG • Insufficient compression • Engine malfunction

DTC P0134	Front HO2S no activity detected



Diagnostic procedure

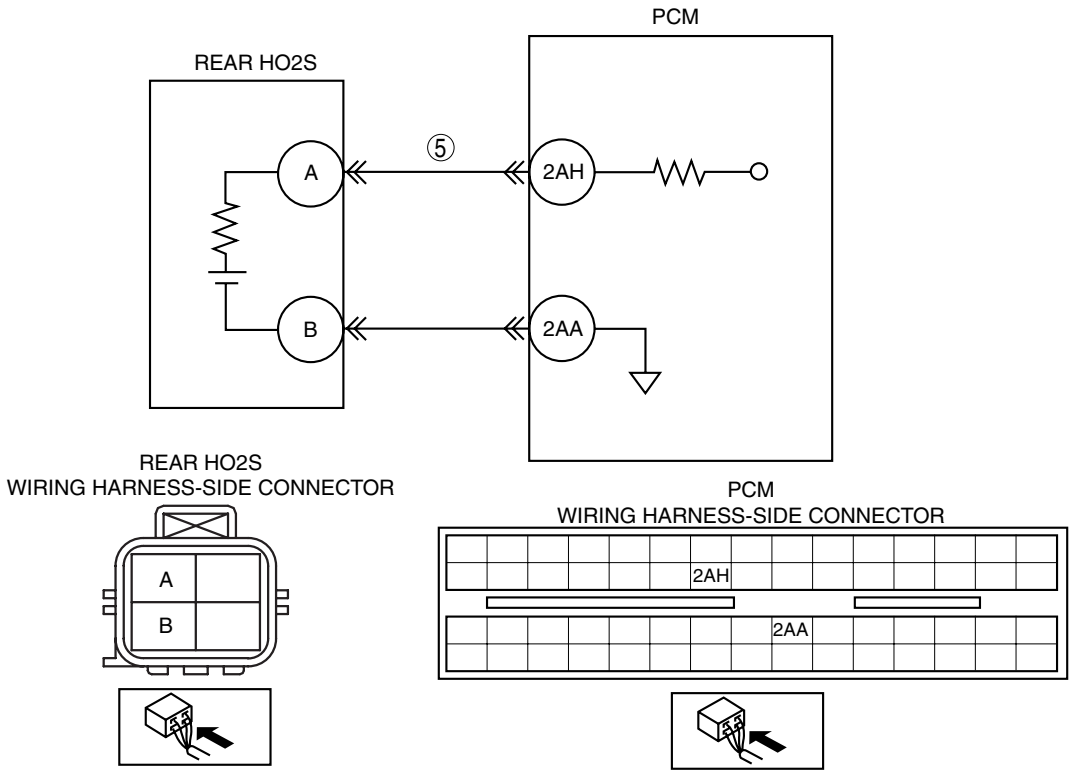
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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	**VERIFY RELATED PENDING AND STORED DTC** **Note** • If the 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. • Are other DTCs 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 the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedures for the DTC on FREEZE FRAME DATA. (See 01–02A–9 DTC TABLE [L8, LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Warm up the engine. • Access the O2S11 PID using the WDS or equivalent. • Verify the PID while racing the engine in PARK or NEUTRAL. • Is the PID normal? — **More than 0.55 V** when the accelerator is suddenly depressed (rich condition). — **Less than 0.55 V** just after the accelerator pedal is released (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 the sensor securely, then go to Step 10.
7	**INSPECT GAS LEAKAGE FROM EXHAUST SYSTEM** • Visually inspect for 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 10.
		No	• Inspect the following harnesses for an open circuit or short to ground, repair or replace the wiring harness if necessary. — Front HO2S terminal A (wiring harness-side) to PCM terminal 2AG (wiring harness-side) • Repair or replace the wiring harness if necessary. • If all items above are normal, replace the malfunctioning sensor. Then go to Step 10.
8	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** • Perform the ENGINE COOLANT LEAKAGE INSPECTION. (See 01–12–4 ENGINE COOLANT LEAKAGE INSPECTION [L8, LF].) • 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 the engine compression. (See 01–10–10 COMPRESSION INSPECTION [L8, LF].) • Is it normal?	Yes	Go to the next step.
		No	Perform the engine overhaul for repairs, then go to the next step.

STEP	INSPECTION		ACTION
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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0138 [L8, LF]

DPE010200100W66

DTC P0138	Rear HO2S circuit high input
DETECTION CONDITION	• The PCM monitors the input voltage from the 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). • 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. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Rear HO2S malfunction • Short to power supply in the wiring harness between rear HO2S terminal A and PCM terminal 2AH • Rear HO2S or PCM terminal is shorted • PCM malfunction



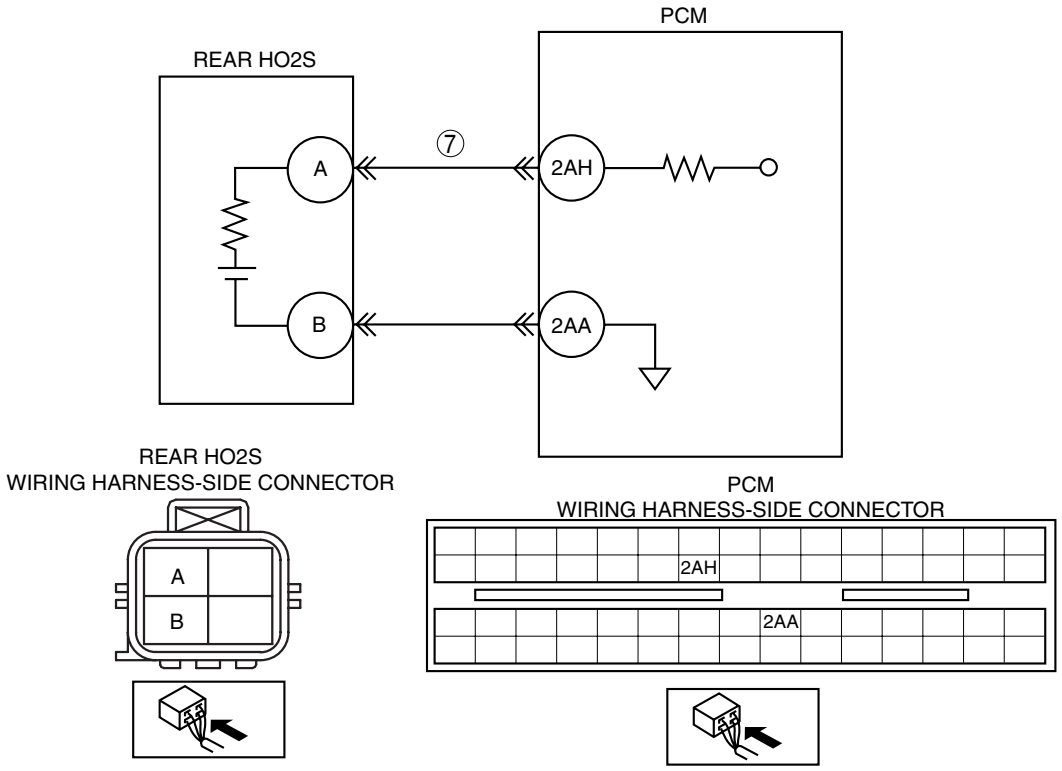
Diagnostic procedure

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 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	**VERIFY RELATED PENDING OR STORED DTC** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the pending code or stored DTCs using the WDS or equivalent. • Are other DTCs present?	Yes	Go to the appropriate DTC troubleshooting procedures. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P0138 on the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedures for the DTC on the FREEZE FRAME DATA. (See 01–02A–9 DTC TABLE [L8, LF].)
5	**INSPECT REAR HO2S SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the ignition switch off. • Disconnect the 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 there 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 the engine. • Access the O2S12 PID using the WDS or equivalent. • Verify the PID while racing the engine at least **10 times** in PARK or NEUTRAL. • Does the PID stay **above 0.55 V**?	Yes	Repair or replace the sensor, 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. • 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0140 [L8, LF]

DPE010200100W67

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 — The 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 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 or short to ground in the 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 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	**VERIFY RELATED PENDING AND STORED DTC** **Note** • If the 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 the pending and stored DTCs using the WDS or equivalent. • Are other DTCs present?	Yes	Go to the appropriate DTC troubleshooting procedures. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P0140 on the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for the DTC on the FREEZE FRAME DATA. (See 01–02A–9 DTC TABLE [L8, LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Warm up the engine. • Access O2S12 for P0140 PID using the WDS or equivalent. • Verify the PID while racing the engine at least **10 times** in PARK or NEUTRAL. • Is the 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 the rear HO2S is loosely installed. • Is the sensor installed securely?	Yes	Go to the next step.
		No	Install the sensor securely, then go to Step 10.
7	**INSPECT GAS LEAKAGE FROM EXHAUST SYSTEM** • Visually check if any gas leakage is found between the exhaust pipe and the 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 an open or short circuit to the ground circuit, repair or replace the wiring harness if necessary. — Rear HO2S terminal A (wiring harness-side) to PCM terminal 2AH (wiring harness-side) • Repair or replace the wiring harness if necessary. • If all items above are normal, replace malfunctioning sensor. Then go to Step 10.

STEP	INSPECTION		ACTION
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 the procedure to bleed air from the engine coolant, then run the engine at idle. • Are there any small bubbles, which make the engine coolant white at the filling opening? **Note** • Large bubbles are normal since they are remaining air coming out of 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 the engine compression. (See 01–10–10 COMPRESSION INSPECTION [L8, 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0300 [L8, LF]

DPE010200300W12

DTC P0300	Random misfire detected
DETECTION CONDITION	• The PCM monitors the CKP sensor input signal interval time. The PCM calculates the change in interval time for each cylinder. If the change in 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 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 a misfire which can damage the catalytic converter during the first drive cycle. • PENDING CODE is available if the PCM detects a misfire which affects emission performance during the first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.

DTC P0300	Random misfire detected
POSSIBLE CAUSE	• CKP sensor malfunction • CMP sensor malfunction • Ignition coil malfunction • Ignition system malfunction • 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 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	**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 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access the BOO, ECT, IAT, MAF, RPM, TP, and VSS PIDs using the WDS or equivalent. (See 01–40–7 PCM INSPECTION [L8, 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 the suspected circuit and/or part according to the inspection results. (See 01–40–7 PCM INSPECTION [L8, LF].) Then go to Step 21.
		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 the FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect the suspected circuit and/or part according to inspection results. (See 01–40–7 PCM INSPECTION [L8, LF].) Then go to Step 21.
		No	Go to the next step.
6	**INSPECT CMP SENSOR** • Inspect the CMP sensor. (See 01–40–30 CAMSHAFT POSITION (CMP) SENSOR INSPECTION [L8, LF].) • Is the CMP sensor normal?	Yes	Go to the next step.
		No	Inspect the installation condition for damage to the timing belt and gears, and repair malfunctioning parts. • If normal, replace the CMP sensor. Then go to Step 21.
7	**VERIFY CKP SENSOR INSTALLATION CONDITION** • Inspect the CKP sensor for looseness. • Is the CKP sensor loose?	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 the 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 the spark test. (See 01–03–60 Spark Test.) • Is a strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the 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 an open circuit in the 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. (See 01–18–2 IGNITION COIL INSPECTION [L8, LF].) • Is the coil resistance normal?	Yes	Go to step 21.
		No	Replace the ignition coil, then go to Step 21.

STEP	INSPECTION		ACTION
12	**INSPECT MAF PID** • Start the engine. • Access the MAF PID using the WDS or equivalent. • Race the engine and verify that the MAF PID changes quickly according to the change in the engine speed. • Is the 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 the following: — Between the MAF sensor and throttle body — Between the 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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • 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 too 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 the suspected fuel line, then go to Step 21.
		No	Inspect the fuel filters for the following: • Foreign material or staining inside fuel filter (low-pressure side) Perform the following actions depending on the result above. • If foreign material or staining is found inside the 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 the engine compression. (See 01–10–10 COMPRESSION INSPECTION [L8, LF].) • Is it normal?	Yes	Go to the next step.
		No	Perform the engine overhaul for repairs, then go to Step 21.
17	**INSPECT OPERATION OF PURGE CONTROL SOLENOID VALVE** • Turn the ignition switch off. • Connect the vacuum pump to the purge control solenoid valve and apply vacuum to the solenoid. • Verify that the solenoid holds vacuum. • Turn the ignition switch to the ON position (Engine off). • Access the EVAPCP PID in the SIMULATION TEST using the WDS or equivalent. • Set the duty value to **100%** for the EVAPCP PID. • Apply vacuum while turning the solenoid from OFF to ON and simulating the EVAPCP PID with a **100%** duty value. • Verify that the solenoid releases vacuum while the solenoid is turned ON. • Is the 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 the PCV valve and inspect the valve operation. (See 01–16A–2 POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [L8, LF].) • Is the PCV valve operation normal?	Yes	Replace the PCV valve, then go to Step 21.
		No	Go to the next step.

STEP	INSPECTION		ACTION
19	**INSPECT OPERATION OF EGR VALVE** • Remove the EGR valve. • Visually inspect the EGR valve to see if it is stuck open. • Is the EGR valve stuck 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 the engine coolant leakage inspection. (See 01–12–4 ENGINE COOLANT LEAKAGE INSPECTION [L8, LF].) • 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
22	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0301, P0302, P0303, P0304 [L8, LF]

DPE010200300W13

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 a 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 a misfire which can damage the catalytic converter during the first drive cycle. • PENDING CODE is available if the PCM detects a misfire which affects emission performance during the first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Spark plug malfunction • Ignition coil malfunction • Ignition system malfunction • Fuel injector malfunction • Air suction in the intake air system (between dynamic chamber and cylinder head) • Inadequate engine compression due to an 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 the 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	**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 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON /IDLE)** • Access the BOO, ECT, IAT, MAF, RPM, TP and VSS PIDs using the WDS or equivalent. (See 01–40–7 PCM INSPECTION [L8, 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 the suspected circuit and/or part according to the inspection results. Then go to Step 13. (See 01–40–7 PCM INSPECTION [L8, LF].)
		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 the FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect the suspected circuit and/or part according to the inspection results. Then go to Step 13. (See 01–40–7 PCM INSPECTION [L8, LF].)
		No	Go to the next step.
6	**INSPECT SPARK PLUG CONDITION** • Turn the ignition switch off. • Remove the spark plug from suspected cylinder. • Inspect the spark plug condition: — Cracks — Excess wear — Gap — Wet • Is any problem found on the 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. • Is the wiring harness condition normal?	Yes	Go to the next step.
		No	Repair the wiring harness, then go to Step 13.
8	**INSPECT FOR AIR SUCTION AT INTAKE AIR SYSTEM** • Inspect for air leakage at the following: — Around the connection of the dynamic chamber and the intake manifold — Around the connection of the intake manifold and the 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 the intake air system parts. • Disconnect the fuel injector connector on suspected cylinder. • Connect the NOID LIGHT to the fuel injector terminals. • Inspect for dimming of the light during cranking. • Does the noid light illuminate?	Yes	Go to the next step.
		No	Inspect the fuel injector wiring harnesses. Repair or replace if necessary, then go to Step 13.

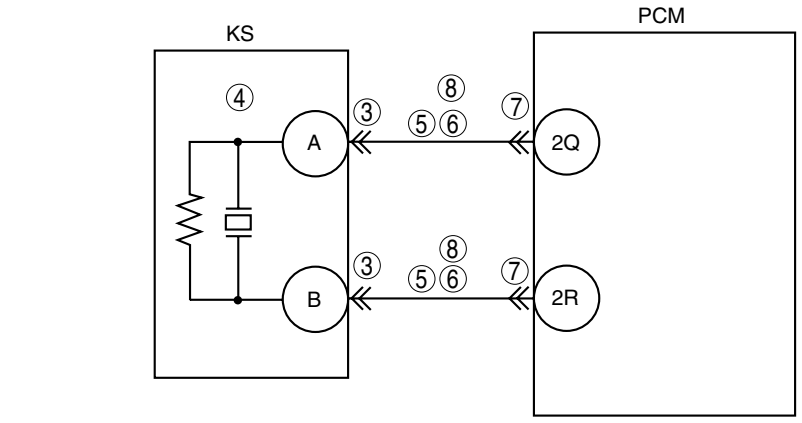
STEP	INSPECTION		ACTION
10	**INSPECT SEALING OF ENGINE COOLANT PASSAGE** • Perform ENGINE COOLANT LEAKAGE INSPECTION. (See 01–12–4 ENGINE COOLANT LEAKAGE INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection result. Then go to Step 13.
		No	Go to the next step.
11	**INSPECT ENGINE COMPRESSION** • Inspect engine compression. (See 01–10–10 COMPRESSION INSPECTION [L8, LF].) • 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 the suspected cylinder. • Switch the injector with the injector on the 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0327 [L8, LF]

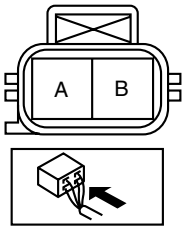
DPE010200300W14

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 between PCM terminals 2Q and 2R is **below 0.9 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 during the first drive cycle. • FREEZE FRAME DATA is available. • DTCs are stored in the PCM memory.
POSSIBLE CAUSE	• KS malfunction • Connector or terminal malfunction • Open circuit or short to ground in the wiring harness between KS connector terminal A and PCM terminal 2Q • Open circuit or short to ground in the wiring harness between KS connector terminal B and PCM terminal 2R • Short KS two wires • PCM malfunction

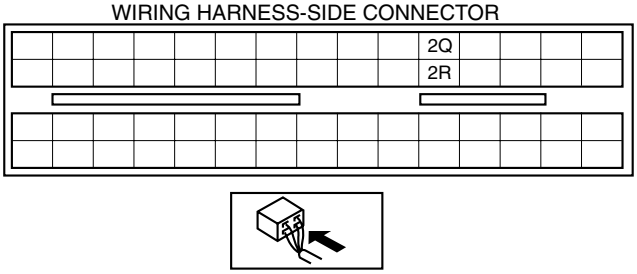
DTC P0327	KS circuit low input



KS
WIRING HARNESS-SIDE CONNECTOR



PCM
WIRING HARNESS-SIDE CONNECTOR



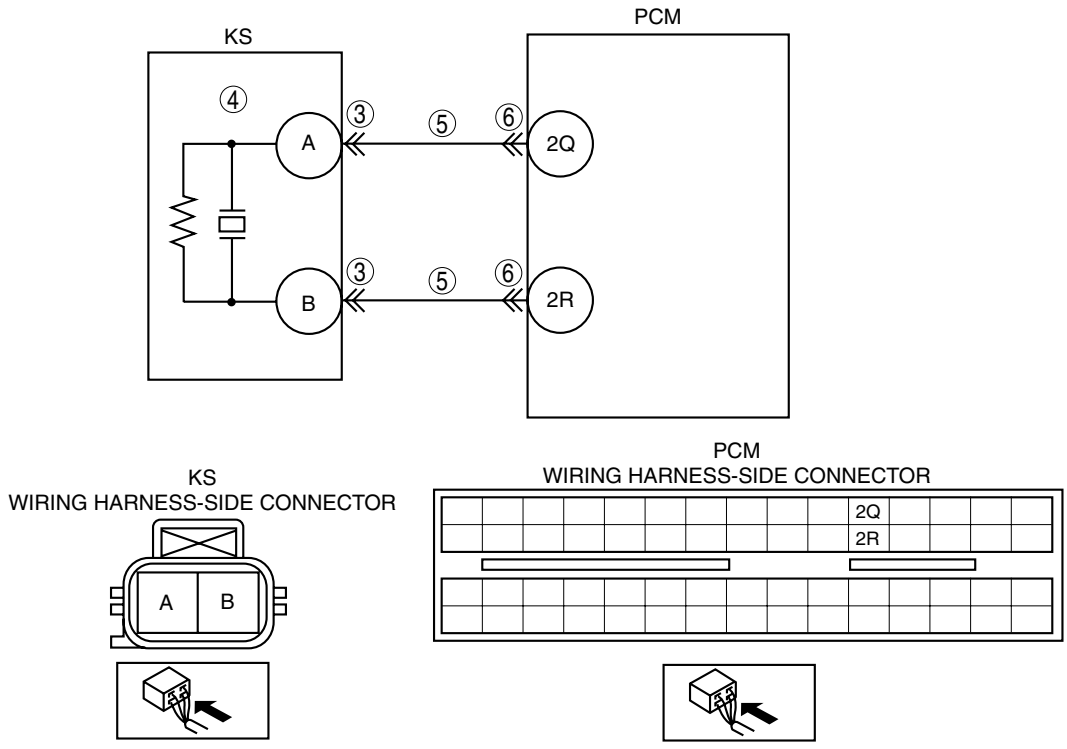
Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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 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 01–40–40 KNOCK SENSOR (KS) INSPECTION [L8, 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) • Is there continuity?	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 the following terminals: — KS female terminal A (wiring harness-side) and body ground — KS female terminal B (wiring harness-side) and body ground • Is there continuity?	Yes	Repair or replace the suspected wiring harness, then go to Step 9.
		No	Go to the next step.
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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0328 [L8, LF]

DPE010200300W15

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 between PCM terminals 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). • The MIL illuminates if the PCM detects the above malfunction conditions during the first drive cycle. • 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 • PCM malfunction



Diagnostic procedure

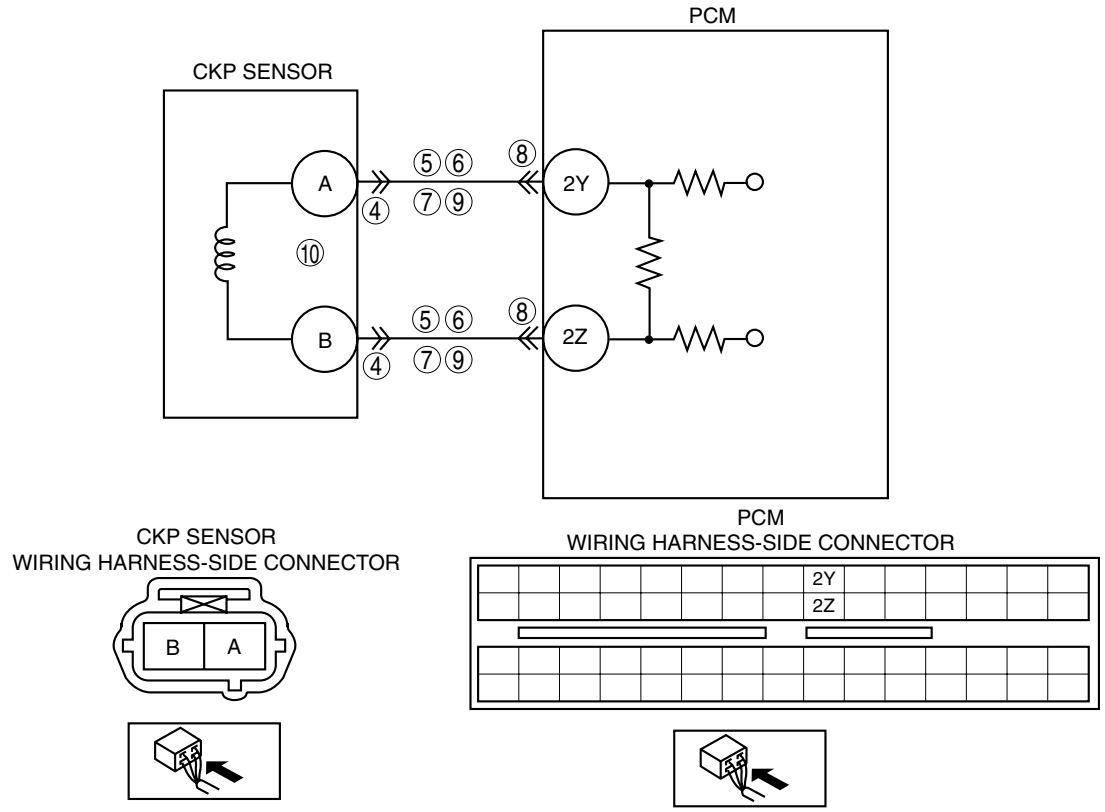
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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 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 7.
		No	Go to the next step.
4	**INSPECT KS** • Perform the KS inspection. (See 01–40–40 KNOCK SENSOR (KS) INSPECTION [L8, 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 ground and KS terminal B (wiring harness-side) and body ground. • Is there any voltage reading?	Yes	Repair or replace the wiring harness for a short to power supply, then go to step 7.
		No	Go to the next step.
6	**INSPECT 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	**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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0335 [L8, LF]

DPE010200300W16

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 the MAF is **2.0 g/s {0.26 lb/min} or above**, the PCM determines that the CKP 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. • FREEZE FRAME DATA is available. • DTCs are stored in the PCM memory.

DTC P0335	CKP sensor circuit problem
POSSIBLE CAUSE	• CKP sensor malfunction • Connector or terminal malfunction • CKP sensor is dirty • Short to power supply in the wiring harness between CKP sensor terminal A to PCM terminal 2Y • Short to power supply in the wiring harness between CKP sensor terminal B to PCM terminal 2Z • Short to ground in the wiring harness between CKP sensor terminal A to PCM terminal 2Y • Short to ground in the wiring harness between CKP sensor terminal B to PCM terminal 2Z • Open circuit in the wiring harness between CKP sensor terminal A to PCM terminal 2Y • Open circuit in the wiring harness between CKP sensor terminal B to PCM terminal 2Z • CKP sensor pulse wheel malfunction • Both CKP sensor wires are shorted to each other • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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	**VERIFY CKP SENSOR VOLTAGE** • Disconnect the CKP sensor connector. • Connect the voltmeter between CKP sensor terminals A and B (sensor-side). • Inspect the voltage in the AC range while cranking the engine. • Is there any voltage reading?	Yes	Go to the next step.
		No	Go to Step 10.
4	**INSPECT POOR CONNECTION OF CKP SENSOR CONNECTOR** • Verify that the CKP sensor connector is connected securely. • Is the connector normal?	Yes	Go to the next step.
		No	Reconnect the connector, then go to Step 11.
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 the following terminals: — CKP sensor terminal A — CKP sensor terminal B • Is there 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 the 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 the following terminals: — 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?	Yes	Go to Step 11.
		No	Repair or replace the suspected wiring harness, then go to Step 11.

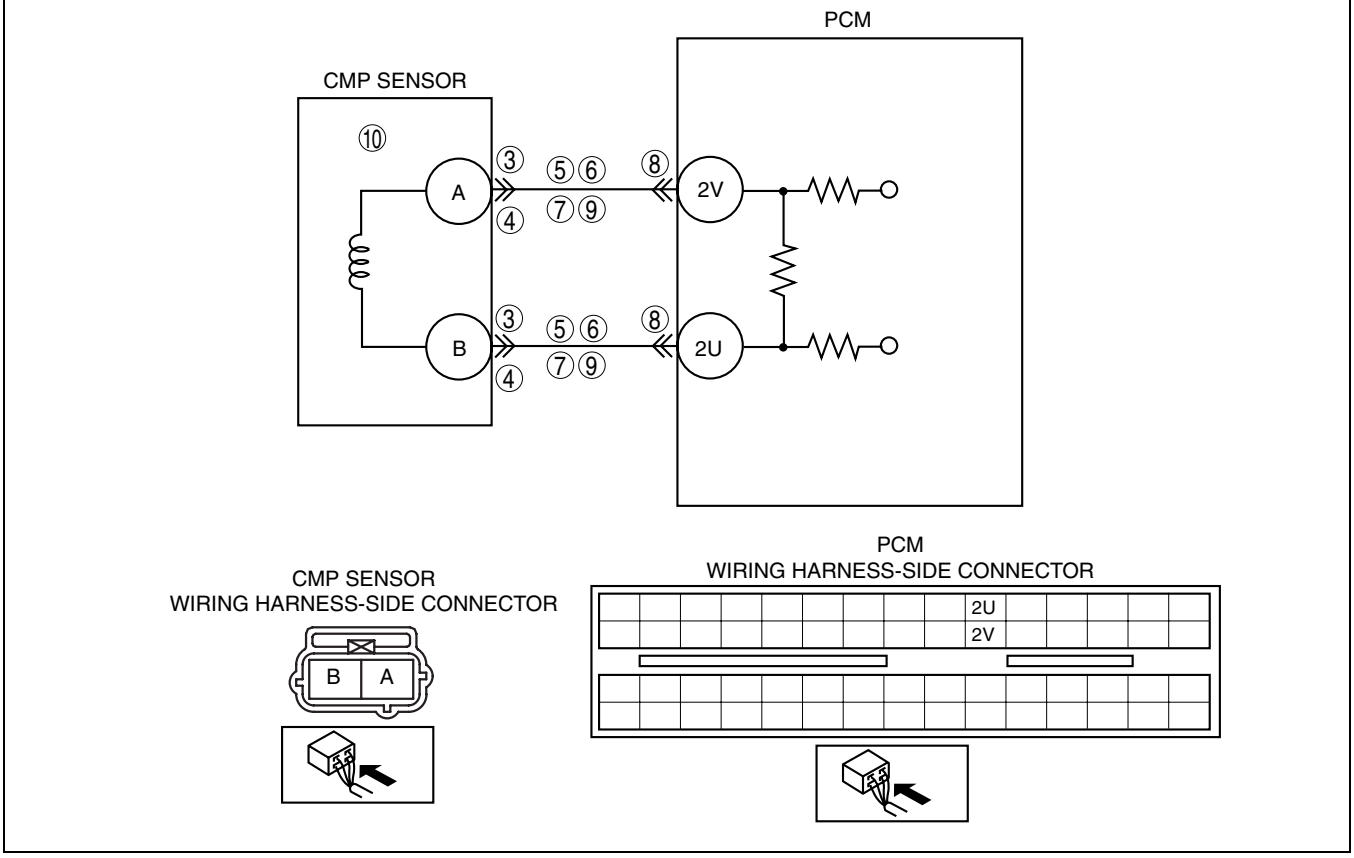
STEP	INSPECTION		ACTION
10	**INSPECT CKP SENSOR** • Turn the ignition switch off. • Perform the CKP sensor inspection. (See 01–40–28 CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [L8, LF]) • Is the CKP sensor normal?	Yes	Go to the next step.
		No	Inspect the CKP sensor pulse wheel for damage. Replace the 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 the engine. • Access the MAF PID using the WDS or equivalent. **Note** • The 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0340 [L8, LF]

DPE010200300W17

DTC P0340	CMP sensor circuit problem
DETECTION CONDITION	• The PCM monitors input voltage from the CMP sensor when the engine is running. If the PCM does not receive input voltage from the CMP sensor while the PCM receives the input signal from the CKP sensor, the PCM determines that CMP 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. • 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 the wiring harness between CMP sensor terminal A and PCM terminal 2V • Short to power supply in the wiring harness between CMP sensor terminal B and PCM terminal 2U • Short to ground in the wiring harness between CMP sensor terminal A and PCM terminal 2V • Short to ground in the wiring harness between CMP sensor terminal B and PCM terminal 2U • Open circuit in the wiring harness between CMP sensor terminal A and PCM terminal 2V • Open circuit in the wiring harness between CMP sensor terminal B and PCM terminal 2U • CKP sensor pulse wheel malfunction • Both CMP sensor wires are shorted to each other • CKP sensor misinstallation • Timing chain misinstallation • Loose timing chain or improper valve timing • Loose camshaft sprocket lock bolt • Loose crankshaft pulley lock bolt • PCM malfunction

DTC P0340	CMP sensor circuit problem



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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	**VERIFY CMP SENSOR VOLTAGE** • Disconnect the CMP sensor connector. • Connect the voltmeter between CMP sensor terminals A and B (sensor-side). • Inspect the voltage in the AC range while cranking the engine. • Is there any voltage reading?	Yes	Go to the next step.
		No	Go to step 10.
4	**INSPECT FRONT HO2S CONNECTOR FOR POOR CONNECTION** • Verify that the CMP sensor connector is connected securely. • Is the connector normal?	Yes	Go to the next step.
		No	Reconnect the connector, then go to Step 13.
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 there any voltage reading?	Yes	Repair or replace the wiring harness, then go to Step 13.
		No	Go to the next step.
6	**INSPECT CMP CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between the following terminals 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 13.
		No	Go to the next step.
7	**INSPECT CMP CIRCUIT FOR SHORT** • Inspect for 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 13.
		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 13.
		No	Go to the next step.
9	**INSPECT CMP CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between the following terminals: — CMP sensor terminal A (wiring harness-side) and PCM terminal 2V (wiring harness-side) — CMP sensor terminal B (wiring harness-side) and PCM terminal 2U (wiring harness-side) • Is there continuity?	Yes	Go to Step 11.
		No	Repair or replace the suspected wiring harness, then go to Step 13.
10	**INSPECT CMP SENSOR** • Turn the ignition switch off. • Perform the CMP sensor inspection. (See 01–40–30 CAMSHAFT POSITION (CMP) SENSOR INSPECTION [L8, LF].) • Is the CMP sensor normal?	Yes	Go to Step 13.
		No	Replace the CMP sensor, then go to Step 13.

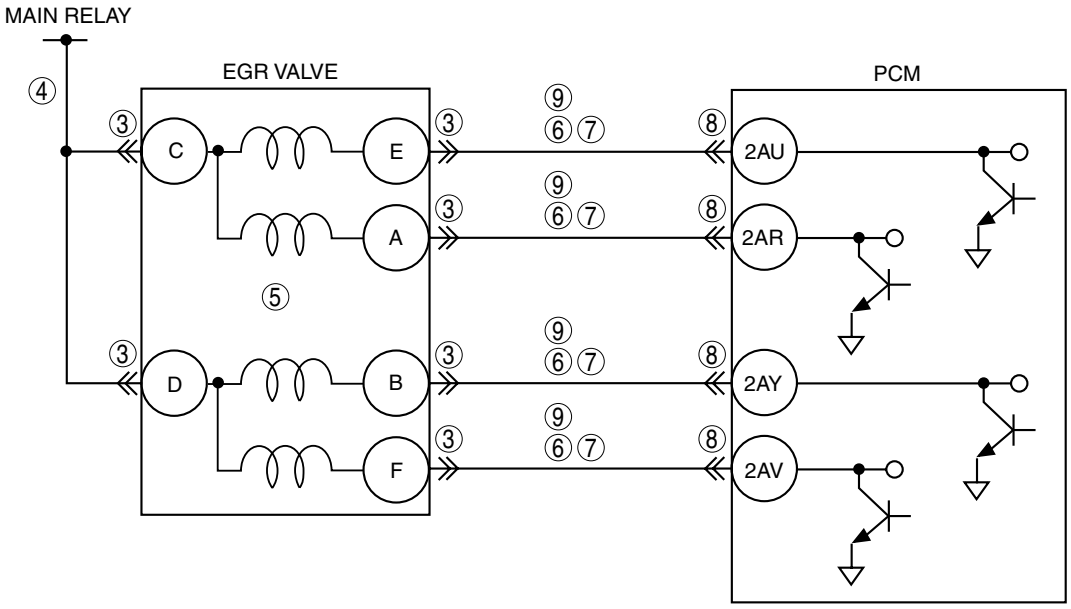
STEP	INSPECTION		ACTION
11	**VERIFY CKP SENSOR INSTALLATION** • Verify the CKP sensor installation. (See 01–40–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].) • Is the CKP sensor installed correctly?	Yes	Go to the next step.
		No	Reinstall the CKP sensor and go to the next step.
12	**VERIFY VALVE TIMING MECHANISM INSTALLATION** • Verify the valve timing mechanism installation for the following parts: — Timing chain misinstallation — Loose camshaft sprocket lock bolt — Loose crankshaft pulley lock bolt • Is the valve timing mechanism installed correctly?	Yes	Go to the next step.
		No	Reinstall valve timing mechanism and go to Step 15.
13	**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 the engine. • Access the MAF PID using the WDS or equivalent. **Note** • The 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0403 [L8, LF]

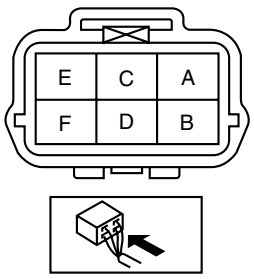
DPE010200400W21

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

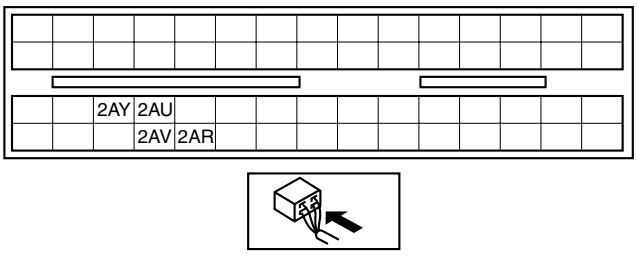
DTC P0403	EGR valve (stepper motor) circuit problem
POSSIBLE CAUSE	• EGR valve malfunction • Connector or terminal malfunction • Short to power supply in the wiring harness between EGR valve terminal E and PCM terminal 2AU • Short to power supply in the wiring harness between EGR valve terminal A and PCM terminal 2AR • Short to power supply in the wiring harness between EGR valve terminal B and PCM terminal 2AY • Short to power supply in the wiring harness between EGR valve terminal F and PCM terminal 2AV • Short to ground circuit in the wiring harness between EGR valve terminal E and PCM terminal 2AU • Short to ground circuit in the wiring harness between EGR valve terminal A and PCM terminal 2AR • Short to ground circuit in the wiring harness between EGR valve terminal B and PCM terminal 2AY • Short to ground circuit in the wiring harness between EGR valve terminal F and PCM terminal 2AV • Open circuit in the wiring harness between EGR valve terminal E and PCM terminal 2AU • Open circuit in the wiring harness between EGR valve terminal A and PCM terminal 2AR • Open circuit in the wiring harness between EGR valve terminal B and PCM terminal 2AY • Open circuit in the wiring harness between EGR valve terminal F and PCM terminal 2AV • Open circuit in the wiring harness between main relay terminal D and EGR valve terminal C • Open circuit in the wiring harness between main relay terminal D and EGR valve terminal D • PCM malfunction



EGR VALVE
WIRING HARNESS-SIDE CONNECTOR



PCM
WIRING HARNESS-SIDE CONNECTOR



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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 EGR VALVE** • Turn the ignition switch off. • Disconnect the 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 between the following terminals 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 the harness for an open circuit then go to Step 10.
5	**INSPECT EGR VALVE** • Perform the EGR valve inspection. (See 01–16A–5 EGR VALVE INSPECTION [L8, LF].) • Is the EGR valve normal?	Yes	Go to the next step.
		No	Replace the EGR valve, then go to Step 10.
6	**INSPECT CONTROL CIRCUIT FOR SHORT TO GROUND** • Turn the ignition switch off. • Inspect for continuity between the following terminals 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 the wiring harness for a short to ground, then go to Step 10.
		No	Go to the next step.
7	**INSPECT 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 a 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. • 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.

STEP	INSPECTION		ACTION
9	**INSPECT CONTROL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between the 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 an 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0421 [L8, LF]

DPE010200400W25

DTC P0421	Warm up three way 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 warm up three way 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—60%** (at **2,000 rpm**) **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 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	• WU-TWC deterioration or malfunction • Exhaust gas leakage • Loose front HO2S • Loose rear HO2S

Diagnostic procedure

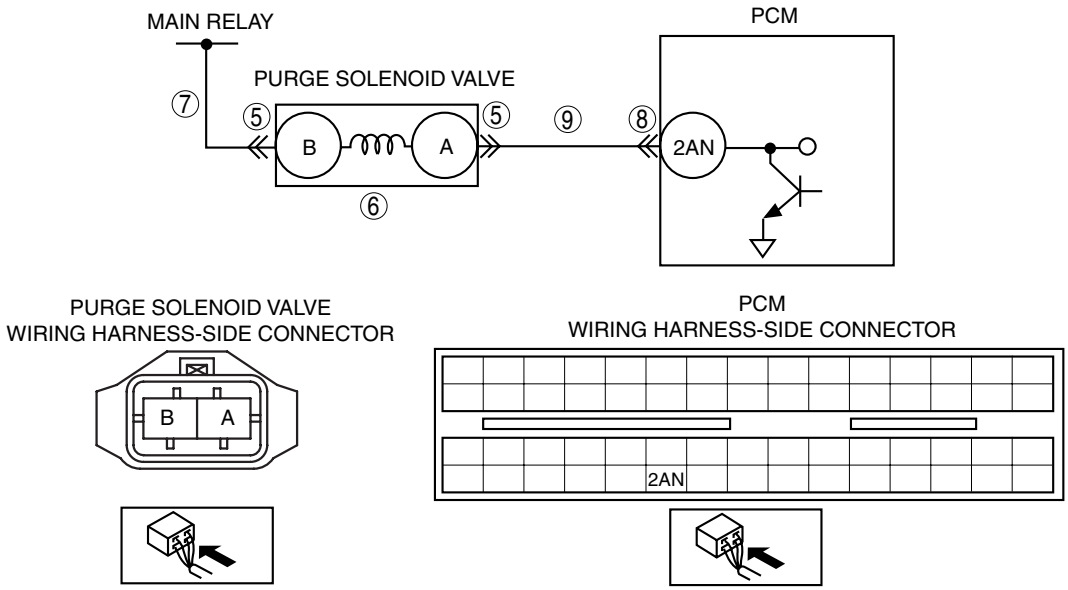
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information 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. • Is there gas leakage?	Yes	Repair or replace the malfunctioning exhaust part, then go to Step 7.
		No	Go to the next step.
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 01–15–1 EXHAUST SYSTEM INSPECTION [L8, 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 P0421 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0443 [L8, LF]

DPE010200400W23

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 a 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 the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.

DTC P0443	Purge solenoid valve circuit problem
POSSIBLE CAUSE	• Purge solenoid valve malfunction • Connector or terminal malfunction • Short to ground in the wiring harness between the purge solenoid valve terminal A and PCM terminal 2AN • Open circuit in the wiring harness between the main relay and purge solenoid valve terminal B • Open circuit in the wiring harness between the purge solenoid valve terminal A and PCM terminal 2AN • Short to power supply in the wiring harness between the purge solenoid valve terminal A and PCM terminal 2AN • PCM malfunction



Diagnostic procedure

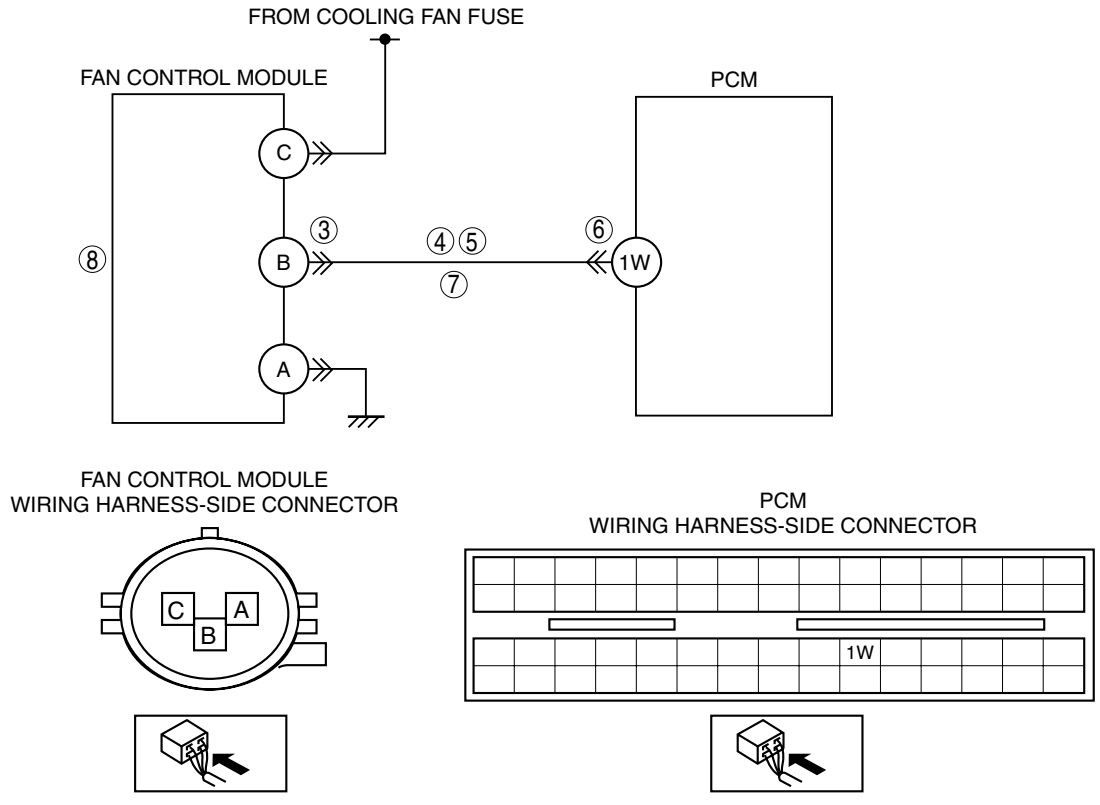
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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	**CLASSIFY OPEN CIRCUIT OR SHORT TO GROUND MALFUNCTION** • Disconnect the purge solenoid valve tube that is connected to the intake manifold. • Connect the vacuum pump to the purge solenoid valve. • Pump the vacuum pump several times and stop. • Wait **a few seconds**. • Is the 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 the purge solenoid valve connector. • Pump the vacuum pump several times and wait **a few seconds**. • Is the vacuum maintained?	Yes	Repair or the replace wiring harness for a 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 any malfunction?	Yes	Repair or replace the terminal, then go to Step 10.
		No	Go to the next step.
6	**INSPECT PURGE SOLENOID VALVE** • Perform the purge solenoid valve inspection. (See 01–16A–3 PURGE SOLENOID VALVE INSPECTION [L8, LF]) • Is the 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** • 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+**?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for an open circuit, then go to Step 10.
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 a 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 the wiring harness for an 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.

STEP	INSPECTION		ACTION
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0480 [L8, LF]

DPE010200400W24

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 a malfunction. **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	• Connector or terminal malfunction • Short to power supply in the wiring harness between fan control module terminal B and PCM terminal 1W • Short to ground in the wiring harness between fan control module terminal B and PCM terminal 1W • Open circuit in the wiring harness between fan control module terminal B and PCM terminal 1W • Fan control module malfunction • PCM malfunction



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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 FAN CONTROL MODULE CONNECTOR FOR POOR CONNECTION** • Turn the ignition switch off. • Disconnect the 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 an 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 an 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. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for an open circuit, then go to Step 9.
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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0500 [L8, LF]

DPE010200500W11

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	• Front ABS wheel-speed sensor malfunction • ABS/BSC 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 STORED DTC IN ABS HU/CM OR DSC HU/CM** • Turn the ignition switch to the ON position (Engine off). • Verify stored DTCs in the ABS HU/CM or DSC HU/CM. (See 04–02A–2 ON-BOARD DIAGNOSIS [ABS].) (See 04–02B–2 ON-BOARD DIAGNOSIS [DSC (DYNAMIC STABILITY CONTROL)]) • Are DTCs stored?	Yes	Go to the appropriate DTC inspection. (See 04–02A–3 DTC Table) (See 04–02B–3 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].) **ATX** **Note** • Possible VSS circuit problem related to ATX control. Go to the DTC inspection for the ATX control. (See 05–02–8 DTC TABLE [FN4A-EL].)
		No	Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “AFTER REPAIR PROCEDURE”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	DTC troubleshooting completed.

DTC P0505 [L8, LF]

DPE010200500W12

DTC P0505	IAC system problem
DETECTION CONDITION	• The PCM cannot control idle the speed toward the target idle speed during the KOER self test.

DTC P0505	IAC system problem
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. • Are DTCs P0511, P2502, P2503 or P2504 present?	Yes	Perform the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
3	**INSPECT IAC VALVE FOR MALFUNCTION** • Start the engine. • Disconnect the IAC valve connector. • Does the engine speed decrease?	Yes	Go to the next step.
		No	Repair the 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. • Is the magnetic clutch still on?	Yes	Go to "A/C ALWAYS ON / A/C COMPRESSOR RUNS CONTINUOUSLY." of ENGINE SYMPTOM TROUBLESHOOTING then go to step 9. (See 01–03–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, LF].)
		No	Go to the next step.
5	**INSPECT GENERATOR CONTROL CIRCUIT MALFUNCTION** • Apply electrical load. • Does engine speed increase?	Yes	Go to the next step.
		No	Repair the short to the power supply in the generator control circuit, then go to Step 9.
6	**INSPECT AIR CLEANER ELEMENT** • Remove the air cleaner element with the engine running. • Does the engine speed increase?	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 the engine compression. (See 01–10–10 COMPRESSION INSPECTION [L8, LF].) • Is the 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0506 [L8, LF]

DPE010200500W13

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 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 the 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 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. • 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 the 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	**VERIFY RELATED PENDING OR STORED DTCs** • Turn the ignition switch to off then to the ON position (Engine off). • Verify the pending code or stored DTCs using the WDS or equivalent. • Are other DTCs present?	Yes	Repair the applicable DTCs. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**INSPECT IAC VALVE FOR MALFUNCTION** • Perform the IAC valve inspection. (See 01–13–6 IDLE AIR CONTROL (IAC) VALVE INSPECTION [L8, LF].) • Is the 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 01–03–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, LF].)
		No	Go to the next step.
6	**INSPECT PURGE SOLENOID VALVE MALFUNCTION** • Perform the purge solenoid valve inspection. (See 01–16A–3 PURGE SOLENOID VALVE INSPECTION [L8, LF].) • 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. • Does engine speed increase?	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 the engine compression. (See 01–10–10 COMPRESSION INSPECTION [L8, LF].) • Is the engine compression normal?	Yes	Go to the next step.
		No	Overhaul the engine, then go to Step 11.
10	**INSPECT GENERATOR** • Perform generator inspection. (See 01–17–7 GENERATOR INSPECTION [L8, LF].) • Is the 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 the 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0507 [L8, LF]

DPE010200500W14

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 the atmospheric pressure is **less than 72.3 kPa {542 mmHg, 21.3 inHg}** or the 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 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 • Accelerator cable misadjusting • Actuator cable misadjusting • Throttle valve malfunction • Vacuum hose misconnection • PCM malfunction

Diagnostic procedure

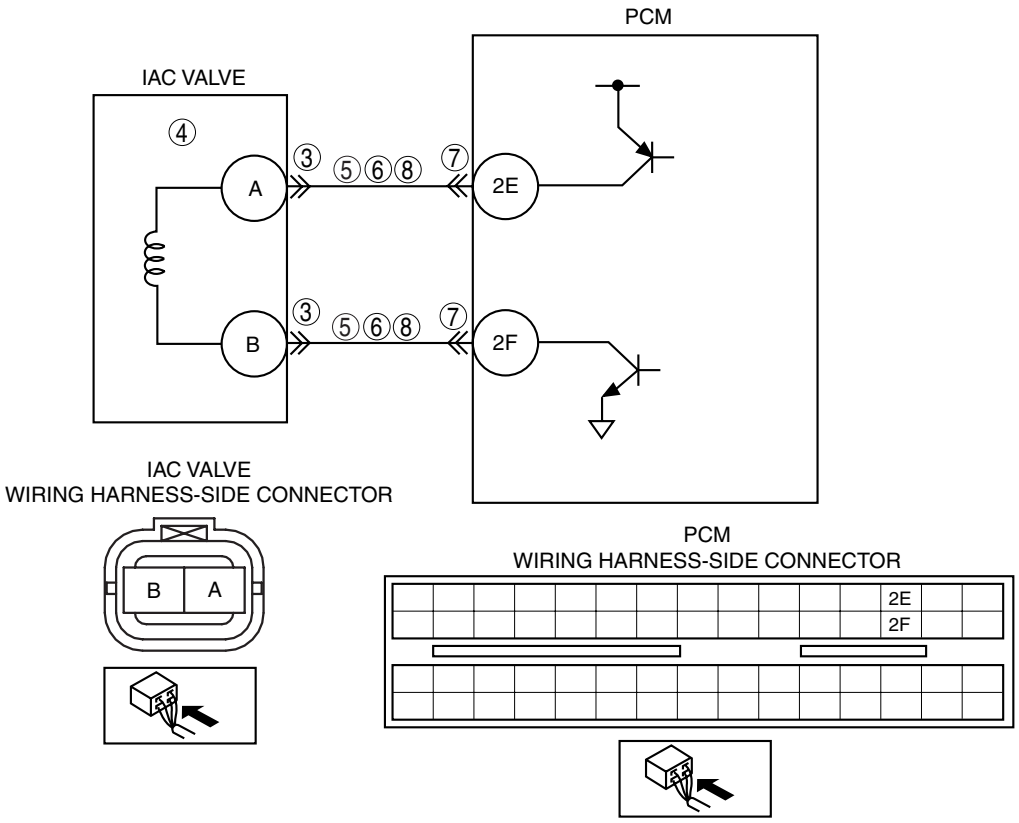
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify the related service 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	**VERIFY RELATED PENDING OR STORED DTC** • Turn the ignition switch off then to the ON position (Engine off). • Verify the pending code or stored DTCs using the WDS or equivalent. • Are other DTCs present?	Yes	Repair the applicable DTCs. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**INSPECT IAC VALVE FOR MALFUNCTION** • Perform the IAC valve inspection. (See 01–13–6 IDLE AIR CONTROL (IAC) VALVE INSPECTION [L8, LF].) • Is the 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 01–13–10 ACCELERATOR CABLE INSPECTION/ADJUSTMENT [L8, LF].)	Yes	Go to the next step.
		No	Adjust accelerator cable free play, then go to Step 9. (See 01–13–10 ACCELERATOR CABLE INSPECTION/ ADJUSTMENT [L8, 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 the vacuum hoses connected completely? (See 01–13–3 INTAKE AIR SYSTEM HOSE ROUTING DIAGRAM [L8, 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 the 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0511 [L8, LF]

DPE010200500W15

DTC P0511	IAC valve circuit problem
DETECTION CONDITION	• If the PCM detects that PCM terminal 2E voltage is above or below the threshold* a when the IAC control duty target is **within 16—30%**, the PCM determines that the IAC valve circuit has a malfunction. *: 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 during the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.

DTC P0511	IAC valve circuit problem
POSSIBLE CAUSE	• IAC valve circuit malfunction • Short to ground in the wiring harness between IAC valve terminal A and PCM terminal 2E • Short to ground in the wiring harness between IAC valve terminal B and PCM terminal 2F • Open circuit in the wiring harness between IAC valve terminal A and PCM terminal 2E • Open circuit in the wiring harness between IAC valve terminal B and PCM terminal 2F • Short to power supply in the wiring harness between IAC valve terminal A and PCM terminal 2E • Short to power supply in the 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 the 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 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. (See 01–13–6 IDLE AIR CONTROL (IAC) VALVE INSPECTION [L8, LF].) • Is IAC valve normal?	Yes	Go to the next step.
		No	Replace IAC valve, then go to Step 9.
5	**INSPECT CONTROL CIRCUIT FOR SHORT TO POWER** • Turn the ignition switch to the ON position (Engine off). • Measure voltage between the 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 the 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 CENNECTOR** • 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 between the 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** • Make sure to reconnect all disconnected connectors. • Clear the DTC using the WDS or equivalent. • Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.

STEP	INSPECTION		ACTION
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0602 [L8, LF]

DPE010200600W20

DTC P0602	PCM programming error
DETECTION CONDITION	• No configuration data in the PCM **Note** • If the “PCM CONFIGURATION” is successful, the PCM stores 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 the 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	**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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
4	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0610 [L8, LF]

DPE010200600W21

DTC P0610	PCM vehicle options error
DETECTION CONDITION	• PCM data configuration error **Diagnostic support note** • The MIL illuminates if the PCM detects the above malfunction condition during the first drive cycle.
POSSIBLE CAUSE	• Configuration procedure has not been completed • PCM malfunction

Diagnostic procedure

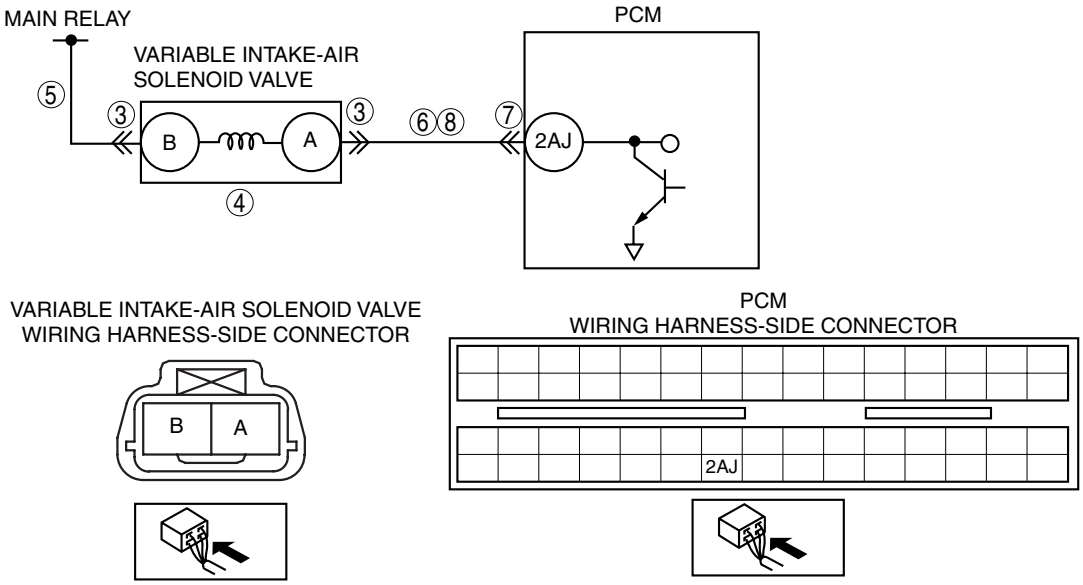
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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	**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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
4	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0661 [LF]

DPE010200600W22

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 the variable intake air solenoid valve off but the voltage at PCM terminal 2AJ still remains low, the PCM determines that the variable intake air solenoid valve circuit 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 during the first drive cycle. • 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 the wiring harness between the main relay and variable intake air solenoid valve terminal B • Open circuit in the wiring harness between variable intake air solenoid valve terminal A and PCM terminal 2AJ • Short to ground in the wiring harness between variable intake air solenoid valve terminal A and PCM terminal 2AJ • Connector or terminal malfunction • PCM malfunction

DTC P0661	Variable intake air solenoid valve circuit low input



Diagnostic procedure

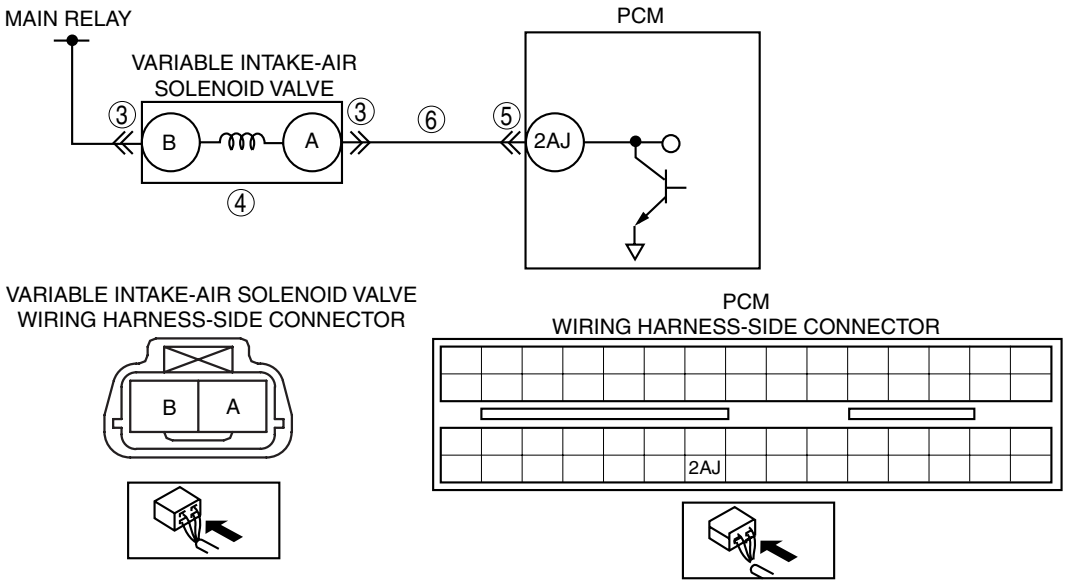
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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 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 FOR MALFUNCTION** • Perform the variable intake air solenoid valve inspection. (See 01–13–7 VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [LF].) • Is the variable intake air solenoid valve normal?	Yes	Go to the next step.
		No	Replace the variable intake air solenoid valve, then go to step 9.
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 an open circuit, 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 a 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 an 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 the RPM PID. • Increase the engine speed to **4,750 rpm or more** 10 times. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.

STEP	INSPECTION		ACTION
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0662 [LF]

DPE010200600W23

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 the variable intake air solenoid valve on but the voltage at PCM terminal 2AJ still remains high, the PCM determines that the variable intake air solenoid valve circuit 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 during the first drive cycle. • 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 the wiring harness between the variable intake air solenoid valve terminal B and PCM terminal 2AJ • Shorted variable intake air solenoid valve or PCM connector • PCM malfunction



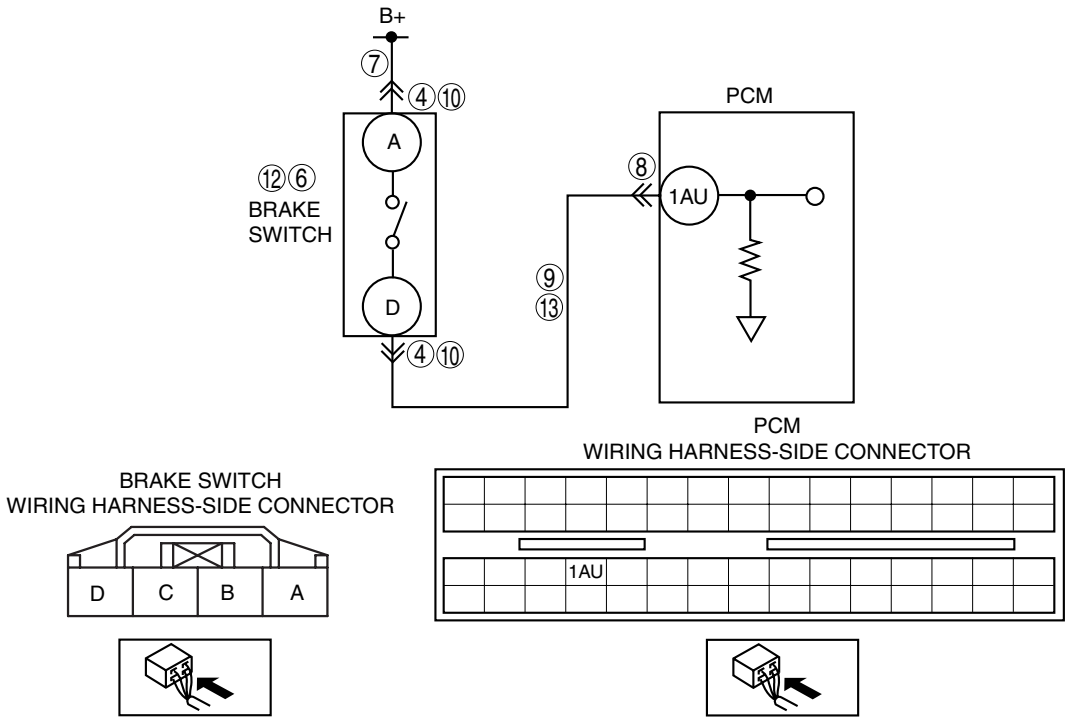
Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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 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 any 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 FOR MALFUNCTION** • Perform variable intake air solenoid valve inspection. (See 01–13–7 VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [LF].) • Is the variable intake air solenoid valve normal?	Yes	Go to the next step.
		No	Replace the variable intake air 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 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 the RPM PID. • Increase the engine speed to **4,750 rpm or more** 10 times. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0703 [L8, LF]

DPE010200700W04

DTC P0703	Brake switch input circuit problem
DETECTION CONDITION	• The PCM monitors changes in the 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 the brake switch 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 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 • Poor connection of the brake switch connector or the PCM connector • Short to power supply in the wiring harness between brake switch terminal D and PCM connector terminal 1AU • Open circuit in the wiring harness between brake switch terminal D and PCM connector terminal 1AU • Open circuit in the 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 the 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	**CLASSIFY HIGH INPUT OR LOW INPUT** • Connect the WDS or equivalent to the DLC-2. • Access the BOO PID. • Verify the BOO PID during brake pedal operation. • Is the 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 the BOO PID. • Connect a jumper wire between brake switch terminals A and D. • Is the BOO PID on?	Yes	Go to the next step.
		No	Go to Step 7.
6	**INSPECT BRAKE SWITCH** • Perform the brake switch inspection. (See 04–11–9 BRAKE SWITCH INSPECTION.) • Is the brake switch normal?	Yes	Go to Step 14.
		No	Replace the 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 the brake switch power circuit for an 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 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 the wiring harness for an 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 the BOO PID. • Verify that the BOO PID changes from ON to OFF when the brake switch connector is disconnected. • Does the BOO PID change from ON to OFF?	Yes	Go to the next step.
		No	Go to Step 13.

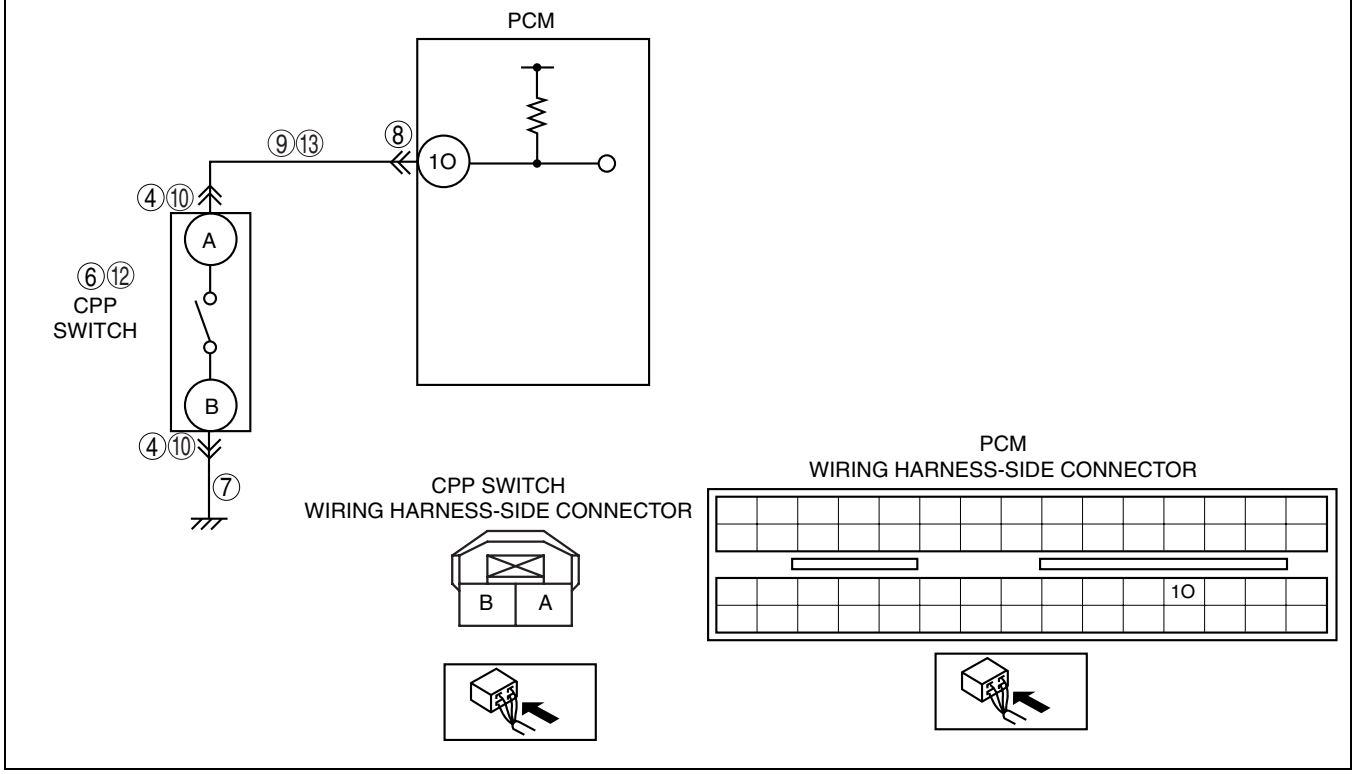
STEP	INSPECTION		ACTION
12	**INSPECT BRAKE SWITCH** • Perform the brake switch inspection. (See 04–11–9 BRAKE SWITCH INSPECTION.) • Is the brake switch normal?	Yes	Go to Step 14.
		No	Replace the brake switch, then go to Step 14.
13	**INSPECT BRAKE SWITCH SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Measure the voltage between brake switch terminal D and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a short to power supply, then go to the next step.
		No	Go to the next step.
14	**VERIFY TROUBLESHOOTING OF DTC P0703 COMPLETED** • 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 the vehicle. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
15	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0704 [L8, LF]

DPE010200700W05

DTC P0704	CPP switch input circuit problem
DETECTION CONDITION	• The PCM monitors changes in the 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 a 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 the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• CPP switch malfunction • Poor connection of the CPP switch connector or the PCM connector • Short to ground in the wiring harness between CPP switch terminal A and PCM terminal 1O • Open circuit in the wiring harness between CPP switch terminal A and PCM terminal 1O • Open circuit in the wiring harness between the ground and CPP switch terminal B • PCM malfunction

DTC P0704	CPP switch input circuit problem



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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	**CLASSIFY HIGH INPUT OR LOW INPUT** • Connect the WDS or equivalent to DLC-2. • Access the CPP PID. • Verify the CPP PID during clutch pedal operation. • Is the 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. • 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 14.
		No	Go to the next step.
5	**CLASSIFY CPP SWITCH OR CIRCUIT** • Connect the WDS or equivalent to DLC-2. • Access the CPP PID. • Connect a jumper wire between CPP switch terminal A and B. • Is the CPP PID on?	Yes	Go to the next step.
		No	Go to Step 7.
6	**INSPECT CPP SWITCH** • Perform the CPP switch inspection. (See 01–40–25 CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [L8, LF].) • Is the 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 an 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 the wiring harness for an 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.
11	**CLASSIFY CPP SWITCH OR CIRCUIT** • Connect the WDS or equivalent to DLC-2. • Access the CPP PID. • Verify that the CPP PID changes from ON to OFF when the CPP switch connector disconnected. • Does the CPP PID change from ON to OFF?	Yes	Go to the next step.
		No	Go to Step 13.

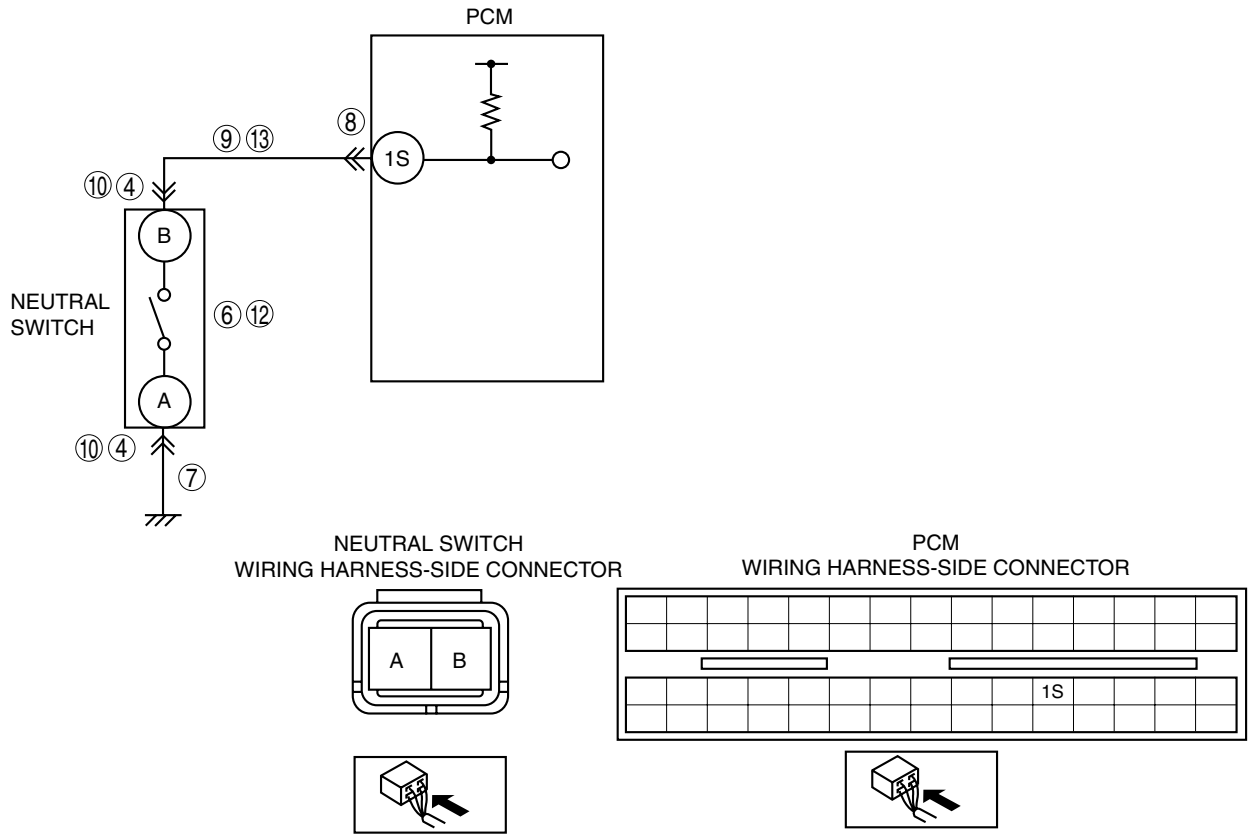
STEP	INSPECTION		ACTION
12	**INSPECT CPP SWITCH** • Perform the CPP switch inspection. (See 01–40–25 CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [L8, LF].) • Is the CPP switch normal?	Yes	Go to Step 14.
		No	Replace the CPP switch, then go to Step 14.
13	**INSPECT CPP SWITCH SIGNAL CIRCUIT FOR SHORT TO GROUND** • Inspect for continuity between CPP switch terminal A and ground. • Is there continuity?	Yes	Repair or the replace wiring harness for a short to ground, then go to Step 14.
		No	Go to the next step.
14	**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?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
15	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P0850 [L8, LF]

DPE010200800W03

DTC P0850	Neutral switch input circuit problem
DETECTION CONDITION	• The PCM monitors changes in the input voltage from the neutral switch. If the PCM does not detect PCM terminal 1S voltage changes while running vehicle with the vehicle speed **above 30 km/h {19 mph}** and the clutch pedal is depressed and released **10 times** repeatedly, the PCM determines that the neutral switch 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 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 • Poor connection of the neutral switch connector or the PCM connector • Short to ground in the wiring harness between neutral switch terminal B and PCM terminal 1S • Open circuit in the wiring harness between neutral switch terminal B and PCM terminal 1S • Open circuit in the wiring harness between the ground and neutral switch terminal A • PCM malfunction

DTC P0850	Neutral switch input circuit problem



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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 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 the CPP PID. • Verify the CPP PID when the gear is in the neutral position. • Is the 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 the CPP PID. • Connect a jumper wire between neutral switch terminals A and B. • Is the CPP PID on?	Yes	Go to the next step.
		No	Go to Step 7.
6	**INSPECT NEUTRAL SWITCH** • Perform the neutral switch inspection. (See 01–40–25 NEUTRAL SWITCH INSPECTION [L8, LF].) • Is the 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** • Inspect for continuity between neutral switch terminal A and ground. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace neutral switch ground circuit for an 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 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 an 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 the CPP PID. • Verify that the CPP PID changes from ON to OFF when the neutral switch connector is disconnected. • Does the CPP PID change from ON to OFF?	Yes	Go to the next step.
		No	Go to Step 13.

STEP	INSPECTION		ACTION
12	**INSPECT NEUTRAL SWITCH** • Perform the neutral switch inspection. (See 01–40–25 NEUTRAL SWITCH INSPECTION [L8, LF].) • Is the 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 the wiring harness for a 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 the vehicle. • Depress and release the clutch pedal **more than 10 times** during the drive cycle. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
15	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P1260 [L8, LF]

DPE010201200W03

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 during the first drive cycle. • FREEZE FRAME DATA is not available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Immobilizer system malfunction • PCM malfunction

Diagnostic procedure

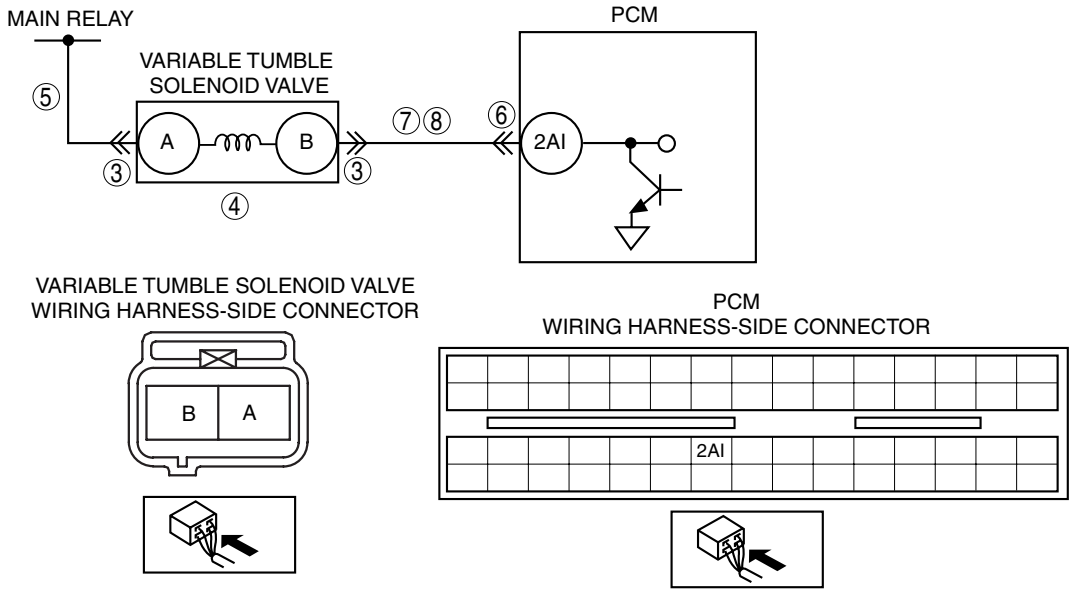
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform 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	**VERIFY STORED DTC IN INSTRUMENT CLUSTER** • Turn the ignition switch to the ON position (Engine off). • Verify stored DTCs in instrument cluster. (See 09–02–1 DTC INSPECTION [IMMOBILIZER SYSTEM (KEYLESS ENTRY SYSTEM)].) • Are DTCs stored?	Yes	Go to the appropriate DTC inspection. (See 09–02–2 DTC TABLE [IMMOBILIZER SYSTEM (ADVANCED KEYLESS SYSTEM)].)(See 09–02–2 DTC TABLE [IMMOBILIZER SYSTEM (KEYLESS ENTRY 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “AFTER REPAIR PROCEDURE”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	DTC troubleshooting completed.

DTC P2009 [L8, LF]

DPE010202000W12

DTC P2009	Variable tumble solenoid valve circuit low input
DETECTION CONDITION	• The PCM monitors the variable tumble solenoid valve control signal at PCM terminal 2AI. If the PCM turns the variable tumble solenoid valve off but the voltage at PCM terminal 2AI still remains low, the PCM determines that the variable tumble solenoid valve 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 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	• Poor connection of connectors at PCM and/or variable tumble solenoid valve • Short to ground in the wiring harness between variable tumble solenoid valve terminal B and PCM terminal 2AI • Open circuit in the wiring harness between the main relay and variable tumble solenoid valve terminal A • Open circuit in the wiring harness between variable tumble solenoid valve terminal B and PCM terminal 2AI • Variable tumble solenoid valve malfunction • PCM malfunction

DTC P2009	Variable tumble solenoid valve circuit low input



VARIABLE TUMBLE SOLENOID VALVE
WIRING HARNESS-SIDE CONNECTOR

PCM
WIRING HARNESS-SIDE CONNECTOR

Diagnostic procedure

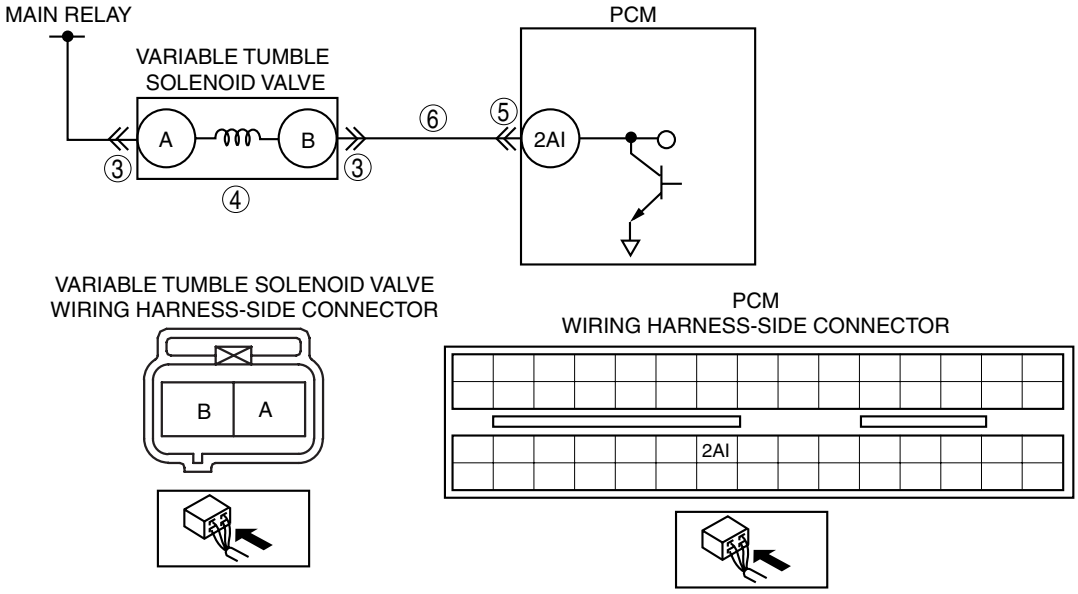
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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 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 any 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 01–13–9 VARIABLE TUMBLE SOLENOID VALVE INSPECTION [L8, 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 an open circuit, then go to Step 9.
6	**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 any malfunction?	Yes	Repair the terminal, then go to Step 9.
		No	Go to the next step.
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 a 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 the 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 the wiring harness for an 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.

STEP	INSPECTION		ACTION
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2010 [L8, LF]

DPE010202000W13

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 the 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 a 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 the 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 the 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 VARIABLE TUMBLE SOLENOID VALVE CONNECTOR** • 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 7.
		No	Go to the next step.
4	**INSPECT VARIABLE TUMBLE SOLENOID VALVE** • Perform the variable tumble solenoid valve inspection. (See 01–13–9 VARIABLE TUMBLE SOLENOID VALVE INSPECTION [L8, LF].) • Is the 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 any 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 a 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. • Start the engine. • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2096 [L8, LF]

DPE010202000W14

DTC P2096	Target A/F feedback system too lean
DETECTION CONDITION	• The PCM monitors the target A/F fuel trim while 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 the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Exhaust gas leakage • 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 • Fuel leakage • Improper operation of the ignition system • Insufficient engine compression • Fuel injector malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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 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	**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 DTCs P2177 or P2187 also present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2096 on the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to FREEZE FRAME DATA DTC inspection. (See 01–02A–9 DTC TABLE [L8, 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 the O2S12 PID under the following accelerator pedal conditions (in PARK or NEUTRAL): — **More than 0.45 V** when the accelerator pedal is suddenly depressed (rich condition). — **Less than 0.45 V** just after release of the accelerator pedal (lean condition) • Is the PID normal?	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 01–40–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, 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 01–40–7 PCM INSPECTION [L8, 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 01–40–7 PCM INSPECTION [L8, 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 the O2S11 PID. • Read the O2S11 PID under the following accelerator pedal conditions (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?	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. (See 01–40–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF].) Then go to Step 17.

STEP	INSPECTION		ACTION
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 the engine speed. • Is the PID normal?	Yes	Go to the next step.
		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 damage. • 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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • 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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
13	**INSPECT IGNITION COIL WIRING HARNESSES** • Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. • Are the wiring harnesses normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses, then go to Step 17.
14	**INSPECT IGNITION SYSTEM OPERATION** • Perform the spark test. (See 01–03–60 Spark Test.) • Is a strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the spark test result. Then go to Step 17.
15	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See 01–10–10 COMPRESSION INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Go to the next step.
		No	Overhaul the engine, then go to Step 17.
16	**INSPECT FUEL INJECTOR** • Inspect the fuel injector. (See 01–14–15 FUEL INJECTOR INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Replace the suspected fuel injector, then go to the next step. (See 01–14–14 FUEL INJECTOR REMOVAL/ INSTALLATION [L8, 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
18	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2097 [L8, LF]

DPE010202000W15

DTC P2097	Target A/F feedback system too rich
DETECTION CONDITION	• The PCM monitors the target A/F fuel trim while 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 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 the first drive cycle. • FREEZE FRAME DATA is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• Exhaust gas leakage • 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 the 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 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	**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. • Are DTCs P2178 or P2188 also present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2097 on the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See 01–02A–9 DTC TABLE [L8, 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 the O2S12 PID. • Read the O2S12 PID under the following accelerator pedal conditions (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?	Yes	Go to the next step.
		No	Visually inspect for exhaust gas leakage between the TWC and the rear HO2S. • If there is no leakage, replace the rear HO2S. (See 01–40–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, 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 01–40–7 PCM INSPECTION [L8, 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 01–40–7 PCM INSPECTION [L8, 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	**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 the O2S11 PID. • Read the O2S11 PID under the following accelerator pedal conditions (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?	Yes	Go to the next step.
		No	Visually inspect exhaust gas leakage between the exhaust manifold and the front HO2S. • If there is no leakage, replace front HO2S. (See 01–40–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF].) Then go to Step 11.

STEP	INSPECTION		ACTION
9	**INSPECT FUEL LINE PRESSURE** • Perform the “FUEL LINE PRESSURE INSPECTION”. (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Replace the fuel pump unit, then go to Step 11. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
		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 the recorded FREEZE FRAME DATA at Step 1. • Is the LONGFT1 PID above the FREEZE FRAME DATA?	Yes	Inspect the purge valve. (See 01–16A–3 PURGE SOLENOID VALVE INSPECTION [L8, LF].) • If there is any malfunction, replace the purge valve. (See 01–13–3 INTAKE AIR SYSTEM HOSE ROUTING DIAGRAM [L8, 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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After repair procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2177 [L8, LF]

DPE010202100W31

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 the preprogrammed criteria, the 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 the 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 in fuel line from fuel delivery pipe and fuel pump • Exhaust system leakage • Purge solenoid valve improper operation • Purge solenoid valve malfunction (stuck open) • Improper connection of purge solenoid hoses • Air suction in intake air system • Insufficient engine compression

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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	**VERIFY RELATED PENDING CODE OR STORED DTCS** • Turn the ignition switch to off, then to the ON position (Engine off). • Verify related pending code or stored DTCs. • Are other DTCs present?	Yes	If a misfire DTC is present, go to Step 8. If other DTCs are present, go to the appropriate DTC troubleshooting procedure. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	If the driveability 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 the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedures for the DTC on the FREEZE FRAME DATA.
5	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access the ECT, MAF, TP and VSS PIDs using the WDS or equivalent. • Is there any signal that is far out of specification when the ignition switch is turned to the ON position and engine is running?	Yes	Inspect the suspected sensor and for excessive resistance in the related wiring harnesses. Repair or replace 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 5 while simulating FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect the suspected sensor, and the related wiring harnesses, and repair or replace. Then go to Step 16.
		No	Go to the next step.
7	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Access the O2S11 PID using the WDS or equivalent. • Check the PID under the following accelerator pedal conditions (in PARK or NEUTRAL). • Is the PID reading normal? — **Above 0.45 V** when the accelerator pedal is suddenly depressed (rich condition). — **Below 0.45 V** just after release of the accelerator pedal (lean condition).	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between the exhaust manifold and the 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 the engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 16.
9	**INSPECT FOR EXCESSIVE AIR SUCTION OF INTAKE AIR SYSTEM** • Visually inspect for loose, cracked or damaged hoses in the intake air system. • Is there any malfunction?	Yes	Repair or replace the source of air suction, then go to Step 16.
		No	Go to the next step.
10	**INSPECT PURGE SOLENOID OPERATION** • Perform the Purge Control System Inspection. (See 01–03–61 Purge Control System Inspection.) • Does the purge control system work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection result, then go to Step 16.

STEP	INSPECTION		ACTION
11	**INSPECT FUEL LINE PRESSURE** • Turn ignition switch off. • Inspect the fuel line pressure. (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • Is the fuel line pressure normal?	Yes	Go to Step 12.
		No	If the fuel pressure is too high, replace the fuel pump, 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 the fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace suspected fuel line, then go to Step 16.
		No	Inspect for foreign material or staining inside the fuel filter (low-pressure). If there is foreign material or staining inside the fuel filter (low-pressure), clean the fuel tank and filter. Then go to Step 16.
13	**INSPECT IGNITION SYSTEM** • Perform the spark test. (See 01–03–60 Spark Test.) • Is a strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the spark test result, then go to Step 16.
14	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See 01–10–10 COMPRESSION INSPECTION [L8, LF].) • Is it normal?	Yes	Go to the next step.
		No	Implement the engine overhaul for repairs, then go to Step 16.
15	**INSPECT FUEL INJECTOR OPERATION** • Remove the fuel injector. • Inspect the fuel injector (resistance, injection amount). (See 01–14–15 FUEL INJECTOR INSPECTION [L8, LF].) • Is the fuel injector normal?	Yes	Go to the next step.
		No	Replace the suspected fuel injector, then go to the next step.
16	**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. • Perform the PCM Adaptive Memory Produce Drive Mode. (See 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
17	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2178 [L8, LF]

DPE010202100W32

DTC P2178	Fuel system too rich at off idle
DETECTION CONDITION	• PCM monitors the short term fuel trim (SHRTFT), long term fuel trim (LONGFT) during the closed loop fuel control at off-idle. If the LONGFT or the sum total of these fuel trims exceed the preprogrammed criteria, the PCM determines that the fuel system is too rich at off-idle. **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 the first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.

DTC P2178	Fuel system too rich at off idle
POSSIBLE CAUSE	• Misfire • Front HO2S deterioration • Front HO2S heater malfunction • MAF sensor malfunction • Pressure regulator (built-in fuel injection pump) malfunction • Fuel pump malfunction • Improper operation of EGR valve • Improper operation of VTCS • Improper operation of Purge solenoid valve • Purge solenoid valve malfunction (stuck open) • Improper operation of purge solenoid hoses • PCV valve malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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	**VERIFY RELATED PENDING CODE OR STORED DTCS** • Turn the ignition switch off, then to the ON position (Engine off). • Verify related pending codes or stored DTCs. • Are other DTCs present?	Yes	If the misfire DTC is present, go to Step 8. If other DTCs are present, go to the appropriate DTC troubleshooting procedure. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	If the driveability 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 the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedures for the DTC on the FREEZE FRAME DATA.
5	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access the ECT, MAF, TP and VSS PIDs using the WDS or equivalent. • Is there any signal that is far out of specification when the ignition switch is in the ON position and the engine is running?	Yes	Inspect the suspected sensor, and for excessive resistance in the related wiring harnesses. Repair or replace if necessary. Then go to Step 15.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect the same PIDs as in Step 5 while simulating the FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect the suspected sensor and the related wiring harnesses, repair or replace it. Then go to Step 15.
		No	Go to the next step.
7	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Access the O2S11 PID using the WDS or equivalent. • Check the PID under the following accelerator pedal conditions (in PARK NEUTRAL): • Is the PID reading normal? — **Above 0.45 V** when the accelerator pedal is suddenly depressed (rich condition). — **Below 0.45 V** just after release of the accelerator pedal (lean condition)	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between the exhaust manifold and the 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 the engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 15.
9	**INSPECT PURGE SOLENOID OPERATION** • Perform the Purge Control System Inspection. (See 01–03–61 Purge Control System Inspection.) • Does the purge control system work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection result, then go to Step 15.
10	**INSPECT PCV VALVE OPERATION** • Inspect the PCV valve operation. (See 01–16A–2 POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [L8, LF].) • Is the PCV valve normal?	Yes	Go to the next step.
		No	Replace the PCV valve, then go to Step 15.

STEP	INSPECTION		ACTION
11	**INSPECT EGR VALVE OPERATION** • Perform EGR Control System Inspection. (See 01–03–61 EGR Control System Inspection.) • Does the EGR control system work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection result, then go to Step 15.
12	**INSPECT VTCS OPERATION** • Carry out the Variable Tumble Control System (VTCS) Operation Inspection. (See 01–03–59 Variable Tumble Control Operation Inspection.) • Does the VTCS work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection result, then go to Step 15.
13	**INSPECT FUEL LINE PRESSURE** • Turn the ignition switch to off. • Inspect the fuel line pressure. (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • Is the fuel line pressure normal?	Yes	Go to the next step.
		No	If the fuel pressure is too high, replace the fuel pump, then go to Step 15. 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 the fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace the suspected fuel line, then go to the next step.
		No	Inspect for foreign material or staining inside the fuel filter (low-pressure). If there is foreign materials or staining inside the fuel filter (low-pressure), clean the 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 the DTC from the PCM memory using the WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
16	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2187 [L8, LF]

DPE010202100W33

DTC P2187	Fuel system too lean at idle
DETECTION CONDITION	• 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, the PCM determines that the fuel system is too lean at idle. **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 PCM detects the above malfunction conditions during the 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 • Exhaust system leakage • Purge solenoid valve malfunction • Improper connection of purge solenoid hoses • Air suction in intake air system • Insufficient engine compression

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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	**VERIFY RELATED PENDING CODE OR STORED DTCS** • Turn ignition switch to off, then to the ON position (Engine off). • Verify related pending code or stored DTCs. • Are other DTCs present?	Yes	If a misfire DTC is present, go to Step 8. If other DTCs are present, go to the appropriate DTC troubleshooting procedure. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	If a 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 P2187 on the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedures for the DTC on the FREEZE FRAME DATA.
5	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access the ECT, MAF and TP PIDs using the WDS or equivalent.) • Is there any signal that is far out of specification when the ignition switch is in the ON position and the engine is running?	Yes	Inspect the suspected sensor, and for excessive resistance in the related wiring harnesses. Repair or replace if necessary. Then go to Step 16.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect the same PIDs as in Step 4 while simulating the FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect the suspected sensor and related wiring harnesses, and repair or replace. Then go to Step 16.
		No	Go to the next step.
7	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Access the O2S11 PID using the WDS or equivalent. • Check the PID under the following accelerator pedal conditions (in PARK or NEUTRAL). • Is the PID reading normal? — **Above 0.45 V** when the accelerator pedal is suddenly depressed (rich condition). — **Below 0.45 V** just after release of the accelerator pedal (lean condition)	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between the exhaust manifold and the 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 the engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 16.
9	**INSPECT FOR EXCESSIVE AIR SUCTION OF INTAKE AIR SYSTEM** • Visually inspect for loose, cracked or damaged hoses in the intake air system. • Is there any malfunction?	Yes	Repair or replace the source of the air suction, then go to Step 16.
		No	Go to the next step.
10	**INSPECT PURGE SOLENOID VALVE IF STUCK OPEN** • Turn the ignition switch to off. • Disconnect both hoses from the purge solenoid valve. • Blow air through the purge solenoid valve. • Does air blow through?	Yes	Replace the purge solenoid valve. Then go to Step 16.
		No	Go to the next step.

STEP	INSPECTION		ACTION
11	**INSPECT FUEL LINE PRESSURE** • Turn the ignition switch to off. • Inspect the fuel line pressure. (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • Is the fuel line pressure normal?	Yes	Go to Step 13.
		No	If the fuel pressure is too high, replace the fuel pump unit, then go to Step 16. 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 any fuel leakage found?	Yes	Replace the suspected fuel line, then go to Step 16.
		No	Inspect for foreign material or staining inside the fuel filter (low-pressure). If there is foreign material or staining inside the fuel filter (low-pressure), clean the fuel tank and filter. Then go to Step 16.
13	**INSPECT IGNITION SYSTEM** • Carry out the spark test. (See 01–03–60 Spark Test.) • Is a strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the spark test results, then go to Step 16.
14	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See 01–10–10 COMPRESSION INSPECTION [L8, LF].) • Is it normal?	Yes	Go to the next step.
		No	Implement the engine overhaul for repairs, then go to Step 16.
15	**INSPECT FUEL INJECTOR OPERATION** • Remove the fuel injector. • Inspect the fuel injector (resistance, injection amount). (See 01–14–15 FUEL INJECTOR INSPECTION [L8, LF].) • Is the fuel injector normal?	Yes	Go to the next step.
		No	Replace the suspected fuel injector, then go to the next step.
16	**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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
17	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2188 [L8, LF]

DPE010202100W34

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 trims exceed the preprogrammed criteria, the PCM determines that the 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 the first drive cycle. • FREEZE FRAME DATA is available. • DTC is stored in the PCM memory.

DTC P2188	Fuel system too rich at idle
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 • Improper operation of VTCS • Improper operation of purge solenoid valve • Purge solenoid valve malfunction (stuck open) • Improper operation of purge solenoid hoses • PCV valve malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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	**VERIFY RELATED PENDING CODE OR STORED DTCs** • Turn the ignition switch off, then to the ON position (Engine off). • Verify related pending code or stored DTCs. • Are other DTCs present?	Yes	If the misfire DTC is present, go to Step 8. If other DTCs are present, go to the appropriate DTC troubleshooting procedure. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	If the 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 P2188 on the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedures for the DTC on the FREEZE FRAME DATA.
5	**VERIFY CURRENT INPUT SIGNAL STATUS (KEY TO ON/IDLE)** • Access the ECT, MAF, TP and VSS PIDs using the WDS or equivalent. • Is there any signal that is far out of specification when the ignition switch is in the ON position and the engine is running?	Yes	Inspect the suspected sensor, and for excessive resistance in the related wiring harnesses. Repair or if necessary. Then go to Step 15.
		No	Go to the next step.
6	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER TROUBLE CONDITION** • Inspect the same PIDs as in Step 5 while simulating the FREEZE FRAME DATA condition. • Is there any signal which causes drastic changes?	Yes	Inspect the suspected sensor and the related wiring harnesses, repair or replace it. Then go to Step 15.
		No	Go to the next step.
7	**VERIFY CURRENT INPUT SIGNAL STATUS OF FRONT HO2S** • Access the O2S11 PID using the WDS or equivalent. • Check the PID under the following accelerator pedal conditions (in PARK or NEUTRAL). • Is the PID reading normal? — **Above 0.45 V** when the accelerator pedal is suddenly depressed (rich condition). — **Below 0.45 V** just after release of the accelerator pedal (lean condition).	Yes	Go to the next step.
		No	Visually inspect for any gas leakage between the exhaust manifold and the 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 the engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 15.
9	**INSPECT PURGE SOLENOID OPERATION** • Carry out the Purge Control System Inspection. (See 01–03–61 Purge Control System Inspection.) • Does the purge control system work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection result, then go to Step 15.
10	**INSPECT PCV VALVE OPERATION** • Inspect the PCV valve operation. (See 01–16A–2 POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [L8, LF].) • Is the PCV valve normal?	Yes	Go to the next step.
		No	Replace the PCV valve, then go to Step 15.

STEP	INSPECTION		ACTION
11	**INSPECT VTCS OPERATION** • Carry out the Variable Tumble Control System (VTCS) Operation Inspection. (See 01–03–59 Variable Tumble Control Operation Inspection.) • Does the VTCS work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection result, then go to Step 15.
12	**INSPECT FUEL LINE PRESSURE** • Turn the ignition switch off. • Inspect the fuel line pressure. (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • Is the fuel line pressure normal?	Yes	Go to the next step.
		No	If the fuel pressure is too high, replace the fuel pump, then go to Step 15. 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 the fuel line for any leakage. • Is any fuel leakage found?	Yes	Replace the suspected fuel line, then go to Step 15.
		No	Inspect for foreign material or staining inside the fuel filter (low-pressure). If there is foreign material or staining inside the fuel filter (low-pressure), clean the fuel tank and filter. Then go to Step 15.
14	**INSPECT EGR VALVE IF STUCK OPEN** • Remove the EGR valve. • Is the 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 the DTC from the PCM memory using the WDS or equivalent. • Perform the PCM Adaptive Memory Produce Drive Mode. (See 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
16	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2195 [L8, LF]

DPE010202100W35

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 **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) • 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 the 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 • Exhaust gas leakage • Air suction at intake air system • Fuel leakage • MAF sensor malfunction • ECT sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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 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	**VERIFY RELATED PENDING CODE OR STORED DTCs** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are DTCs P2177 or P2187 also present?	Yes	Go to applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2195 on the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See 01–40–7 PCM INSPECTION [L8, 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 01–40–7 PCM INSPECTION [L8, 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 loose, cracked or damaged hoses in the 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 the engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 14.
9	**INSPECT FRONT HO2S** • Inspect the front HO2S. (See 01–40–35 FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Replace the front HO2S, then go to Step 14. (See 01–40–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
10	**INSPECT FUEL INJECTOR** • Inspect the fuel injector. (See 01–14–15 FUEL INJECTOR INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Replace suspected fuel injector, then go to Step 14. (See 01–14–14 FUEL INJECTOR REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.

STEP	INSPECTION		ACTION
11	**INSPECT FUEL LINE PRESSURE** • Perform the "FUEL LINE PRESSURE INSPECTION". (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 13.
12	**INSPECT FUEL SYSTEM FOR FUEL LEAKAGE** • Visually inspect for 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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
14	**VERIFY AFTER REPAIR PROCEDURE** • Perform "After Repair Procedure". (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2196 [L8, LF]

DPE010202100W36

DTC P2196	Front HO2S signal stuck rich
DETECTION CONDITION	• The PCM monitors the front HO2S output voltage when the following conditions are met. If the 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). • 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 the 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 the 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 the 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 01–02A–9 DTC TABLE [L8, LF].)
3	**VERIFY RELATED PENDING CODE OR STORED DTCs** • Turn the ignition switch off, then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs. • Are DTCs P2177 or P2187 also present?	Yes	Go to the appropriate DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Go to the next step.
4	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is DTC P2196 on the FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the FREEZE FRAME DATA DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
5	**VERIFY CURRENT INPUT SIGNAL STATUS** • Connect the WDS or equivalent to the DLC-2. • Verify the following PIDs. (See 01–40–7 PCM INSPECTION [L8, 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 the engine speed. • Is the PID normal?	Yes	Go to the next step.
		No	Replace the MAF/IAT sensor, then go to Step 10.
7	**INSPECT FRONT HO2S** • Inspect the front HO2S. (See 01–40–35 FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Replace the front HO2S, then go to Step 10. (See 01–40–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**INSPECT FUEL INJECTOR** • Inspect the fuel injector. (See 01–14–15 FUEL INJECTOR INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Replace the suspected fuel injector, then go to Step 10. (See 01–14–14 FUEL INJECTOR REMOVAL/ INSTALLATION [L8, LF].)
		No	Go to the next step.
9	**INSPECT FUEL LINE PRESSURE** • Perform the “FUEL LINE PRESSURE INSPECTION”. (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) • Is there any malfunction?	Yes	Replace the fuel pump unit, then go to the next step. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
		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 01–02A–7 OBD DRIVE MODE [L8, LF].) • Is the PENDING CODE for this DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.

STEP	INSPECTION		ACTION
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2228 [LF (VEHICLES EQUIPPED WITH BARO SENSOR BUILT INTO PCM)]

DPE010202200W10

DTC P2228	BARO sensor circuit low input
DETECTION CONDITION	• PCM monitors the input voltage from the BARO sensor. If the input voltage at the PCM is **below 1.95 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 during the first drive cycle. • FREEZE FRAME DATA is available. • DTCs are stored in the PCM memory.
POSSIBLE CAUSE	• BARO sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Check for related Service Bulletins and/or on-line 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 BARO SENSOR MALFUNCTION** • Start the engine. • Access the BARO PID using the WDS or equivalent. • Inspect that the BARO PID is within the specification. • Is there any malfunction?	Yes	Replace the PCM, then go to the next step.
		No	Go to the next step.
4	**VERIFY TROUBLESHOOTING OF DTC P2228 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 and warm it up completely. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	No concern is detected. Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2229 [LF (VEHICLES EQUIPPED WITH BARO SENSOR BUILT INTO PCM)]

DPE010202200W11

DTC P2229	BARO sensor circuit high input
DETECTION CONDITION	• PCM monitors the input voltage from the BARO sensor. If the input voltage at the PCM is **above 4.45 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 during the first drive cycle. • FREEZE FRAME DATA is available. • DTCs are stored in the PCM memory.

DTC P2229	BARO sensor circuit high input
POSSIBLE CAUSE	• BARO sensor malfunction • PCM malfunction

Diagnostic procedure

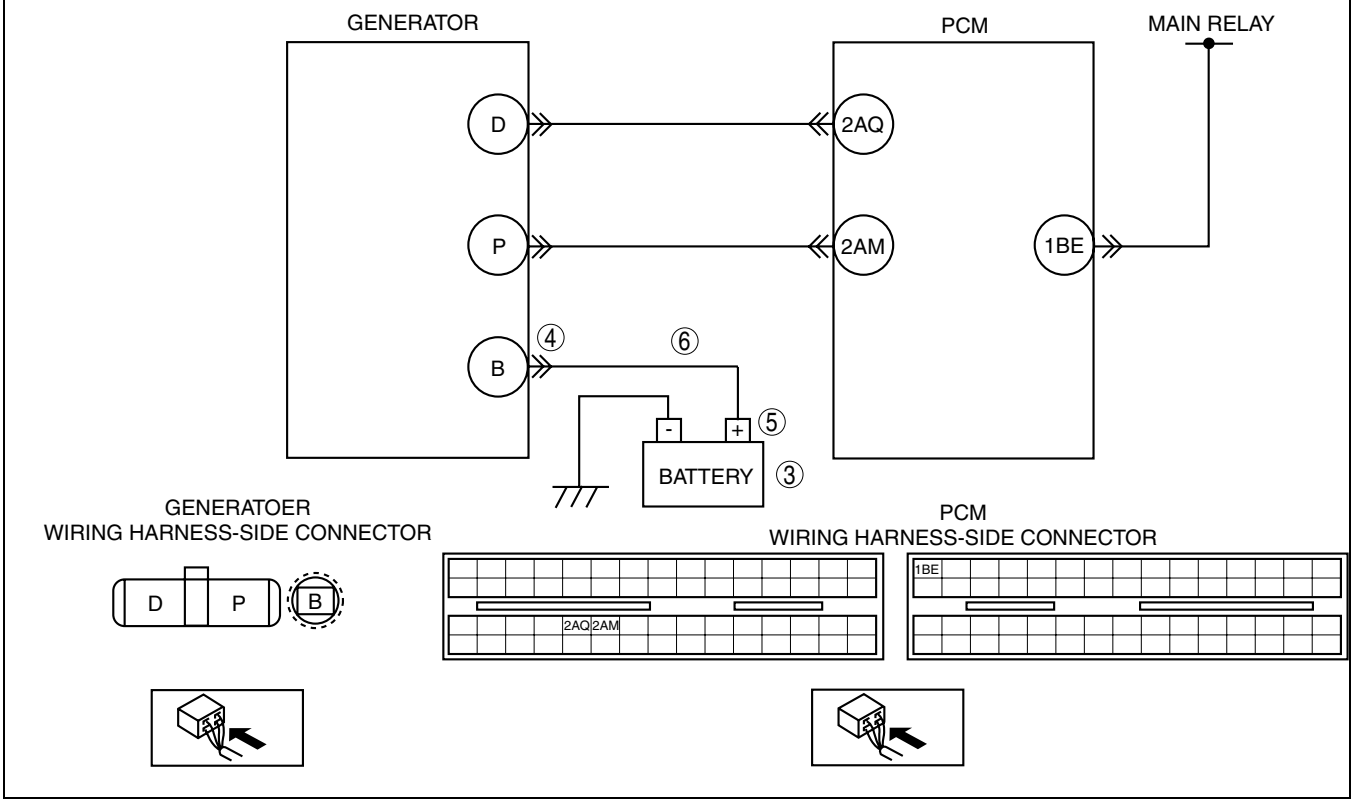
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Check for related Service Bulletins and/or on-line 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 BARO SENSOR MALFUNCTION** • Start the engine. • Access the BARO PID using the WDS or equivalent. • Inspect that the BARO PID is within the specification. • Is there any malfunction?	Yes	Replace the PCM, then go to the next step.
		No	Go to the next step.
4	**VERIFY TROUBLESHOOTING OF DTC P2229 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 engine and warm it up completely. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	No concern is detected. Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2502 [L8, LF]

DPE010202500W08

DTC P2502	Charging system voltage problem
DETECTION CONDITION	• PCM determines that the generator output voltage is **above 17 V** or the battery voltage is **below 11 V** while the engine is running. **Diagnostic support note** • The MIL does not illuminate.
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

DTC P2502	Charging system voltage problem



Diagnostic procedure

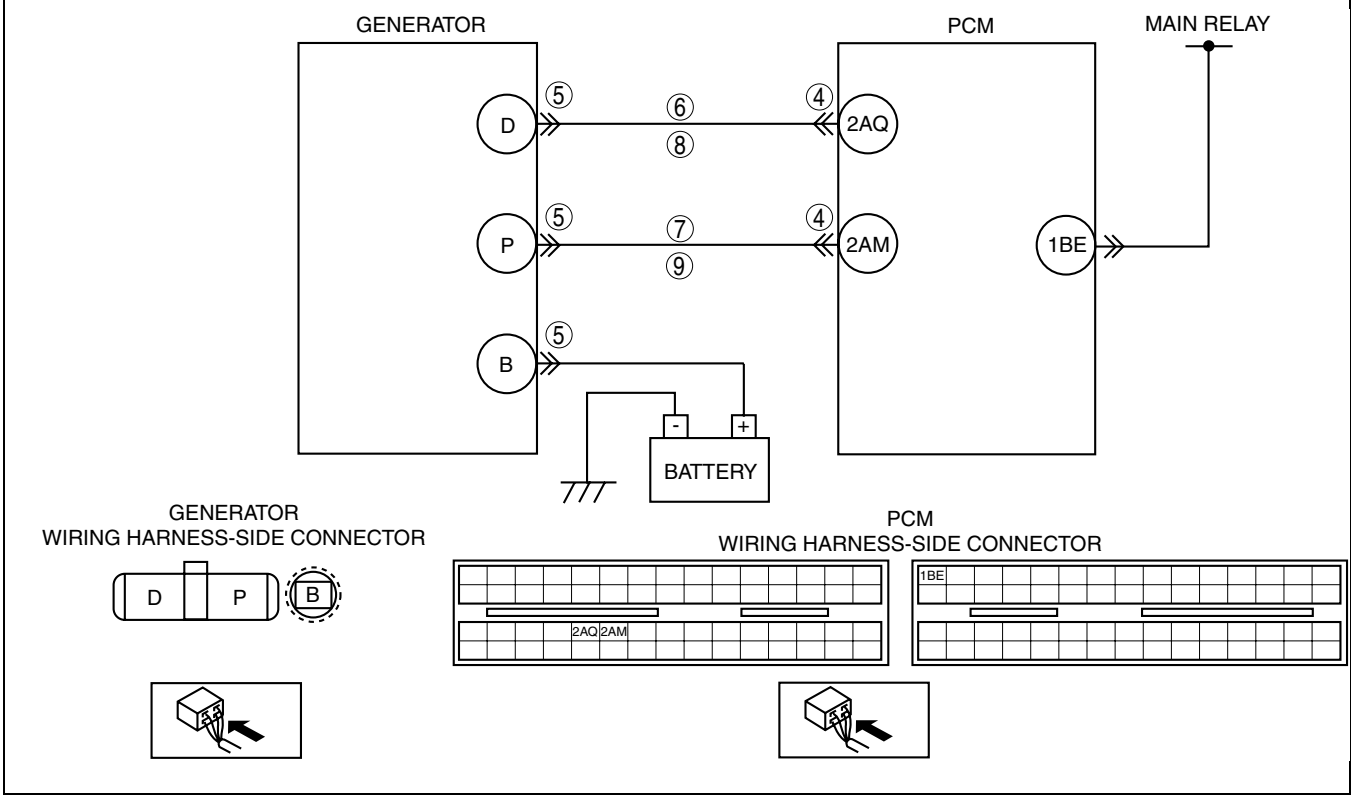
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair 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 BATTERY** • Turn the ignition switch off. • Inspect the battery. • Is the battery normal?	Yes	Go to the next step.
		No	Replace the battery, then go to Step 7.
4	**INSPECT POOR INSTALLATION OF GENERATOR TERMINAL** • Turn the ignition switch to off. • Inspect for looseness of the 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 BATTERY POSITIVE TERMINAL FOR POOR INSTALLATION** • Inspect for looseness of the battery positive terminal. • 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 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 the 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 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform the “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to the applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2503 [L8, LF]

DPE010202500W09

DTC P2503	Charging system voltage low
DETECTION CONDITION	• PCM needs **more than 20 A** from the generator, and determines to the generator output voltage to be **below 8.5 V** while the engine is running. **Diagnostic support note** • The MIL does not illuminate.
POSSIBLE CAUSE	• Generator malfunction • PCM and/or generator are poorly connected • Open and/or short to ground in the wiring from between generator terminal P and PCM terminal 2AM • Open and/or short to ground in wiring the from between generator terminal D and PCM terminal 2AQ • Drive belt misadjustment

DTC P2503	Charging system voltage low



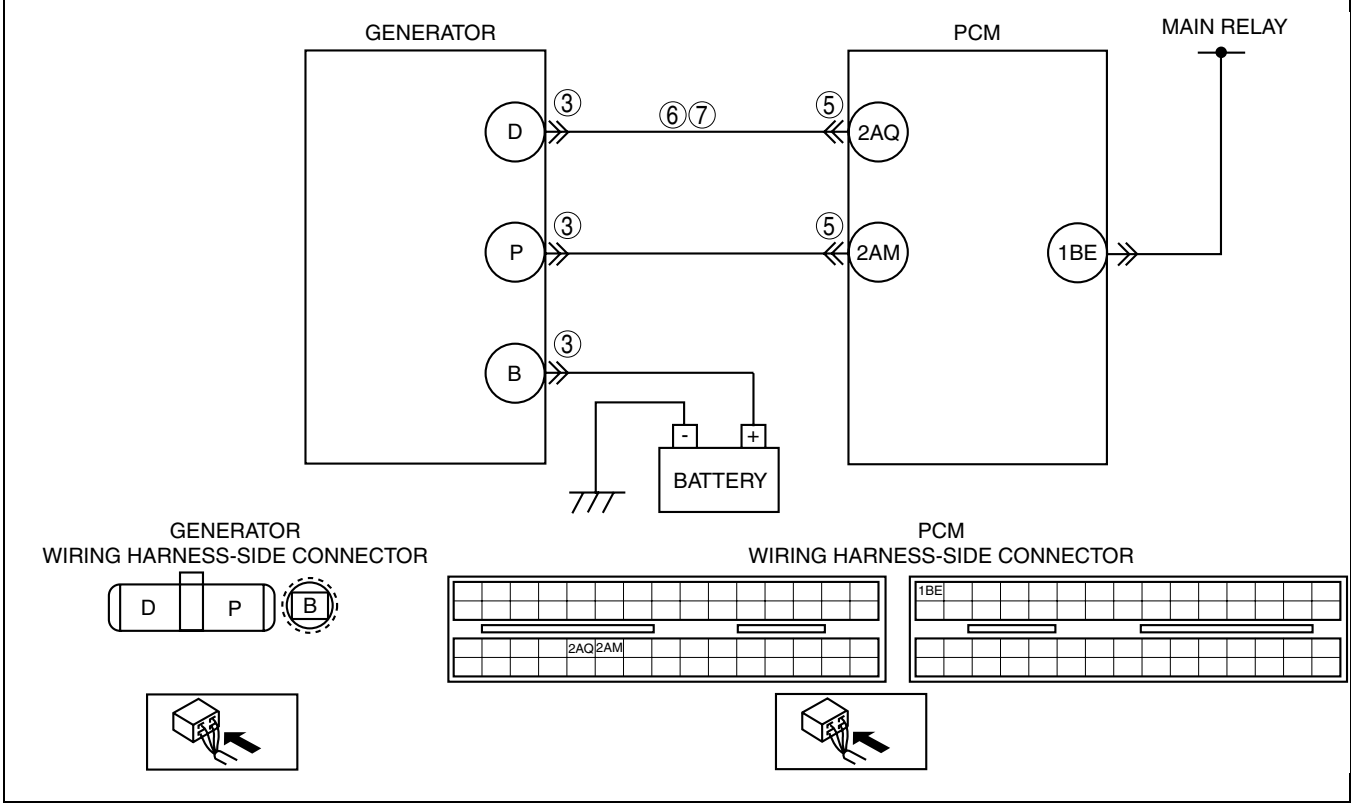
Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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 DRIVE BELT CONDITION** • Verify that the drive belt auto tensioner indicator mark does not exceed the limit. • Is the 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 the 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 the wiring harness for a 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 the wiring harness for a short to ground, then go to Step 10.
		No	Go to the next step.
8	**INSPECT GENERATOR CONTROL CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between generator terminal D (wiring harness-side) and PCM terminal 2AQ (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for an 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 the wiring harness for an open circuit, then go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P2503 COMPLETED** • Make sure to reconnect all 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

DTC P2504 [L8, LF]

DPE010202500W10

DTC P2504	Charging system voltage high
DETECTION CONDITION	• PCM determines that the generator output voltage is **above 18.5 V** or the battery voltage is **above 16.0 V** while the engine is running. **Diagnostic support note** • The MIL does not illuminate.
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



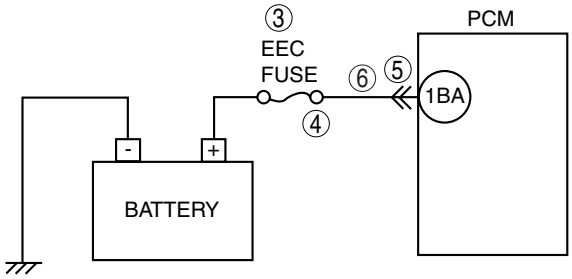
Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the 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 the 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). • Measure the voltage between generator terminal D (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Go to the next step.
		No	Malfunction at generator. Go to Step 7.
5	**INSPECT POOR CONNECTION OF PCM CONNECTOR** • Turn the ignition switch off. • Disconnect the 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 the voltage between generator terminal D (wiring harness-side) and body ground. • Is the voltage **B+**?	Yes	Repair or replace the wiring harness for a short to the power supply, then go to Step 8.
		No	Go to Step 8.
7	**INSPECT GENERATOR CONTROL TERMINAL FOR SHORT TO POWER** • Measure the 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 the DTC from the PCM memory using the WDS or equivalent. • Perform the KOER self-test. Start the engine. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
9	**VERIFY AFTER REPAIR PROCEDURE** • Perform “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Is there any DTC present?	Yes	Go to applicable DTC troubleshooting. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

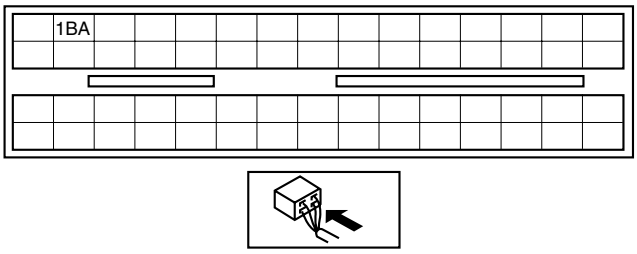
DTC P2507 [L8, LF]

DPE010202500W11

DTC P2507	PCM B+ voltage low
DETECTION CONDITION	• The PCM monitors the voltage of the back-up battery positive terminal at PCM terminal 1BA. If the PCM detects battery positive terminal voltage **below 2.5 V** for **2 s**, the PCM determines that the backup voltage circuit has a malfunction. **Diagnostic support note** • The MIL illuminates if the PCM detects the above malfunction condition during the first drive cycle.
POSSIBLE CAUSE	• EEC fuse melt down • Open circuit in the wiring between the EEC fuse and PCM terminal 1BA • Short to ground between the EEC fuse and PCM terminal 1BA • Poor connection of the PCM connector • PCM malfunction



PCM
WIRING HARNESS-SIDE CONNECTOR



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME PID DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME PID DATA on the 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 the 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	**INSPECT EEC FUSE** • Turn the ignition switch off. • Inspect the EEC fuse for malfunction. • Is it normal?	Yes	Go to step 6.
		No	• If the EEC fuse has melted down, then go to the next step. • If the EEC fuse is not installed correctly, install it correctly then go to Step 7.
4	**INSPECT MONITOR CIRCUIT FOR SHORT TO GROUND** • Disconnect the battery cables. • Inspect the continuity between the EEC fuse terminal and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for a short to ground and install a new fuse, then go to Step 7.
		No	Go to step 7.
5	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Disconnect the 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 the battery cables. • Inspect the continuity between the EEC fuse terminal and PCM terminal 1BA (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for an 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 the DTC from the PCM memory using the WDS or equivalent. • Start the engine and warm it up completely. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
		No	Go to the next step.
8	**VERIFY AFTER REPAIR PROCEDURE** • Perform “After Repair Procedure”. (See 01–02A–7 AFTER REPAIR PROCEDURE [L8, LF].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)
		No	Troubleshooting completed.

01–03A SYMPTOM TROUBLESHOOTING [ENGINE CONTROL SYSTEM (L8, LF)]

ENGINE SYMPTOM TROUBLESHOOTING [L8, LF] 01–03A–1
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NO.2 MIL ILLUMINATES [L8, LF]. 01–03A–6
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NO.12 LACK/LOSS OF POWER-ACCELERATION/ CRUISE [L8, LF] 01–03A–32
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ENGINE SYMPTOM TROUBLESHOOTING [L8, LF]

DPE010300000W01

- 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 [L8, LF]

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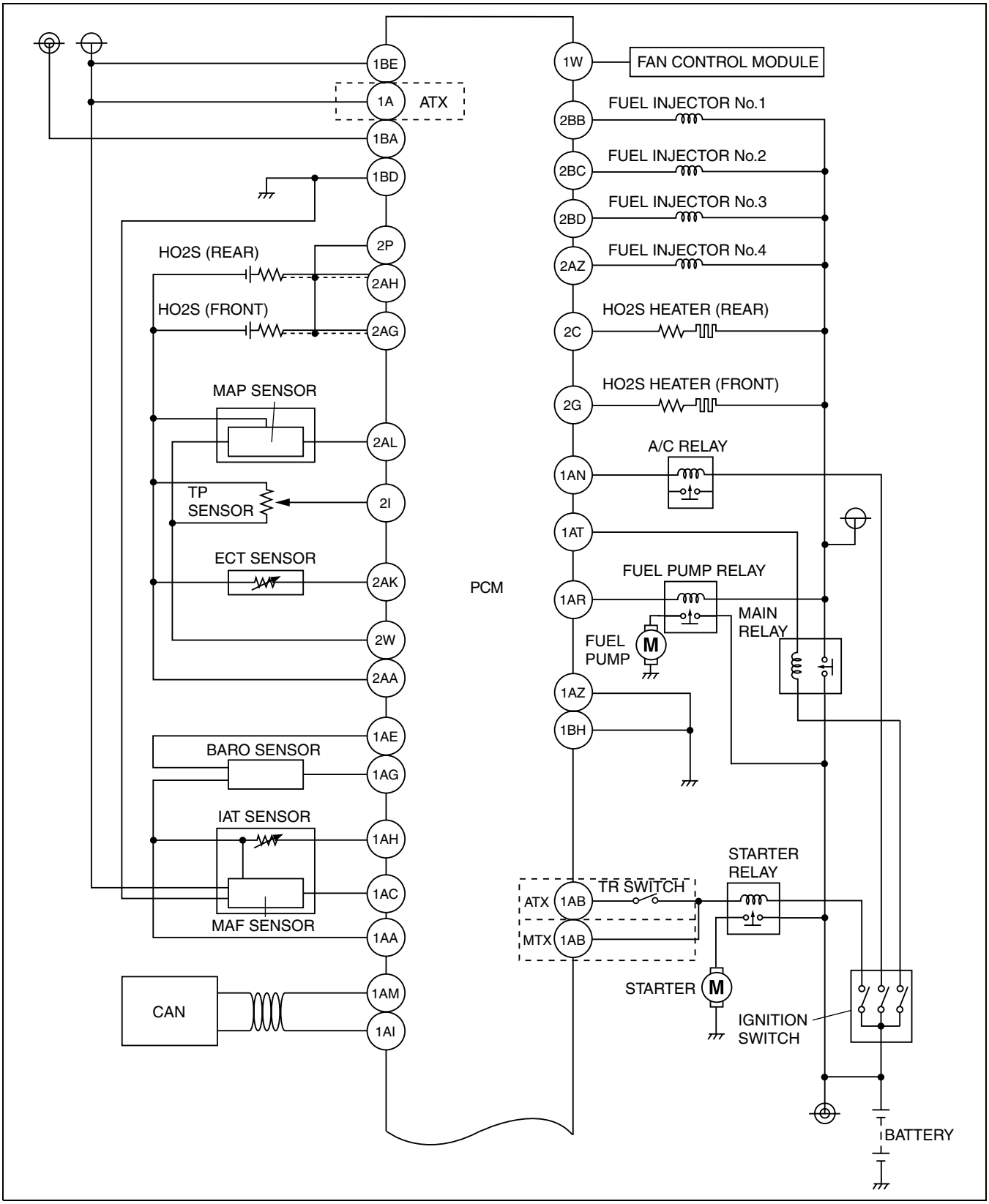
X: Applicable

	Troubleshooting item / Possible factor		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	ATX related parts malfunction	Improper ATF level	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)	Immobilizer system or related circuit malfunction	Advanced keyless entry system malfunction
1	Melting of main or other fuses																									
2	MIL illuminates		X	X	X	X	X	X		X									X								
3	Will not crank																							X	X	X
4	Hard to start/long crank/erratic start/erratic crank					X																				
5	Engine stalls.	After start/at idle		X							X	X												X	X	
6	Cranks normally but will not start																							X	X	
7	Slow return to idle																									
8	Engine runs rough/rolling idle			X						X	X	X		X												
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							
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						
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																							

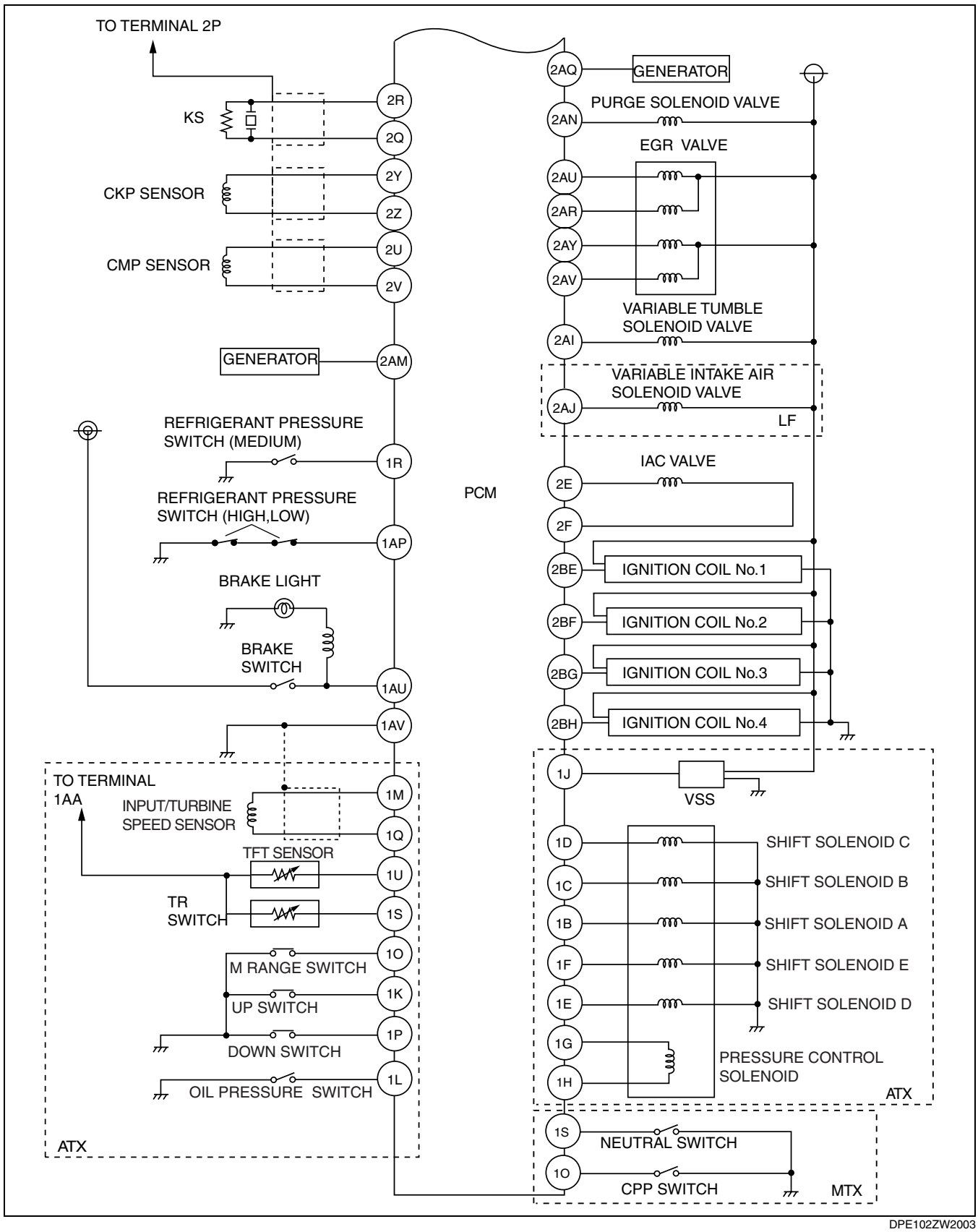
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SYMPTOM TROUBLESHOOTING WIRING DIAGRAM [L8, LF]

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DPE102ZW2002



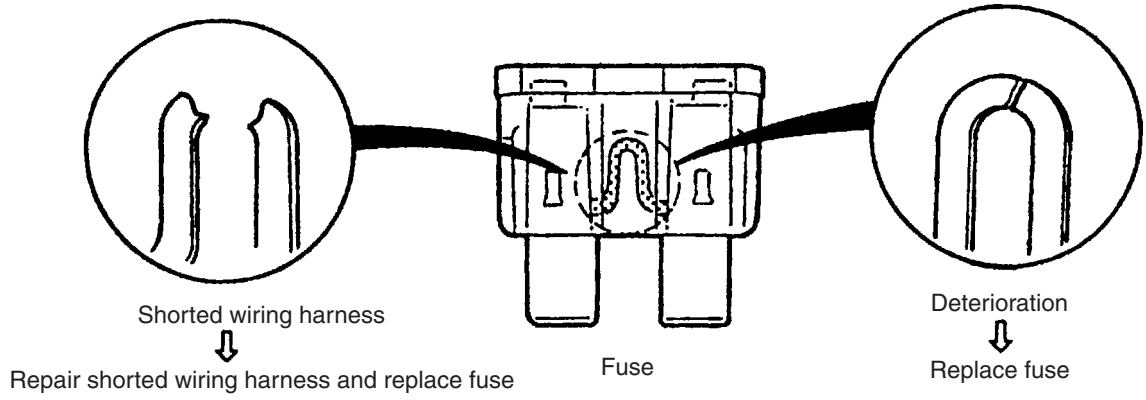
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NO.1 MELTING OF MAIN OR OTHER FUSES [L8, LF]

DPE010300000W03

1	MELTING OF MAIN OR OTHER FUSES
[TROUBLESHOOTING HINTS] Inspect condition of fuse.	

1	MELTING OF MAIN OR OTHER FUSES



Damaged fuse	Related wiring harness
FUEL	**FUEL fuse** • Fuel pump relay
IG KEY1	**IG KEY1 fuse** • Ignition switch — ENG fuse
ENG	**ENG fuse** • Main relay
IG KEY2	**IG KEY2 fuse** • Ignition switch
ENG +B	**ENG +B fuse** • PCM
ING	**INJ fuse** • PCM
FAN	**FAN fuse** • Cooling fan relay
ENG BAR1	**ENG BAR1 fuse** • MAF/IAT sensor • EGR valve • Variable tumble solenoid valve • Variable intake air solenoid valve (LF) • Purge solenoid valve
ENG BAR2	**ENG BAR2 fuse** • Front HO2S • Rear HO2S • VSS (ATX)

NO.2 MIL ILLUMINATES [L8, LF]

DPE010300000W04

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 01–02A–9 DTC TABLE [L8, LF].)
		No	**No DTC is displayed:** • Inspect instrument cluster operation. (See 09–22–3 INSTRUMENT CLUSTER INSPECTION.)
2	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.3 WILL NOT CRANK [L8, LF]

DPE010300000W05

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 or drive plate • Immobilizer system and/or circuit malfunction (if equipped) • Immobilizer system operating properly (Ignition key is not registered) • Advanced keyless entry system malfunction (if equipped)

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**Note** • The following test should be performed on the advanced keyless entry system. If not equipped, go to the next step. Start the engine using the mechanical ignition key. Does the engine start?	Yes	Inspect advanced keyless entry system and repair or replace according to inspection result. (See 09–03B–3 SYMPTOM TROUBLESHOOTING CHART [KEYLESS ENTRY SYSTEM].)(See 09–03A–3 SYMPTOM TROUBLESHOOTING CHART [ADVANCED KEYLESS SYSTEM].)
		No	Go to the next step.
2	**Note** • The following test should be performed for vehicles with immobilizer system. Go to Step 10 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 5.
		No	**Either or other condition appears:** Go to the next step.
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 09–22–3 INSTRUMENT CLUSTER INSPECTION.)
5	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 01–02A–9 DTC TABLE [L8, LF].)
		No	Advanced keyless entry system not equipped; Go to the next step. Advanced keyless entry system equipped; Go to Step 8.
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	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 1AI and instrument cluster terminal 1I • Between coil terminal 1AM and instrument cluster terminal 1K Is there any malfunction?	Yes	Repair or replace the wiring harness and connector.
		No	Go to the next step.
8	Inspect the following wiring harnesses and connectors. • Between keyless CM terminal 3Y and coil A • Between keyless CM terminal 3AA and coil B • Between keyless CM terminal 4Z and PCM 1AI • Between keyless CM terminal 4AA and PCM 1AM Is there any malfunction (open or short circuit, terminal corrosion, etc.)?	Yes	Repair or replace malfunctioning part.
		No	Go to the next step.
9	Is there continuity between PCM terminal 1AB and starter relay with clutch pedal depressed?	Yes	Go to the next step.
		No	Repair or replace wiring harness.
10	Inspect the following: • Battery connection • Battery condition • Fuses Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 10.
11	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.

STEP	INSPECTION	RESULTS	ACTION
12	Inspect the starting system. (See 01–19–2 STARTER INSPECTION [L8, LF].) Is starting system normal?	Yes	Inspect for seized/hydrolocked engine or flywheel. (See 05–10–15 FLYWHEEL INSPECTION.)
		No	Repair or replace components as required.
13	Do any other electrical accessories function?	Yes	Go to the next step.
		No	Inspect charging system. (See 01–17–5 BATTERY INSPECTION [L8, LF].) (See 01–17–7 GENERATOR INSPECTION [L8, LF].)
14	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 01–02A–9 DTC TABLE [L8, 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 or 1BD) • 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
15	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 01–02A–9 DTC TABLE [L8, LF].)
		No	**No DTC is displayed:** Inspect the following: • START circuit in ignition switch • Open circuit in wiring harness between ignition switch and starter
16	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [L8, LF]

DPE010300000W06

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.

4	HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK
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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 • Intake-air system restriction (e.g. air cleaner element, fresh air duct.) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the 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 01–02A–9 DTC TABLE [L8, 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 01–03A–41 NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [L8, 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 01–40–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].)
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 the WDS or equivalent to the DLC-2 in Turn the fuel pump on using FP PID in output state control of datalogger function. Is fuel line pressure correct? (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
10	Is the fuel line pressure held after the ignition switch is turned off? (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See 01–14–15 FUEL INJECTOR INSPECTION [L8, LF].) • If the fuel injector is normal, replace fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
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.

STEP	INSPECTION	RESULTS	ACTION
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	Inspect engine condition while tapping the EGR valve housing. Does engine condition improve?	Yes	Replace the EGR valve.
		No	Go to the next step.
15	Inspect the starting system. (See 01–19–2 STARTER INSPECTION [L8, LF].) 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.5 ENGINE STALLS-AFTER START/AT IDLE [L8, LF]

DPE010300000W07

5	ENGINE STALLS—AFTER START/AT IDLE
DESCRIPTION	• The engine stops unexpectedly.

5	ENGINE STALLS—AFTER START/AT IDLE
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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 9 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 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 9.
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 01–02A–9 DTC TABLE [L8, LF].)
		No	Advanced keyless entry system not equipped; Go to the next step. Advanced keyless entry system equipped; Go to Step 8.
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 1I • Between PCM terminal 1AM and instrument cluster terminal 1K Is there any malfunction?	Yes	Repair or replace the suspected wiring harness and connector.
		No	Go to the next step.
8	Inspect the following wiring harnesses and connectors. • Between keyless CM terminal 3Y and coil A • Between keyless CM terminal 3AA and coil B • Between keyless CM terminal 4Z and PCM 1AI • Between keyless CM terminal 4AA and PCM 1AM Is there any malfunction (open or short circuit, terminal corrosion, etc.)?	Yes	Repair or replace malfunctioning part.
		No	Go to the next step.
9	Verify the following: • Vacuum connection • Air cleaner element • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold: EGR valve, IAC 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 9.

STEP	INSPECTION	RESULTS	ACTION
10	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 01–02A–9 DTC TABLE [L8, 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 or 1BC) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.
11	Attempt to start engine at part throttle. Does engine run smoothly at part throttle?	Yes	Inspect the IAC valve and wiring harness. (See 01–13–6 IDLE AIR CONTROL (IAC) VALVE INSPECTION [L8, LF].)
		No	Go to the next step.
12	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.
13	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.
14	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 01–40–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].)
15	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.
16	Perform the spark test. (See 01–03A–60 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 22.
		No	Repair or replace the malfunctioning part according to spark test result.
17	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.
18	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
19	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
20	Install the fuel pressure gauge between the fuel pipe and 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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
21	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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	Yes	Go to the next step.
		No	Inspect the fuel injector. • If fuel injector is normal, replace fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
22	**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 07–10–5 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 01–03A–49 NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [L8, LF].) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
23	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.
24	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.
25	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.
26	Is the engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for cause.
27	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.6 CRANKS NORMALLY BUT WILL NOT START [L8, LF]

DPE010300000W08

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.

6	CRANKS NORMALLY BUT WILL NOT START
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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 9 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 9.
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 01–02A–9 DTC TABLE [L8, LF].)
		No	Advanced keyless entry system not equipped; Go to the next step. Advanced keyless entry system equipped; Go to Step 8.
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: • Between PCM terminal 1AI and instrument cluster terminal 1I • Between PCM terminal 1AM and instrument cluster terminal 1K Is there any malfunction?	Yes	Repair or replace the suspected wiring harness and connector.
		No	Go to the next step.
8	Inspect the following wiring harnesses and connectors. • Between keyless CM terminal 3Y and coil A • Between keyless CM terminal 3AA and coil B • Between keyless CM terminal 4Z and PCM 1AI • Between keyless CM terminal 4AA and PCM 1AM Is there any malfunction (open or short circuit, terminal corrosion, etc.)?	Yes	Repair or replace malfunctioning part.
		No	Go to the next step.
9	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 9.

STEP	INSPECTION	RESULTS	ACTION
10	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 01–02A–9 DTC TABLE [L8, 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 or 1BD) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.
11	Does the engine start with the throttle valve closed?	Yes	Go to Step 29.
		No	Go to the next step.
12	Will the engine start and run smoothly at part throttle?	Yes	Inspect the IAC valve and wiring harness.
		No	Go to the next step.
13	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.
14	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.
15	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 01–40–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].)
16	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.
17	Perform the spark test. (See 01–03A–60 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.
18	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.
19	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
20	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
21	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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
22	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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See 01–14–15 FUEL INJECTOR INSPECTION [L8, LF].) • If fuel injector is normal, replace fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF])
23	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.
24	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.
25	Inspect engine condition while tapping the EGR valve housing. Is engine condition improved?	Yes	Replace the EGR valve.
		No	Go to the next step.
26	Is engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for causes.
27	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.7 SLOW RETURN TO IDLE [L8, LF]

DPE010300000W09

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 01–02A–9 DTC TABLE [L8, LF].)
		No	**No DTC is displayed:** Go to the next step.
2	Remove thermostat and inspect operation. (See 01–12–8 THERMOSTAT REMOVAL/ INSTALLATION [L8, LF].) (See 01–12–8 THERMOSTAT INSPECTION [L8, 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [L8, LF]

DPE010300000W10

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.

8	ENGINE RUNS ROUGH/ROLLING IDLE
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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 01–02A–9 DTC TABLE [L8, 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 01–03A–41 NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [L8, 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 01–40–7 PCM INSPECTION [L8, 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 07–10–5 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 01–03A–49 NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [L8, 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** **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 01–40–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].)

STEP	INSPECTION	RESULTS	ACTION
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 01–13–6 IDLE AIR CONTROL (IAC) VALVE INSPECTION [L8, 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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	Yes	Go to the next step.
		No	Inspect fuel injector. • If fuel injector is normal, replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
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 01–40–35 FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.9 FAST IDLE/RUNS ON [L8, LF]

DPE010300000W11

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 01–03A–41 NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [L8, LF].) **ECT PID is less than 82°C {180°F}:** Go to symptom troubleshooting "No.18 Cooling system concerns - Runs cold". (See 01–03A–43 NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [L8, 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 01–02A–9 DTC TABLE [L8, LF].)
		No	**No DTC is displayed:** Go to the next step.
3	Connect the WDS or equivalent to the DLC-2. Access following PIDs. • AC_REQ • CPP (MTX) • CPP/PNP (MTX) • TR (ATX) • PSP Monitor each PID. (See 01–40–7 PCM INSPECTION [L8, LF].) Are PIDs normal?	Yes	Go to the next step.
		No	**AC_REQ PID:** Inspect the A/C switch, refrigerant pressure switch and the fan switch. **CPP PID:** (MTX) Inspect the clutch pedal position switch. (See 01–40–25 CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [L8, LF].) **CPP/PNP PID:** (MTX) Inspect neutral switch. (See 01–40–25 NEUTRAL SWITCH INSPECTION [L8, LF].) **TR PID:** (ATX) Inspect the TR switch. (See05–17–9 TRANSAXLE RANGE (TR) SWITCH INSPECTION [FN4A-EL].) **PSP PID:** Inspect EHPAS.
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 01–13–10 ACCELERATOR CABLE INSPECTION/ADJUSTMENT [L8, LF].)
5	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.10 LOW IDLE/STALLS DURING DECELERATION [L8, LF]

DPE010300000W12

10	LOW IDLE/STALLS DURING DECELERATION
DESCRIPTION	• Engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.

10	LOW IDLE/STALLS DURING 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 01–03A–21 NO.8 ENGINE RUNS ROUGH/ ROLLING IDLE [L8, 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 01–03A–49 NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [L8, 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 01–02A–9 DTC TABLE [L8, 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 following PIDs. • TP • MAT • VSS • BOO • CPP (MTX) • CPP/PNP (MTX) • TR (ATX) Monitor each PID while driving the vehicle. (See 01–40–7 PCM INSPECTION [L8, LF].) Are PIDs normal?	Yes	Intermittent concern exists. (See 01–03A–55 INTERMITTENT CONCERN TROUBLESHOOTING [L8, LF].)
		No	**TP PID:** Inspect the TP sensor. (See 01–40–31 THROTTLE POSITION (TP) SENSOR INSPECTION [L8, LF].) **MAF PID:** Inspect the MAF sensor. (See 01–40–32 MASS AIR FLOW (MAF) SENSOR INSPECTION [L8, LF].) **VSS PID:** Inspect the VSS. (See 01–02A–9 DTC TABLE [L8, LF].) **BOO PID:** Inspect the brake switch. (See 04–11–9 BRAKE SWITCH INSPECTION.) **CPP PID: (MTX)** Inspect the clutch pedal position switch. (See 01–40–25 CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [L8, LF].) **CPP/PNP PID:** (MTX) Inspect the neutral switch. (See 01–40–25 NEUTRAL SWITCH INSPECTION [L8, LF].) **TR PID:** (ATX) Inspect the TR switch. (See05–17–9 TRANSAXLE RANGE (TR) SWITCH INSPECTION [FN4A-EL].)

STEP	INSPECTION	RESULTS	ACTION
8	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.11 ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES [L8, LF]

DPE010300000W13

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

11	**ENGINE STALLS/QUITS — ACCELERATION/CRUISE** **ENGINE RUNS ROUGH — ACCELERATION/CRUISE** **MISSES — ACCELERATION/CRUISE** **BUCK/JERK — ACCELERATION/CRUISE/DECELERATION** **HESITATION/STUMBLE — ACCELERATION** **SURGES — ACCELERATION/CRUISE**
POSSIBLE CAUSE	• Improper A/C system operation • Erratic signal or no signal from CMP sensor • Air leakage from intake-air system parts • Purge 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 (MTX) • ATX malfunction (ATX) • 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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 01–02A–9 DTC TABLE [L8, 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. Access RPM, VPWR, MAF, TP and VSS PIDs. Drive the vehicle with monitoring PIDs. Are PIDs within specifications? (See 01–40–7 PCM INSPECTION [L8, LF].)	Yes	Go to the next step.
		No	**RPM PID:** 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. Is the lever in correct position?	Yes	Go to the next step.
		No	Adjust if necessary.
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.

STEP	INSPECTION	RESULTS	ACTION
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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	Yes	Go to the next step.
		No	Inspect the fuel injector. • If the fuel injector is normal, replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
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 07–10–5 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 01–03A–49 NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [L8, LF].) For other symptoms, inspect following: • Refrigerant charging amount • Condenser fan operation
14	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 01–40–35 FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, 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 01–14–7 FUEL TANK INSPECTION [L8, LF].)
		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 01–03A–59 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 01–03A–61 EGR Control System Inspection.) Is EGR system normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.

STEP	INSPECTION	RESULTS	ACTION
20	Is engine compression correct?	Yes	Inspect the following: • Valve timing • Clutch (MTX) • Internal ATX components (ATX) • 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE [L8, LF]

DPE010300000W14

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 (MTX) • ATX malfunction (ATX) **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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 • 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?	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 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 01–02A–9 DTC TABLE [L8, 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 01–03A–41 NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [L8, 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 01–40–7 PCM INSPECTION [L8, 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.

STEP	INSPECTION	RESULTS	ACTION
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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
11	Inspect the variable tumble control operation. (See 01–03A–59 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 01–03A–58 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 07–10–5 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 01–03A–49 NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [L8, LF].) For other symptoms, inspect following: • Refrigerant charging amount • Condenser fan operation
14	Inspect A/C cut-off operation. (See 01–03A–62 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 01–03A–61 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 01–03A–61 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 • Clutch (MTX) • Internal ATX components (ATX) • Brake system for dragging
		No	Inspect for cause.
19	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [L8, LF]

DPE010300000W15

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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 01–40–7 PCM INSPECTION [L8, 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 01–02A–9 DTC TABLE [L8, 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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	Yes	Inspect ignition timing.
		No	**Low:** Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
6	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.14 POOR FUEL ECONOMY [L8, LF]

DPE010300000W16

14	POOR FUEL ECONOMY
DESCRIPTION	Fuel economy is unsatisfactory.

14	POOR FUEL ECONOMY
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 (MTX) • Improper ATF level (ATX) • 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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 • ATF level (ATX) • Fuel quality • Coolant level • Brake dragging • Clutch slippage (MTX) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the 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 01–02A–9 DTC TABLE [L8, LF].)
		No	**No DTC is displayed:** Go to the next step.
3	Access ECT PID. Drive the vehicle while monitoring PID. (See 01–40–7 PCM INSPECTION [L8, 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 01–03A–60 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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
6	Inspect variable tumble control operation. (See 01–03A–59 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 01–03A–58 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.15 EMISSION COMPLIANCE [L8, LF]

DPE010300000W17

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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 • Intake-air system and air cleaner element concerns: obstructions, leakage or dirtiness Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the 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 01–02A–9 DTC TABLE [L8, LF].)
		No	**No DTC is displayed:** Go to the next step.
3	Is any other driveability concern present?	Yes	Go to appropriate symptom troubleshooting.
		No	Go to the next step.
4	Connect the WDS or equivalent to the DLC-2. Access ECT PID. Warm up the engine and idle it. Verify ECT PID is correct. (See 01–40–7 PCM INSPECTION [L8, 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 01–40–35 FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF].)
6	Perform the spark test. (See 01–03A–60 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. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. • If normal, replace fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/INSTALLATION [L8, LF].)
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 01–14–7 FUEL TANK INSPECTION [L8, LF].)
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 three-way catalytic converter. (See 01–15–1 EXHAUST SYSTEM INSPECTION [L8, LF].) Is the threeway catalytic converter normal?	Yes	Inspect the EGR system. (See 01–03A–61 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.16 HIGH OIL CONSUMPTION/LEAKAGE [L8, LF]

DPE010300000W18

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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [L8, LF]

DPE010300000W19

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 01–02A–9 DTC TABLE [L8, 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 01–03A–62 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. (See 01–12–8 THERMOSTAT REMOVAL/INSTALLATION [L8, LF].) (See 01–12–8 THERMOSTAT INSPECTION [L8, LF].) Is thermostat normal?	Yes	The ECT sensor and thermostat are normal. Inspect engine block for leakage or blockage.
		No	Access ECT PID. Inspect for both ECT PID and temperature gauge readings. • If temperature gauge on instrument cluster indicates normal range but ECT PID is not same as temperature gauge reading, inspect ECT sensor. • If temperature gauge on instrument cluster indicates overheating but ECT PID is normal, inspect temperature gauge and heat gauge unit.
10	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [L8, LF]

DPE010300000W20

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 01–03A–25 NO.9 FAST IDLE/RUNS ON [L8, LF].)
		No	Go to the next step.
3	Remove thermostat and inspect operation. (See 01–12–8 THERMOSTAT REMOVAL/ INSTALLATION [L8, LF].) (See 01–12–8 THERMOSTAT INSPECTION [L8, LF].) Is thermostat normal?	Yes	Go to the next step.
		No	Replace the thermostat.
4	Inspect cooling fan control system operation. (See 01–03A–62 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.19 EXHAUST SMOKE [L8, LF]

DPE010300000W21

19	EXHAUST SMOKE
DESCRIPTION	Blue, black, or white smoke from exhaust system

19	EXHAUST SMOKE
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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 driveability 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 driveability 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 01–02A–9 DTC TABLE [L8, 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? (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
7	Is strong blue spark visible at each disconnected high-tension lead while cranking the engine?	Yes	Inspect spark plugs and CMP sensor. (See 01–18–3 SPARK PLUG REMOVAL/ INSTALLATION [L8, LF].) (See 01–40–30 CAMSHAFT POSITION (CMP) SENSOR INSPECTION [L8, 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) [L8, LF]

DPE010300000W22

20	FUEL ODOR (IN ENGINE COMPARTMENT)
DESCRIPTION	Gasoline fuel smell or visible leakage

20	FUEL ODOR (IN ENGINE COMPARTMENT)
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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	Yes	Go to the next step.
		No	Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/INSTALLATION [L8, LF].)
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 01–16A–3 PURGE SOLENOID VALVE INSPECTION [L8, LF].) Is purge valve operating properly?	Yes	Go to the next step.
		No	Replace the purge valve. (See 01–16A–3 PURGE SOLENOID VALVE REMOVAL/INSTALLATION [L8, LF].)
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 01–02A–9 DTC TABLE [L8, 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.21 ENGINE NOISE [L8, LF]

DPE010300000W23

21	ENGINE NOISE
DESCRIPTION	Engine noise from under hood

21	ENGINE NOISE
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 01–03A–35 NO.13 KNOCKING/ PINGING-ACCELERATION/CRUISE [L8, 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.22 VIBRATION CONCERNS (ENGINE) [L8, LF]

DPE010300000W24

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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.23 A/C DOES NOT WORK SUFFICIENTLY [L8, LF]

DPE010300000W25

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 01–02A–9 DTC TABLE [L8, 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. Is there correct voltage A/C compressor magnetic clutch terminal? **Specification** **More than 10.5 V**	Yes	Inspect for GND condition of magnetic clutch on A/C compressor. • If GND condition is normal, inspect for open circuit magnetic clutch coil.
		No	Go to the next step.
3	Disconnect 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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [L8, LF]

DPE010300000W26

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 01–02A–9 DTC TABLE [L8, 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 remains On, short to GND may be present. Does AC_REQ PID remain On?	Yes	Inspect for short to GND in wiring harness between refrigerant pressure switch and PCM terminal 1AP.
		No	Go to the next step.
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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.25 A/C IS NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS [L8, LF]

DPE010300000W27

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	Does A/C compressor disengage when the A/C switch is turned off?	Yes	Go to the next step.
		No	Go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See 01–03A–49 NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [L8, 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 01–02A–9 DTC TABLE [L8, LF].)
		No	**No DTC is displayed:** Inspect TP sensor for proper adjustment. (See 01–40–31 THROTTLE POSITION (TP) SENSOR INSPECTION [L8, LF].)
3	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.26 EXHAUST SULPHUR SMELL [L8, LF]

DPE010300000W28

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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 01–02A–9 DTC TABLE [L8, 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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
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 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

NO.27 SPARK PLUG CONDITION [L8, LF]

DPE010300000W29

27	SPARK PLUG CONDITION
DESCRIPTION	Incorrect spark plug condition

27	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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)** **(See 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)** **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 01–18–3 SPARK PLUG REMOVAL/ INSTALLATION [L8, LF].)
4	Inspect compression pressure at suspected malfunction cylinder. Is compression pressure correct? (See 01–10–10 COMPRESSION INSPECTION [L8, 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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
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 01–14–15 FUEL INJECTOR INSPECTION [L8, LF].) • Fuel injection volume (See 01–14–15 FUEL INJECTOR INSPECTION [L8, LF].) 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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.

STEP	INSPECTION	RESULTS	ACTION
11	Perform the fuel line pressure inspection. Is fuel line pressure correct? (See 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
12	Inspect the following PIDs. • ECT • O2S11 (When engine can be started) • O2S12 (When engine can be started) • MAF (See 01–40–7 PCM INSPECTION [L8, LF].) Are PIDs normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
13	Perform the purge control inspection. (When engine can be started) (See 01–03A–61 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 01–10–10 COMPRESSION INSPECTION [L8, 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 01–14–3 FUEL LINE PRESSURE INSPECTION [L8, LF].)	Yes	Inspect the following PIDs. • ECT • O2S11 • O2S12 • MAF (See 01–40–7 PCM INSPECTION [L8, 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 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].) **High:** Replace the fuel pump unit. (See 01–14–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)
17	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See 01–03A–1 ENGINE SYMPTOM TROUBLESHOOTING [L8, 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 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)		

INTERMITTENT CONCERN TROUBLESHOOTING [L8, LF]

DPE010300000W30

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.

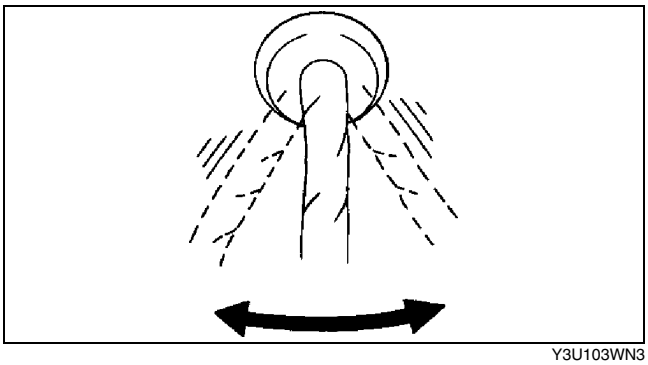
Inspection Method for Switch Connectors or Wiring Harnesses

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

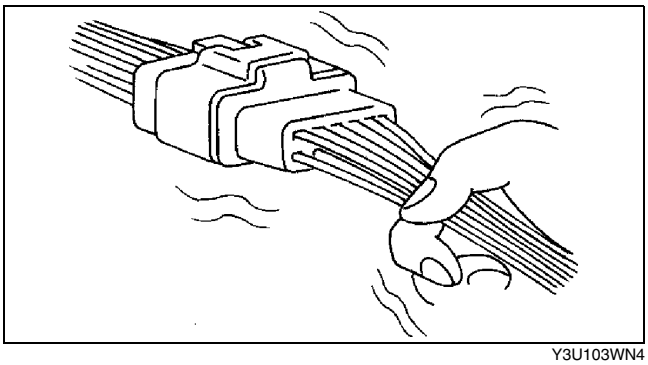
Inspection Method for Sensor Connectors or Wiring Harnesses

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.

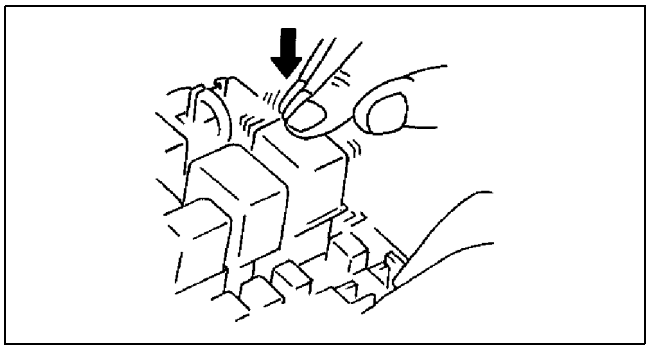
Inspection Method for Actuators or Relays

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.

Note
- Vibrating relays too strongly may result in open relays.



Y3U103WN5

Water Sprinkling Method

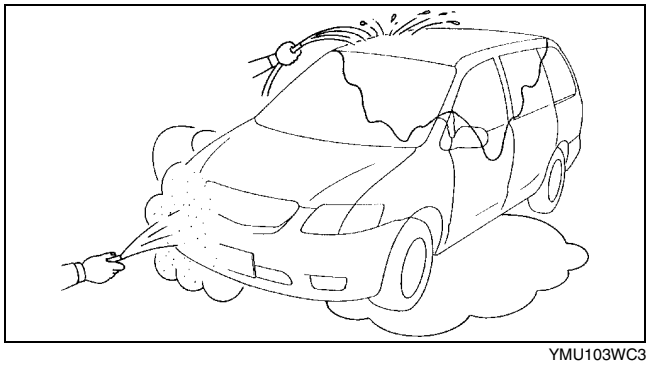
Caution
- **Indirectly change the temperature and humidity by spraying water onto the front of the radiator.**
- **If a vehicle is subject to water leakage, the leakage may damage the control module. When testing a vehicle with a water leakage problem, special caution must be used.**

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 [L8, LF]

DPE010300000W31

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 09–21–3 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. (See 01–13–3 INTAKE AIR SYSTEM MANIFOLD VACUUM INSPECTION [L8, LF].)
   - If not as specified, inspect the following.

   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 01–10–10 COMPRESSION INSPECTION [L8, 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 01–40–26 ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [L8, LF].)
     — IAC valve and related wiring harness (See 01–13–6 IDLE AIR CONTROL (IAC) VALVE INSPECTION [L8, 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 01–02A–9 DTC TABLE [L8, 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. (See 01–10–30 ENGINE TUNE-UP [L8, LF].)
   - 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 07–40–46 FAN SWITCH INSPECTION.)
     — PSP switch and related wiring harness.

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 01–02A–9 DTC TABLE [L8, 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 01–13–8 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 01–13–7 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 01–02A–9 DTC TABLE [L8, 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 01–13–10 VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [L8, LF].)
     — Shutter valve stuck open or close
   - If the operation sound is not heard, inspect the following.
     — Variable tumble solenoid valve (See 01–13–9 VARIABLE TUMBLE SOLENOID VALVE INSPECTION [L8, 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.

STEP	INSPECTION	RESULTS	ACTION
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 01–14–15 FUEL INJECTOR INSPECTION [L8, LF])
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 01–40–26 ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [L8, LF].)
     — Neutral/clutch pedal position switch and related wiring harness (See 01–40–25 CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [L8, 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 09–21–3 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 C—PCM terminal 2BE — Ignition coil No.2 terminal C—PCM terminal 2BF — Ignition coil No.3 terminal C—PCM terminal 2BG — Ignition coil No.4 terminal C—PCM terminal 2BH • Are wiring harnesses normal?	Yes	Inspect and replace ignition coil. (See 01–18–2 IGNITION COIL INSPECTION [L8, 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 01–02A–9 DTC TABLE [L8, 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 01–40–7 PCM INSPECTION [L8, 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 01–02A–9 DTC TABLE [L8, 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 01–12–11 FAN MOTOR INSPECTION [L8, LF].)

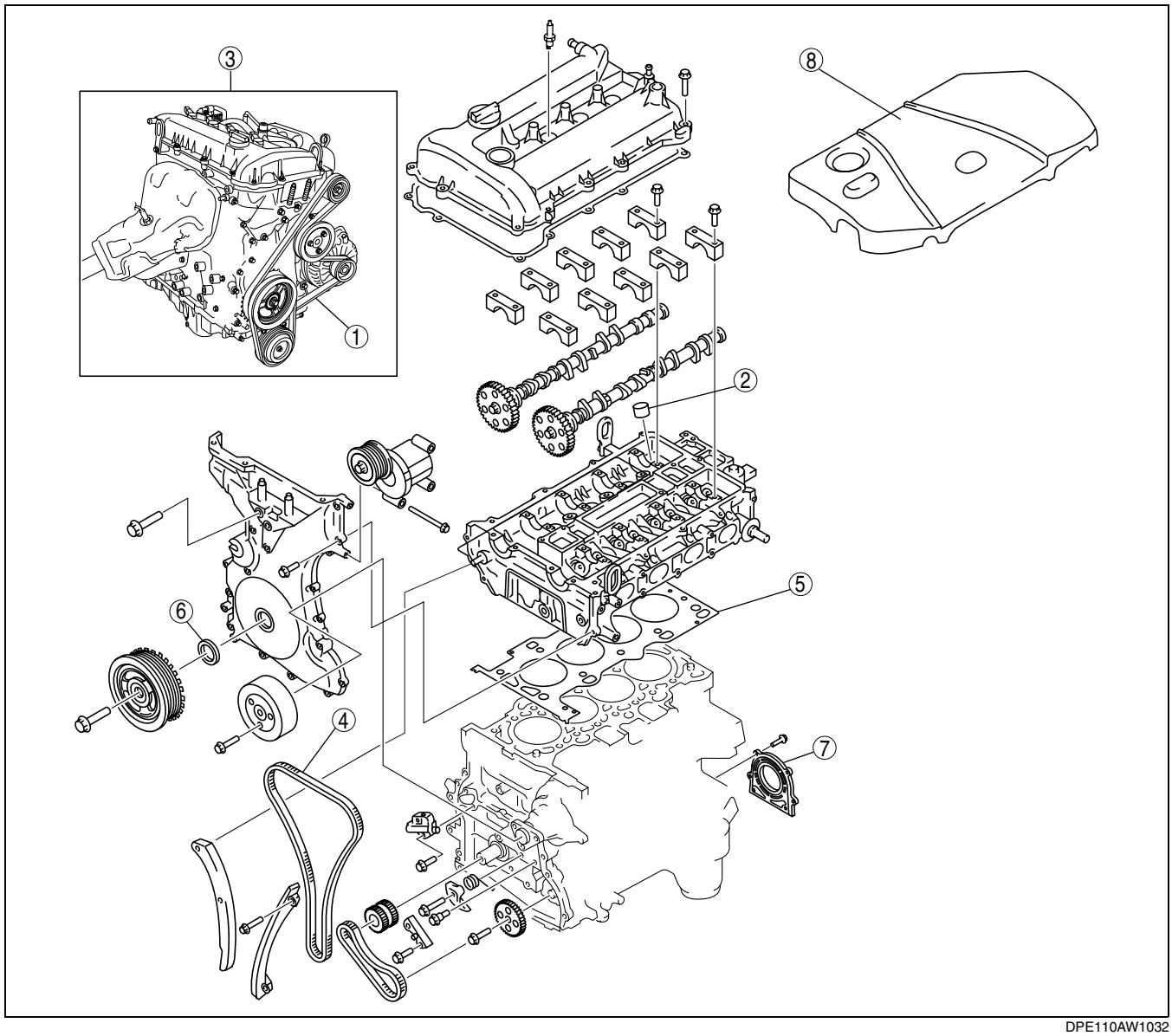
10. Verify that the cooling fan operates at medium speed while the COLP PID is off and high speed while the COLP PID is on.
    - If the cooling fan does not operate middle and/or high speed, inspect for the following:
      — A/C refrigerant pressure switch (medium switch)
      — Fan control module
      (See 01–12–11 FAN MOTOR INSPECTION [L8, LF].)
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.

01–10A MECHANICAL [L8, LF]

ENGINE LOCATION INDEX [L8, LF] . . . 01–10A–1
PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF] 01–10A–2
DRIVE BELT INSPECTION [L8, LF] 01–10A–2
DRIVE BELT REPLACEMENT [L8, LF] 01–10A–3
DRIVE BELT AUTO TENSIONER INSPECTION [L8, LF] 01–10A–5
VALVE CLEARANCE INSPECTION [L8, LF] 01–10A–5
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COMPRESSION INSPECTION [L8, LF] 01–10A–10
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ENGINE LOCATION INDEX [L8, LF]

DPE011002000W01



DPE110AW1032

1	Drive belt (See 01–10A–2 DRIVE BELT INSPECTION [L8, LF].) (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, LF].) (See 01–10A–5 DRIVE BELT AUTO TENSIONER INSPECTION [L8, LF].)
2	Tappet (See 01–10A–5 VALVE CLEARANCE INSPECTION [L8, LF].) (See 01–10A–6 VALVE CLEARANCE ADJUSTMENT [L8, LF].)
3	Engine (See 01–10A–10 COMPRESSION INSPECTION [L8, LF].) (See 01–10A–26 ENGINE REMOVAL/ INSTALLATION [L8, LF].) (See 01–10A–30 ENGINE DISASSEMBLY/ ASSEMBLY [L8, LF].)
4	Timing chain (See 01–10A–11 TIMING CHAIN REMOVAL/ INSTALLATION [L8, LF].)
5	Cylinder head gasket (See 01–10A–19 CYLINDER HEAD GASKET REPLACEMENT [L8, LF].)
6	Front oil seal (See 01–10A–22 FRONT OIL SEAL REPLACEMENT [L8, LF].)
7	Rear oil seal (See 01–10A–25 REAR OIL SEAL REPLACEMENT [L8, LF].)
8	Plug hole plate (See 01–10A–2 PLUG HOLE PLATE REMOVAL/ INSTALLATION [L8, LF].)

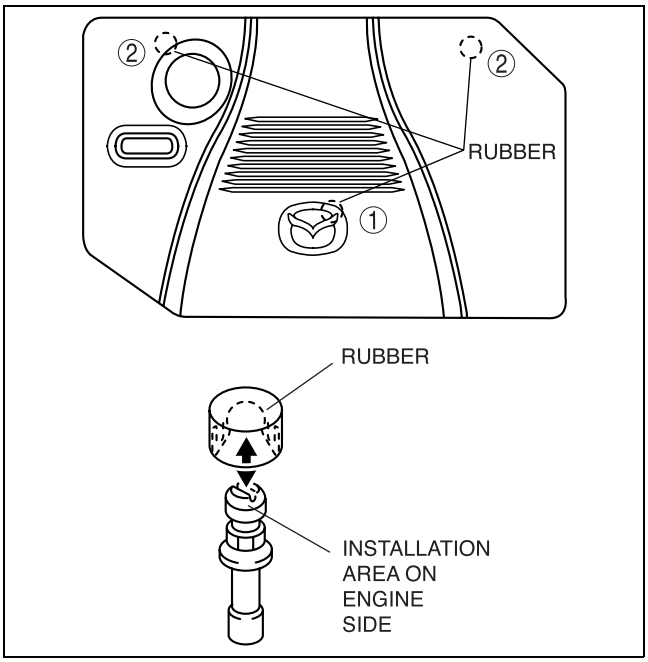
PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF]

DPE011010291W02

1. Remove the plug hole plate in the order indicated in the figure.

Note
- Lift off and remove the plug hole plate from the installation areas as shown in the figure.

2. Install the plug hole plate in the reverse order of removal.



DPE110AW1031

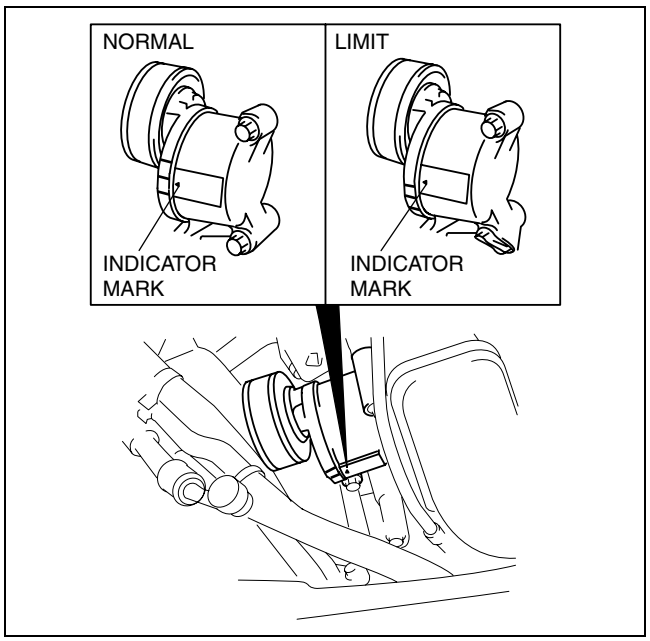
DRIVE BELT INSPECTION [L8, LF]

DPE011015800W01

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 01–10A–3 DRIVE BELT REPLACEMENT [L8, LF].)



C3U0110W067

A/C Drive Belt

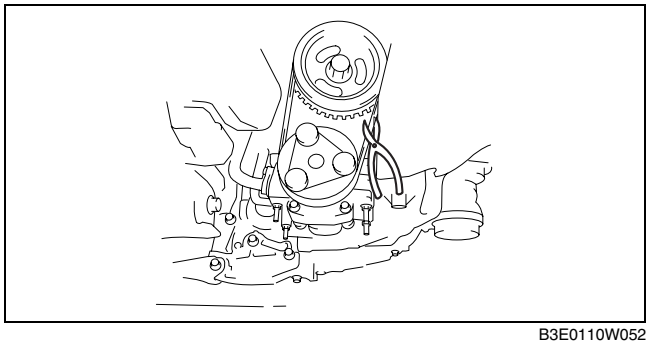
Note
- Drive belt deflection/tension inspection is not necessary because of the use of the maintenance-free type A/C drive belt.
- Replace the drive belt if it is found to be damaged during visual inspection, or if there is a malfunction or noise in the A/C compressor.

DRIVE BELT REPLACEMENT [L8, LF]

DPE011015800W02

A/C Drive belt

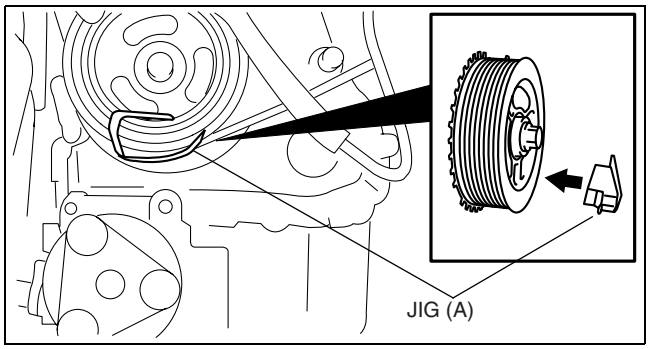
1. Remove the engine under cover and splash shield (RH).
2. Cut the A/C drive belt using scissors.



B3E0110W052

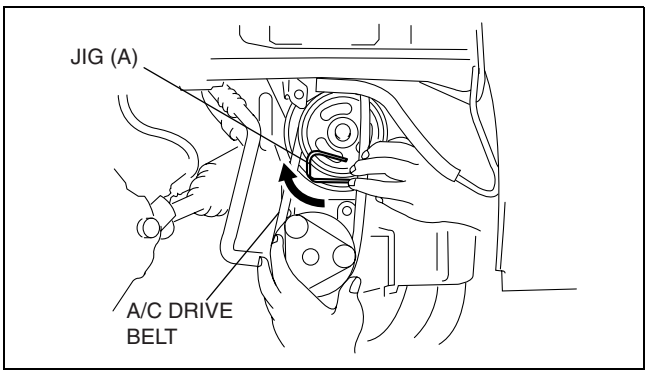
3. Install a jig (A) to the crankshaft pulley as shown in the figure.

Note
- The jig is prepackaged with a new A/C drive belt.



C3U0110W064

4. Install a new A/C drive belt to the A/C compressor pulley, move jig (A) upward, and then install the A/C drive belt to the crankshaft pulley.

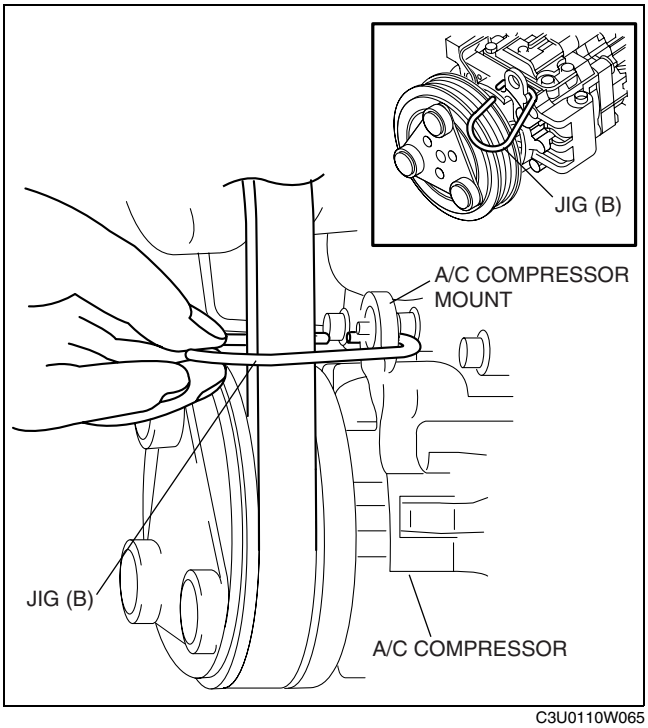


DPE110AW1023

5. Install jig (B) to the A/C compressor mount as shown in the figure.

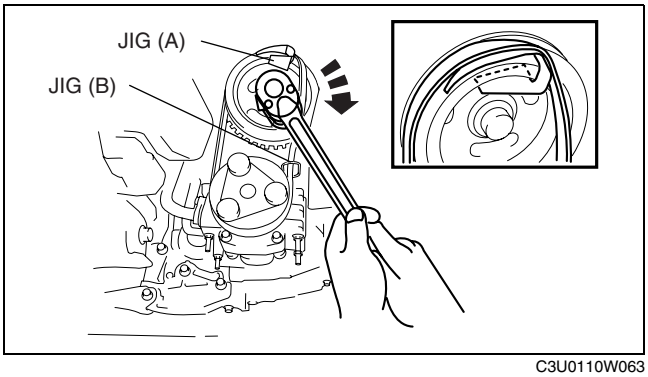
Caution
- **The A/C drive belt cannot be reused.**

Note
- The jig is prepackaged with a new A/C drive belt.
- Do not pass jig (B) through the A/C compressor mount hole.



C3U0110W065

6. Rotate the crankshaft pulley to the right using a wrench and install the A/C drive belt.
7. Install the under cover and splash shield (RH).

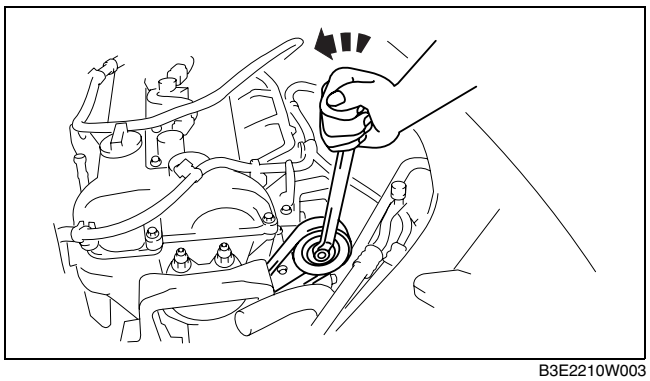


C3U0110W063

Generator Drive Belt

1. Remove the plug hole plate.
   (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, 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. Install the A/C drive belt.
7. Install the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)

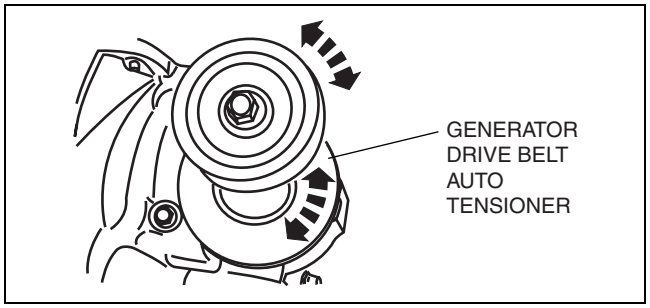


B3E2210W003

DRIVE BELT AUTO TENSIONER INSPECTION [L8, LF]

DPE011015980W01

1. Remove the drive belt. (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, 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 01–10A–3 DRIVE BELT REPLACEMENT [L8, LF].)



B3E2210W007

VALVE CLEARANCE INSPECTION [L8, LF]

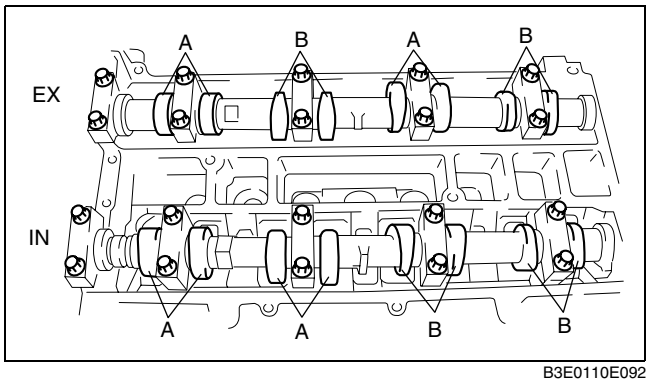
DPE011002000W02

1. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
2. Remove the battery cover (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
3. Disconnect the negative battery cable.
4. Disconnect the wiring harness.
5. Remove the ignition coils. (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, 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 01–10A–6 VALVE CLEARANCE ADJUSTMENT [L8, 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 01–10A–6 VALVE CLEARANCE ADJUSTMENT [L8, LF].)



B3E0110E092

Note
- Make sure to note down the measured values for choosing the suitable replacement tappets.

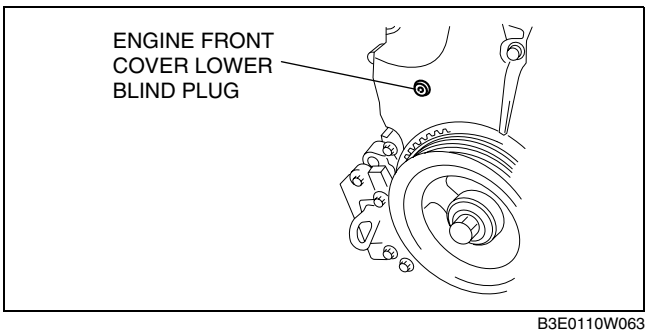
Standard [Engine cold]
IN: 0.22—0.28 mm {0.0087—0.0110 in}
EX: 0.27—0.33 mm {0.0107—0.0129 in}

10. Install the cylinder head cover. (See 01–10A–18 Cylinder Head Cover Installation Note.)
11. Install the ventilation hose.
12. Install the ignition coils. (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
13. Connect the wiring harness.
14. Connect the negative battery cable.
15. Install the battery cover. (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
16. Install the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)

VALVE CLEARANCE ADJUSTMENT [L8, LF]

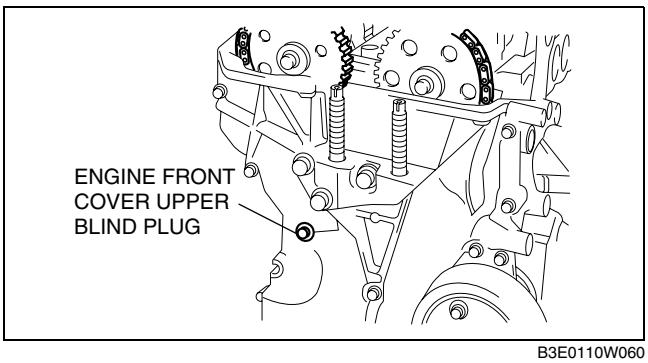
DPE011002000W03

1. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
2. Remove the battery cover. (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
3. Disconnect the negative battery cable.
4. Disconnect the wiring harness.
5. Remove the following parts.
   (1) Front wheel and tire (RH) (See 02–10–1 GENERAL PROCEDURES (SUSPENSION).)
   (2) Engine under cover and splash shield (RH)
   (3) Ignition coils (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
   (4) Ventilation hose
   (5) Cylinder head cover
   (6) Engine front cover lower blind plug



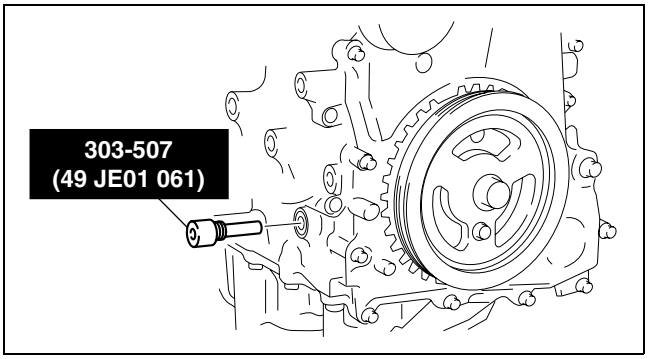
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   (7) Engine front cover upper blind plug
   (8) Cylinder block lower blind plug



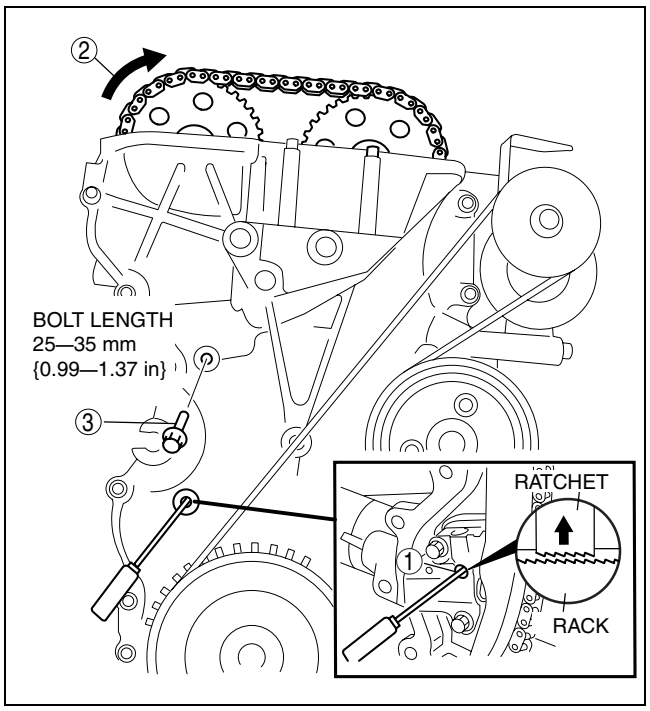
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6. Install the **SST** as shown in the figure.
7. Turn the crankshaft clockwise the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the **SST**).
8. Loosen the timing chain.



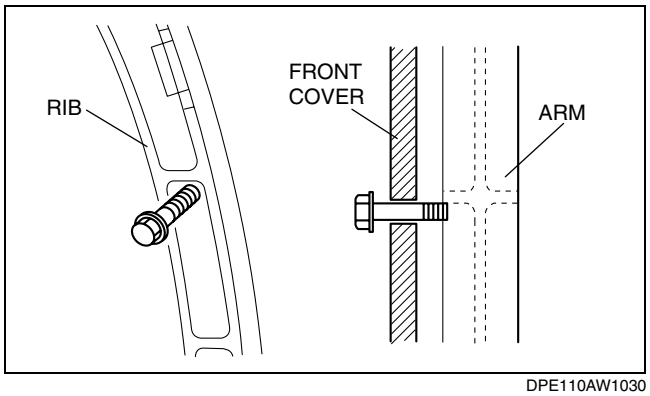
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(1) Unlock the chain tensioner ratchet using a suitable screwdriver or equivalent tool.
(2) Turn the exhaust camshaft clockwise using a suitable wrench on the cast hexagon and loosen the timing chain.



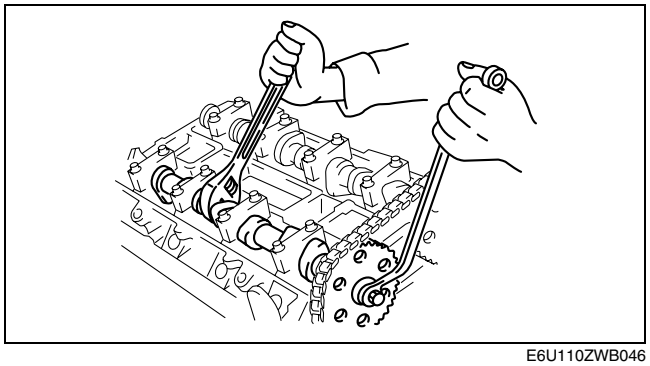
C3U0110W068

(3) Placing the suitable bolt **(M6 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.



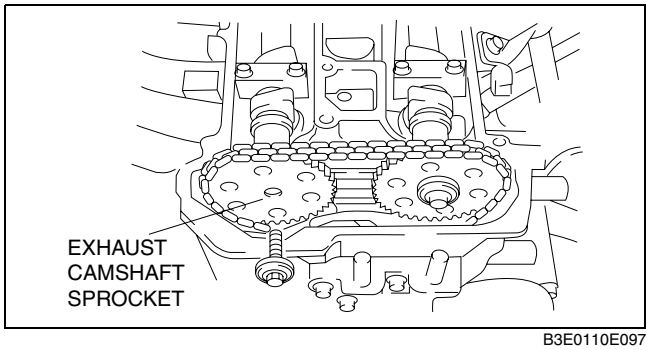
DPE110AW1030

9. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in the figure.



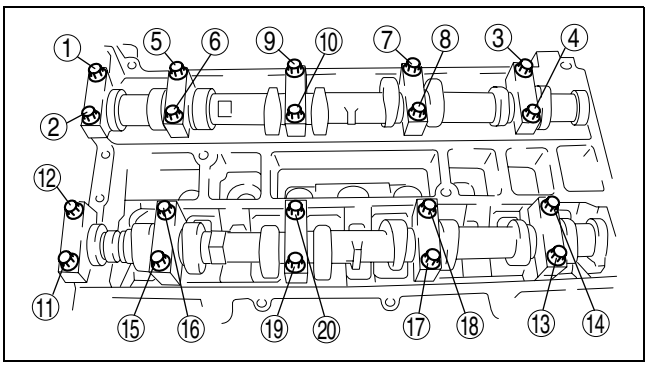
E6U110ZWB046

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.

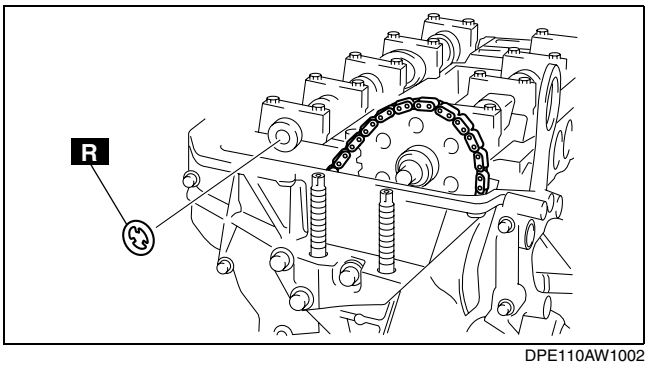
New adjustment shim
= Removed shim thickness + Measured valve clearance - Standard valve clearance (IN: 0.25 mm {0.0098 in}, EX: 0.30 mm {0.0118 in})

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 a new washer.

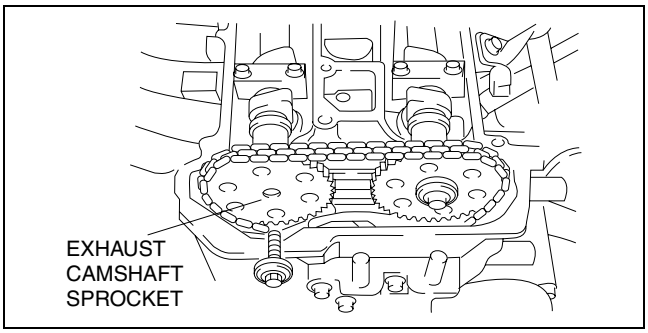


DPE110AW1002

18. Install the exhaust camshaft sprocket.

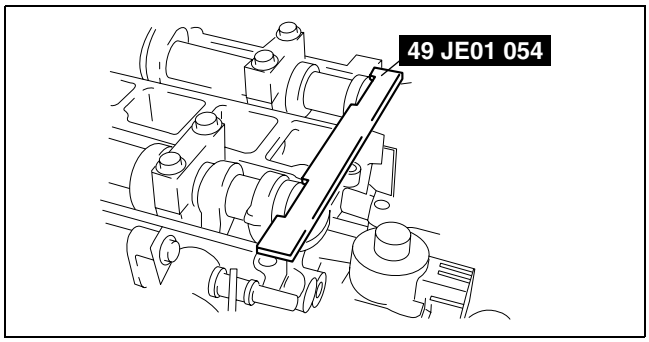
Note
- Do not tighten the bolt for the camshaft sprocket during this step. First confirm the valve timing, then tighten the bolt.

19. Install the **SST** to the camshaft as shown in the figure.



B3E0110E097

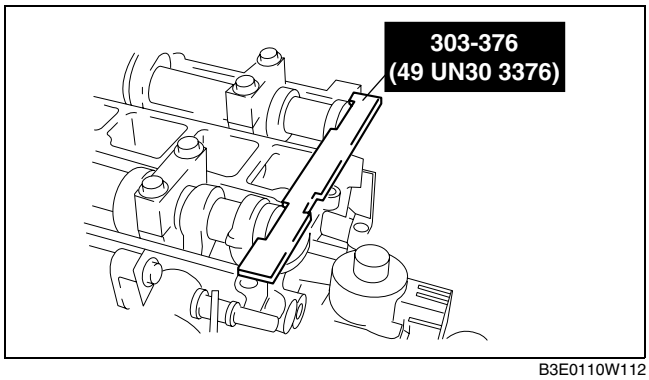
Eupore



B3E0110W132

Excpet Europe

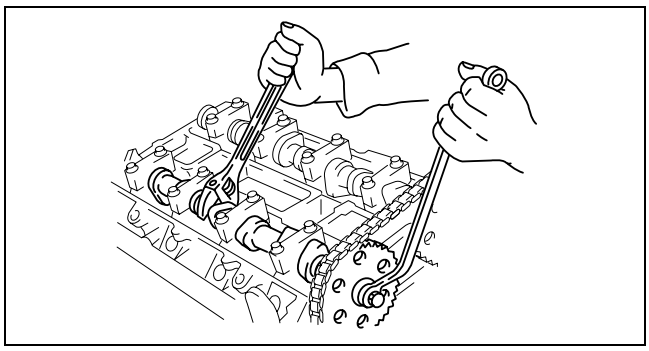
20. Remove the **(M6 length 25mm—35mm {0.99—1.37in})** bolt from the engine front cover to apply tension to the timing chain.
21. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the **SST**).



B3E0110W112

22. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in the figure.
23. Tighten the exhaust camshaft sprocket lock bolt.

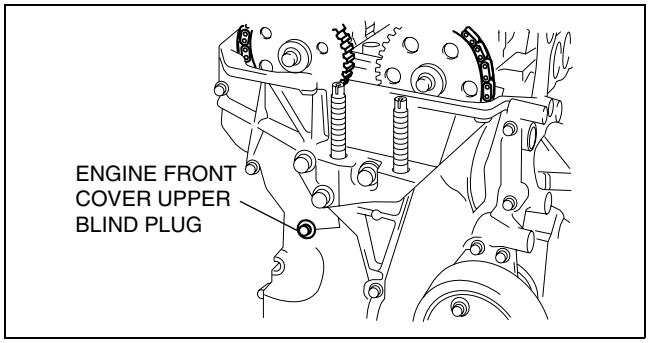
    Tightening torque
    69—75 N·m
    {7.1—7.6 kgf·m, 50.9—55.3 ft·lbf}



B3E0110E095

24. Remove the **SST** from the camshaft.
25. Remove the **SST** from the block lower blind plug.
26. Rotate the crankshaft clockwise two turns until the TDC position.
    - If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 14.
27. Apply silicone sealant to the engine front cover upper blind plug.
28. Install the following parts.
    (1) Engine front cover upper blind plug

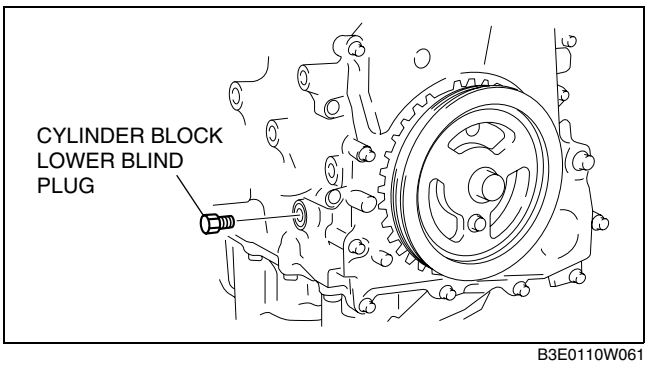
    Tightening torque
    8.0—11.5 N·m
    {81.6—117.2 kgf·cm, 70.9—101.7 in·lbf}



B3E0110W060

(2) Cylinder block lower blind plug

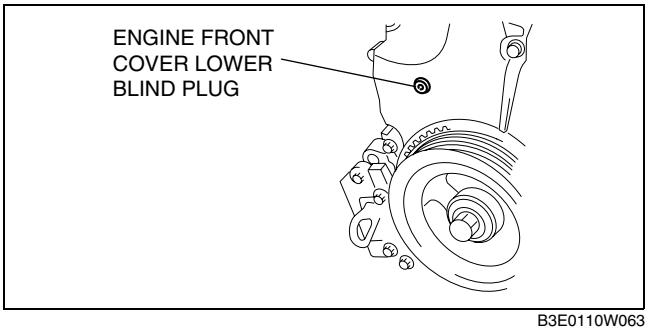
Tightening torque
18—22 N·m
{1.9—2.2 kgf·m, 14—16 ft·lbf}



B3E0110W061

(3) New engine front cover lower blind plug

Tightening torque
10—14 N·m
{1.1—1.4 kgf·m, 7.4—10.3 ft·lbf}



B3E0110W063

(4) Cylinder head cover (See 01–10A–18 Cylinder Head Cover Installation Note.)
(5) Ventilation hose
(6) Ignition coils (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
(7) Engine under cover and splash shield (RH)
(8) Front wheel and tire (RH) (See 02–10–1 GENERAL PROCEDURES (SUSPENSION).)

29. Connect the wiring harness.
30. Connect the negative battery cable.
31. Install the battery cover. (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
32. Install the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)

COMPRESSION INSPECTION [L8, LF]

DPE011002000W04

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 01–17A–5 BATTERY INSPECTION [L8, LF].)
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 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)

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 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)**

5. Remove the plug hole plate (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
6. Remove the ignition coils. (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
7. Remove the spark plugs. (See 01–18–3 SPARK PLUG REMOVAL/INSTALLATION [L8, 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 pressure (L8)
- **Standard: 1,750 kpa {17.845 kgf/cm^2, 253.816 psi} [300 rpm]**
- **Minimum: 1,225 kpa {12.492 kgf/cm^2, 177.64 psi} [300 rpm]**
- **Maximum difference between cylinders: 196.1 kpa {2.0 kgf/cm^2, 28.5 psi}**

Compression pressure (LF)
- **Standard: 1,720 kpa {17.54 kgf/cm^2, 249.5 psi} [300 rpm]**
- **Minimum: 1,204 kpa {12.28 kgf/cm^2, 174.6 psi} [300 rpm]**
- **Maximum difference between cylinders: 196.1 kpa {2.0 kgf/cm^2, 28.5 psi}**

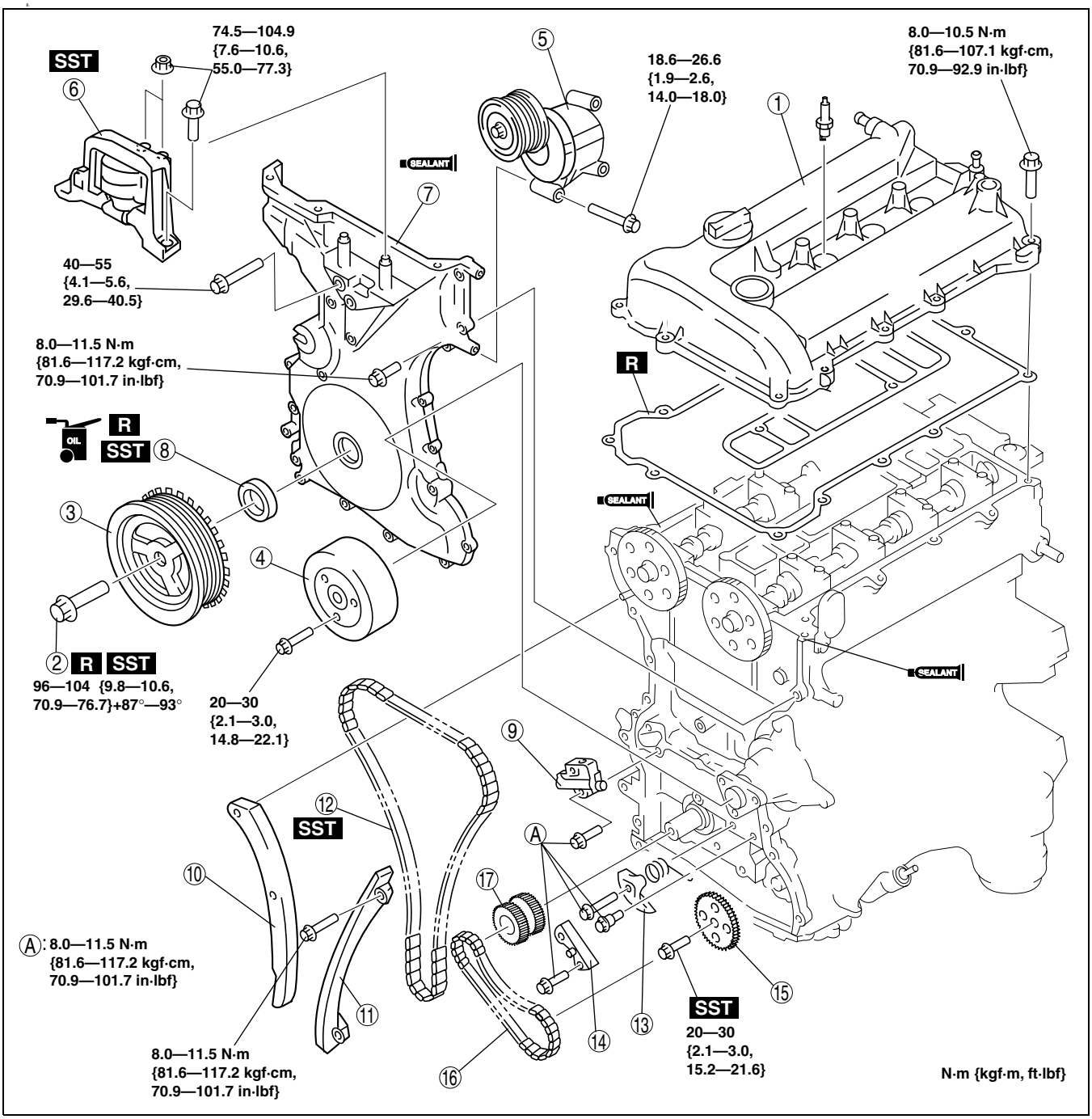
12. Disconnect the compression gauge.
13. Install the following parts.
    (1) Spark plug (See 01–18–3 SPARK PLUG REMOVAL/INSTALLATION [L8, LF].)
    (2) Ignition coils (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
    (3) Fuel pump relay (See 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)
    (4) Plug hole plate (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)

TIMING CHAIN REMOVAL/INSTALLATION [L8, LF]

DPE011012201W01

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 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)**

1. Remove the following parts.
    (1) Plug hole plate (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
    (2) Plug hole plate bracket
    (3) Accelerator cable and bracket
    (4) Battery cover (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the following parts.
    (1) Ignition coils (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
    (2) Front wheel and tire (RH) (See 02–10–1 GENERAL PROCEDURES (SUSPENSION).)
    (3) Under cover and splash shields
    (4) Crankshaft position (CKP) sensor (See 01–40A–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].)
    (5) Drive belt (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, 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 07–11–25 A/C COMPRESSOR REMOVAL/INSTALLATION [LF, L8].)
    (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, and amount of CO and HC (See 01–10A–30 ENGINE TUNE-UP [L8, LF].)
    - Engine-driven accessories operation



DPE110AW1003

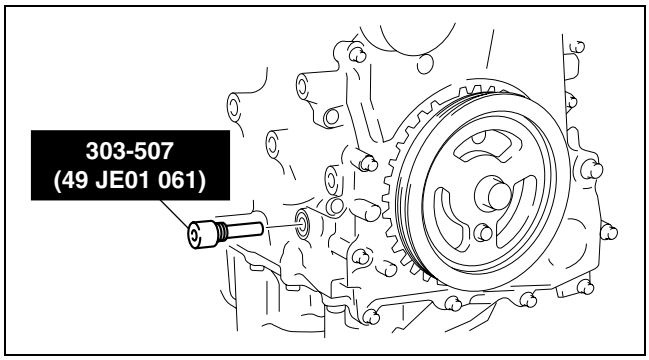
1	Cylinder head cover (See 01–10A–18 Cylinder Head Cover Installation Note.)
2	Crankshaft pulley lock bolt (See 01–10A–13 Crankshaft Pulley Lock Bolt Removal Note.) (See 01–10A–17 Crankshaft Pulley Lock Bolt Installation Note.)
3	Crankshaft pulley
4	Water pump pulley
5	Drive belt auto tensioner
6	No.3 engine mount rubber and No.3 engine joint bracket (See 01–10A–13 No.3 Engine Mount Rubber Removal Note.) (See 01–10A–17 No.3 Engine Mount Rubber Installation Note.)

7	Engine front cover (See 01–10A–16 Engine Front Cover Installation Note.)
8	Front oil seal (See 01–10A–14 Engine Front Cover Removal Note.) (See 01–10A–16 Front Oil Seal Installation Note.)
9	Chain tensioner (See 01–10A–14 Chain Tensioner Removal Note.)
10	Tensioner arm
11	Chain guide
12	Timing chain (See 01–10A–15 Timing Chain Installation Note.)
13	Oil pump chain tensioner
14	Oil pump chain guide

15	Oil pump sprocket (See 01–10A–15 Oil Pump Sprocket Removal Note.) (See 01–10A–15 Oil Pump Sprocket Installation Note.)
16	Oil pump chain
17	Crankshaft sprocket

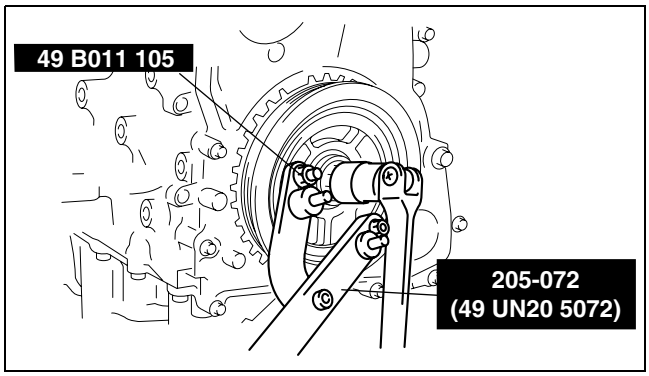
Crankshaft Pulley Lock Bolt Removal Note

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**).



B3E0110W062

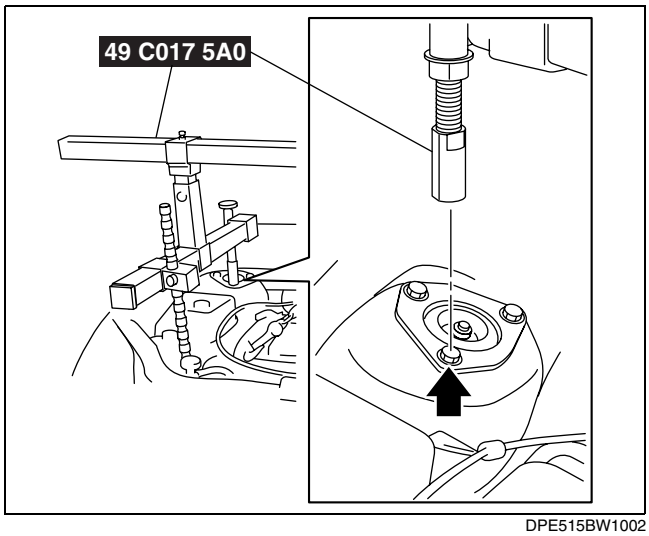
4. Hold the crankshaft pulley using the **SSTs**.



B3E0110W107

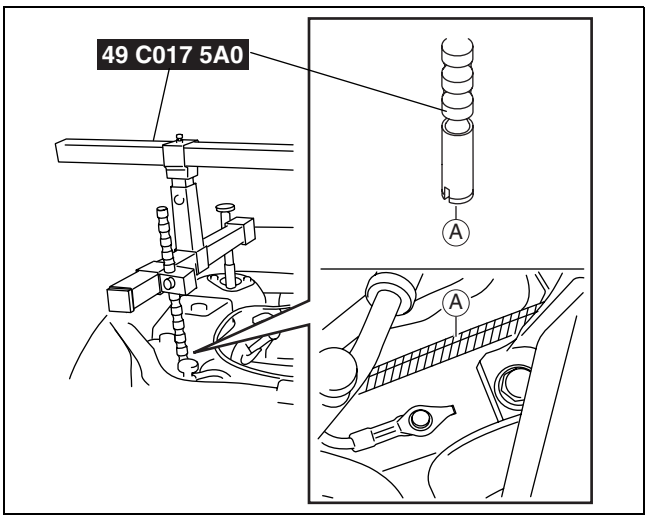
No.3 Engine Mount Rubber Removal Note

1. Remove the following parts to install the **SST**.
   (1) Air cleaner assemby (See:01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, LF])
   (2) Windshield wiper arm and blade(See:09–19–3 WINDSHIELD WIPER ARM AND BLADE REMOVAL/INSTALLATION)
   (3) Cowl grille (See:09–16–2 COWL GRILLE REMOVAL/INSTALLATION)
   (4) Cowl panel (See:09–10–11 COWL PANEL REMOVAL/INSTALLATION)
2. Install the **SST** using the following procedure.
   (1) Align the rear support rod hole of the **SST** to the the shock absorber upper bolt.



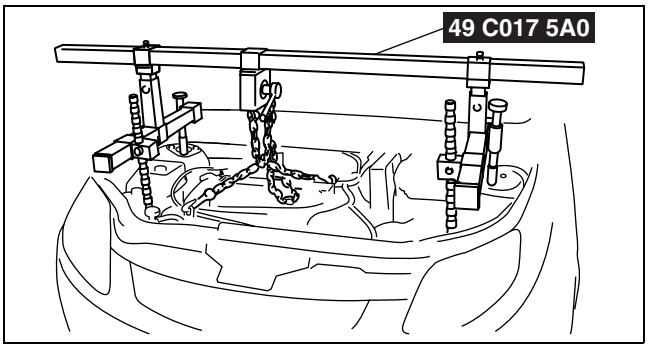
DPE515BW1002

(2) Align the front support rod groove of the **SST** to the folded part of the frame .



DPE515BW1003

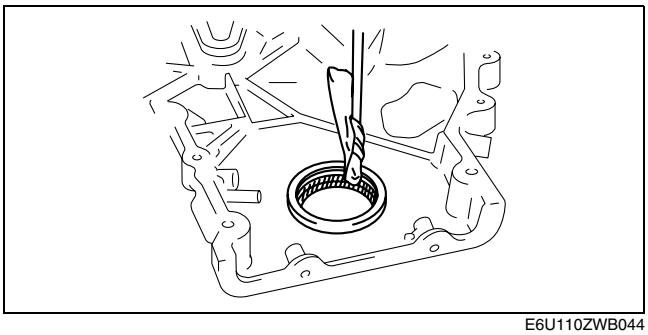
3. Suspend the engine using the **SST**.



DPE515AW1002

Engine Front Cover Removal Note

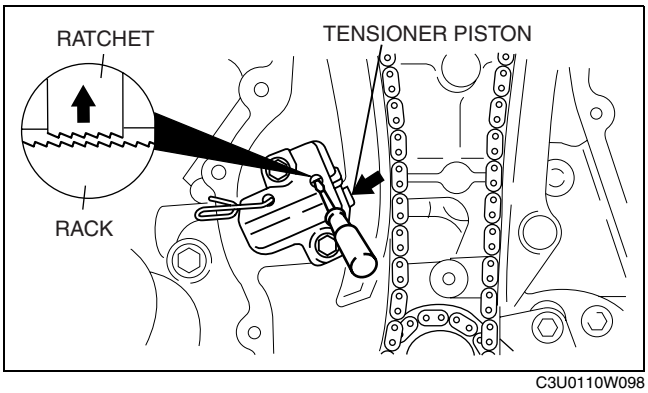
1. Remove the oil seal using a screwdriver as shown in the figure.



E6U110ZWB044

Chain Tensioner Removal Note

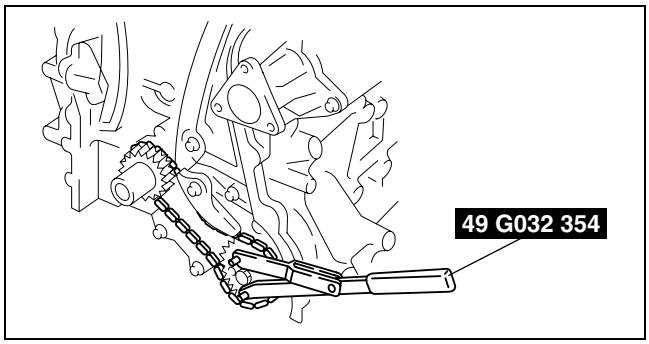
1. Unlock the chain tensioner ratchet using a suitable screw driver or equivalent tool.
2. Slowly compress the tensioner piston.
3. Hold the tensioner piston using a **1.5 mm {0.059 in}** wire or paper clip.



C3U0110W098

Oil Pump Sprocket Removal Note

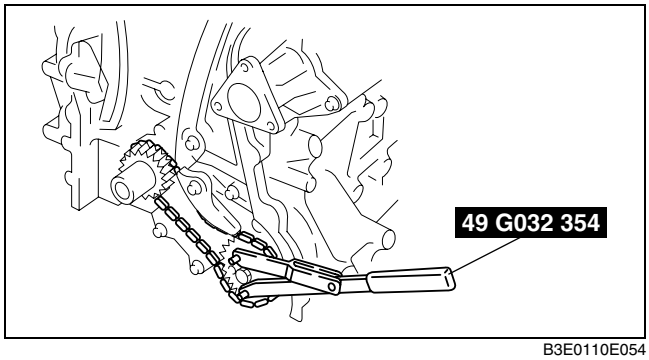
1. Hold the oil pump sprocket using the **SST**.



B3E0110E054

Oil Pump Sprocket Installation Note

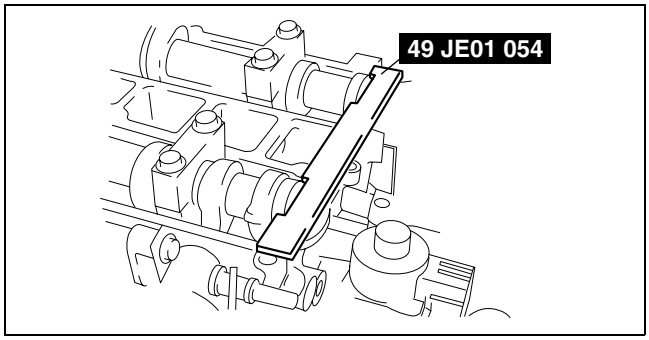
1. Hold the oil pump sprocket using the **SST**.



B3E0110E054

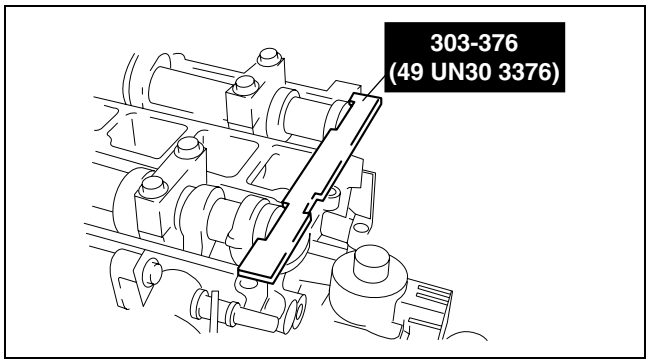
Timing Chain Installation Note

1. Install the **SST** to the camshaft as shown in the figure.



B3E0110W132

2. Install the timing chain.
3. Remove the retaining wire or paper clip from the auto tensioner to apply tension to the timing chain.



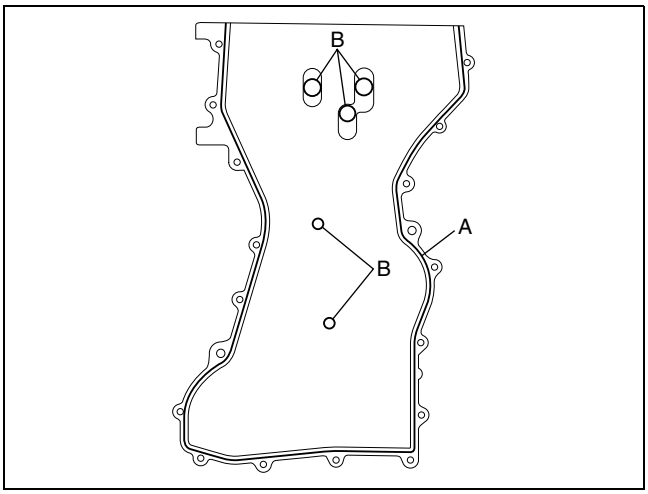
B3E0110W112

Engine Front Cover Installation Note

1. Apply silicone sealant to the engine front cover as shown in the figure.

   Caution
   - **Install the engine front cover within 10 min of applying the silicone sealant.**

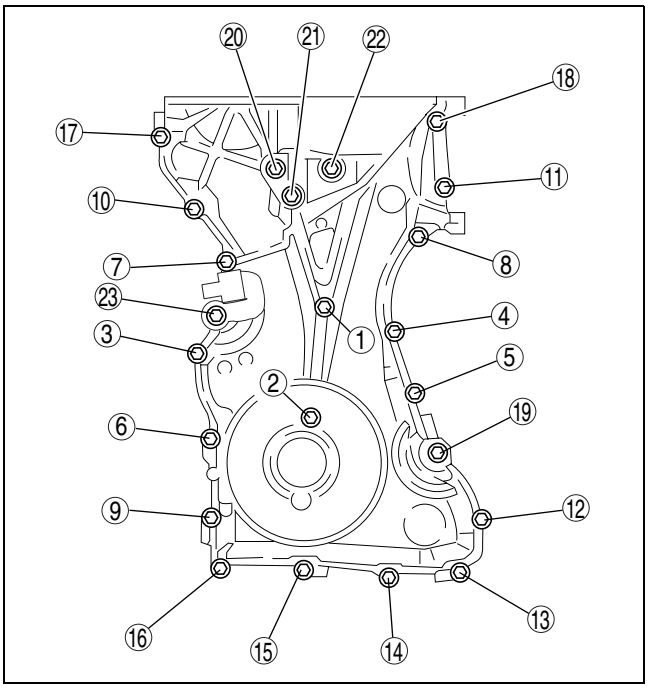
   Thickness
   A: 2.2—3.2 mm {0.087—0.125 in}
   B: 1.5—2.5 mm {0.059—0.098 in}



B3E0110W113

2. Install the engine front cover bolts in the order shown in the figure.

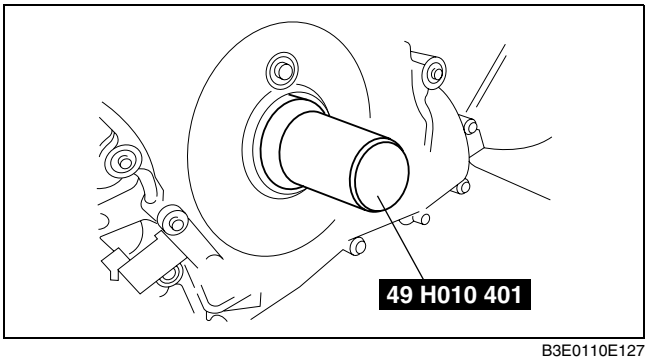
Bolt No.	Tightening torque
1—18	**8.0—11.5 N·m {81.6—117.2 kgf·cm, 70.9—101.7 in·lbf}**
19—22	**40—55 N·m {4.1—5.6 kgf·m, 29.6—40.5 ft·lbf}**
23	**20—30 N·m {2.1—3.0 kgf·m, 14.8—22.1 ft·lbf}**



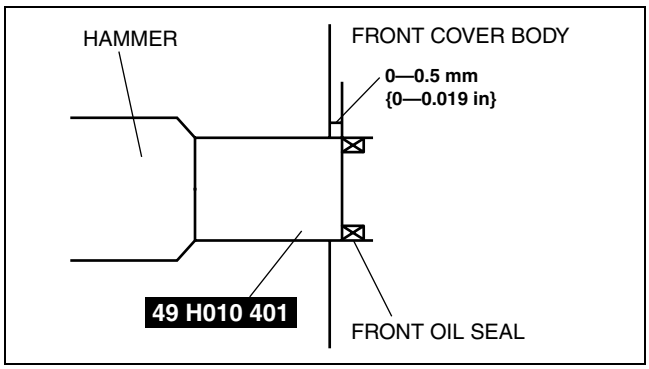
B3E0110W114

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



C3U0110W057

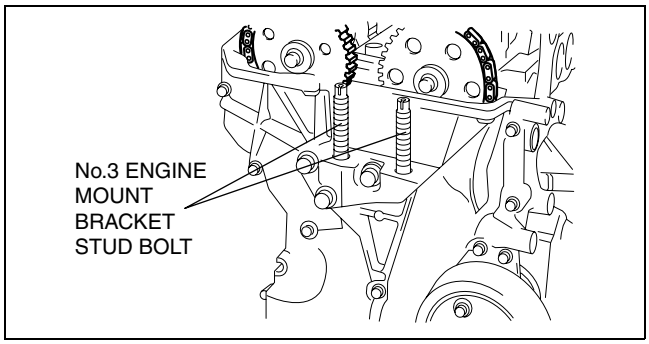
No.3 Engine Mount Rubber Installation Note

1. Tighten the stud bolt of the No.3 engine mount bracket.

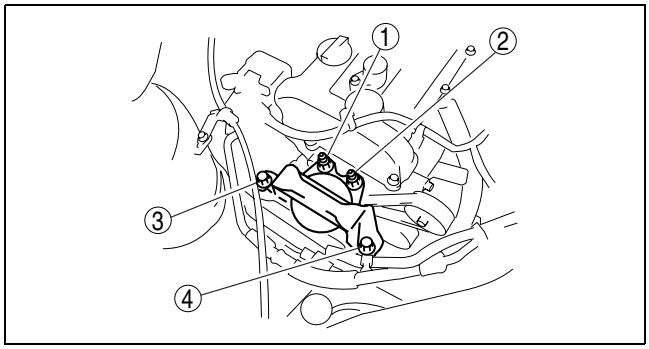
   Tightening torque
   7.0—13 N·m
   {71.4—132.5 kgf·cm, 62.0—115.0 in·lbf}

   Note
   - If the No.3 engine mount bracket and the engine are removed, retighten the No.3 engine mount bracket stud bolt

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.



B3E0110W115

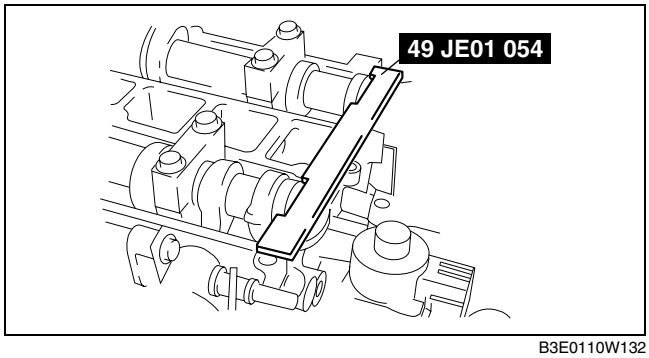


B3E2224W007

Crankshaft Pulley Lock Bolt Installation Note

1. Install the **SST** to the camshaft as shown in the figure.

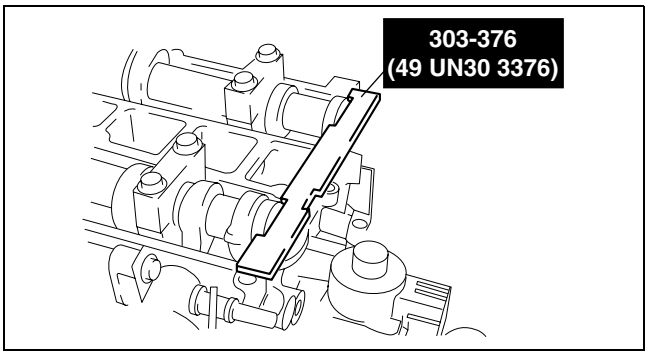
Europe



B3E0110W132

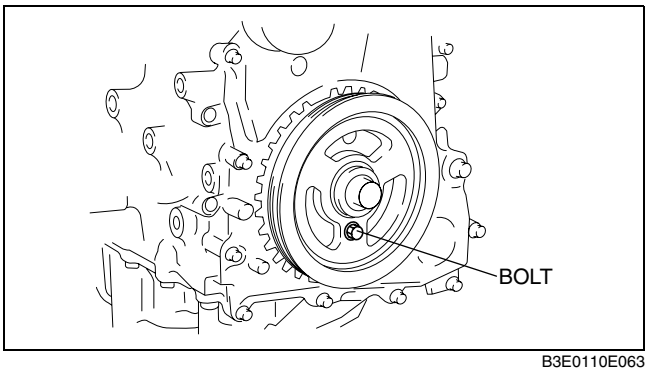
Except Europe

2. Verify that cylinder No.1 is at TDC of the compression stroke. (Position crank weight contacts **SST**.)



B3E0110W112

3. To position the crankshaft pulley, temporarily tighten it and, using a suitable bolt **(M6 length 25—35 mm {0.99—1.37 in})**, fix the crankshaft pulley to the engine front cover.

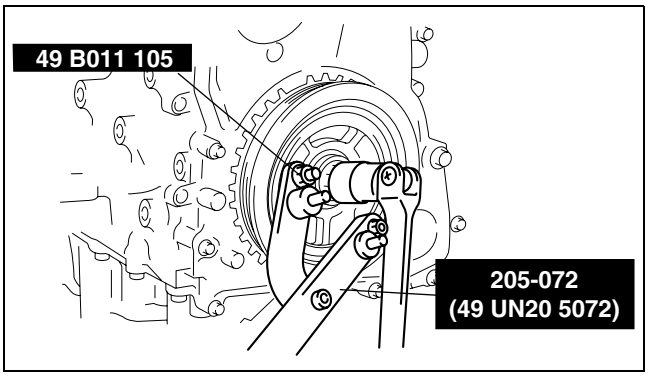


B3E0110E063

4. Install the **SSTs** to the crankshaft pulley, lock the crankshaft against rotation, and tighten the crankshaft pulley lock bolt using the following two steps.

   Tightening torque
   (1) 96—104 N·m
   {9.8—10.6 kgf·m, 70.9—76.7 ft·lbf}
   (2) 87°—93°

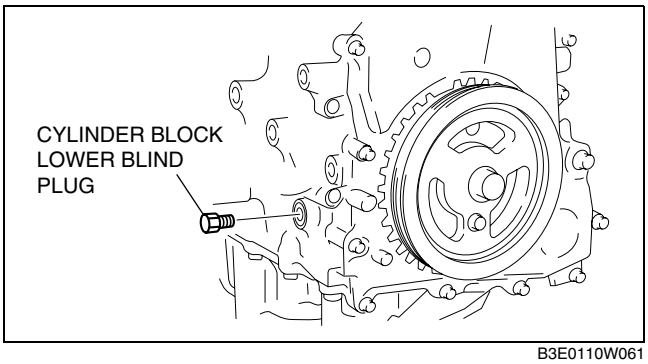
5. Remove the bolt **(M6 length 25—35 mm {0.99—1.37 in})** installed to the crankshaft pulley.
6. Remove the **SST** from the camshaft.
7. Remove the **SST** from the cylinder block lower blind plug.



B3E0110W107

8. Rotate the crankshaft clockwise two turns until the TDC position.
   - If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 1.
9. Install the cylinder block lower blind plug.

   Tightening torque
   18—22 N·m {1.9—2.2 kgf·m, 14—16 ft·lbf}



B3E0110W061

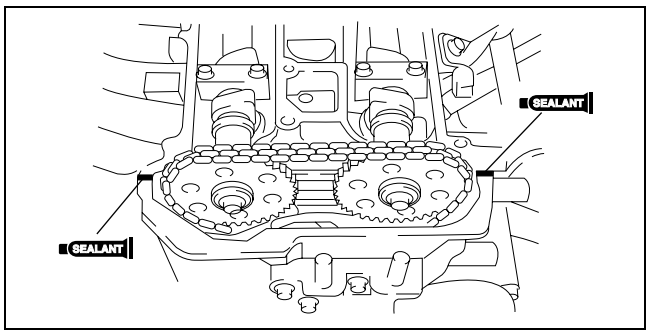
Cylinder Head Cover Installation Note

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}

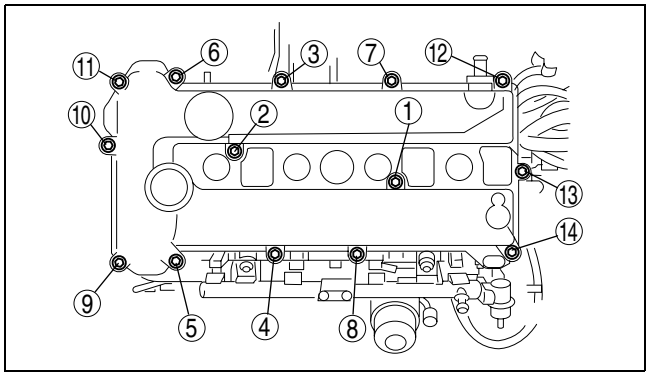
2. Install the cylinder head cover with a new gasket.



B3E0110E064

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—92.9 in·lbf}



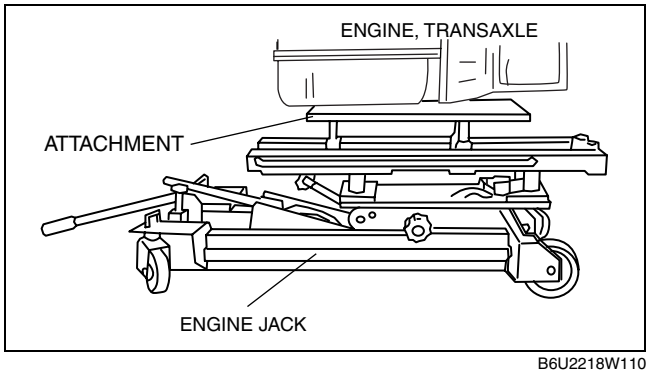
B3E0110W050

CYLINDER HEAD GASKET REPLACEMENT [L8, LF]

DPE011010271W01

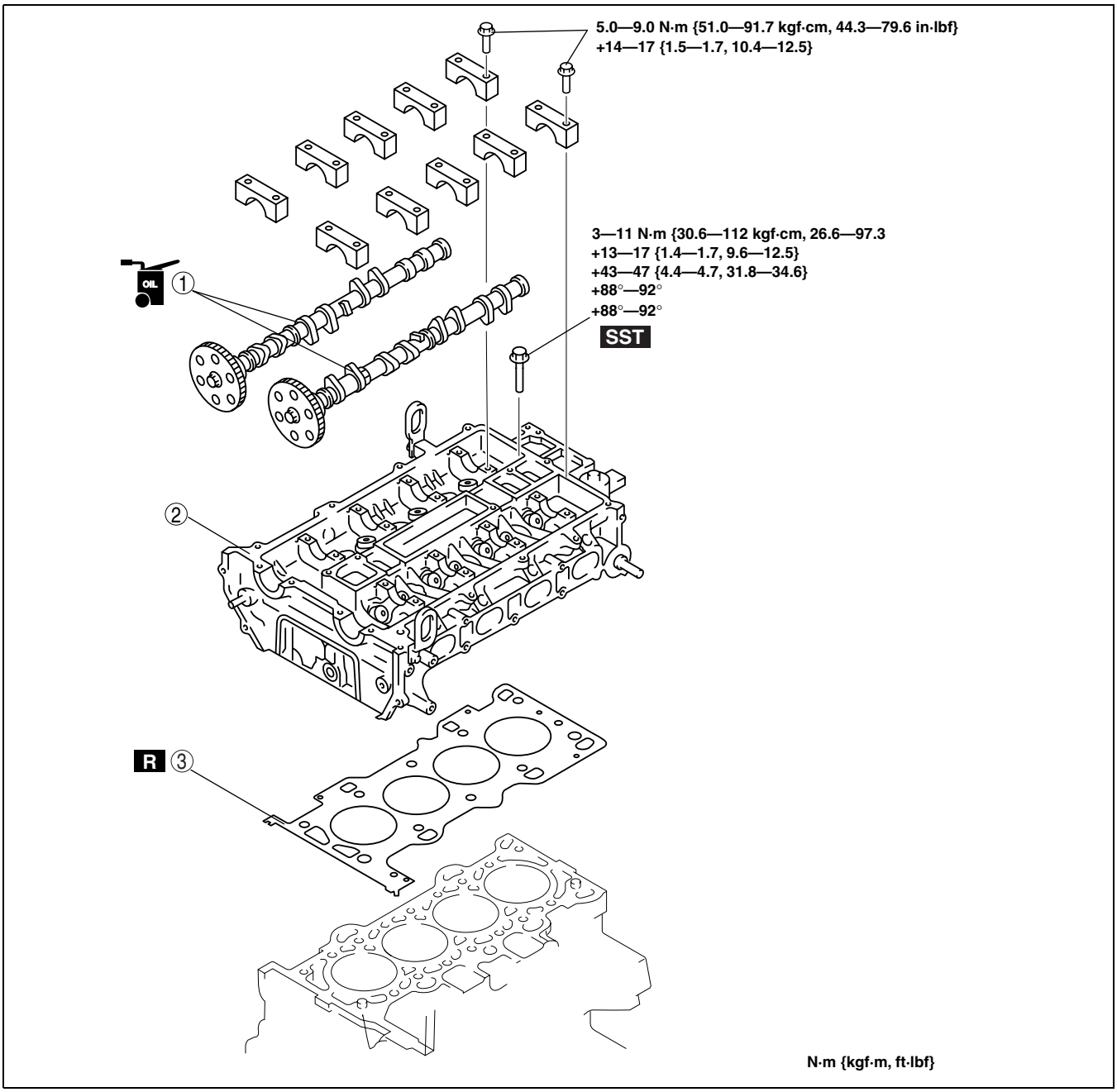
Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure". (See 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)**

1. Remove the timing chain. (See 01–10A–11 TIMING CHAIN REMOVAL/INSTALLATION [L8, LF].)
2. Remove the ignition coils. (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
3. Remove the intake manifold. (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, LF].)
4. Disconnect the following parts.
   (1) WU-TWC (See 01–15A–1 EXHAUST SYSTEM REMOVAL/INSTALLATION [L8, 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.
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.



B6U2218W110

8. Inspect the compression. (See 01–10A–10 COMPRESSION INSPECTION [L8, LF].)



DPE110AW1001

1	Camshaft (See 01–10A–20 Camshaft Removal Note.) (See 01–10A–21 Camshaft Installation Note.)

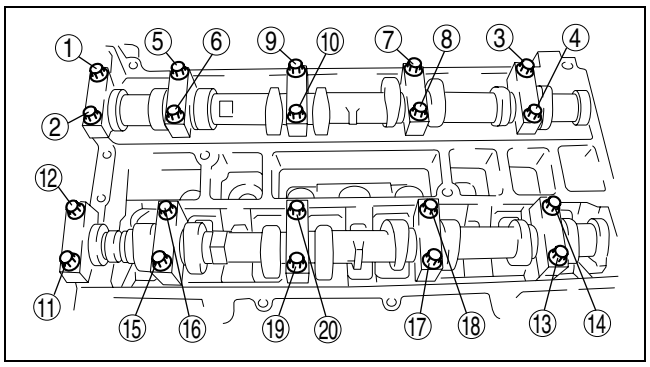
2	Cylinder head (See 01–10A–21 Cylinder Head Removal Note.) (See 01–10A–21 Cylinder Head Installation Note.)
3	Cylinder head gasket

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.

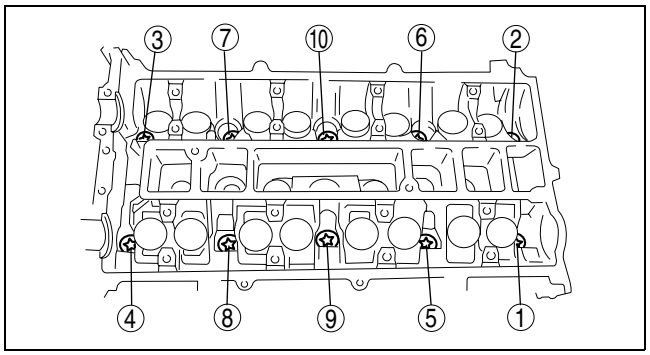
1. Loosen the camshaft cap bolts in 2—3 passes in the order shown in the figure.



B3E0110E057

Cylinder Head Removal Note

1. Loosen the cylinder head bolts in 2—3 passes in the order shown in the figure.



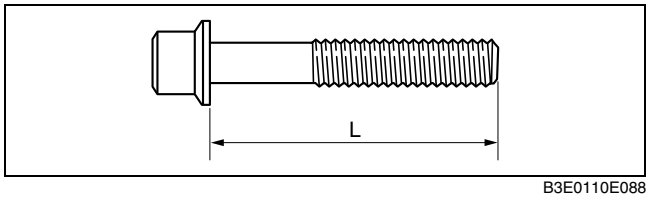
B3E0110E059

Cylinder Head Installation Note

1. Measure the length of each cylinder head bolt.
   - Replace any that exceeds maximum length.

   Cylinder Head Bolt Length (standard)
   145.2—145.8 mm {5.72—5.74 in}

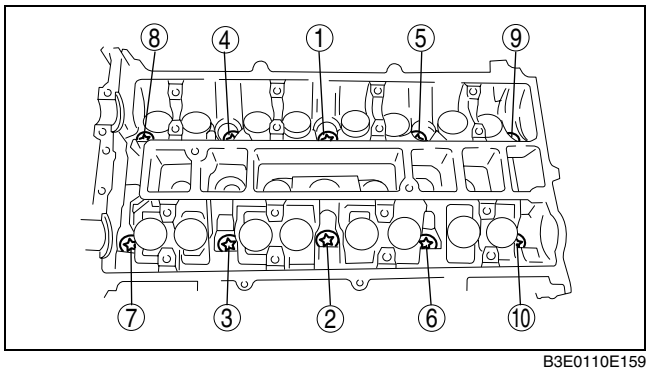
   Cylinder Head Bolt Length (Maximum)
   146.5 mm {5.77 in}



B3E0110E088

2. Tighten the cylinder head bolts in the order shown with the following 5 steps using the **SST (49 D032 316)**.

   Tightening torque
   (1) 3—11 N·m {30.6—112 kgf·cm, 26.6—97.3 in·lbf}
   (2) 13—17 N·m {1.4—1.7 kgf·m, 9.6—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°

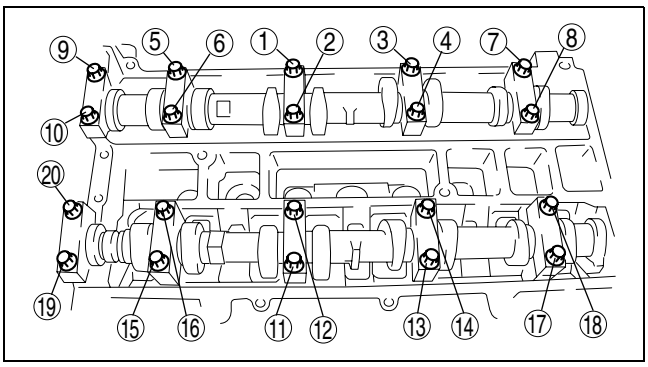


B3E0110E159

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}

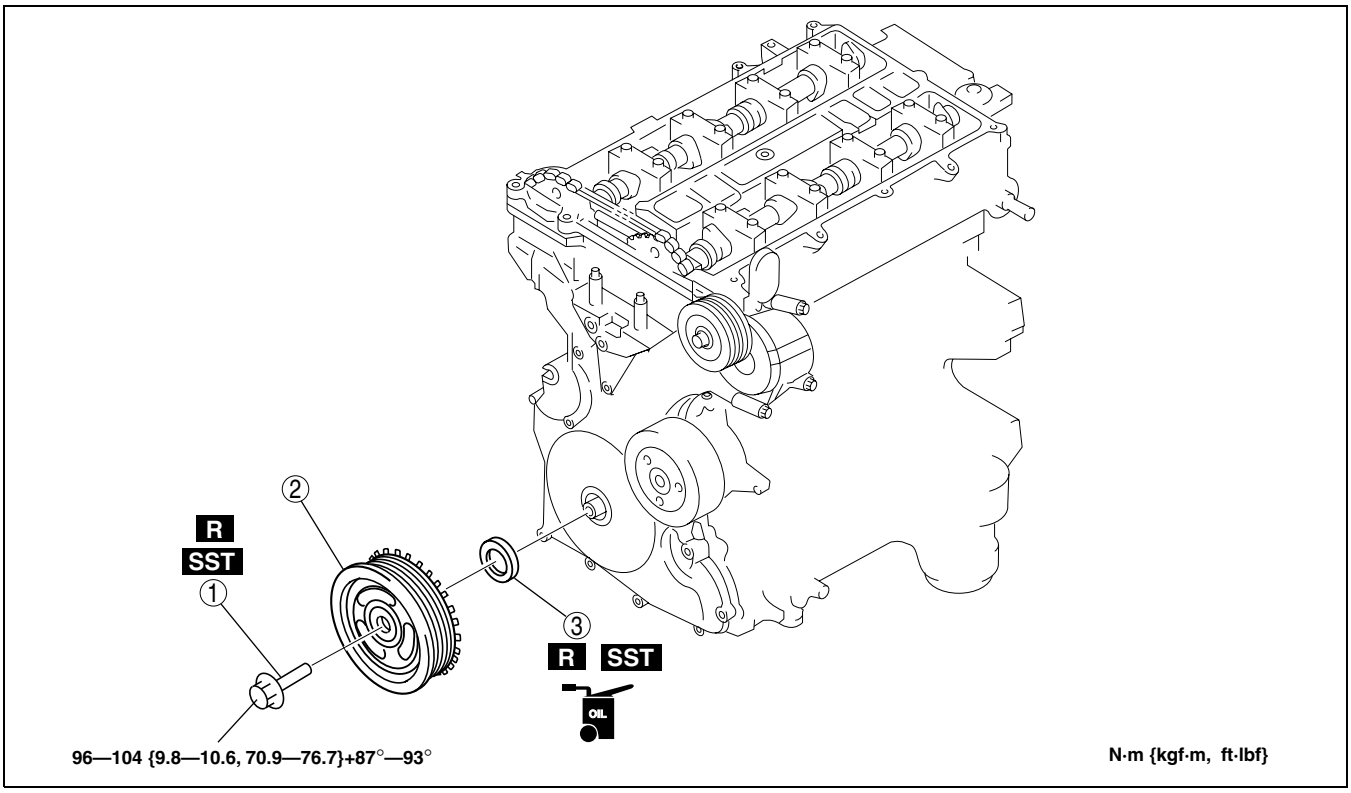


B3E0110E157

FRONT OIL SEAL REPLACEMENT [L8, LF]

DPE011010602W01

1. Remove the plug hole plate (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
2. Remove the plug hole plate bracket.
3. Remove the battery cover (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
4. Disconnect the negative battery cable.
5. Disconnect the wiring harness.
6. Remove the following parts.
   (1) Ignition coils (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
   (2) Cylinder head cover (See 01–10A–18 Cylinder Head Cover Installation Note.)
   (3) Drive belt (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, LF].)
   (4) Front wheel and tire (RH) (See 02–10–1 GENERAL PROCEDURES (SUSPENSION).)
   (5) Under cover and splash shield
   (6) Crankshaft position (CKP) sensor (See 01–40A–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].)
7. Remove in the order indicated in the table.
8. Install in the reverse order of removal.

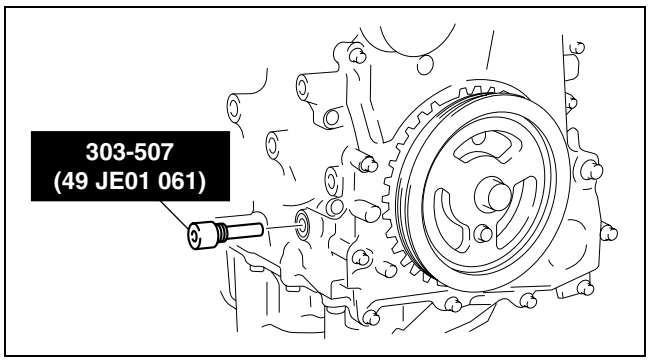


B3E0110W123

Crankshaft Pulley Lock Bolt Removal Note

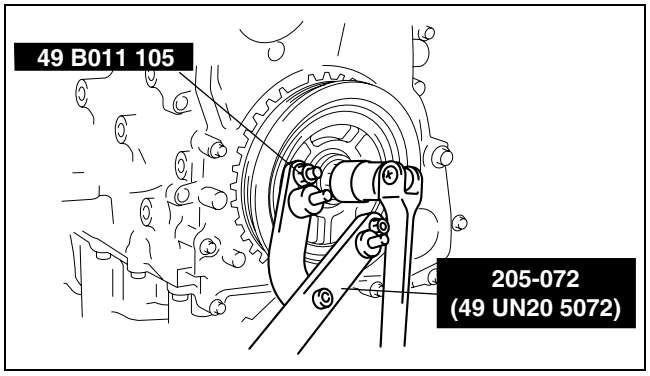
1. Remove the cylinder block lower blind plug.

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**).



B3E0110W062

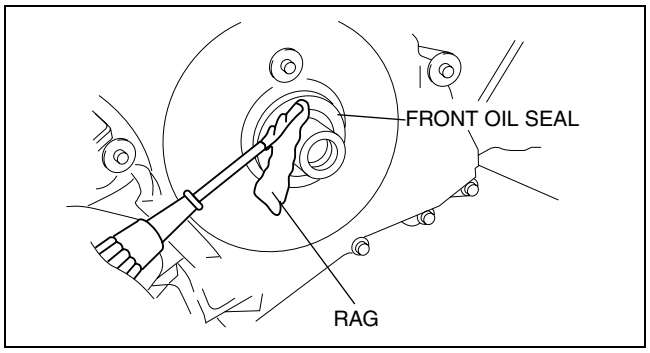
4. Hold the crankshaft pulley using the **SSTs**.



B3E0110W107

Front Oil Seal Removal Note

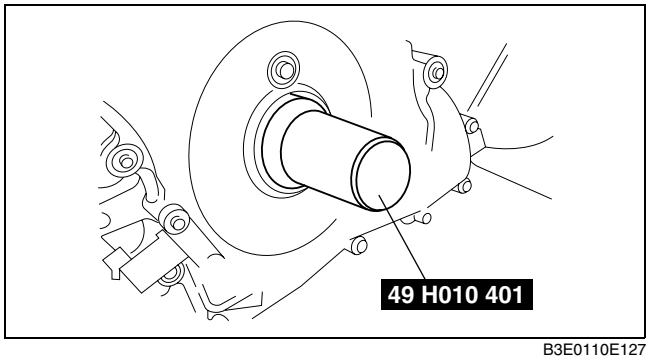
1. Cut the oil seal lip using a razor knife.
2. Remove the oil seal using a screwdriver wrapped with a rag.



B3E0110W130

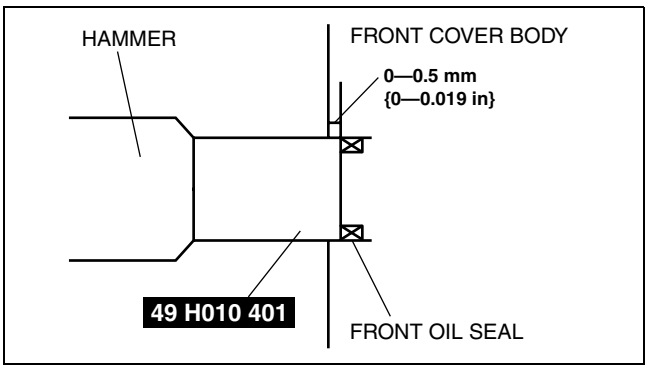
Front Oil Seal Installation Note

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.



B3E0110E127

Pushing distance of the front oil sael
0—0.5 mm {0—0.019 in}

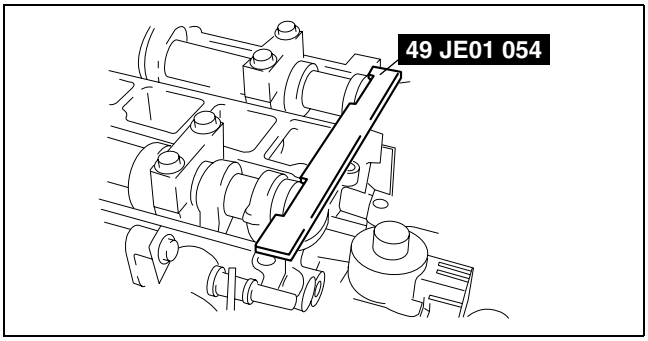


C3U0110W057

Crankshaft Pulley Lock Bolt Installation Note

1. Install the **SST** on the camshaft as shown in the figure.

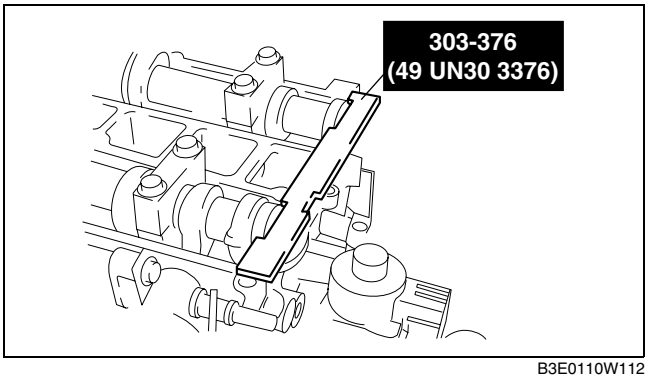
Europe



B3E0110W132

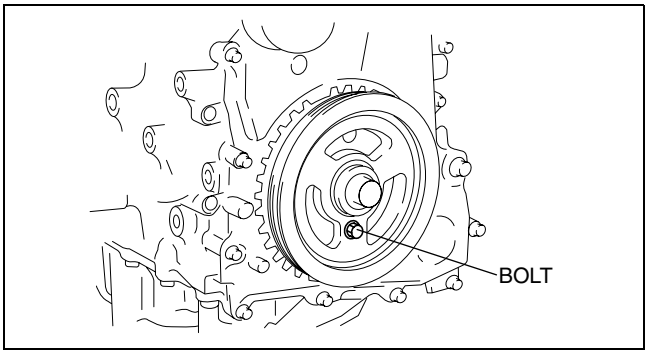
Except Europe

2. Verify that cylinder No.1 is at TDC of the compression stroke. (Position crank weight contacts **SST**.)



B3E0110W112

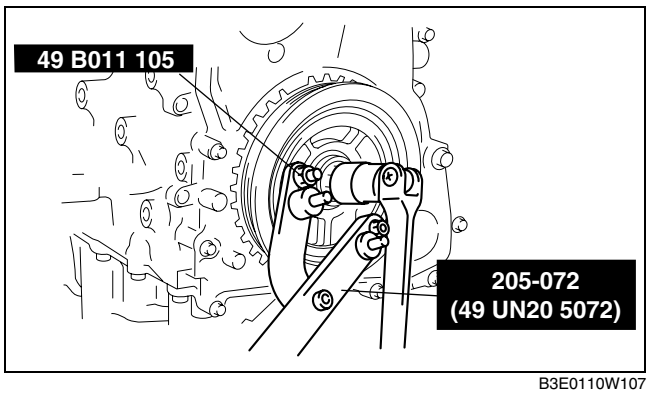
3. To position the crankshaft pulley, temporarily tighten it and, using a suitable bolt **(M6 length 25-35 mm {0.99-1.37 in})** fix the crankshaft pulley to the engine front cover.



B3E0110E063

4. Install the **SSTs** to the crankshaft pulley, lock the crankshaft against rotation, and tighten the crankshaft pulley lock bolt using the following two steps.

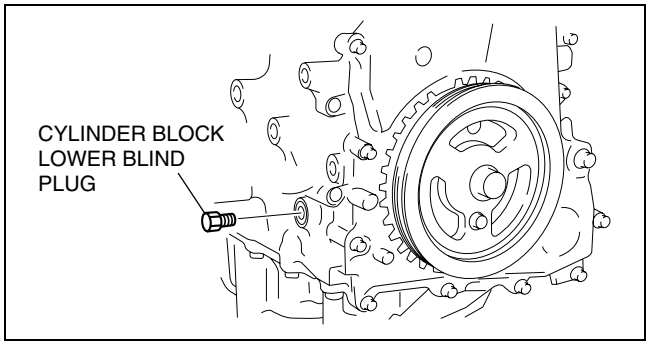
   Tightening torque
   (1) 96—104 N·m {9.8—10.6 kgf·m, 70.9—76.7 ft·lbf}
   (2) 87°—93°



B3E0110W107

5. Remove the bolt **((M6 X 1.0 length) 25-35 mm {0.99-1.37 in})** installed to the crankshaft pulley.
6. Remove the **SST** from the camshaft.
7. Remove the **SST** from the cylinder block lower blind plug.
8. Rotate the crankshaft clockwise 2 turns until the TDC position.
   - If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 1.
9. Install the cylinder block lower blind plug.

   Tightening torque
   18—22 N·m {1.9—2.2 kgf·m, 14—16 ft·lbf}

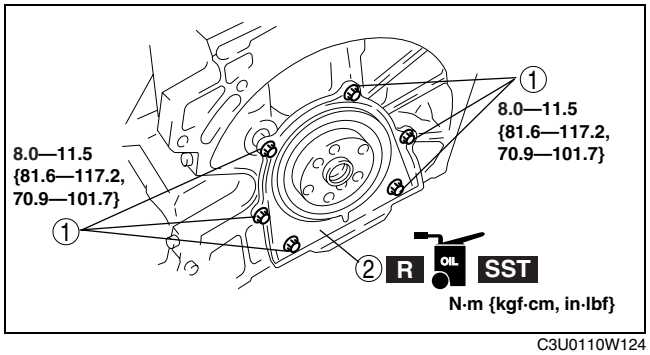


B3E0110W061

REAR OIL SEAL REPLACEMENT [L8, LF]

DPE011011399W01

1. Remove the drive plate. (ATX) (See 05–17–38 DRIVE PLATE REMOVAL/INSTALLATION [FN4A-EL].)
2. Remove the flywheel. (MTX) (See 05–10–8 CLUTCH UNIT REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



C3U0110W124

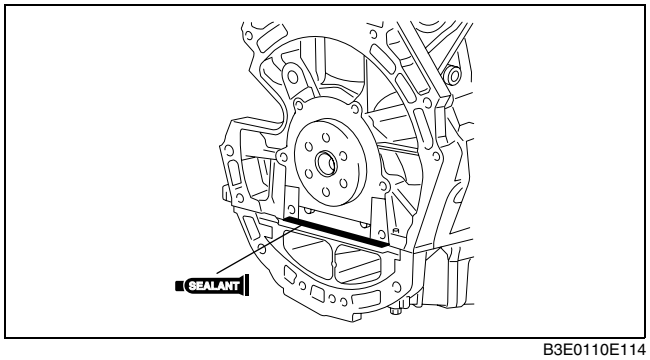
1	Bolt
2	Rear oil seal (See 01–10A–25 Rear Oil Seal Installation Note.)

Rear Oil Seal Installation Note

1. Apply silicone sealant to the mating faces as shown in the figure.

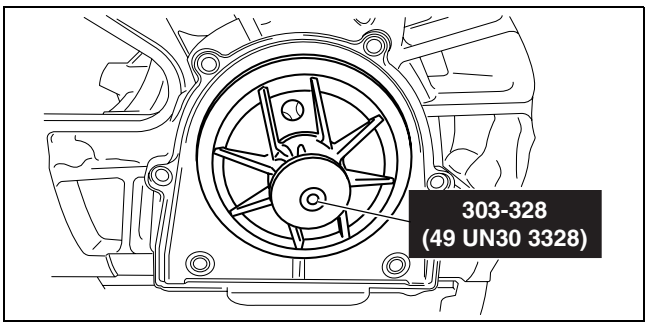
   Thickness
   4.0—6.0 mm {0.16—0.23 in}

2. Apply clean engine oil to the new oil seal lip.



B3E0110E114

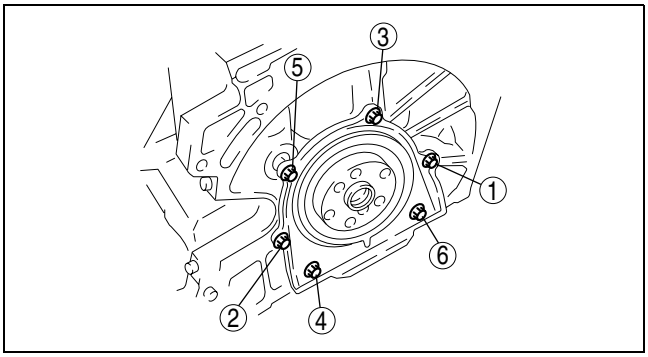
3. Install the rear oil seal using the **SST** as shown in the figure.



CUE110BW2005

4. Tighten the rear oil seal bolts in the order as shown in the figure.

Tightening torque
8.0—11.5 N·m {81.6—117.2 kgf·cm, 70.9—101.7 in·lbf}



B3E0110E116

ENGINE REMOVAL/INSTALLATION [L8, LF]

DPE011002000W05

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 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)**

1. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
2. Remove the air hose and air cleaner component. (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, LF].)
3. Remove the battery cover, battery duct, battery clamp, battery and battery tray. (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
4. Disconnect the fuel hose. (See 01–14A–11 QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION [L8, LF].)
5. Remove the following parts.
   (1) Accelerator cable and bracket
   (2) Front wheels and tires (See 02–10–1 GENERAL PROCEDURES (SUSPENSION).)
   (3) Under cover and splash shields
   (4) A/C drive belt (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, 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 ATF (ATX) or transaxle oil (MTX) (See 05–15A–2 TRANSAXLE OIL REPLACEMENT [G35M-R].)(See 05–17–9 AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT [FN4A-EL].)
7. Drain the engine coolant (See 01–12A–3 ENGINE COOLANT REPLACEMENT [L8, LF].)
8. Disconnect the brake vacuum hose.
9. Remove the following parts.
   (1) Member (See 01–15A–1 EXHAUST SYSTEM REMOVAL/INSTALLATION [L8, LF].)
   (2) Front crossmember, front stabilizer, lower arm, steering gear and No.1 engine mount rubber component (See 06-14–11 STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.)
   (3) Drive shafts (See 03–13–7 DRIVE SHAFT REMOVAL/INSTALLATION.)
   (4) Coolant reserve tank with the hose still connected
   (5) Cooling fan component (See 01–12A–6 RADIATOR REMOVAL/INSTALLATION [L8, LF].)
   (6) ATF hose, selector cable and wiring harness (ATX) (See 05–17–26 AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION [FN4A-EL].)
   (7) Shift cable (MTX) (See 05–15A–3 MANUAL TRANSAXLE REMOVAL/INSTALLATION [G35M-R].)

(8) Clutch release cylinder with the pipe still connected (MTX) (See 05–10–7 CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION.)

10. Disconnect the heater hose.
11. Disconnect the Upper and lower radiator hose.
12. Disconnect the pre-silencer (See 01–15A–1 EXHAUST SYSTEM REMOVAL/INSTALLATION [L8, LF].)
13. Remove in the order indicated in the table.
14. Install in the reverse order of removal.

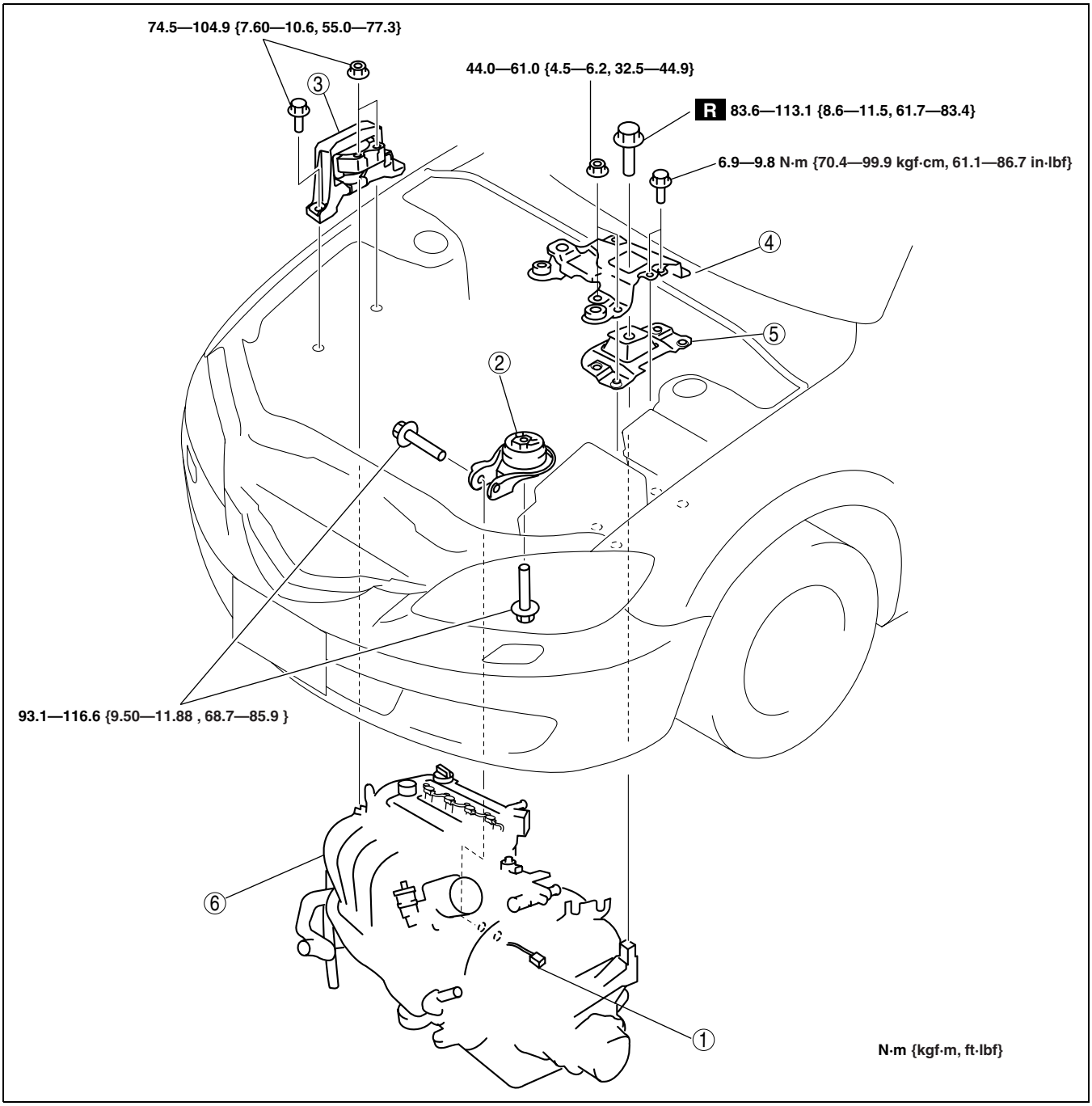
Caution

- **Do not tighten the No.1 engine mount rubber installation bolt before tightening the No.3 engine mount rubber installation bolt. (See 01–10A–29 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 02–11–2 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, and amount of CO, HC. (See 01–10A–30 ENGINE TUNE-UP [L8, 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.

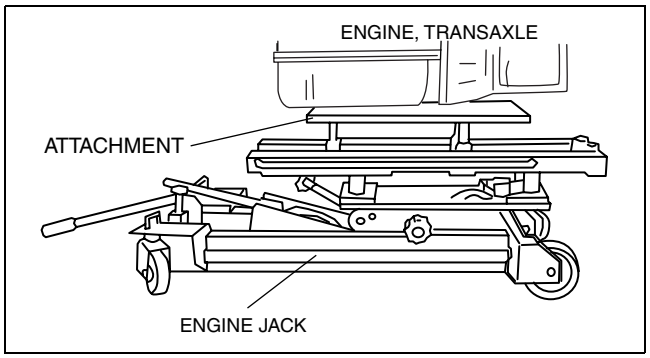


DPE110WZB013

1	Main fuse block connector
2	No.1 engine mount rubber (See 01–10A–30 No.1 Engine Mount Rubber Installation Note.)
3	No.3 Engine mount (See 01–10A–29 No.3 Engine Mount and No.4 Engine Mount Rubber Removal Note.) (See 01–10A–29 No.3 Engine Mount and No.4 Engine Mount Rubber Installation Note.)
4	Battery bracket
5	No.4 Engine mount rubber (See 01–10A–29 No.3 Engine Mount and No.4 Engine Mount Rubber Removal Note.) (See 01–10A–29 No.3 Engine Mount and No.4 Engine Mount Rubber Installation Note.)
6	Engine, transaxle

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.

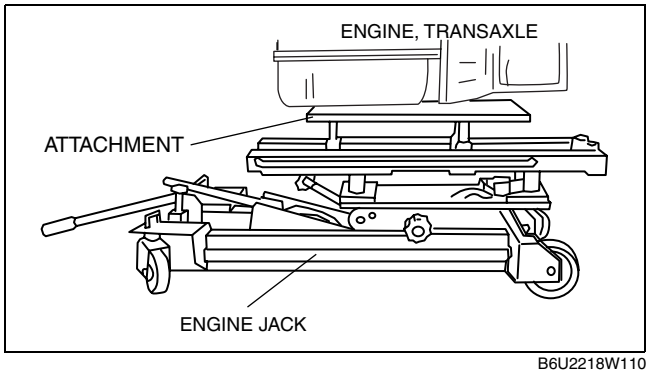


B6U2218W110

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.
2. Install the No.1 engine mount rubber and No.4 engine mount rubber.

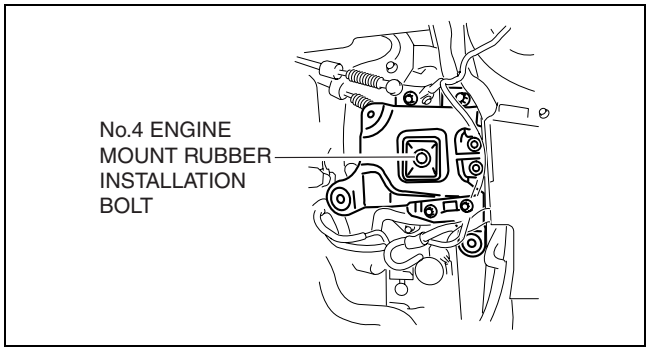
   Note
   - Do not tighten the bolt and nut for the No.1 engine mount rubber and No.4 engine mount rubber during this step.



B6U2218W110

3. Tighten the new No.4 engine mount rubber installation bolt as shown in the figure.

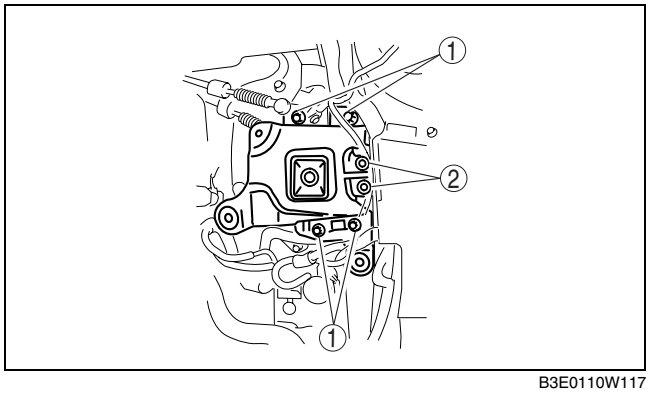
   Tightening torque
   83.6—113.1 N·m {8.6—11.5 kgf·m, 61.7—83.4 ft·lbf}



B3E0110W116

4. Tighten the No.4 engine mount rubber and battery bracket bolts and nuts in the order as shown in the figure.

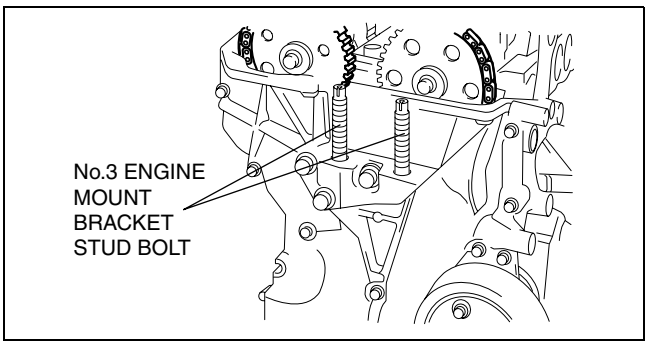
   Tightening torque
   (1) 44.0—61.0 N·m {4.5—6.2 kgf·m, 32.5—44.9 ft·lbf}
   (2) 6.9—9.8 N·m {70.4—99.9 kgf·cm, 61.1—86.7 in·lbf}



B3E0110W117

5. Tighten the No.3 engine mount bracket stud bolts.

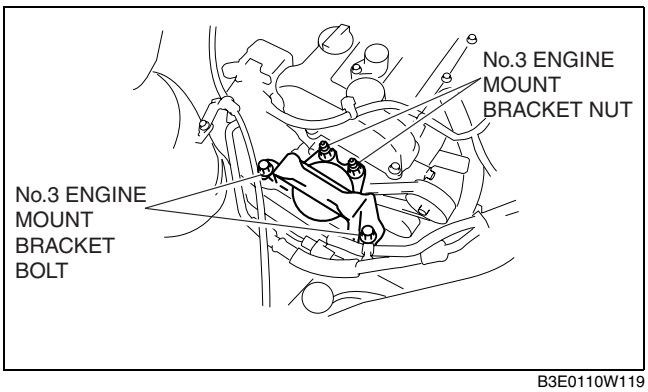
Tightening torque
7.0—13 N·m {71.4—132.5 kgf·cm, 62.0—115.0 in·lbf}



B3E0110W115

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}

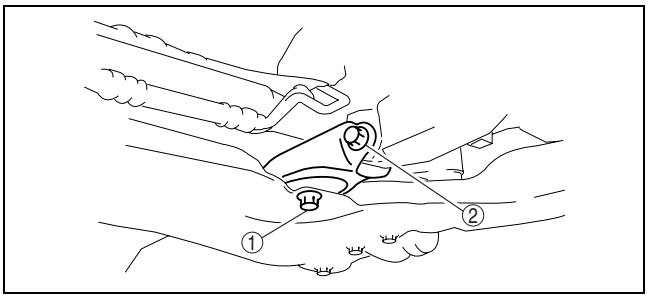


B3E0110W119

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.

Caution
- **Tighten the bolts in the order shown in the figure to prevent abnormal noise and vibration after assembly.**

Tightening torque
93.1—116.6 N·m {9.50—11.88 kgf·m, 68.7—85.9 ft·lbf}



C3J110AW2001

ENGINE DISASSEMBLY/ASSEMBLY [L8, LF]

DPE011002000W06

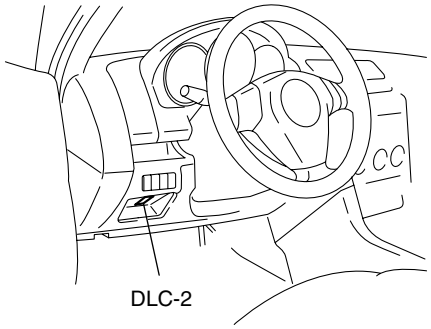
1. Disconnect the engine and transaxle. (See 05–17–26 AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION [FN4A-EL].) (See 05–15A–3 MANUAL TRANSAXLE REMOVAL/INSTALLATION [G35M-R].)
2. Remove the following parts:
   (1) Intake-air system (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, LF].)
   (2) Generator (See 01–17A–7 GENERATOR REMOVAL/INSTALLATION [L8, LF].)
   (3) Ignition coils (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
   (4) Crankshaft position (CKP) sensor (See 01–40A–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].)
3. Assemble in the reverse order of disassembly.

ENGINE TUNE-UP [L8, LF]

DPE011002000W07

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.



DPE102ZW2001

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			
	MTX		ATX	
	L8	LF		
	Neutral position		N range	D range
No load	650—750	600—700	650—750	550—650 600—700*3
Electrical loads*2 ON (38—48 A)	650—750	650—750	650—750	600—700
Electrical loads*2 ON (Above 48 A)	700—800	700—800	700—800	670—770
A/C ON and refrigerant pressure switch (middle) OFF	700—800	700—800	650—750	650—750
A/C ON and refrigerant pressure switch (middle) ON	700—800	700—800	670—770 750—800*3	670—770 750—850*3

*1 : Excludes temporary idle speed drop just after the electrical loads are turned on.

*2 : Alternator generating current value.

*3 : Israel specs.

Idle Mixture Inspection

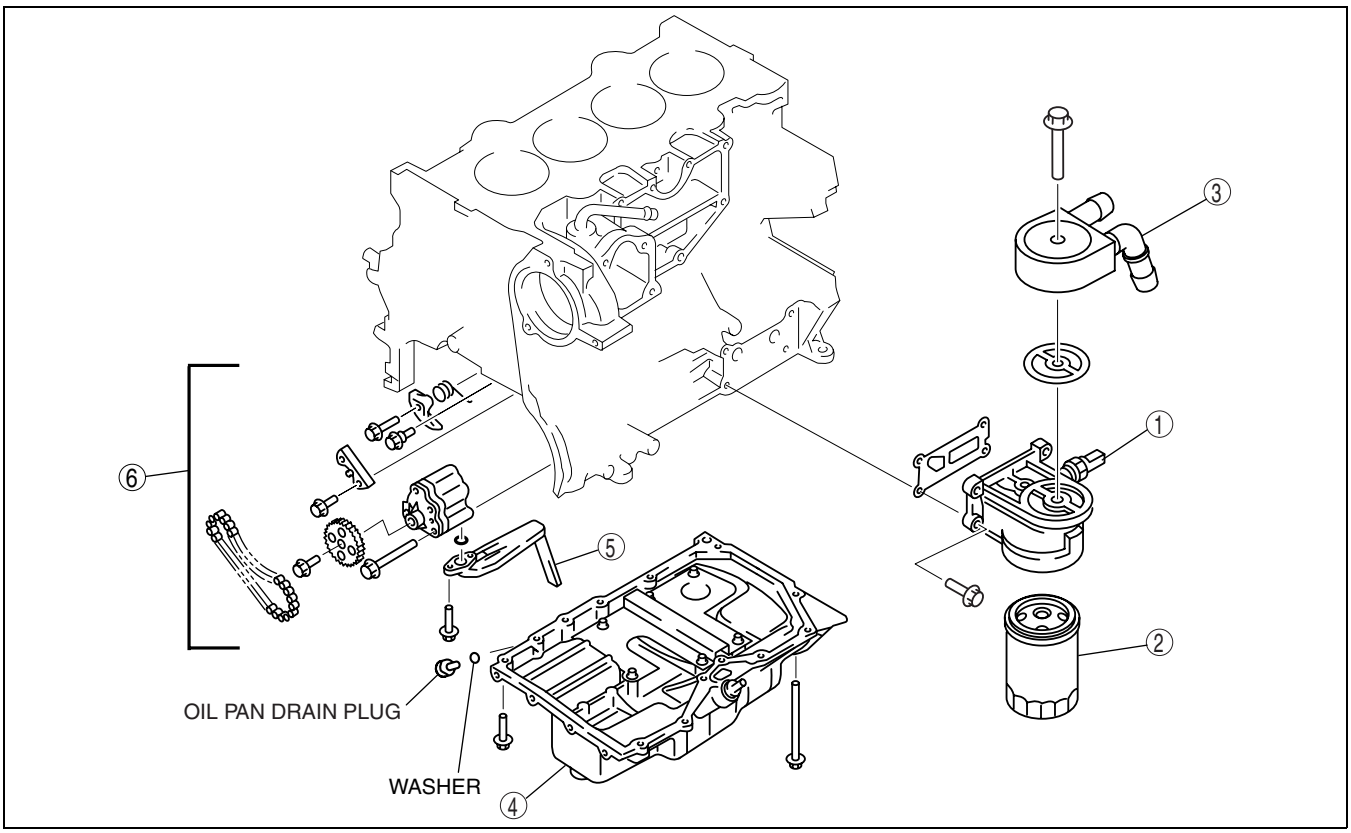
1. Verify that the idle speed and ignition timing are within the specification. (See 01–10A–31 Idle Speed Inspection.) (See 01–10A–31 Ignition Timing Inspection.)
2. Insert an exhaust gas analyzer to the tailpipe.
3. Verify that the CO and HC concentrations are within the regulation.

01–11A LUBRICATION [L8, LF]

LUBRICATION SYSTEM LOCATION INDEX [L8, LF] 01–11A–1
OIL PRESSURE INSPECTION [L8, LF] 01–11A–1
ENGINE OIL LEVEL INSPECTION [L8, LF] 01–11A–2
ENGINE OIL REPLACEMENT [L8, LF] 01–11A–3
OIL FILTER REPLACEMENT [L8, LF] . . . 01–11A–4
OIL COOLER REMOVAL/INSTALLATION [L8, LF] 01–11A–4
OIL PAN REMOVAL/INSTALLATION [L8, LF] 01–11A–5
OIL PUMP REMOVAL/INSTALLATION [L8, LF] 01–11A–7

LUBRICATION SYSTEM LOCATION INDEX [L8, LF]

DPE011100000W01



DPE111AW1001

1	Oil pressure switch (See 01–11A–1 OIL PRESSURE INSPECTION [L8, LF].)
2	Oil filter (See 01–11A–4 OIL FILTER REPLACEMENT [L8, LF].)
3	Oil cooler (See 01–11A–4 OIL COOLER REMOVAL/ INSTALLATION [L8, LF].)
4	Oil pan (See 01–11A–5 OIL PAN REMOVAL/ INSTALLATION [L8, LF].)
5	Oil strainer (See 01–11A–7 OIL PUMP REMOVAL/ INSTALLATION [L8, LF].)
6	Oil pump component (See 01–11A–7 OIL PUMP REMOVAL/ INSTALLATION [L8, LF].)

OIL PRESSURE INSPECTION [L8, LF]

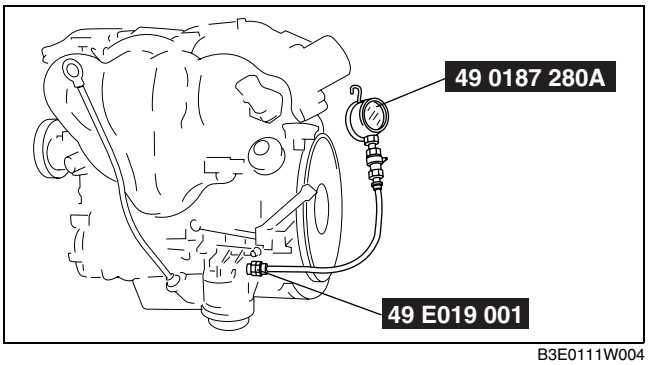
DPE011114000W01

Warning

- **Hot engines and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.**
- **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 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the under cover.
4. Remove the oil pressure switch.
5. Screw the **SSTs** into the oil pressure switch installation hole.
6. Connect the negative battery cable.
7. Warm up the engine to normal operating temperature.
8. 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.



B3E0111W004

Note
- The oil pressure can vary with oil viscosity and temperature.

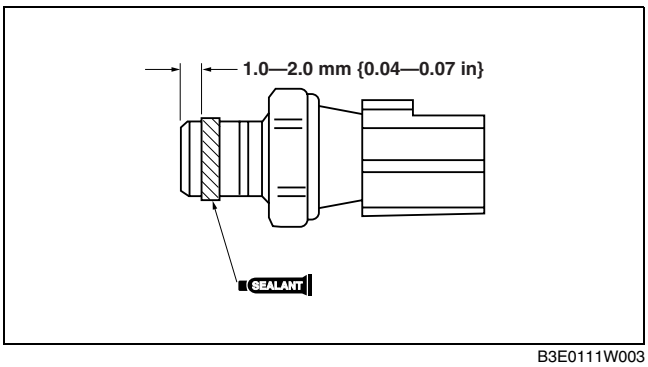
Oil pressure (reference value) [oil temperature: 100 °C {212 °F}]
234—521 kPa {2.39—5.31 kgf/cm^2, 33.9—75.5 psi} min [3,000 rpm]

9. Stop the engine and wait until it is cool.
10. Disconnect the negative battery cable.
11. Remove the **SSTs**.

Caution
- **Make sure that 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.**

12. Apply silicone sealant to the oil pressure switch threads as shown in the figure.
13. Install the oil pressure switch.

Tightening torque
12—18 N·m {1.2—1.8 kgf·m, 9—13 ft·lbf}



B3E0111W003

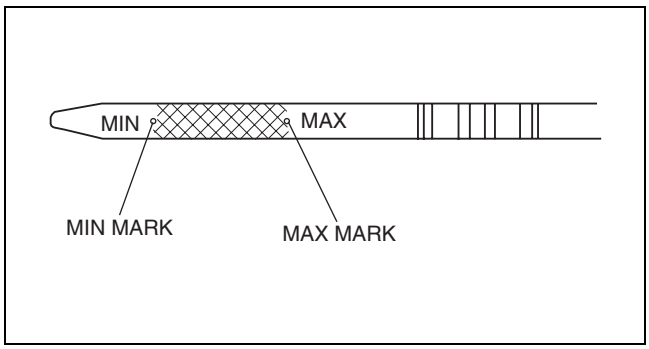
14. Install the under cover.
15. Connect the negative battery cable.
16. Install the battery cover. (See 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
17. Start the engine and confirm that there is no oil leakage.
    - If there is oil leakage, find the cause and repair or replace the applicable part.

ENGINE OIL LEVEL INSPECTION [L8, LF]

DPE011114001W01

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.



B3E0111W005

ENGINE OIL REPLACEMENT [L8, LF]

DPE011114001W02

Warning
- **Hot engines and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.**
- **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 and oil temperature. Verify the oil level after engine oil replacement.

6. Refill the following type and amount of the engine oil.

Note
- The maintenance intervals on scheduled maintenance table (See 00–00–34 SCHEDULED MAINTENANCE TABLE) can only be supported with the use of the following oils.

Recommended engine oil

Item	Specifications			
	Europe			Except Europe
Grade	API SL or ACEA A3/A5	API SL or ACEA A3		API SG/SH/SJ/SL or 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.**		—	—

Engine oil capacity (approx. quantity)
Oil replacement: 3.9 L {4.1 US qt, 3.4 Imp qt}
Oil and oil filter replacement: 4.3 L {4.5 US qt, 3.8 Imp qt}
Total (dry engine): 4.6 L {4.9 US qt, 4.0 Imp qt}

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 01–11A–2 ENGINE OIL LEVEL INSPECTION [L8, LF].)

OIL FILTER REPLACEMENT [L8, LF]

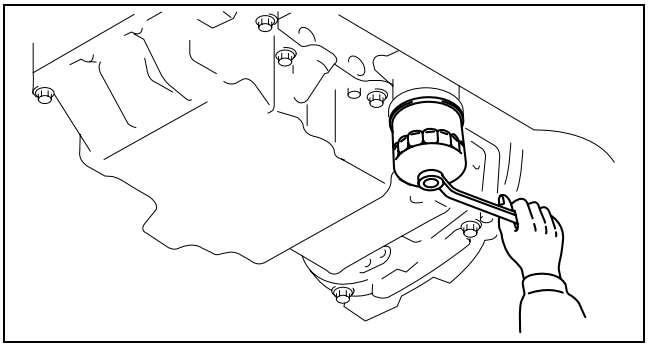
DPE011114300W01

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**).
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 a cup-type oil filter wrench and according to the instruction on the package or side of the oil filter.

   Tightening torque (reference value)
   15—20 N·m {1.6—2.0 kgf·m, 11—14 ft·lbf}



A6J0111W001

6. 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.
7. Inspect the oil level. (See 01–11A–2 ENGINE OIL LEVEL INSPECTION [L8, LF].)
8. Install the under cover.

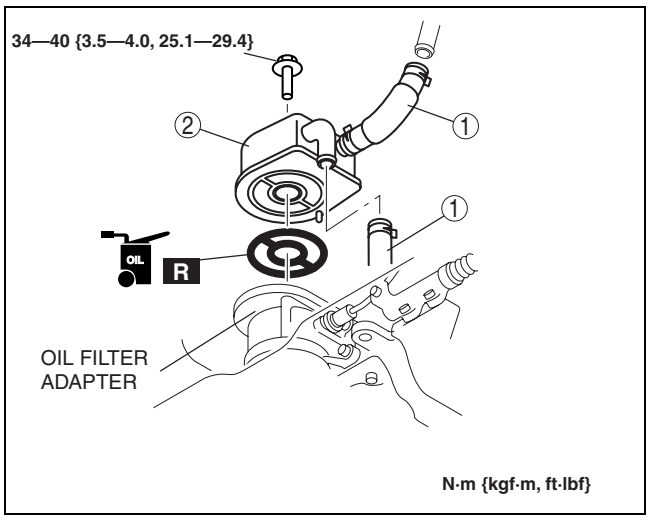
OIL COOLER REMOVAL/INSTALLATION [L8, LF]

DPE011114700W01

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 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the under cover.
4. Drain the engine coolant. (See 01–12–3 ENGINE COOLANT REPLACEMENT [L8, LF].)

5. Remove in the order indicated in the table.



E6U111ZWB002

1	Water hose
2	Oil cooler

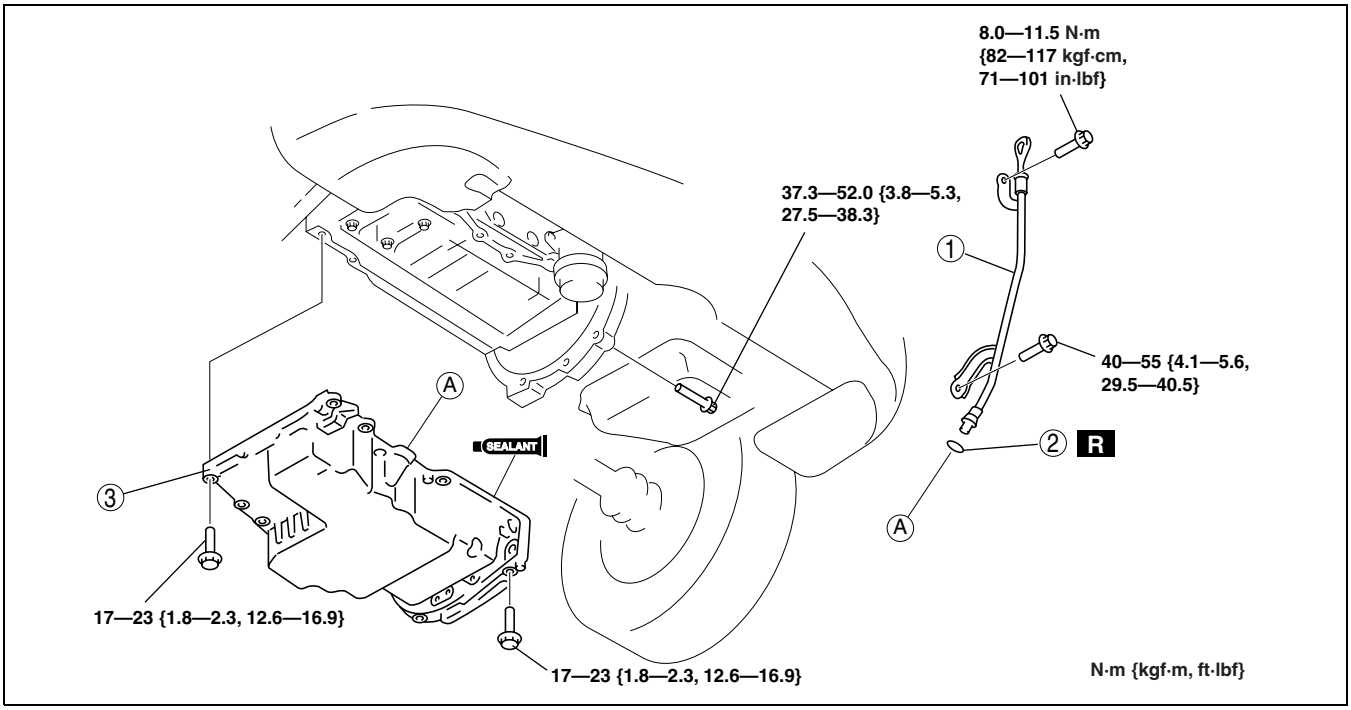
6. Use a clean rag to wipe off the mounting surface on the oil filter adapter and the oil cooler.
7. Install in the reverse order of the removal.
8. Refill the engine coolant. (See 01–12–3 ENGINE COOLANT REPLACEMENT [L8, LF].)
9. Start the engine and confirm that there is no oil leakage.
   - If there is oil leakage, find the cause and repair or replace the applicable part.
10. Inspect the oil level. (See 01–11A–2 ENGINE OIL LEVEL INSPECTION [L8, LF].)

OIL PAN REMOVAL/INSTALLATION [L8, LF]

DPE011110040W01

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 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, 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 01–11A–3 ENGINE OIL REPLACEMENT [L8, LF].)
6. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
7. Remove the drive belt. (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, LF].)
8. Position the coolant reserve tank out of the way.
9. Remove the A/C compressor with the pipes still connected. (See 07–11–25 A/C COMPRESSOR REMOVAL/INSTALLATION [LF, L8].)
10. Remove the ignition coil. (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
11. Position the accelerator cable bracket out of the way.
12. Remove the crankshaft position (CKP) sensor. (See 01–40–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].)
13. Remove the engine front cover. (See 01–10A–11 TIMING CHAIN REMOVAL/INSTALLATION [L8, LF].)
14. Remove in the order indicated in the table.
15. Install in the reverse order of removal.
16. Refill the specified type and amount of the engine oil. (See 01–11A–3 ENGINE OIL REPLACEMENT [L8, LF].)
17. 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.
18. Inspect the oil level. (See 01–11A–2 ENGINE OIL LEVEL INSPECTION [L8, LF].)
19. Inspect for the ignition timing and idle speed. (See 01–10A–30 ENGINE TUNE-UP [L8, LF].)



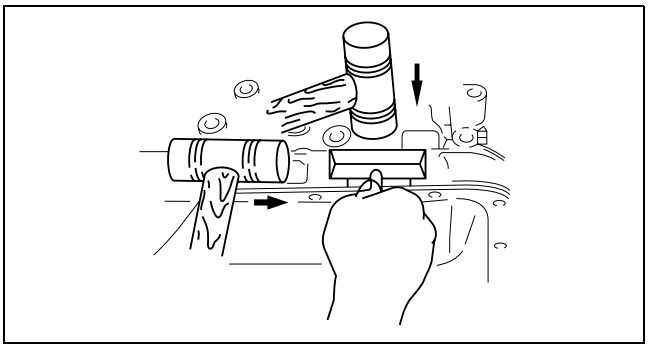
DPE111AW1002

1	Oil level gauge pipe
2	O-ring

3	Oil pan (See 01–11A–6 Oil Pan Removal Note.) (See 01–11A–6 Oil Pan Installation Note.)

Oil Pan Removal Note

1. Remove the oil pan using the separator tool.



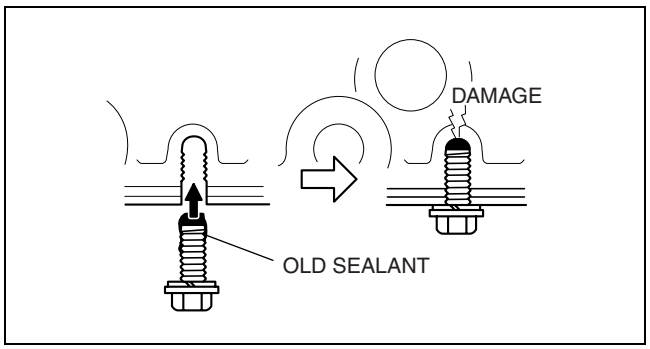
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Oil Pan Installation Note

Caution

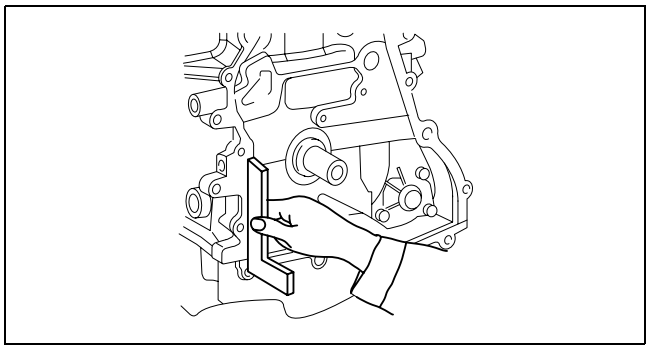
- **Apply the silicon sealant in a single, unbroken line around the whole perimeter.**
- **Using bolts with the old seal adhering could cause cracks in the housing.**

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 the oil pan installation bolts, clean any old sealant from the bolts.



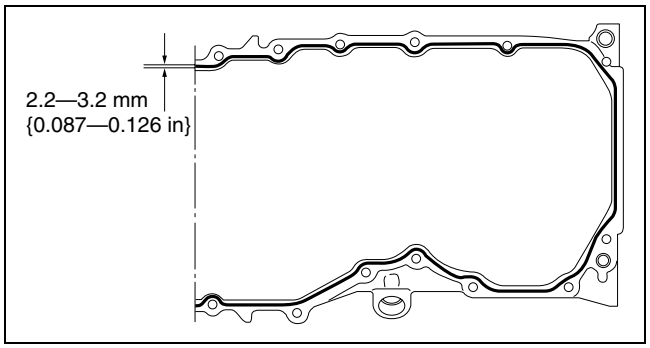
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3. Use a square ruler to align the oil pan and the cylinder block junction side on the engine front cover side.


B3E0111W007

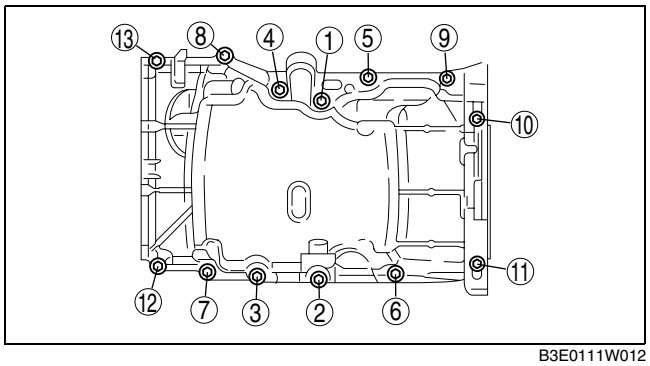
4. Apply silicone sealant to the oil pan along the inside of the bolt holes as shown in the figure.

   Thickness
   2.2—3.2 mm {0.087—0.126 in}



E6U111ZWB006

5. Tighten the bolts in the order as shown in the figure.



B3E0111W012

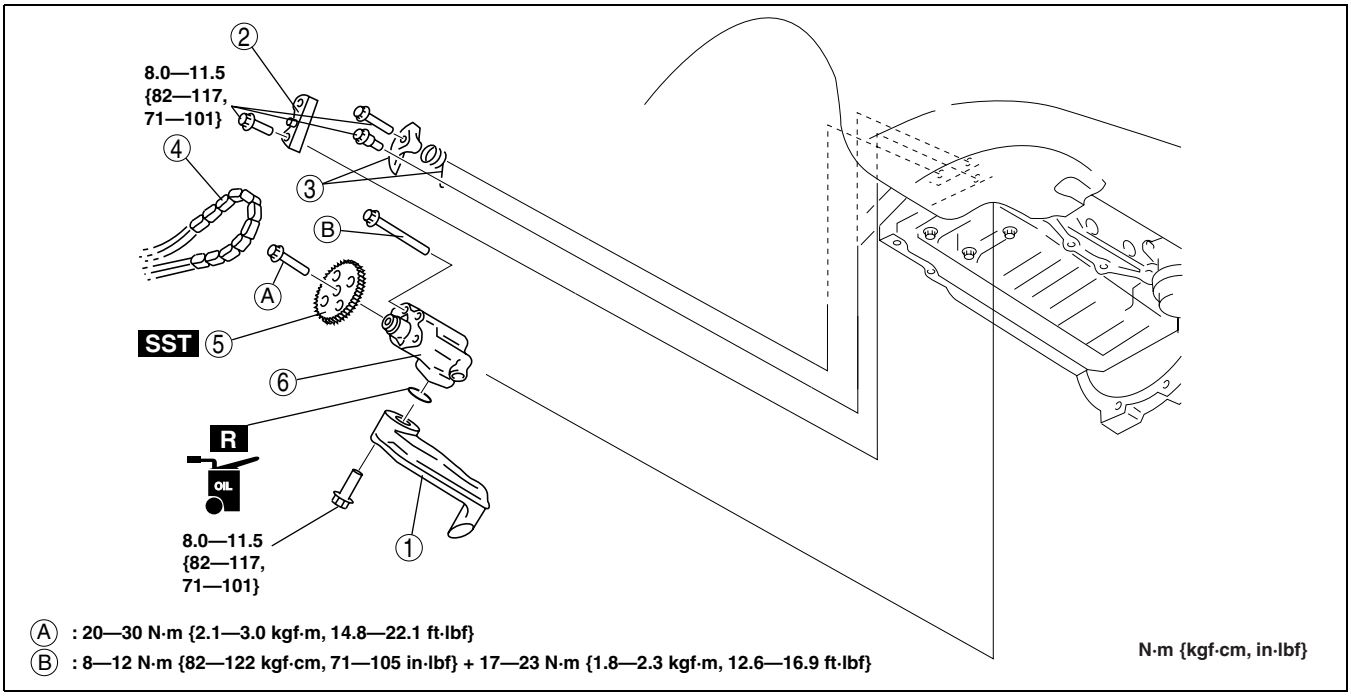
OIL PUMP REMOVAL/INSTALLATION [L8, LF]

DPE011114100W01

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 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, 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 01–11A–3 ENGINE OIL REPLACEMENT [L8, LF].)
6. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
7. Remove the drive belt. (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, LF].)
8. Position the coolant reserve tank out of the way.
9. Remove the A/C compressor with the pipes still connected. (See 07–11–25 A/C COMPRESSOR REMOVAL/INSTALLATION [LF, L8].)
10. Remove the ignition coil. (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].)
11. Position the accelerator cable bracket out of the way.
12. Remove the crankshaft position (CKP) sensor. (See 01–40–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].)
13. Remove the engine front cover. (See 01–10A–11 TIMING CHAIN REMOVAL/INSTALLATION [L8, LF].)
14. Remove the oil pan. (See 01–11A–5 OIL PAN REMOVAL/INSTALLATION [L8, LF].)
15. Remove in the order indicated in the table.
16. Install in the reverse order of removal.
17. Refill the specified type and amount of the engine oil. (See 01–11A–3 ENGINE OIL REPLACEMENT [L8, LF].)
18. 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.
19. Inspect the oil level. (See 01–11A–2 ENGINE OIL LEVEL INSPECTION [L8, LF].)
20. Inspect for the ignition timing and idle speed. (See 01–10A–30 ENGINE TUNE-UP [L8, LF].)



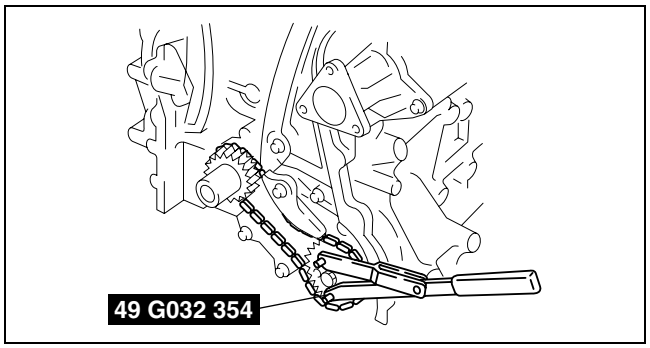
DPE111AW1005

1	Oil strainer
2	Oil pump chain guide
3	Oil pump chain tensioner
4	Oil pump chain

5	Oil pump sprocket (See 01–11A–9 Oil Pump Sprocket Removal/Installation Note.)
6	Oil pump (See 01–11A–9 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.

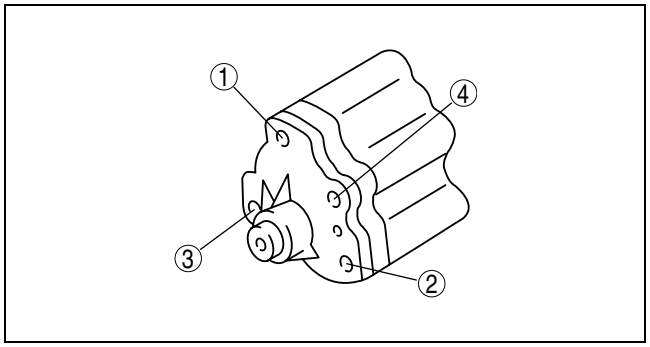


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Oil Pump Installation Note

1. Tighten the oil pump bolts in two steps in the order indicated in the figure.

   Tightening torque:
   1) 8—12 N·m {82—122 kgf·cm, 71—105 in·lbf}
   2) 17—23 N·m {1.8—2.3 kgf·m, 12.6—16.9 ft·lbf}



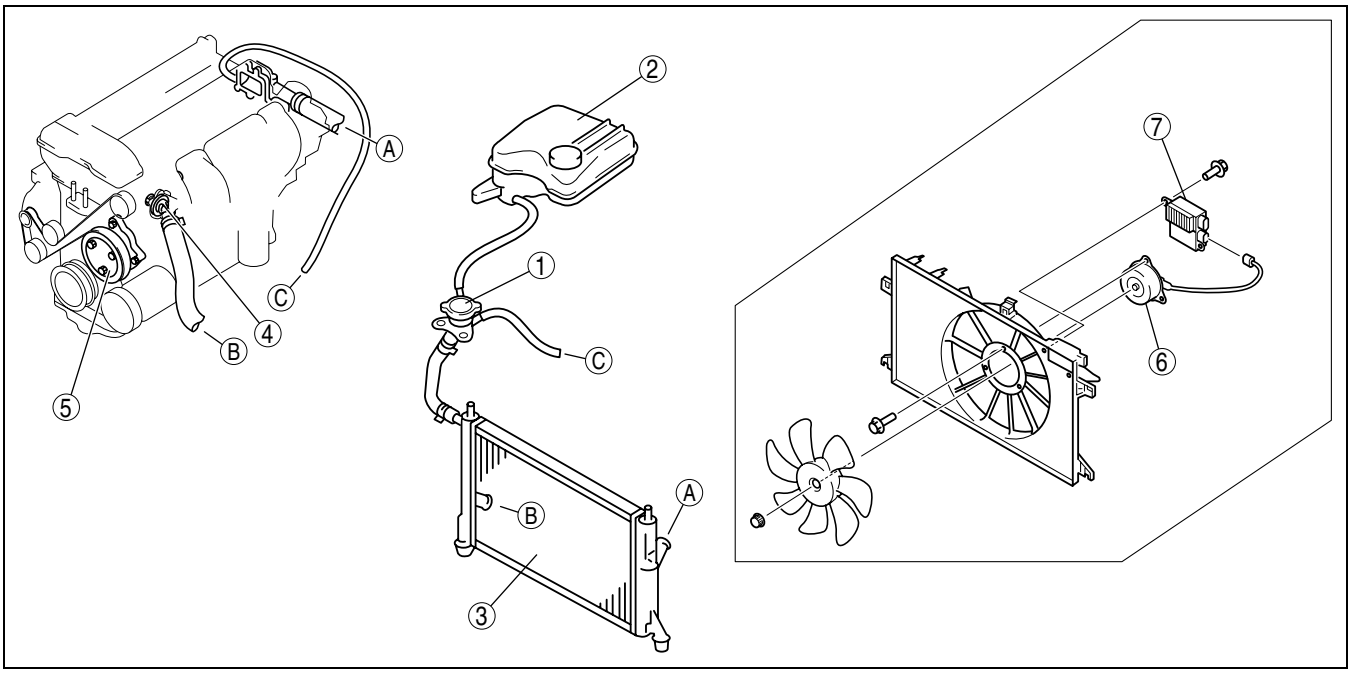
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01–12A COOLING SYSTEM [L8,LF]

COOLING SYSTEM LOCATION INDEX [L8, LF] 01–12A–1
COOLING SYSTEM SERVICE WARNINGS [L8, LF] 01–12A–2
ENGINE COOLANT LEVEL INSPECTION [L8, LF] 01–12A–2
ENGINE COOLANT PROTECTION INSPECTION [L8, LF] 01–12A–2
ENGINE COOLANT REPLACEMENT [L8, LF] 01–12A–3
ENGINE COOLANT LEAKAGE INSPECTION [L8, LF] 01–12A–4
COOLING SYSTEM CAP INSPECTION [L8, LF] 01–12A–5
COOLANT RESERVE TANK REMOVAL/INSTALLATION [L8, LF]. 01–12A–5
RADIATOR REMOVAL/INSTALLATION [L8, LF] 01–12A–6
THERMOSTAT REMOVAL/INSTALLATION [L8, LF] 01–12A–8
THERMOSTAT INSPECTION [L8, LF]. . . 01–12A–8
WATER PUMP REMOVAL/INSTALLATION [L8, LF] 01–12A–9
FAN MOTOR REMOVAL/INSTALLATION [L8, LF] 01–12A–9
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FAN CONTROL MODULE INSPECTION [L8, LF] 01–12A–11

COOLING SYSTEM LOCATION INDEX [L8, LF]

DPE011200000W01



CPJ112ZWB008

1	Cooling system cap (See 01–12A–5 COOLING SYSTEM CAP INSPECTION [L8, LF].)
2	Coolant reserve tank (See 01–12A–5 COOLANT RESERVE TANK REMOVAL/INSTALLATION [L8, LF].)
3	Radiator (See 01–12A–6 RADIATOR REMOVAL/INSTALLATION [L8, LF].)
4	Thermostat (See 01–12A–8 THERMOSTAT REMOVAL/INSTALLATION [L8, LF].) (See 01–12A–8 THERMOSTAT INSPECTION [L8, LF].)
5	Water pump (See 01–12A–9 WATER PUMP REMOVAL/INSTALLATION [L8, LF].)
6	Cooling fan motor (See 01–12A–9 FAN MOTOR REMOVAL/INSTALLATION [L8, LF].) (See 01–12A–11 FAN MOTOR INSPECTION [L8, LF].)
7	Fan control module (See 01–12A–11 FAN CONTROL MODULE INSPECTION [L8, LF].)

COOLING SYSTEM SERVICE WARNINGS [L8, LF]

DPE011200000W02

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.**

ENGINE COOLANT LEVEL INSPECTION [L8, LF]

DPE011215001W01

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. Remove the cooling system cap and verify that the engine coolant is filled close to the top of the cooling system filler neck.
2. Verify that the engine coolant level in the coolant reserve tank is between the L and F marks.
3. If the engine coolant level is below L mark, add engine coolant.

ENGINE COOLANT PROTECTION INSPECTION [L8, LF]

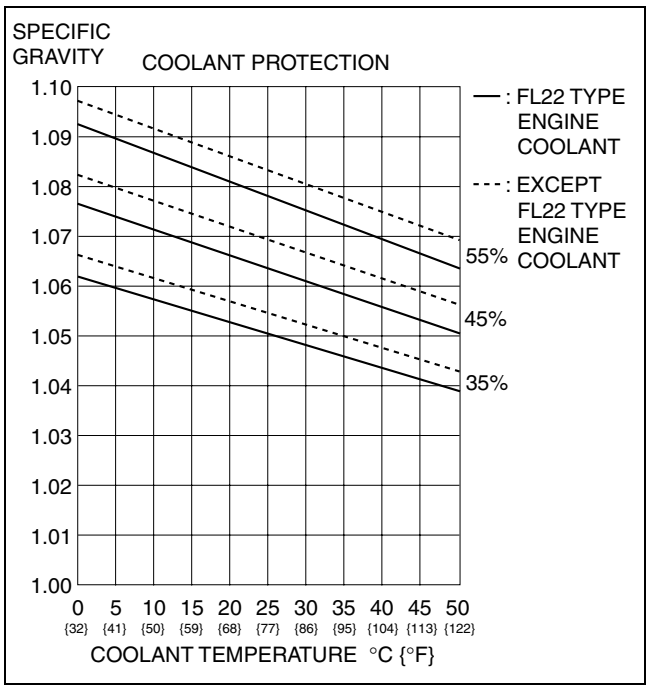
DPE011215001W02

1. Measure the coolant temperature and specific gravity using a thermometer and a hydrometer.

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 and must be protected by an ethylene-glycol-based coolant to prevent corrosion and freezing.**
- **Do not use coolants containing Alcohol, Methanol, Borate or Silicate. These coolants could damage the cooling system.**
- **Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.**
- **Engine coolant damages paint. If engine coolant does get on a painted surface, rinse it off quickly.**

2. Determine the coolant protection level by referring to the graph shown.
   - If the coolant protection level is not correct, add water or coolant.



E6U112ZWB010

ENGINE COOLANT REPLACEMENT [L8, LF]

DPE011215001W03

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.**

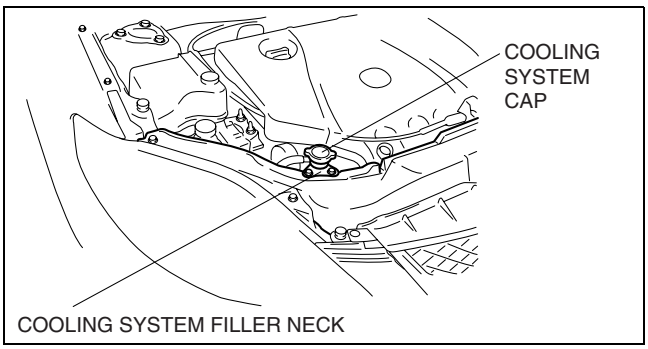
Caution

- **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 and must be protected by an ethylene-glycol-based coolant to prevent corrosion and freezing.**
- **Do not use coolants containing Alcohol, Methanol, Borate or Silicate. These coolants could damage the cooling system.**
- **Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.**
- **Engine coolant damages paint. If engine coolant does get on a painted surface, rinse it off quickly.**

Engine coolant capacity (approx. quantity)
With heater: 7.0 L {7.4 US qt, 6.2 Imp qt}
Without heater: 6.5 L {6.9 US qt, 5.7 Imp qt}

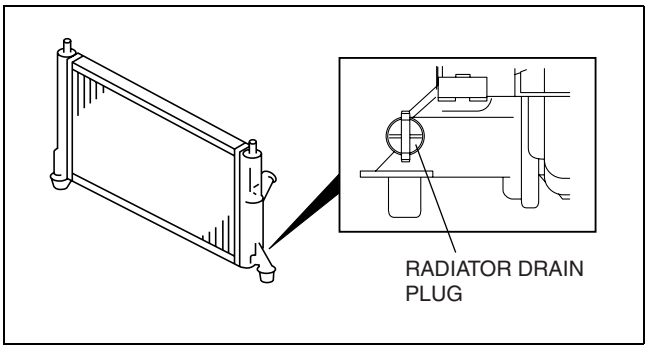
1. Remove the coolant reserve tank with the hose still connected.
2. Remove the coolant reserve tank cap and drain the engine coolant from the coolant reserve tank.

3. Remove the cooling system cap.
4. Remove the battery duct. (See 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)



DPE112AW1009

5. Loosen the radiator drain plug and drain the engine coolant into a container.
6. Flush the cooling system with water until all traces of color are gone.
7. Let the system drain completely.
8. Tighten the radiator drain plug.
9. Referring to the following chart, select the correct volume percentage of the water and coolant.



DPE112AW1002

Antifreeze solution mixture percentage

Engine coolant protection	Volume percentage (%)		Gravity at 20 °C {68 °F}	
	Water	Coolant	FL22 type engine coolant	Except FL22 type engine coolant
Above -16 °C {3 °F}	65	35	1.053	1.057
Above -26 °C {-15 °F}	55	45	1.067	1.072
Above -40 °C {-40 °F}	45	55	1.081	1.086

10. Refill the coolant from the cooling system filler neck until it is close to the top of the cooling system filler neck.
11. Refill the coolant into the coolant reserve tank up to the F mark on the tank.
12. 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.**

13. Start the engine and warm up the engine by idling.
14. After the engine warms up, perform the following steps. At this time, be careful of the coolant temperature to prevent overheating.
    (1) Run the engine at **approx. 2,500 rpm** for **5 min**.
    (2) Run the engine at **approx. 3,000 rpm** for **5 s**, then idle.
    (3) Repeat step (2) 4—5 times.
15. Stop the engine, and inspect the coolant level after the coolant temperature decreases. If it is low, repeat steps 10—14.
16. Inspect for coolant leakage. (See 01–12A–4 ENGINE COOLANT LEAKAGE INSPECTION [L8, LF].)
    - If the coolant leaks, specify the malfunctioning part and repair or replace it.

ENGINE COOLANT LEAKAGE INSPECTION [L8, LF]

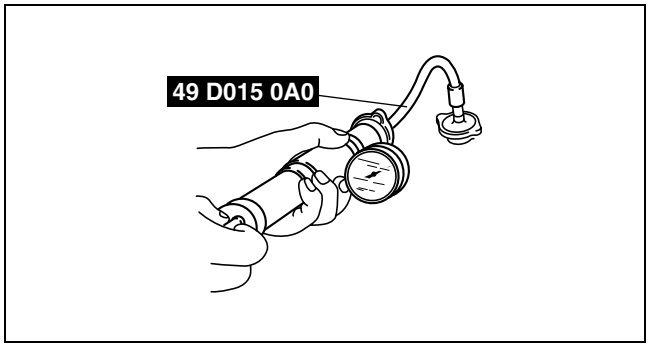
DPE011215001W04

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. (See 01–12A–2 ENGINE COOLANT LEVEL INSPECTION [L8, LF].)
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 cooling system filler neck.
5. Apply pressure using the radiator cap tester.

Caution
- **Applying more than 122.6 kPa {1.25 kgf/cm^2, 17.8 psi} can damage the hoses, fittings, and other components, and cause leakage.**

Pressure
122.6 kPa {1.25 kgf/cm^2, 17.8 psi} [1 min]



DPE112AW1015

6. When pressurizing the cooling system, 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.

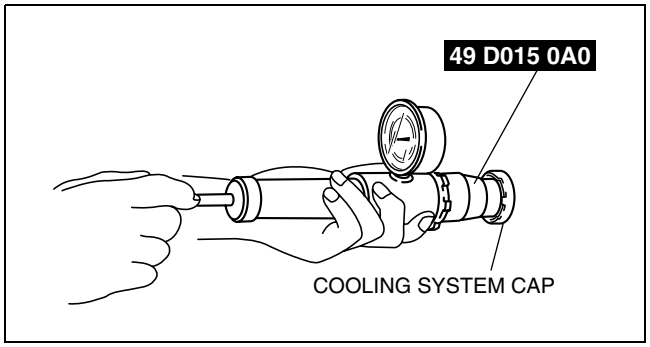
COOLING SYSTEM CAP INSPECTION [L8, LF]

DPE011215201W01

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 for cracks or roll up on the sealed part of the cooling system cap.
   - If there is any malfunction, replace the cooling system cap.
3. Attach the cooling system cap to the **SST** and a radiator cap tester.
4. Hold the cooling system cap downward and apply pressure gradually. Verify that the pressure is held stable for **10 s**.
   - If the pressure is not held stable, replace the cooling system cap.

Cooling system cap valve opening pressure
93.2—122.6 kPa {0.95—1.25 kgf/cm^2, 13.5—17.8 psi}



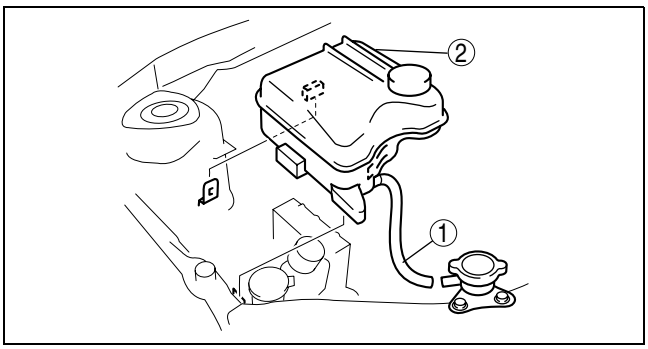
DPE112AW1016

COOLANT RESERVE TANK REMOVAL/INSTALLATION [L8, LF]

DPE011215030W01

Warning
- **Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.**

1. Remove in the order indicated in the table.



CPJ112ZWB001

1	Hose
2	Coolant reserve tank

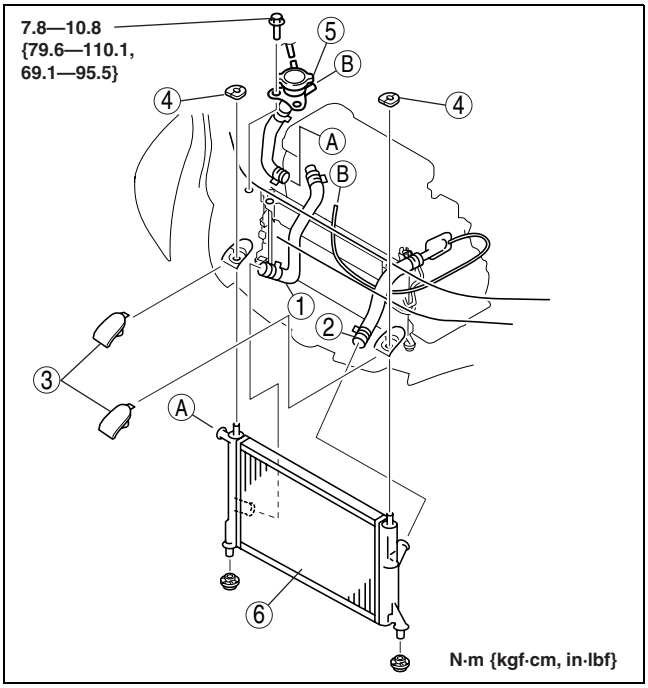
2. Install in the reverse order of removal.

RADIATOR REMOVAL/INSTALLATION [L8, LF]

DPE011215200W01

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 and battery duct. (See 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the under cover.
4. Remove the cooling fan component. (See 01–12A–9 FAN MOTOR REMOVAL/INSTALLATION [L8, LF].)
5. Drain the engine coolant. (See 01–12A–3 ENGINE COOLANT REPLACEMENT [L8, LF].)
6. Remove the air cleaner. (See 01–13–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, LF].)
7. Remove the radiator grille. (With standard bumper) (See 09–16–3 RADIATOR GRILLE REMOVAL/INSTALLATION.)
8. Remove the front bumper. (With sport bumper) (See 09–10–5 FRONT BUMPER REMOVAL/INSTALLATION.)
9. Remove in the order indicated in the table.
10. Install in the reverse order of removal.
11. Refill the engine coolant. (See 01–12A–3 ENGINE COOLANT REPLACEMENT [L8, LF].)
12. Inspect for engine coolant leakage. (See 01–12A–4 ENGINE COOLANT LEAKAGE INSPECTION [L8, LF].)



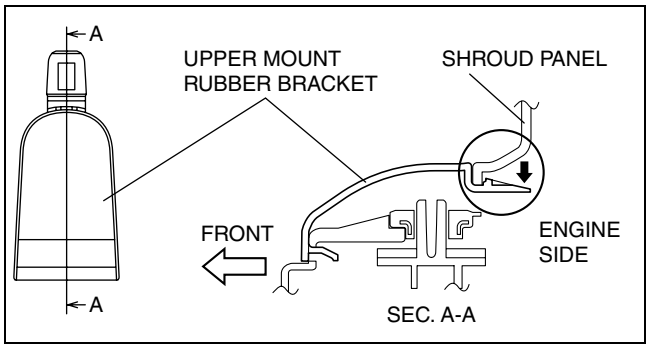
DPE112AW1006

1	Radiator lower hose
2	Radiator upper hose

3	Upper mount rubber bracket (See 01–12A–7 Upper Mount Rubber Bracket Removal Note.)
4	Upper mount rubber
5	Cooling system filler neck
6	Radiator (See 01–12A–7 Radiator Removal Note.) (See 01–12A–8 Radiator Installation Note.)

Upper Mount Rubber Bracket Removal Note

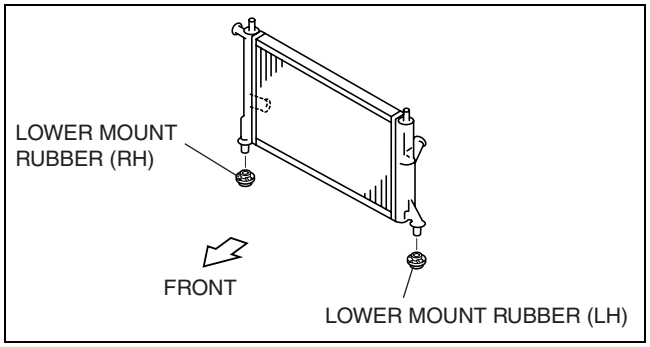
1. Remove the upper mount rubber bracket while pressing down the upper mount rubber bracket tab in the direction of the arrow.



DPE112AW1014

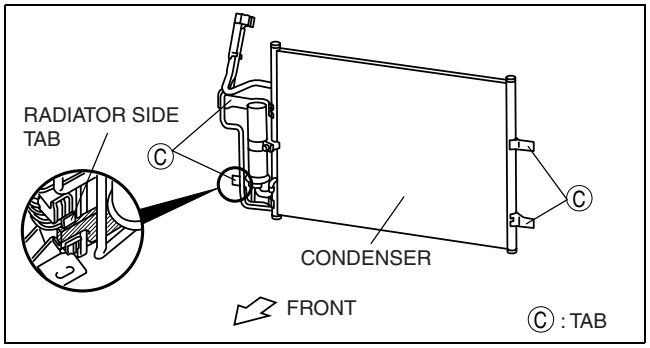
Radiator Removal Note

1. Tilt the radiator to the engine side.
2. While lifting the radiator, remove the lower mount rubber (LH) from the mount installation hole.
3. While lifting the radiator, remove the lower mount rubber (RH) from the mount installation hole.



DPE112AW1013

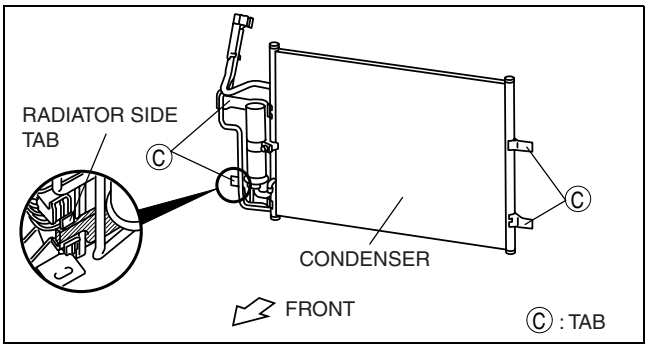
4. Remove the condenser from the radiator with the pipes still connected, by pressing the radiator side tab to unlock the tab C on the condenser.
5. Remove the radiator from below.



DPE112AW1012

Radiator Installation Note

1. Install the condenser to the radiator by aligning lower side tab C with the radiator side tab, install upper tab C, then install lower side tab C.



DPE112AW1012

THERMOSTAT REMOVAL/INSTALLATION [L8, LF]

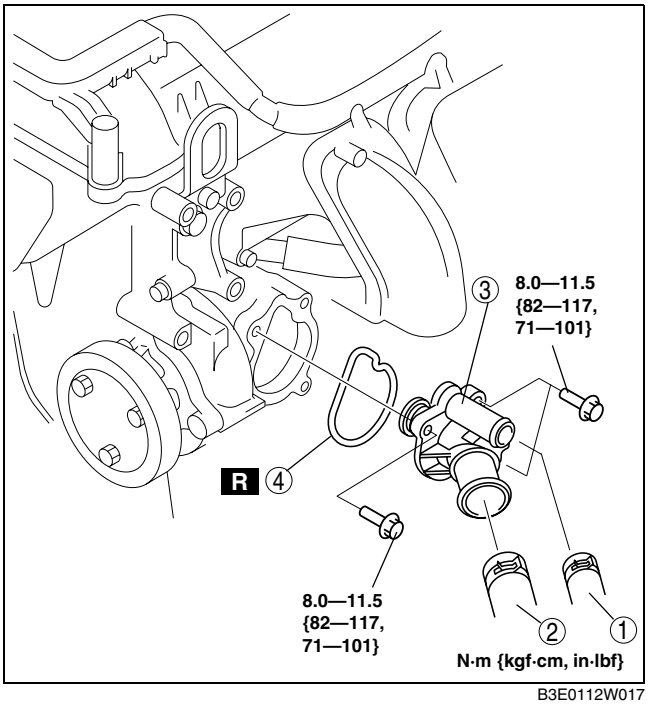
DPE011215171W01

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 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, 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 01–12A–3 ENGINE COOLANT REPLACEMENT [L8, LF].)
5. Position the coolant reserve tank out of the way.
6. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
7. Position the drive belt out of the way. (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, LF].)
8. Remove the drive belt tensioner. (See 01–10A–11 TIMING CHAIN REMOVAL/INSTALLATION [L8, LF].)
9. Remove in the order indicated in the table.
10. Install in the reverse order of removal.
11. Refill the engine coolant. (See 01–12A–3 ENGINE COOLANT REPLACEMENT [L8, LF].)
12. Inspect for the engine coolant leakage. (See 01–12A–4 ENGINE COOLANT LEAKAGE INSPECTION [L8, LF].)

1	Bypass hose
2	Lower radiator hose
3	Thermostat component
4	Gasket



B3E0112W017

THERMOSTAT INSPECTION [L8, LF]

DPE011215171W02

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.

Thermostat initial-opening temperature
80—84 °C {176—183 °F}

Thermostat full-open temperature
97 °C {207 °F}

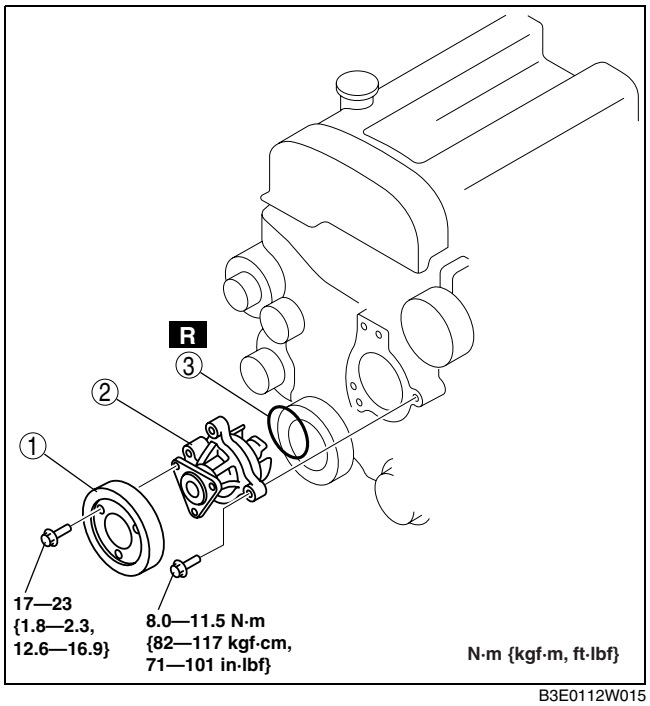
Thermostat full-open lift
More than 8.0 mm {0.31 in}

WATER PUMP REMOVAL/INSTALLATION [L8, LF]

DPE011215010W01

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 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, 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 01–12A–3 ENGINE COOLANT REPLACEMENT [L8, LF].)
5. Position the coolant reserve tank out of the way.
6. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
7. Loosen the water pump pulley bolt and position the drive belt out of the way. (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, LF].)
8. Remove in the order indicated in the table.
9. Install in the reverse order of removal.
10. Refill the engine coolant. (See 01–12A–3 ENGINE COOLANT REPLACEMENT [L8, LF].)
11. Inspect for engine coolant leakage. (See 01–12A–4 ENGINE COOLANT LEAKAGE INSPECTION [L8, LF].)



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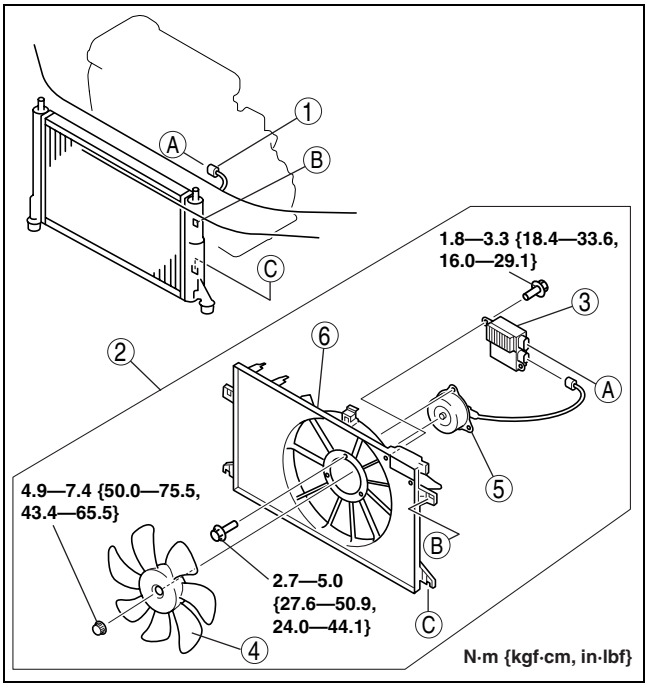
1	Water pump pulley
2	Water pump
3	O-ring

FAN MOTOR REMOVAL/INSTALLATION [L8, LF]

DPE011215025W01

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 and battery duct. (See 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the under cover.
4. Remove in the order indicated in the table.



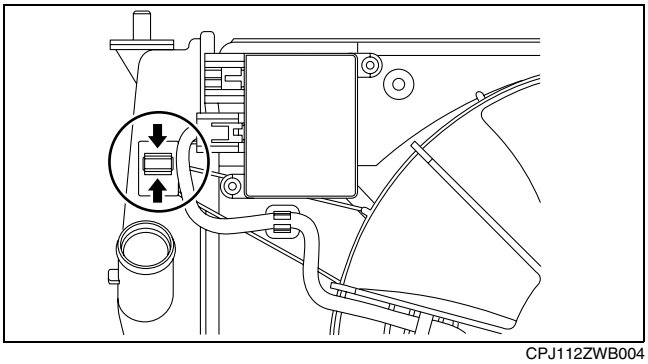
DPE112AW1003

1	Fan control module connector
2	Cooling fan component (See 01–12A–10 Cooling Fan Component Removal Note.) (See 01–12A–11 Cooling Fan Component Installation Note.)
3	Fan control module
4	Cooling fan
5	Cooling fan motor
6	Radiator cowling

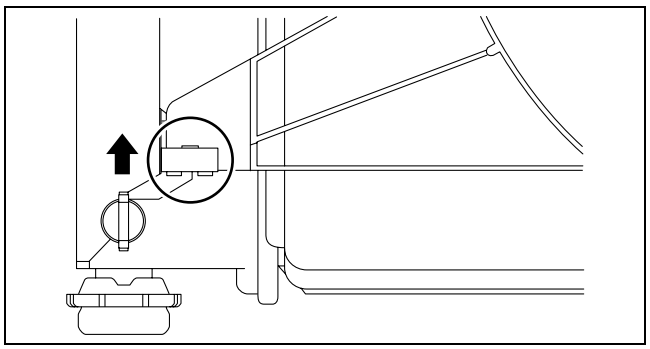
5. Install in the reverse order of removal.

Cooling Fan Component Removal Note

1. Release the left and right tabs on the upper side of the radiator by pressing them in the direction shown in the figure.


CPJ112ZWB004

2. Lift the cooling fan component to remove it from the left and right insertion areas on the lower side of the radiator.
3. Remove the cooling fan component from below.



CPJ112ZWB005

Cooling Fan Component Installation Note

1. Insert the cooling fan component in the left and right insertion areas on the lower side of the radiator, and then attach the left and right tabs on the upper side of the radiator.

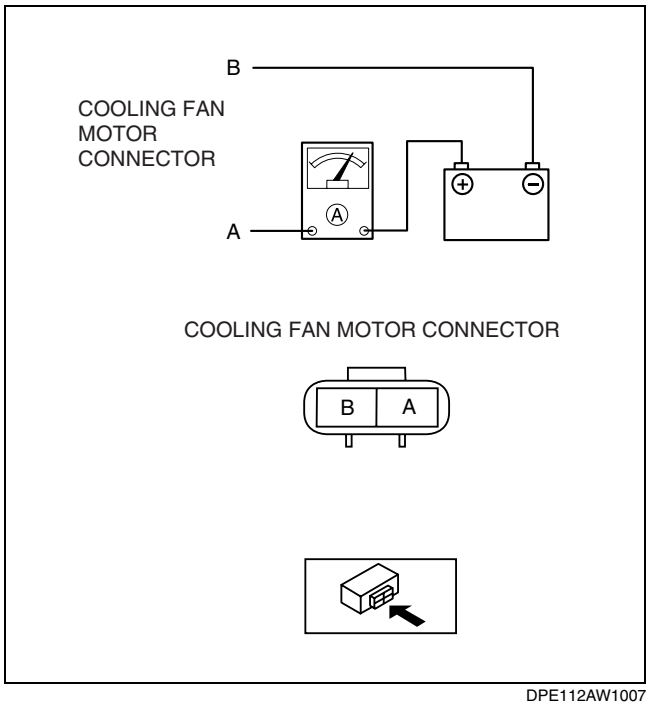
FAN MOTOR INSPECTION [L8, LF]

DPE011215025W02

Part inspection

1. Verify that the battery is fully charged.
2. Install a tester and battery to the cooling fan motor connector (2 terminals) as shown in the figure.
3. Verify that fan motor operates smoothly at the standard current.
   - If there is any malfunction, replace the applicable part.

Cooling fan motor current
17—23 A



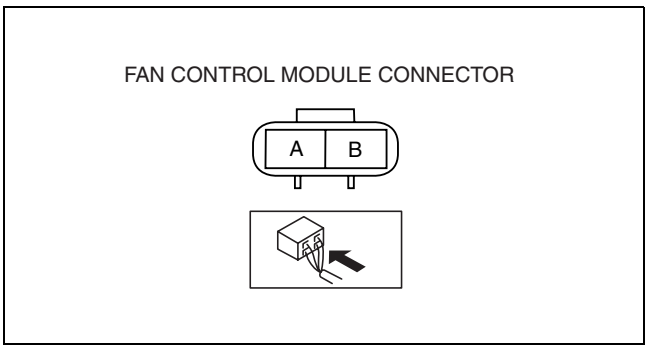
DPE112AW1007

FAN CONTROL MODULE INSPECTION [L8, LF]

DPE011215150W01

1. Start and warm up the engine.
2. Monitor the engine coolant temperature with the WDS or the equivalent.

3. Measure the voltage at terminal A of the fan control module connector (2 terminals) from the harness side as shown in the table.



DPE112AW1011

Inspection			Result
Condition	A/C	Engine coolant temp.	
IG SW ON	OFF	95 °C {203 °F} or less	B+ (Fan stops.)
IG SW ON (Idling)	OFF	95 °C {203 °F} or less	B+ (Fan stops.)
IG SW ON (Idling)	ON*	95 °C {203 °F} or less	8.9—10.3 V
IG SW ON (Idling)	OFF	100 °C {212 °F} or more	4.1—14.6 V

* : Refrigerant pressure switch (middle) is on.

- If not within the specification, inspect the input signals from the following parts.
  - — Crankshaft Position (CKP) sensor
  - — Engine Coolant Temperature (ECT) sensor
  - — Throttle Position (TP) sensor
  - — Refrigerant pressure switch (middle)

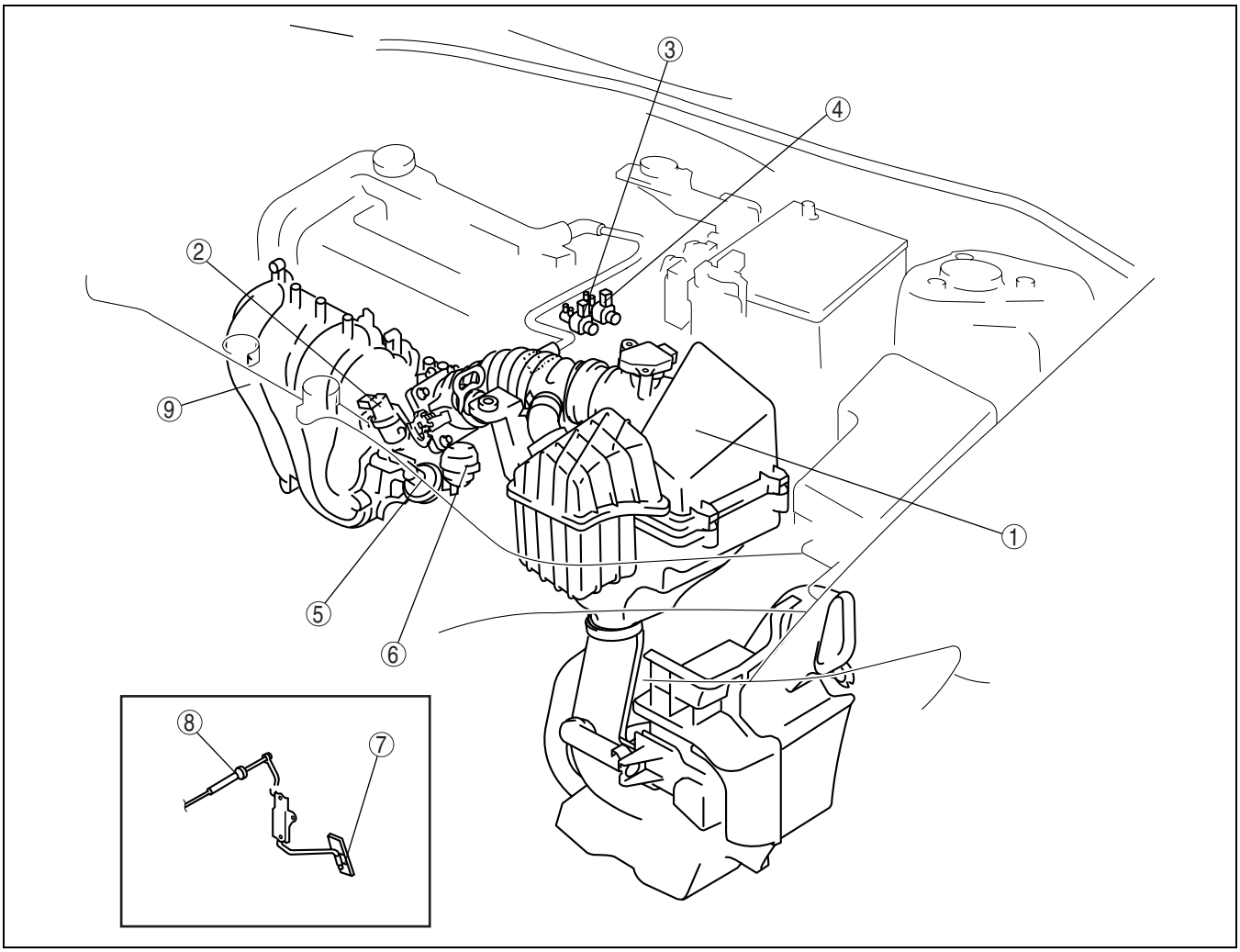
4. If all the above parts are normal, replace the fan control module.

01–13A INTAKE-AIR SYSTEM [L8, LF]

INTAKE AIR SYSTEM LOCATION INDEX [L8, LF] 01–13A–1
INTAKE AIR SYSTEM DIAGRAM [L8, LF] 01–13A–2
INTAKE AIR SYSTEM HOSE ROUTING DIAGRAM [L8, LF] 01–13A–3
INTAKE AIR SYSTEM MANIFOLD VACUUM INSPECTION [L8, LF] 01–13A–3
INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, LF] 01–13A–4
AIR CLEANER ELEMENT INSPECTION [L8, LF] 01–13A–6
IDLE AIR CONTROL (IAC) VALVE INSPECTION [L8, LF] 01–13A–6
VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [LF] 01–13A–7
VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [LF] 01–13A–8
VARIABLE TUMBLE SOLENOID VALVE INSPECTION [L8, LF] 01–13A–9
VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [L8, LF] 01–13A–10
ACCELERATOR PEDAL REMOVAL/INSTALLATION [L8, LF] 01–13A–10
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BEFORE SERVICE PRECAUTION [L8, LF] 01–13A–10

INTAKE AIR SYSTEM LOCATION INDEX [L8, LF]

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DPE0113ZW200

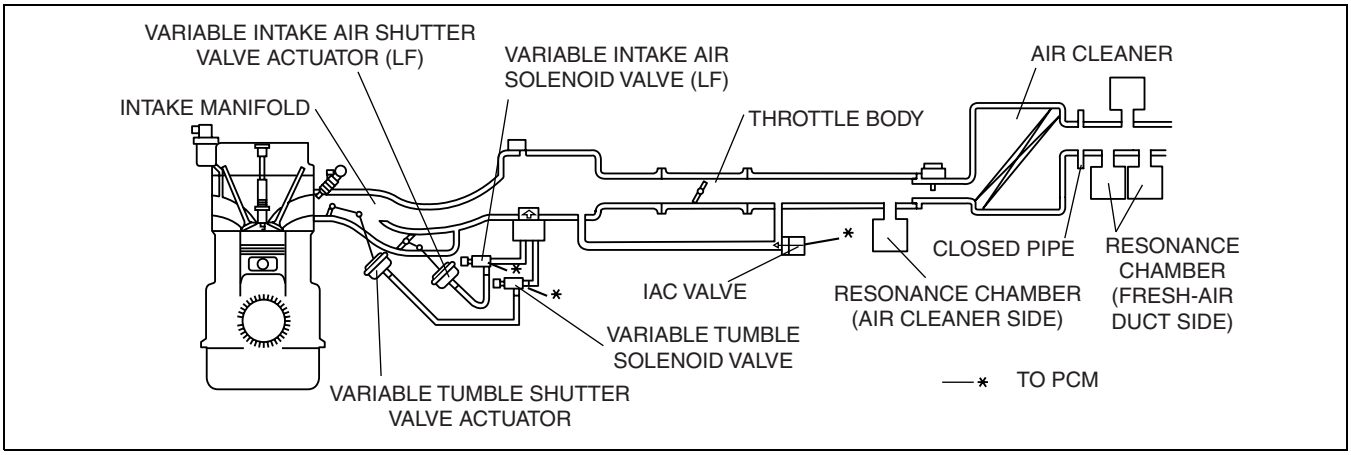
1	Air cleaner (See 01–13A–6 AIR CLEANER ELEMENT INSPECTION [L8, LF].)
2	IAC valve (See 01–13A–6 IDLE AIR CONTROL (IAC) VALVE INSPECTION [L8, LF].)

3	Variable intake air solenoid valve (LF) (See 01–13A–7 VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [LF].)
4	Variable tumble solenoid valve (See 01–13A–9 VARIABLE TUMBLE SOLENOID VALVE INSPECTION [L8, LF].)

5	Variable intake air shutter valve actuator (LF) (See 01–13A–8 VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [LF].)
6	Variable tumble shutter valve actuator (See 01–13A–10 VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [L8, LF].)
7	Accelerator pedal (See 01–13A–10 ACCELERATOR PEDAL REMOVAL/INSTALLATION [L8, LF].)
8	Accelerator cable (See 01–13A–10 ACCELERATOR CABLE INSPECTION/ADJUSTMENT [L8, LF].)
9	Intake manifold (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/ INSTALLATION [L8, LF].)

INTAKE AIR SYSTEM DIAGRAM [L8, LF]

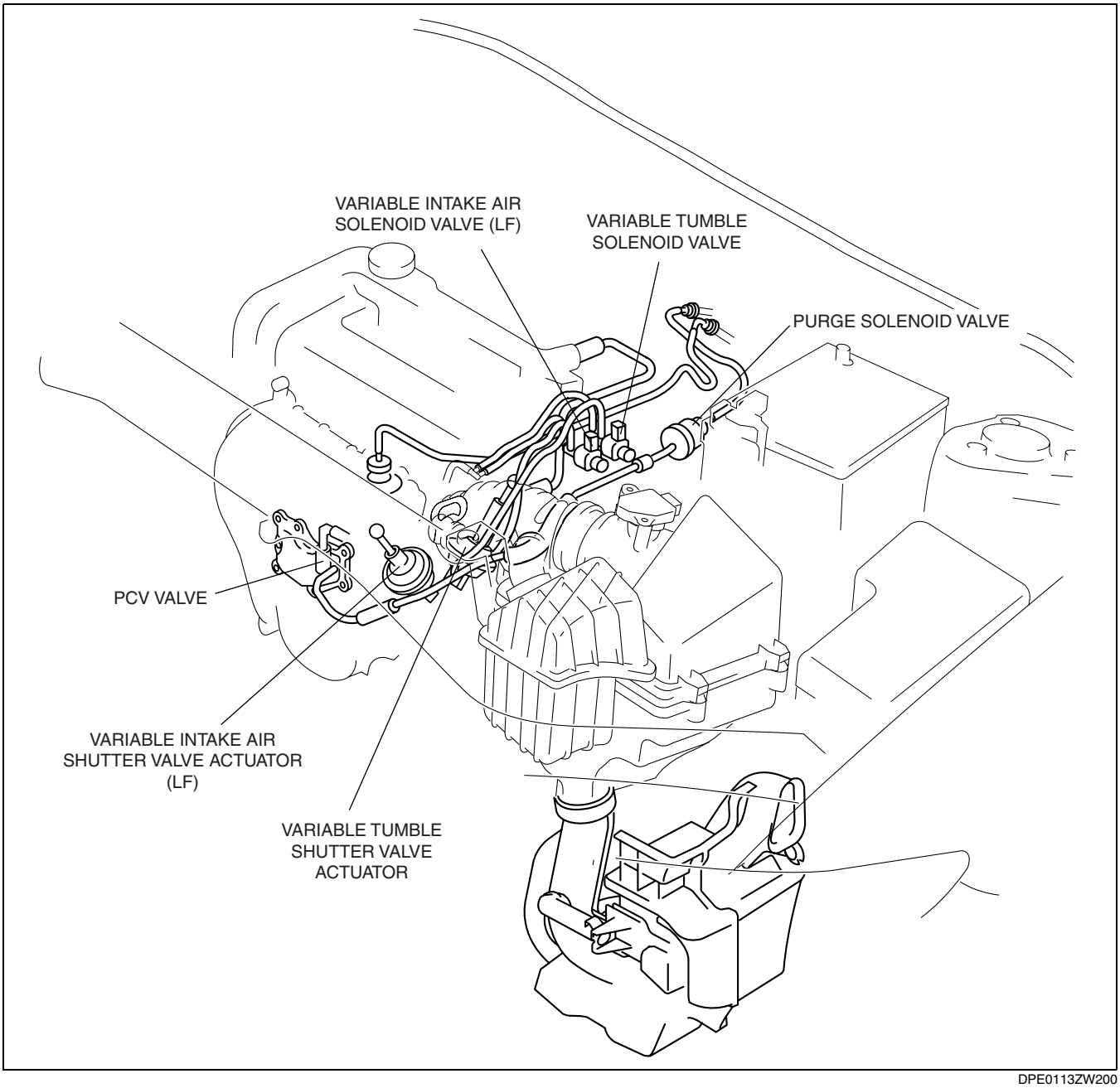
DPE011300000W02



DPE0113ZW200

INTAKE AIR SYSTEM HOSE ROUTING DIAGRAM [L8, LF]

DPE011300000W03



DPE0113ZW200

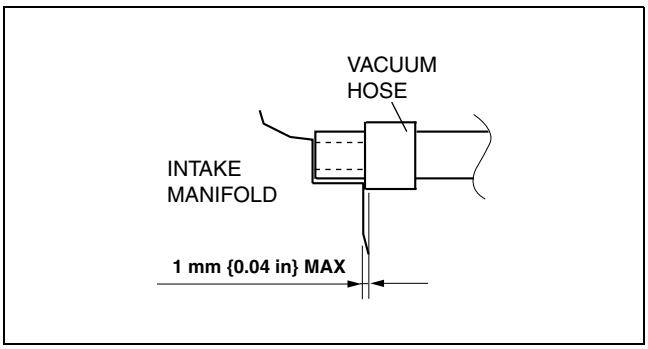
INTAKE AIR SYSTEM MANIFOLD VACUUM INSPECTION [L8, LF]

DPE011300000W04

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 01–10A–10 COMPRESSION INSPECTION [L8, LF].)
     — Air suction (throttle body, fuel injector, PCV valve, intake manifold)

Standard
MTX: -60.0 kPa {-451 mmHg, -17.8 inHg} or more
ATX: -55.0 kPa {-413 mmHg, -16.3 inHg} or more

5. After measuring the intake manifold vacuum, install the vacuum hose to the intake manifold as shown in the figure.



B3E0113W124

INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, LF]

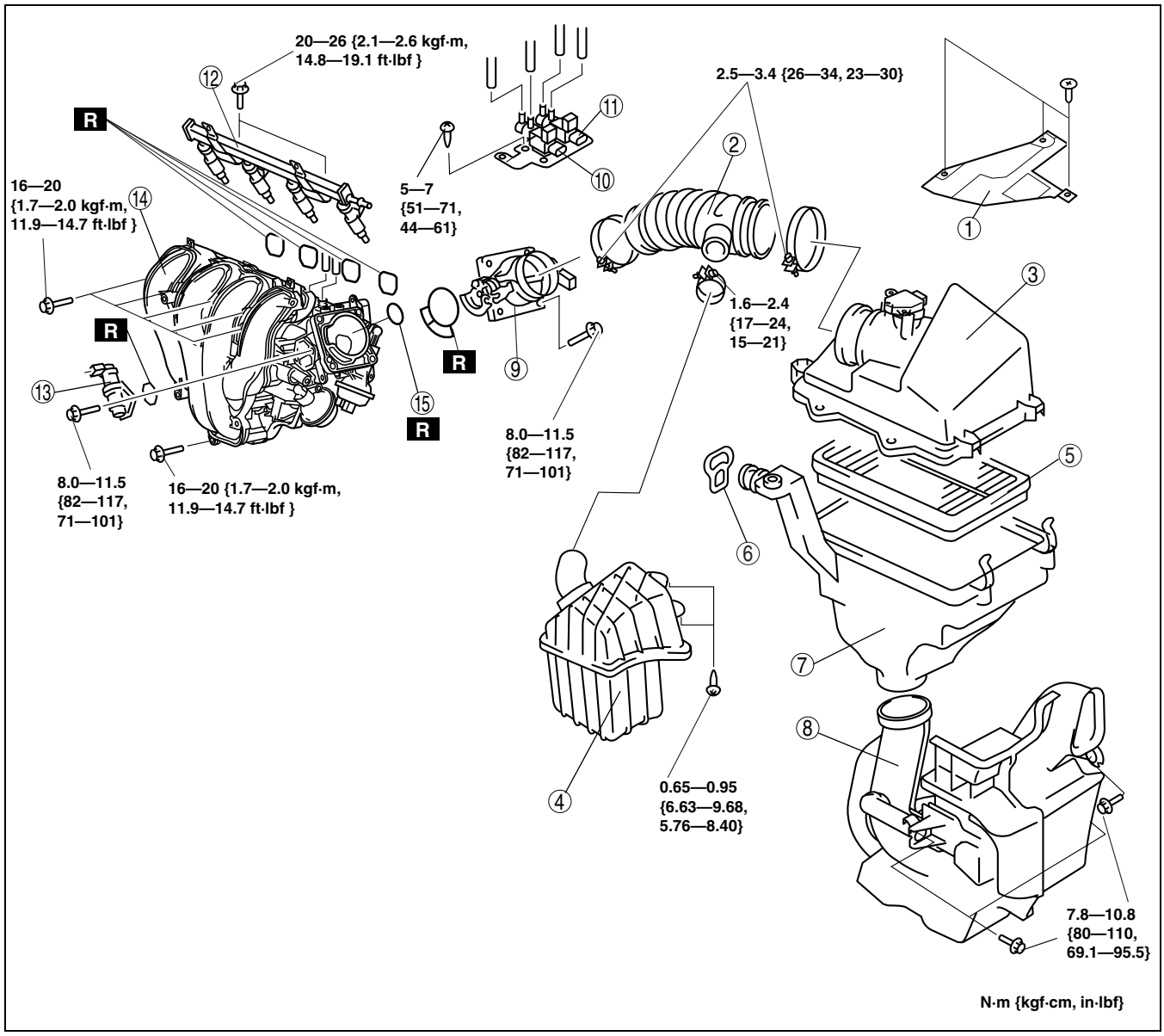
DPE011300000W05

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 01–14–3 BEFORE SERVICE PRECAUTION [L8, LF].)**

1. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
2. Remove the battery cover and battery duct. (See 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, 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 01–14–3 AFTER SERVICE PRECAUTION [L8, LF].)



DPE0113ZW200

1	Intake air cover
2	Air hose (See 01–13A–6 Air Hose Installation Note.)
3	Air cleaner cover
4	Resonance chamber (Air cleaner side)
5	Air cleaner element
6	Strap (See 01–13A–6 Strap Installation Note.)
7	Air cleaner case (See 01–13A–6 Air Cleaner Case Installation Note.)
8	Fresh-air duct (See 01–13A–5 Fresh-air Duct Removal Note.)

9	Throttle body
10	Variable intake air solenoid valve (LF)
11	Variable tumble solenoid valve
12	Fuel distributor (See 01–14–14 FUEL INJECTOR REMOVAL/ INSTALLATION [L8, LF].)
13	IAC valve
14	Intake manifold (See 01–13A–5 Intake Manifold Removal Note.)
15	EGR pipe gasket

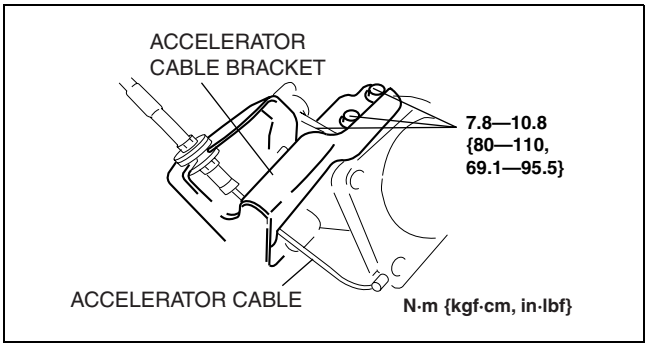
Fresh-air Duct Removal Note

1. Remove the front bumper before removing the fresh-air duct. (See 09–10–5 FRONT BUMPER REMOVAL/ INSTALLATION.)

Intake Manifold Removal Note

1. Remove the dipstick pipe. (See 01–11A–5 OIL PAN REMOVAL/INSTALLATION [L8, LF].)

2. Remove the accelerator cable bracket from the intake manifold.



B3E0113W213

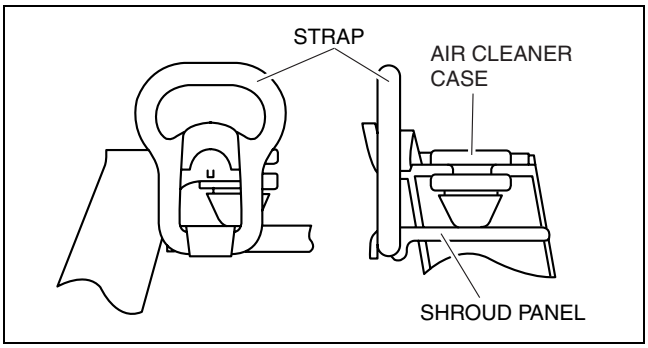
Air Cleaner Case Installation Note

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

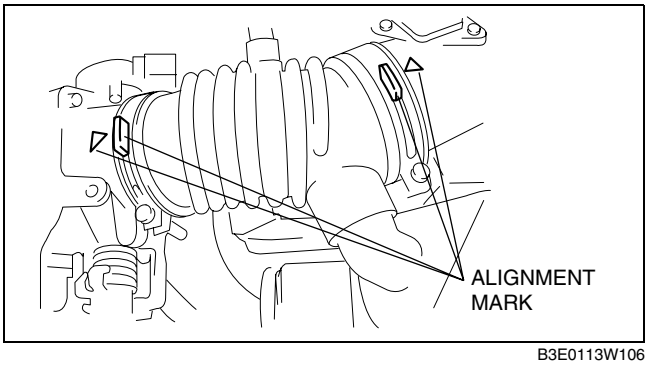
1. Using the strap, secure the shroud panel and the air cleaner case as shown in the figure.



B3E0113W105

Air Hose Installation Note

1. Align the alignment marks on the throttle body and the air hose.



B3E0113W106

AIR CLEANER ELEMENT INSPECTION [L8, LF]

DPE011313300W01

1. Remove the air cleaner element. (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, 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 [L8, LF]

DPE011320661W01

Note

- Perform the following inspection only when directed.

Operation Test

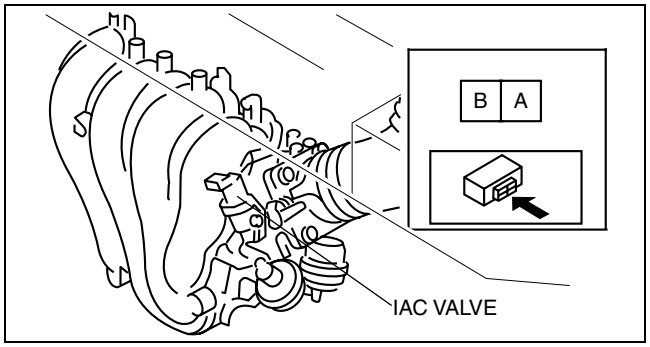
1. Carry out the “Idle Air Control Inspection”. (See 01–03A–58 Idle Air Control System Inspection.)
   - If not as specified, perform the further inspection for the IAC valve.

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 01–13A–4 INTAKE AIR SYSTEM REMOVAL/ INSTALLATION [L8, LF].)
   - If as specified but the Operation Test is failed, carry out the “Circuit Open/Short Inspection”.

Specification

Ambient temperature (°C {°F})	Resistance (ohm)
23 {73}	8.8—10.6



B3E0113W107

Circuit Open/Short Inspection

1. Disconnect the PCM connector. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Inspect the following wiring harnesses for an 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 ground
  - — IAC valve terminal B and power supply
  - — IAC valve terminal B and ground

VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [LF]

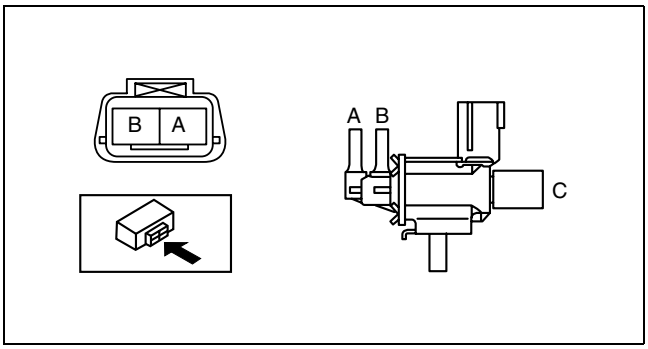
DPE011318740W01

1. Remove the variable intake air solenoid valve. (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/ INSTALLATION [L8, 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		Port		
	A	B	A	B	C
1					
2	B+	GND			

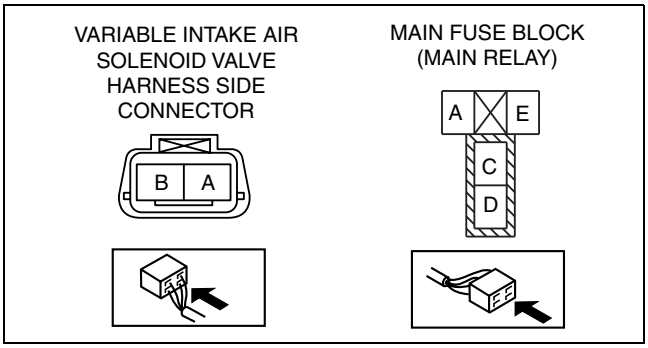
B3E0113W121



B3E0113W125

Circuit Open/Short Inspection

1. Disconnect the PCM connector. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Inspect the following wiring harness for an open or short (continuity check).



DPE113AW9901

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 C

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 ground
  - — Variable intake air solenoid valve terminal A and power supply

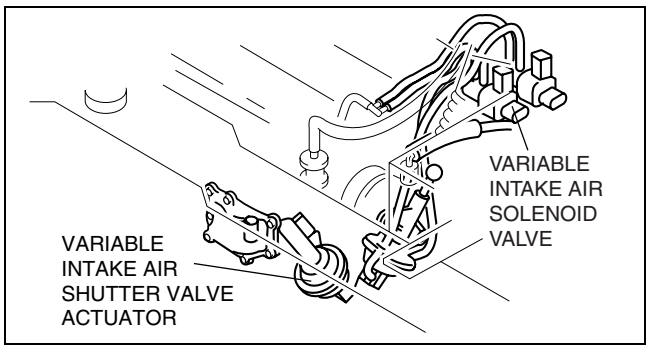
VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [LF]

DPE011320132W01

1. Remove the air hose. (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, 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



DPE0113ZW200

VARIABLE TUMBLE SOLENOID VALVE INSPECTION [L8, LF]

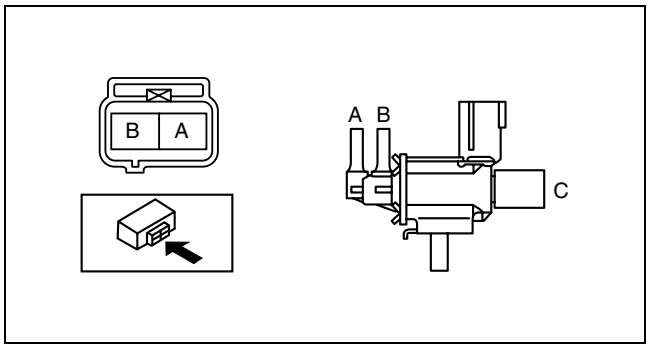
DPE011318745W01

1. Remove the variable tumble solenoid valve. (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, 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”.

: Airflow

Step	Terminal		Port		
	A	B	A	B	C
1				○—○	
2	B+	GND	○—○		

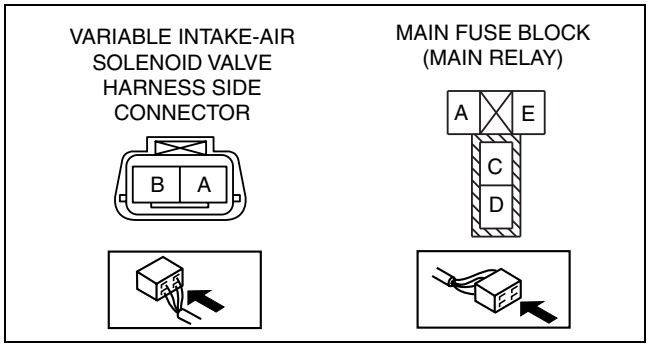
B3E0113W121



B3E0113W120

Circuit Open/Short Inspection

1. Disconnect the PCM connector. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Inspect the following wiring harness for an open or short (continuity check).



DPE113AW2801

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 C

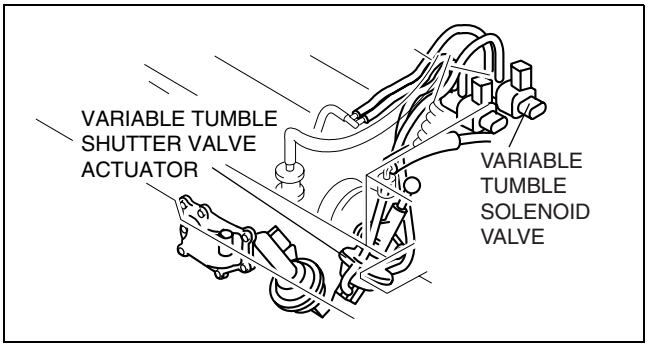
Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the wiring harness.
  — Variable tumble solenoid valve terminal A and body ground
  — Variable tumble solenoid valve terminal B and power supply

VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [L8, LF]

DPE011320135W01

1. Remove the air hose. (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, 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 operation
Above –33.4 {–251, –9.89 }	Fully pulled



B3E0113W111

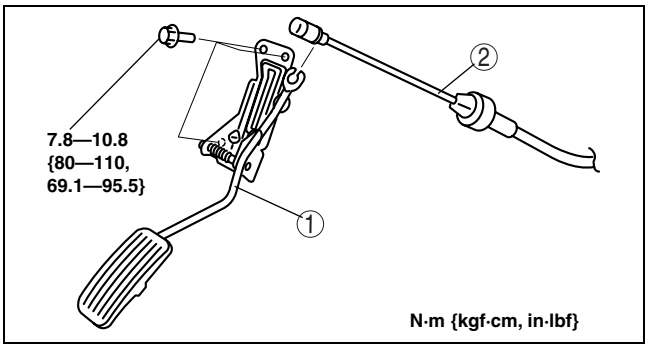
ACCELERATOR PEDAL REMOVAL/INSTALLATION [L8, LF]

DPE011341600W01

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 01–13A–10 ACCELERATOR CABLE INSPECTION/ ADJUSTMENT [L8, LF].)



B3E0113W112

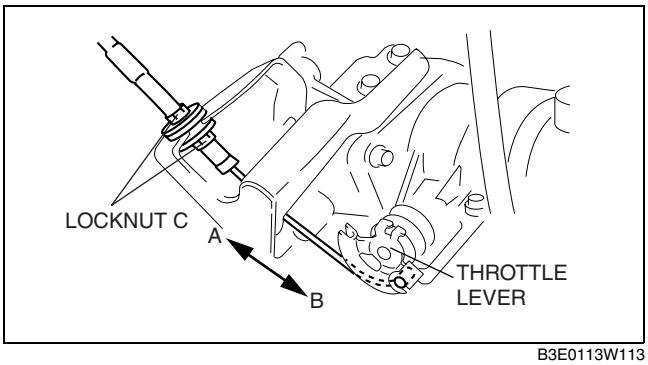
ACCELERATOR CABLE INSPECTION/ADJUSTMENT [L8, LF]

DPE011341660W01

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}



B3E0113W113

BEFORE SERVICE PRECAUTION [L8, LF]

DPE011341660W02

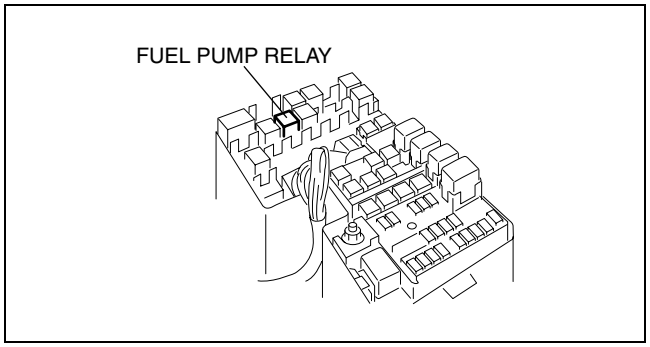
Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also 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.



DPE0113ZW200

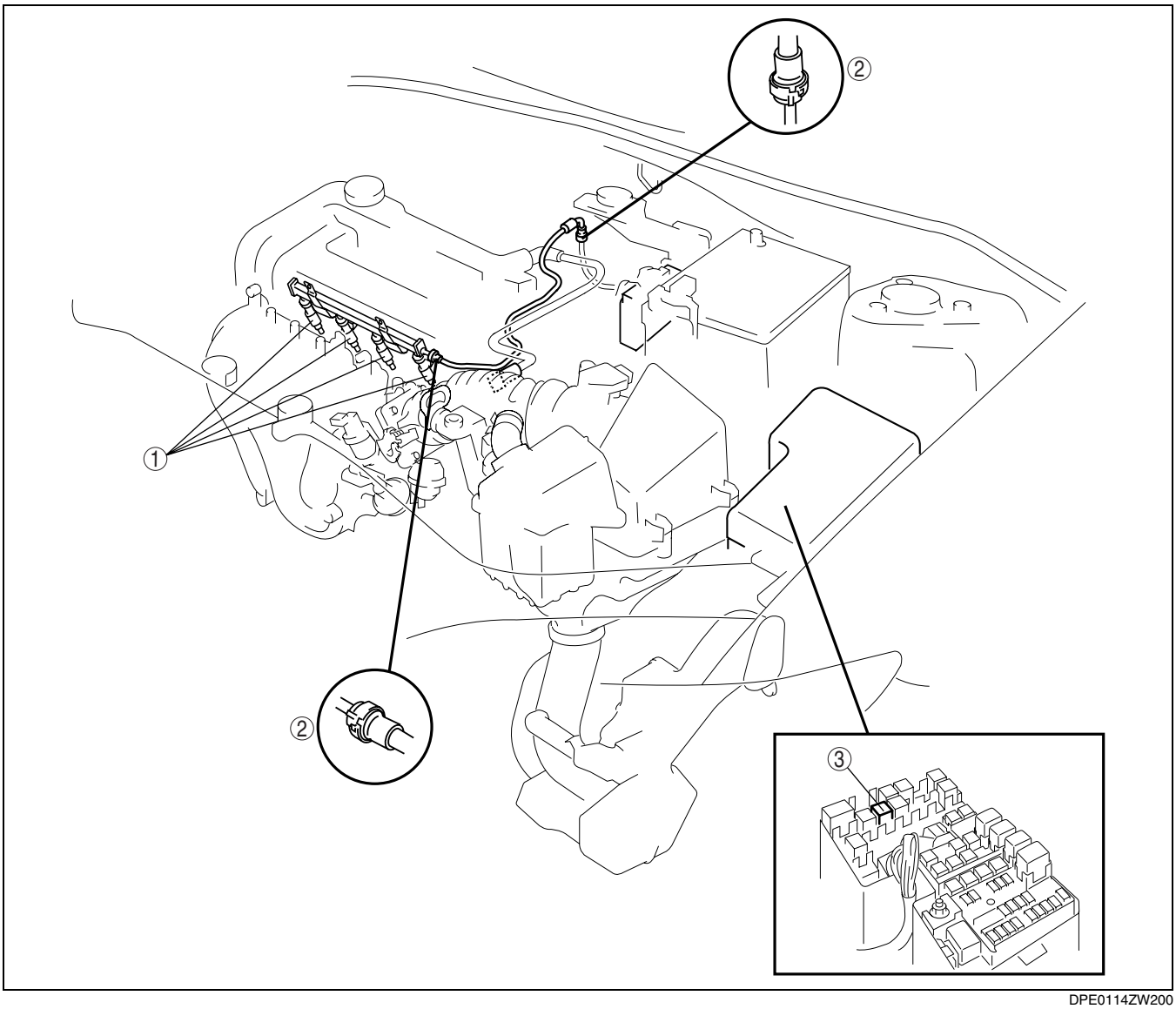
01–14A FUEL SYSTEM [L8, LF]

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AFTER SERVICE PRECAUTION [L8, LF] 01–14A–3
FUEL LINE PRESSURE INSPECTION [L8, LF] 01–14A–4
FUEL TANK REMOVAL/INSTALLATION [L8, LF] 01–14A–5
FUEL TANK INSPECTION [L8, LF] 01–14A–7
NONRETURN VALVE INSPECTION [L8, LF] 01–14A–8
FUEL PUMP UNIT REMOVAL/INSTALLATION [L8, LF] 01–14A–8
FUEL PUMP UNIT DISASSEMBLY/ASSEMBLY [L8, LF] 01–14A–9
FUEL PUMP UNIT INSPECTION [L8, LF] 01–14A–10
QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION [L8, LF]. 01–14A–11
FUEL INJECTOR REMOVAL/INSTALLATION [L8, LF] 01–14A–14
FUEL INJECTOR INSPECTION [L8, LF] 01–14A–16

FUEL SYSTEM LOCATION INDEX [L8, LF]

DPE011400000W01

Engine Compartment Side

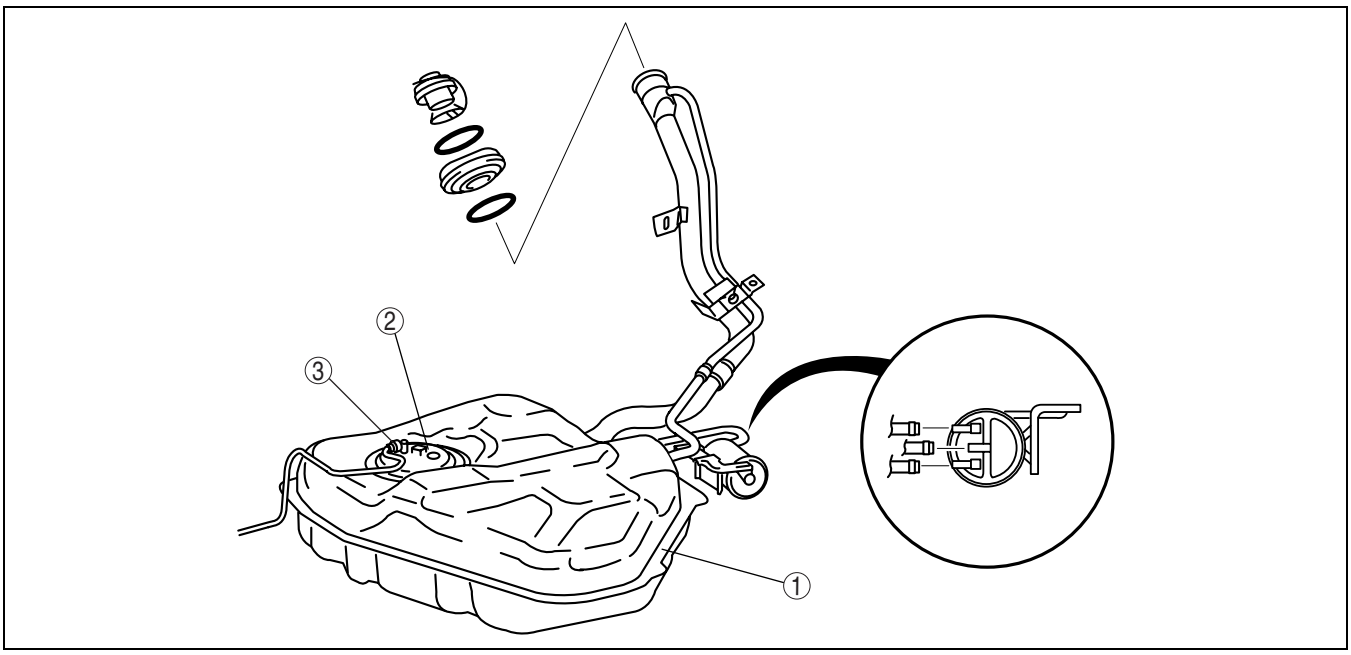


DPE0114ZW200

1	Fuel injector
2	Quick release connector (See 01–14A–11 QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION [L8, LF].)

3	Fuel pump relay

Fuel Tank Side



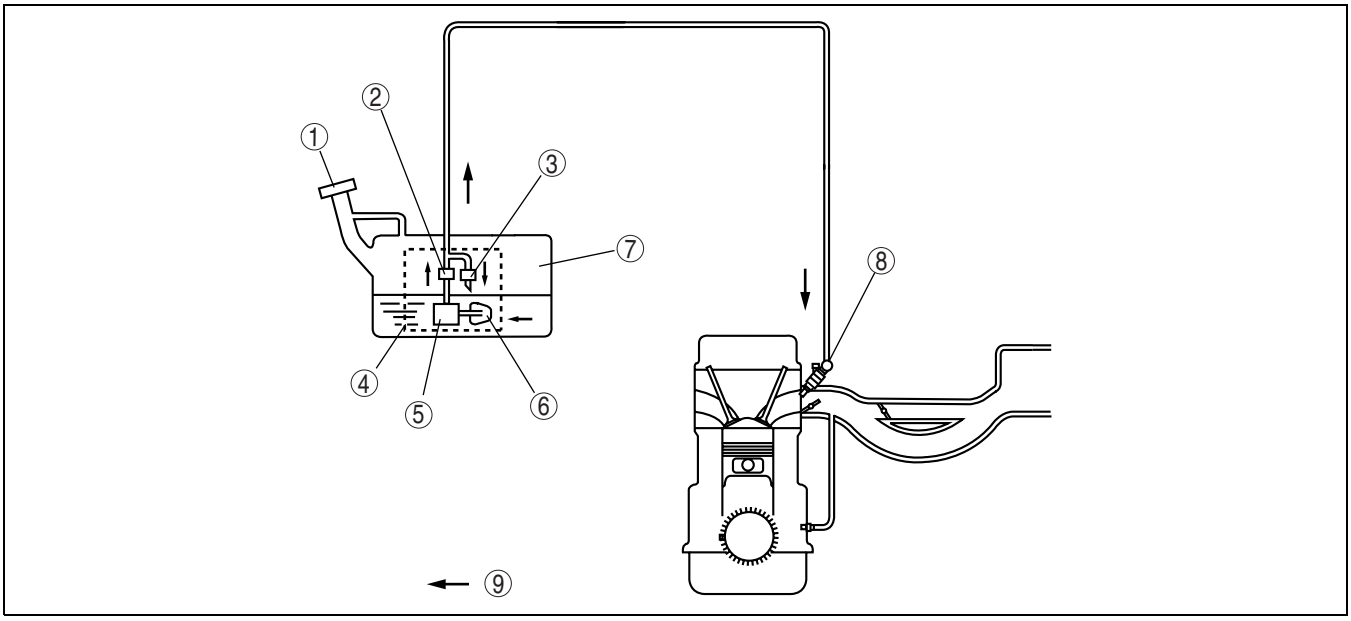
DPE0114ZW200

1	Fuel tank (See 01–14A–5 FUEL TANK REMOVAL/ INSTALLATION [L8, LF].)
2	Fuel pump unit (See 01–14A–8 FUEL PUMP UNIT REMOVAL/ INSTALLATION [L8, LF].)

3	Quick release connector (See 01–14A–11 QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION [L8, LF].)

FUEL SYSTEM FLOW DIAGRAM [L8, LF]

DPE011400000W02



B3E0114T004

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 [L8, LF]

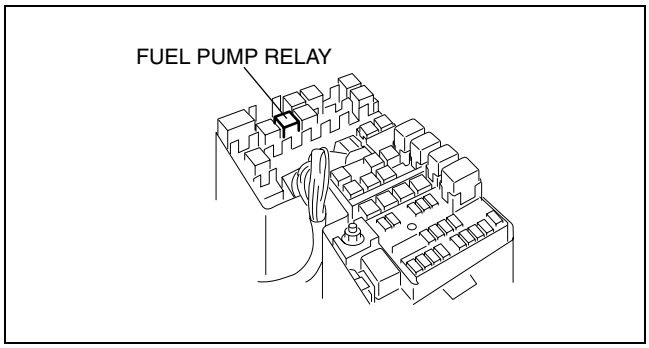
DPE011400000W03

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.



DPE0113ZW200

AFTER SERVICE PRECAUTION [L8, LF]

DPE011400000W04

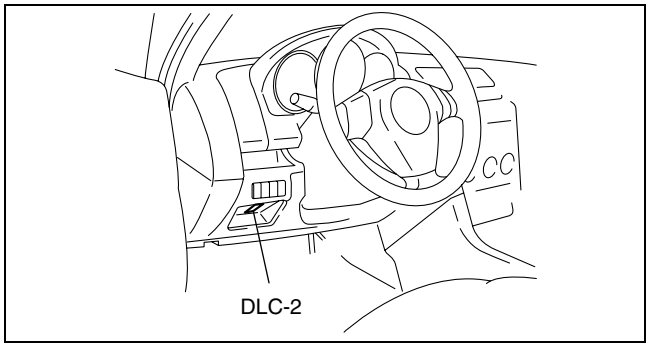
Warning
- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Inspection".**

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.



DPE102ZW2001

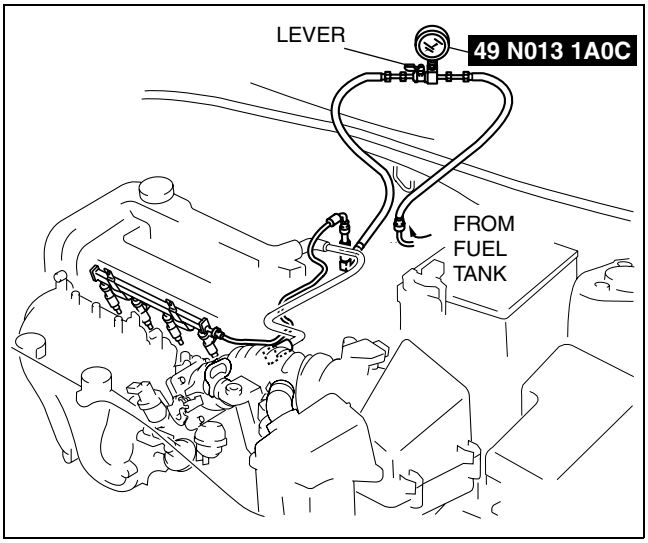
5. After reinstallation, repeat step 2—3 in the fuel leakage inspection.

FUEL LINE PRESSURE INSPECTION [L8, LF]

DPE011400000W05

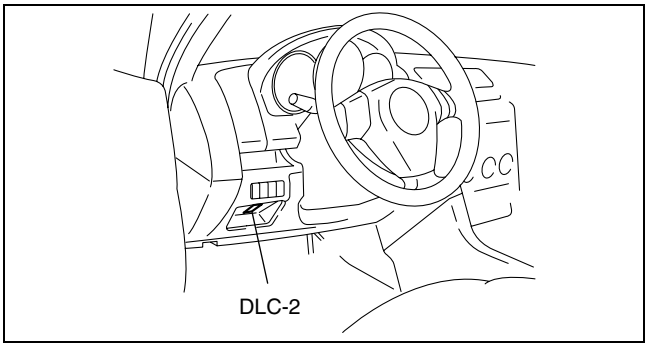
Warning
- **Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. To prevent this, complete the following inspection with the engine stopped.**

1. Follow “BEFORE SERVICE PRECAUTION” before performing any work operations to prevent fuel from spilling from the fuel system. (See 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)
2. Disconnect the negative battery cable.
3. Disconnect the quick release connector (in the engine compartment). (See 01–14A–11 QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION [L8, LF].)
4. Turn the lever of the **SST** parallel to the hose as shown in the figure.
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.



DPE0114ZW200

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



DPE102ZW2001

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 01–14A–11 QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION [L8, LF].)
17. Inspect all related parts by performing “AFTER SERVICE PRECAUTION”. (See 01–14A–3 AFTER SERVICE PRECAUTION [L8, LF].)

FUEL TANK REMOVAL/INSTALLATION [L8, LF]

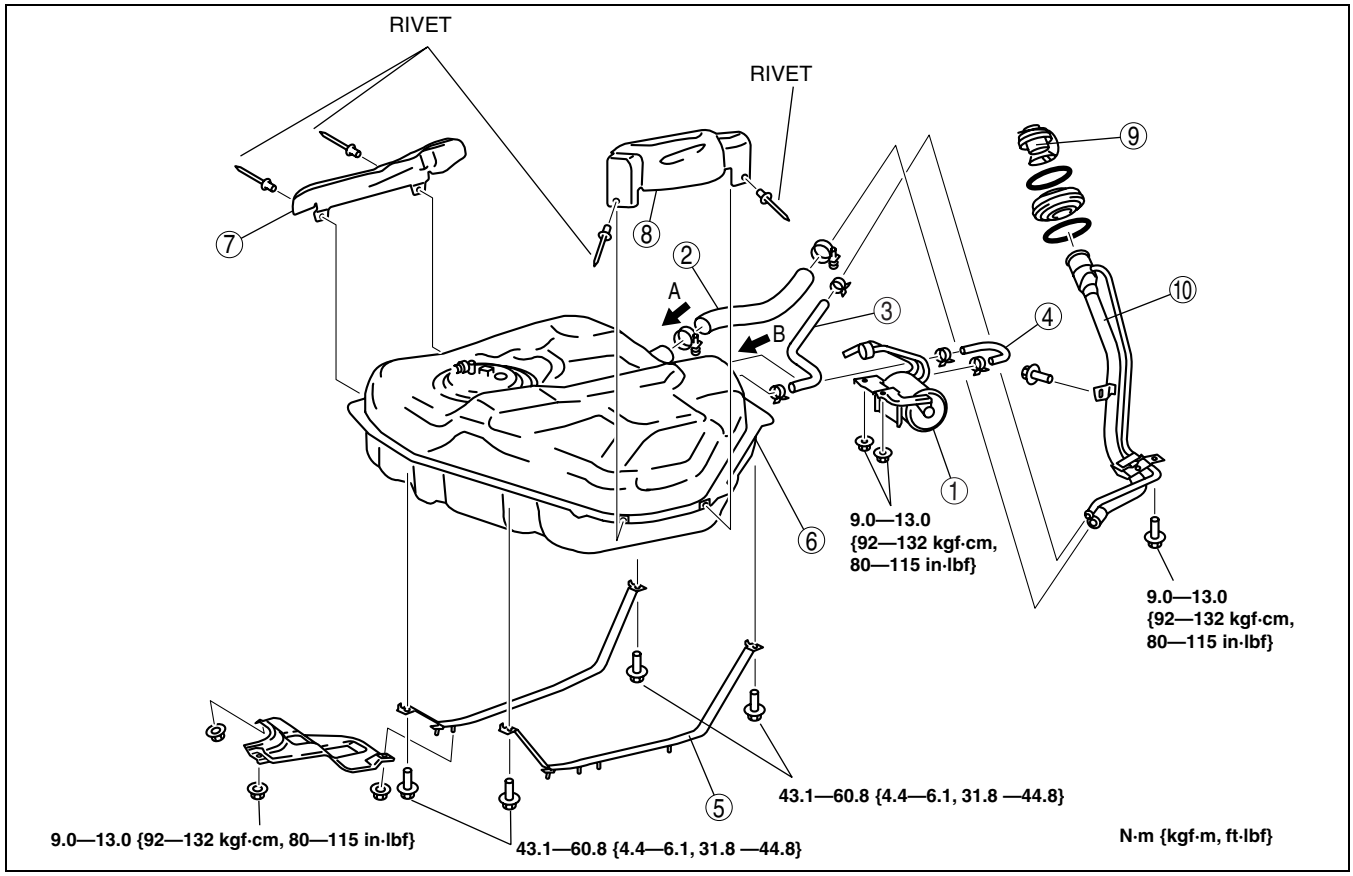
DPE011442110W01

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. Remove the second-row seat. (See09–13–5 SECOND-ROW SEAT REMOVAL/INSTALLATION.)
2. Partially peel back the floor covering. (See09–17–19 TRUNK SIDE TRIM REMOVAL/INSTALLATION.)
3. Remove the service hole cover.
4. Disconnect the quick release connector.
5. Park the vehicle on a level surface.
6. Follow “BEFORE SERVICE PRECAUTION” before performing any work operations to prevent fuel from spilling from the fuel system.

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.**

7. Drain the fuel.
8. Remove the flange nuts between the catalytic converter and pre-silencer, and between the pre-silencer and main silencer, to allow the insulator to be removed.
9. Remove the insulator.
10. Remove the rear under cover.
11. Remove in the order indicated in the table.
12. Install in the reverse order of removal.
13. Inspect all parts by performing “AFTER SERVICE PRECAUTION”.



DPE0114ZW200

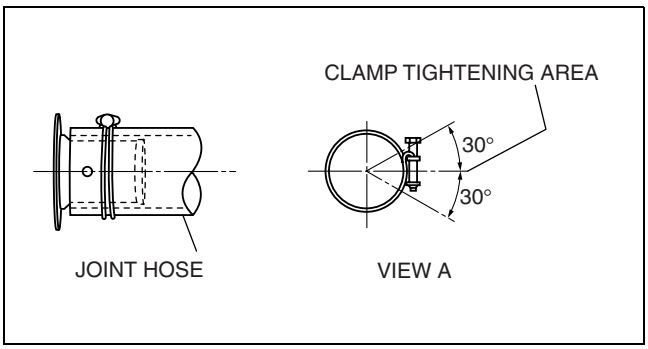
1	Charcoal canister (See 01–16A–7 CHARCOAL CANISTER REMOVAL/INSTALLATION [L8, LF].)
2	Joint hose (See 01–14A–6 Joint Hose Installation Note.)
3	Breather hose (See 01–14A–6 Breather Hose Installation Note.)

4	Fuel hose
5	Strap
6	Fuel tank
7	Protector (See 01–14A–6 Rivet Removal Note.)
8	Protector (See 01–14A–6 Rivet Removal Note.)

9	Fuel-filler cap
10	Fuel-filler pipe (See 01–14A–6 Fuel-filler Pipe Removal Note.)

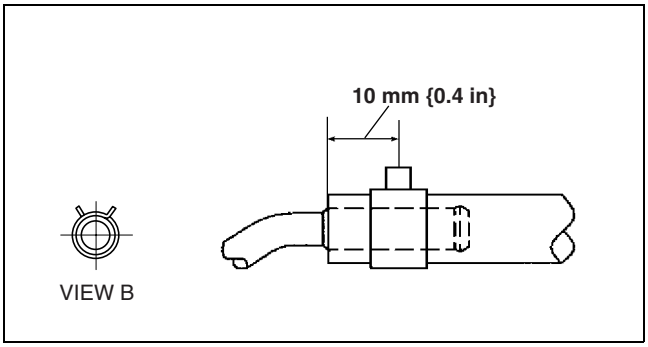
Fuel-filler Pipe Removal Note
1. Remove the rear tire (RH).
2. Remove the fuel-filler pipe.

Joint Hose Installation Note
1. Install the joint hose and clamp as shown in the figure.



DPE0114ZW200

Breather Hose Installation Note
1. Install the breather hose and clamp as shown in the figure.



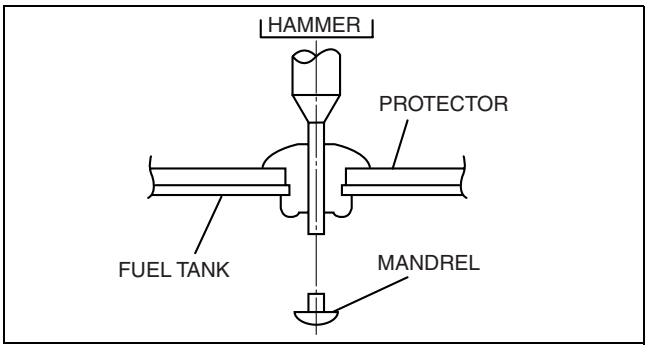
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Rivet Removal Note

Caution
- **Be careful not to damage the fuel tank when removing the rivet. If the fuel tank is damaged, it may cause fuel leakage.**

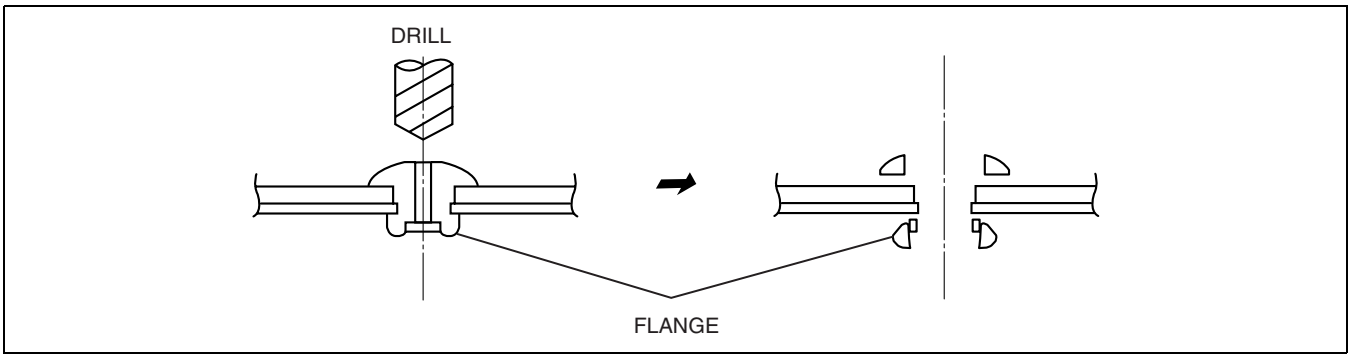
Note
- When reinstalling the rivet, install the same rivet or M5 bolt and nut.

1. Push out the mandrel using a hammer and punch (**2—2.8 mm {0.08—0.11 in}** diameter).



DPE0114ZW201

2. Remove the flange using a drill (**5 mm {0.20 in}** drill bit).



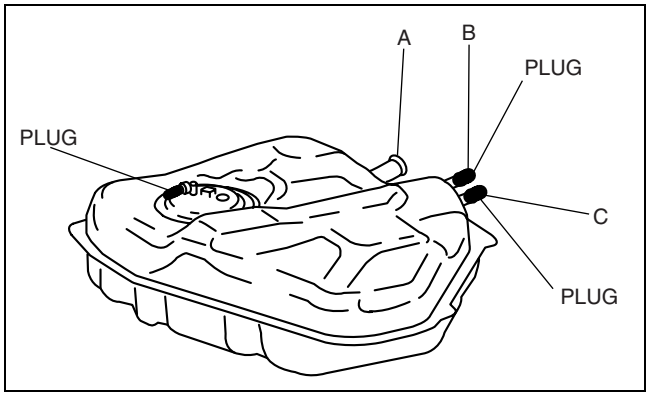
DPE0114ZW201

FUEL TANK INSPECTION [L8, LF]

DPE011442110W02

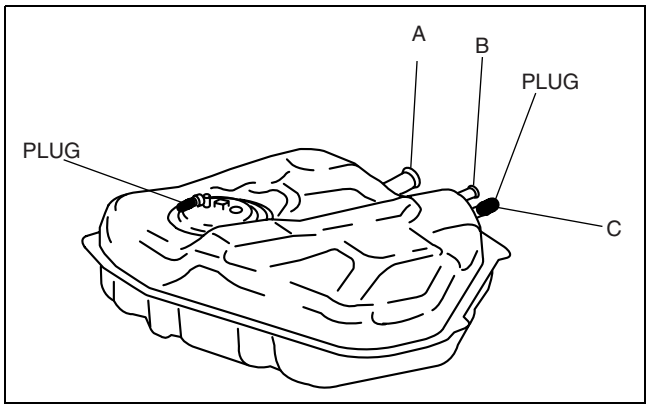
Note
- The two rollover valves built into the fuel tank and check valves (two-way) also built into the fuel tank are inspected in this inspection.

1. Follow “BEFORE SERVICE PRECAUTION” before performing any work operations to prevent fuel from spilling from the fuel system. (See 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the fuel tank. (See 01–14A–5 FUEL TANK REMOVAL/INSTALLATION [L8, LF].)
4. Perform the following procedure to verify the fuel tank airtightness.
   (1) Plug the fuel pump unit pipe, ports B and C.
   (2) Apply a pressure of **3 kPa {23 mmHg, 0.9 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 C.
6. Level the fuel tank.



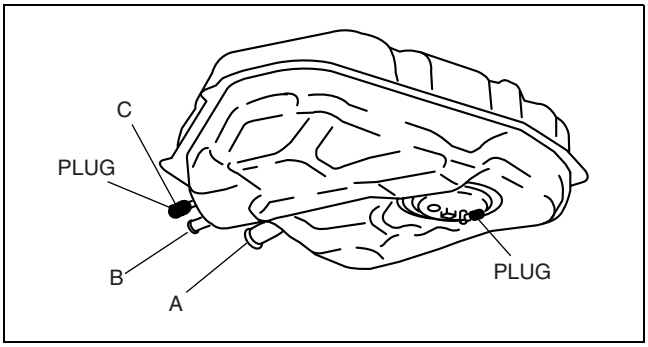
DPE0114ZW200

7. Apply a pressure of **3 kPa {23 mmHg, 0.9 inHg}** to port A and wait for a while.
8. With the pressure still applied, verify that there is airflow from port B 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 {–3.8 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 **–0.5—0 kPa {–3.8—0 mmHg, –0.2—0 inHg}.**
    - If there is no airflow, replace the fuel tank.
    - If there is airflow, place the fuel tank upside down.



DPE0114ZW200

11. Apply a pressure of **3 kPa {23 mmHg, 0.9 inHg}** to port A and wait for a while.
12. With the pressure still applied, verify that there is no airflow from port B.
    - If there is airflow, replace the fuel tank.

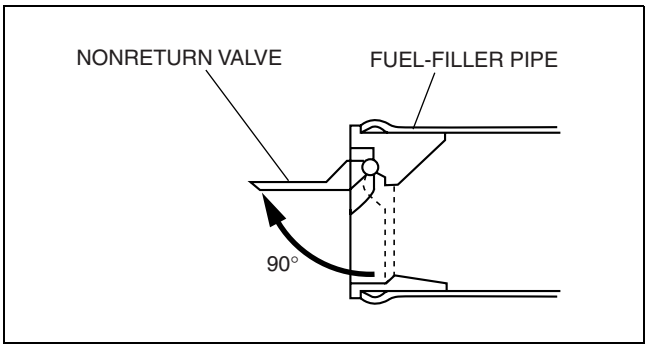


DPE0114ZW200

NONRETURN VALVE INSPECTION [L8, LF]

DPE011442270W01

1. Remove the fuel-filler pipe. (See 01–14A–5 FUEL TANK REMOVAL/INSTALLATION [L8, LF].)
2. Move the valve and verify that the valve opens to **90**°.
    - 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.



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FUEL PUMP UNIT REMOVAL/INSTALLATION [L8, LF]

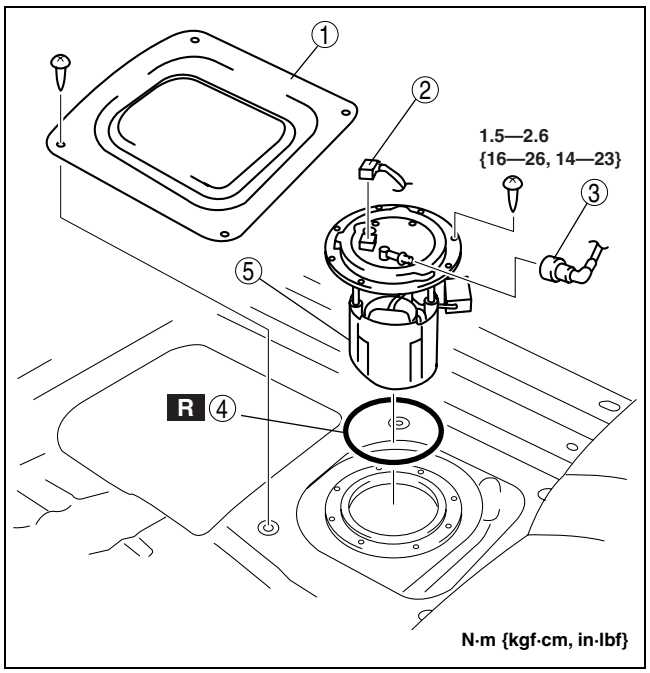
DPE011413350W01

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.
2. Disconnect the negative battery cable.
3. Remove the fuel tank. (See 01–14A–5 FUEL TANK REMOVAL/INSTALLATION [L8, LF].)

4. Remove in the order indicated in the table.



DPE0114ZW200

1	Service hole cover
2	Connector
3	Quick release connector (See 01–14A–11 QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION [L8, LF])
4	Packing
5	Fuel pump unit

5. Install in the reverse order of removal.
6. Inspect all related parts by performing “AFTER SERVICE PRECAUTION”.

FUEL PUMP UNIT DISASSEMBLY/ASSEMBLY [L8, LF]

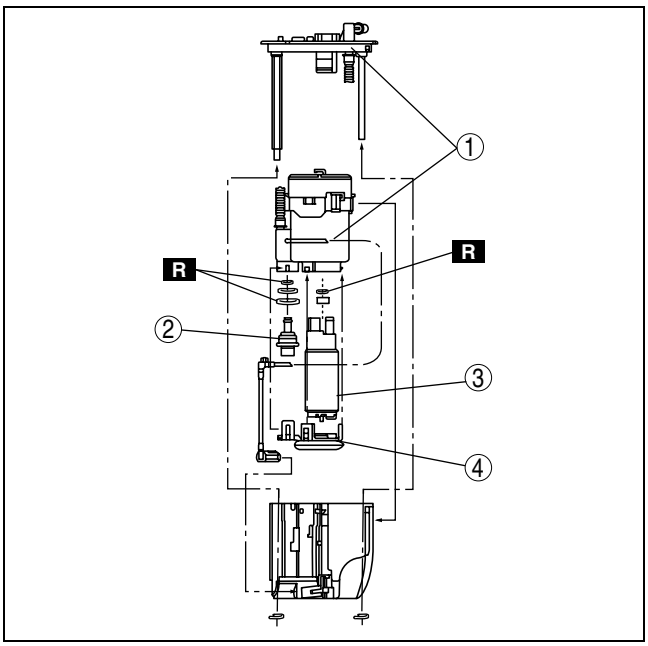
DPE011413350W02

Warning

- **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, do not damage the sealing surface of the fuel pump unit when removing or installing.**

1. Disassemble in the order indicated in the table.

2. Assemble in the reverse order of disassembly.



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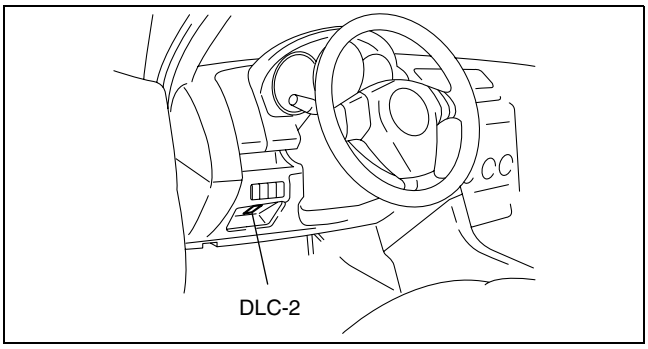
1	Fuel filter body
2	Fuel pressure regulator
3	Fuel pump
4	Fuel filter (low-pressure)

FUEL PUMP UNIT INSPECTION [L8, LF]

DPE011413350W03

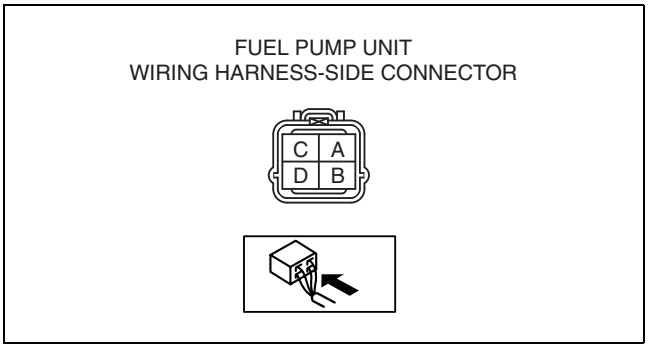
Fuel Pump Operation Inspection

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. Using the simulation function “FP”, verify that operation sound is heard from the fuel pump when “FP” is turned from OFF to ON.



DPE102ZW2001

- 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



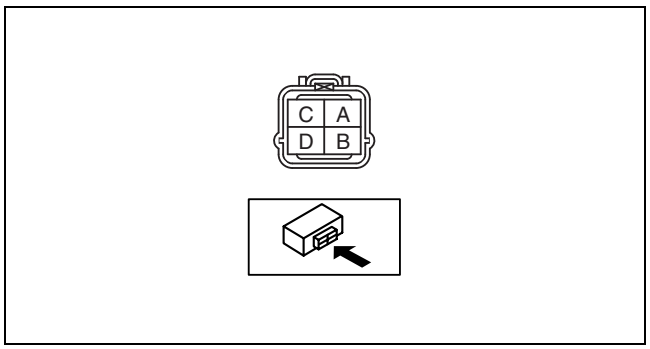
DPE114AW2991

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 B—D.
   - If there is continuity, perform the “Circuit Open/Short Inspection”.
   - If there is no continuity, replace the fuel pump.

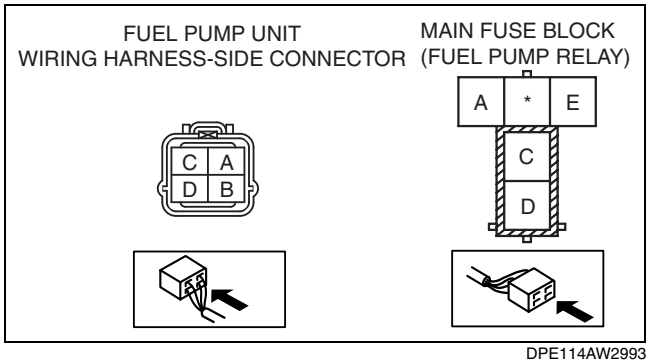


DPE114AW2992

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 B and fuel pump relay terminal C
     — Fuel pump unit terminal D and body ground

   Short circuit
   - If there is continuity, the circuit is short. Repair or replace the harness.
     — Fuel pump unit terminal A and body ground
     — Fuel pump unit terminal E and power supply



DPE114AW2993

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 [L8, LF]

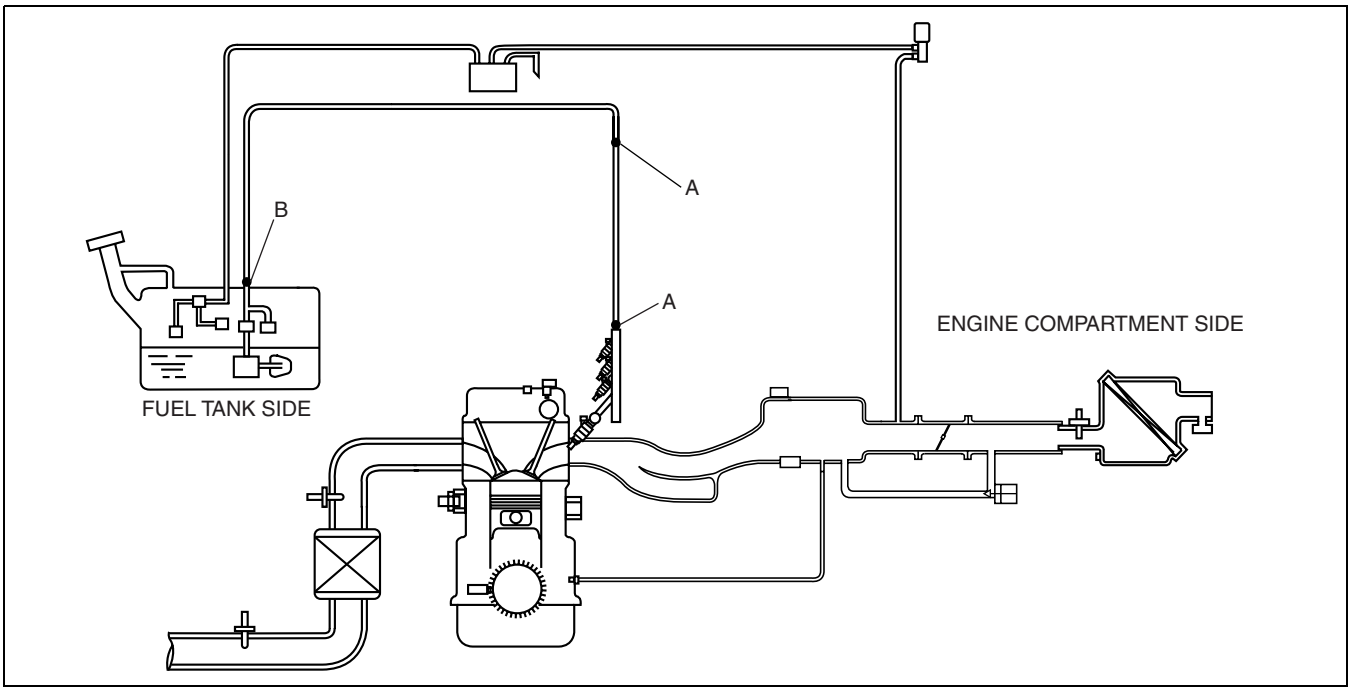
DPE011442692W01

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 two types of quick release connectors. Verify the type and location, and install/remove**

properly.



DPE0114ZW201

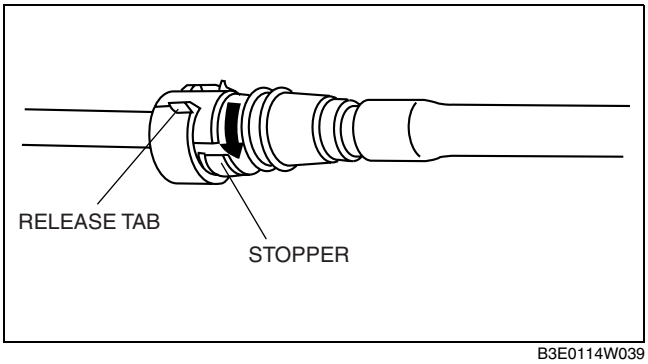
Type A Removal

1. Follow “BEFORE SERVICE PRECAUTION” before performing any work operations to prevent fuel from spilling from the fuel system.

   Caution
   - **The quick release connector may be damaged if the release tab is bent excessively. Do not expand the release tab over the stopper.**

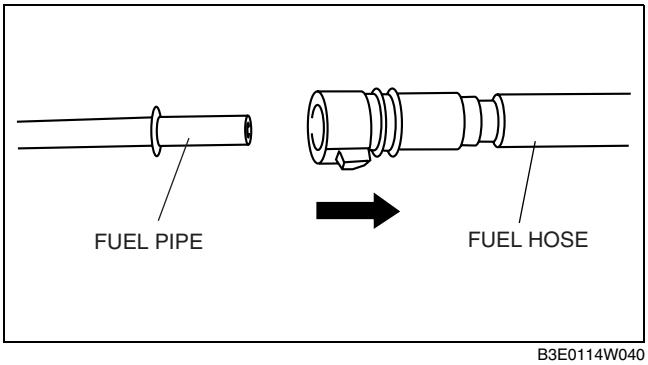
   Note
   - The fuel hose can be removed by pushing it to the pipe side to release the lock.

2. Rotate the release tab on the quick release connector to the stopper position.



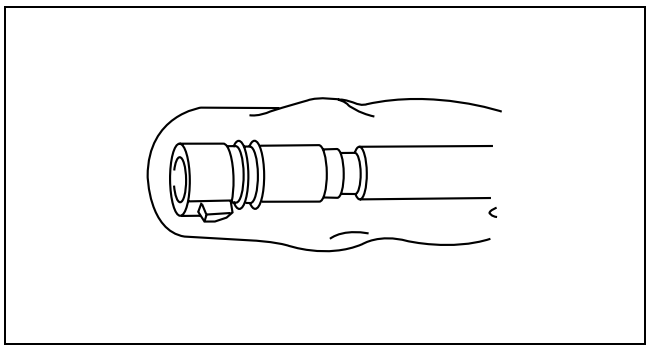
B3E0114W039

3. Pull out the fuel hose straight from the fuel pipe and disconnect it.



B3E0114W040

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 B Removal

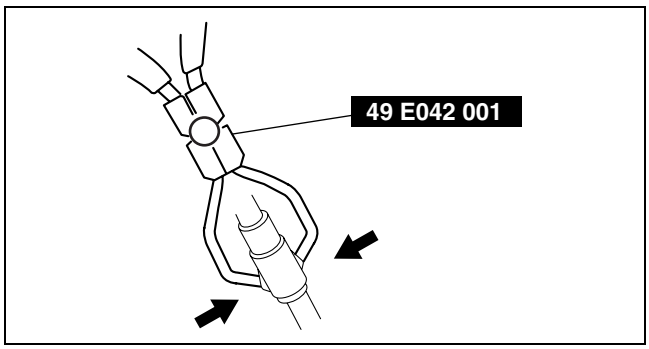
Caution
- **Be careful not to damage the pipe when unlocking the retainer.**

Note
- If the quick release connector is removed, replace the retainer with a new one.

1. Follow “BEFORE SERVICE PRECAUTION” and remove dirt from the connecting surfaces before performing any work operations.

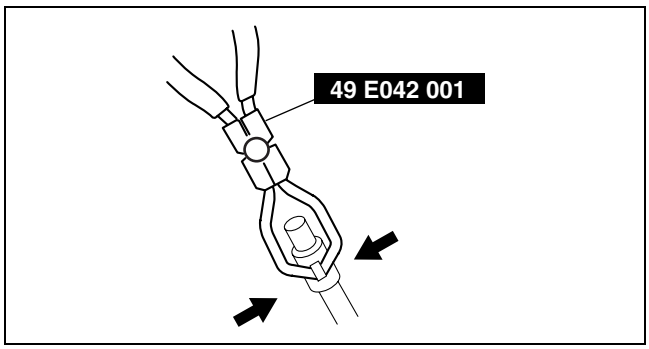
Note
- The retainer is attached to the pipe even after the connector is disconnected.

2. Pinch the retainer tabs using the **SST** and pull the connector side.



CPJ114ZWB881

3. Raise a retainer tab using the **SST** and remove the retainer.

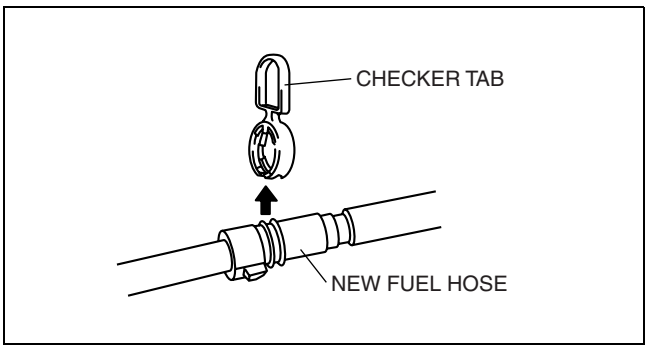


CPJ114ZWB882

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

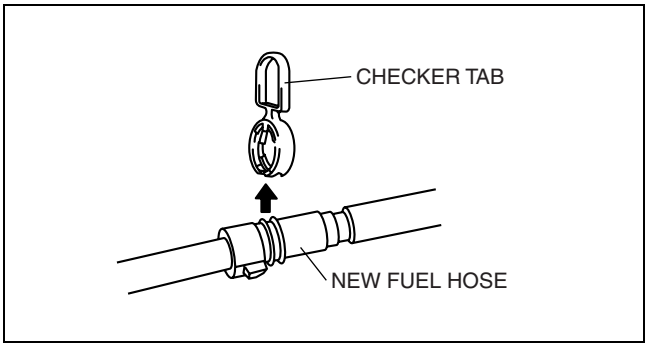
1. Inspect the fuel hose and fuel pipe sealing surface for damage and deformation.
   - If there is any malfunction, replace it with a new one.
2. Apply a small amount of clean engine oil to the sealing surface of the fuel pipe.
3. Reconnect the fuel hose straight to the fuel pipe until a click is heard.

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”.

Type B Installation

Note
- If the quick release connector O-ring is damaged or has slipped, replace the piping component.
- 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

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”.

Without using the SST

Caution
- **Be sure to replace the retainer with a new one to prevent gas leakage.**

1. Install a new retainer to the quick release connector.
2. Reconnect the hose straight to the 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”.

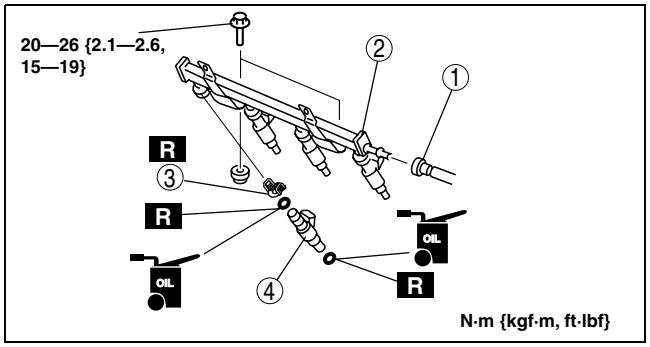
FUEL INJECTOR REMOVAL/INSTALLATION [L8, LF]

DPE011413250W02

1. Follow “BEFORE SERVICE PRECAUTION” before performing any work operations to prevent fuel from spilling from the fuel system. (See 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)

2. Remove the plug hole plate.
3. Remove the battery cover. (See 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, 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 01–14A–11 QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION [L8, LF].)
2	Fuel distributor
3	Injector clip (See 01–14A–15 Fuel Injector Removal Note.)
4	Fuel injector (See 01–14A–16 Fuel Injector Installation Note.)



B3E0114W017

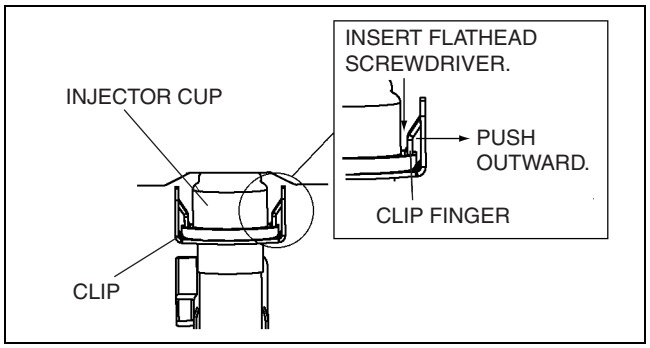
7. Install in the reverse order of removal.
8. Inspect all related parts by performing “AFTER SERVICE PRECAUTION”. (See 01–14A–3 AFTER SERVICE PRECAUTION [L8, LF].)

Fuel Injector Removal Note

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.**

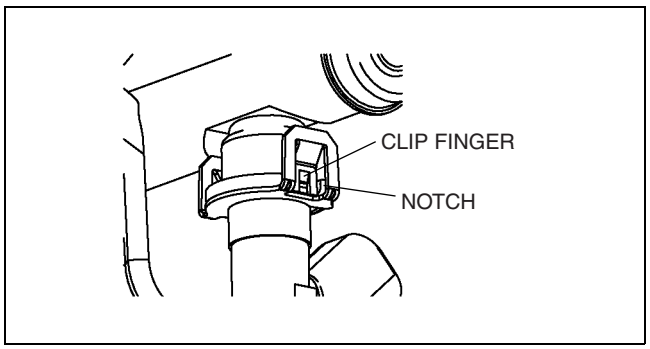
1. Insert a flathead screwdriver between the injector cup and clip finger.

Note



B3E0114W019

- When pushing the clip finger outward, deform the finger until it is removed completely from the cup notch.



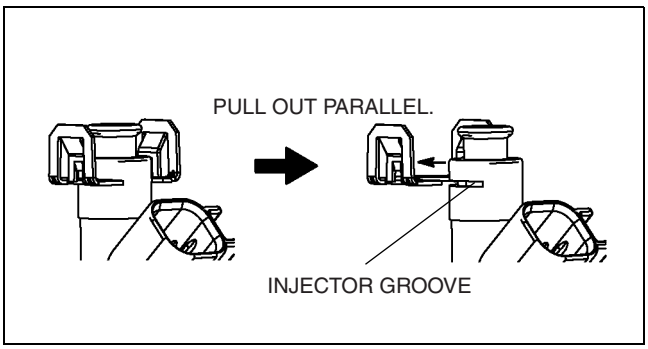
B3E0114W020

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.



B3E0114W021

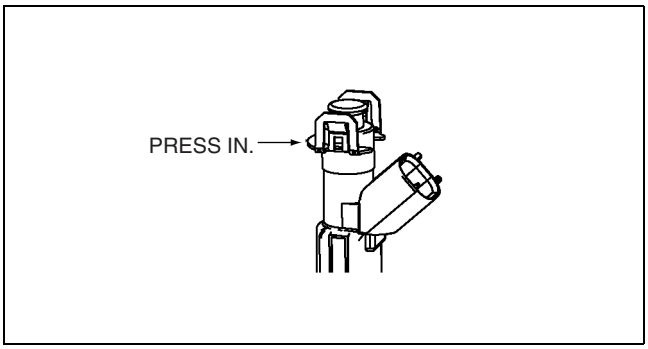
Fuel Injector Installation Note

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.



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FUEL INJECTOR INSPECTION [L8, LF]

DPE011413250W03

Fuel Injector Operation Inspection

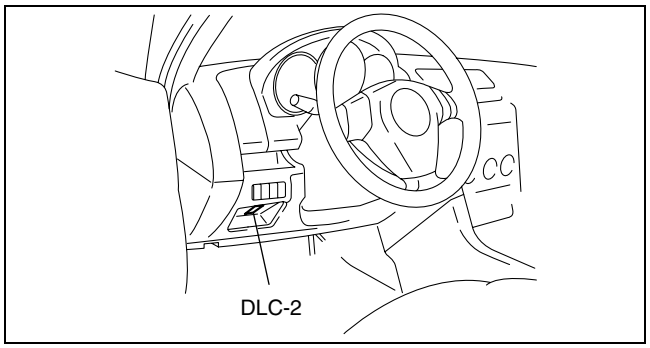
Warning

- **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	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 01–14A–16 FUEL INJECTOR INSPECTION [L8, LF])
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 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))

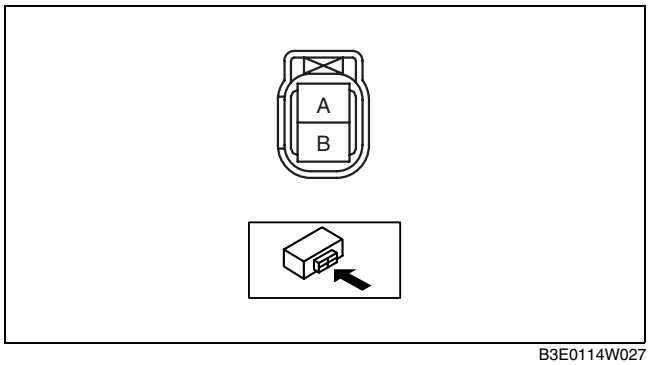


DPE102ZW2001

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.
   - If within the specification, perform the “Circuit Open/Short Inspection”.
   - If not within the specification, replace the fuel injector.

   Resistance
   11.4—12.6 ohms [20 °C {68 °F}]



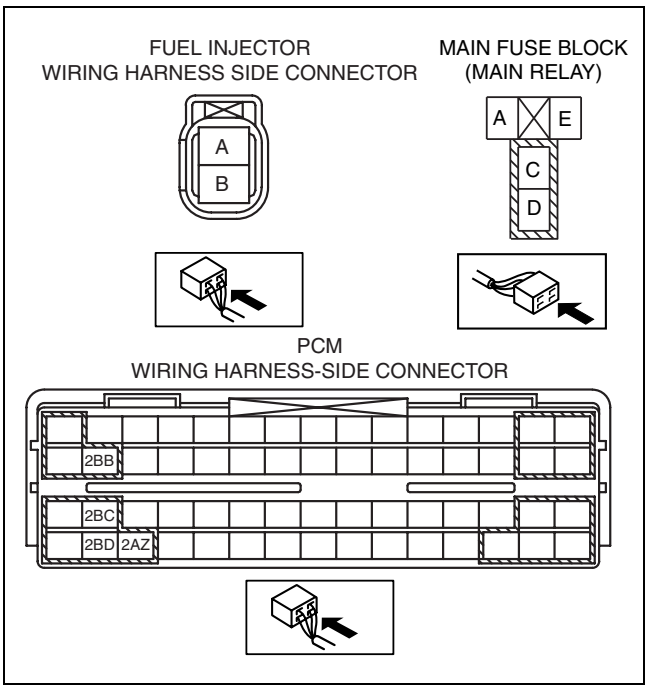
B3E0114W027

Circuit Open/Short Inspection

1. Disconnect the PCM connector. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, 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 C
     — Fuel injector No.2 terminal B and main relay terminal C
     — Fuel injector No.3 terminal B and main relay terminal C
     — Fuel injector No.4 terminal B and main relay terminal C

   Short circuit
   - If there is continuity, the circuit is short. Repair or replace the harness.
     — Fuel injector No.1 terminal A and body ground
     — Fuel injector No.2 terminal A and body ground
     — Fuel injector No.3 terminal A and body ground
     — Fuel injector No.4 terminal A and body ground

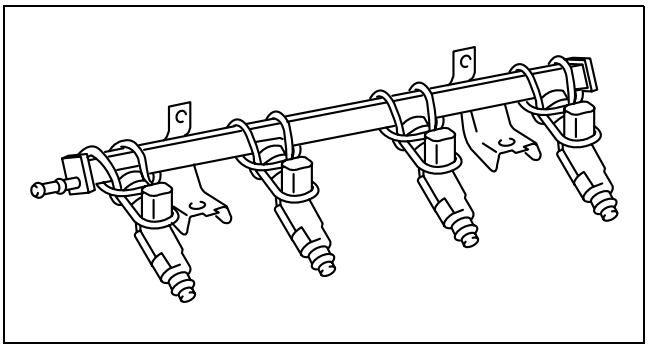


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Leakage Inspection

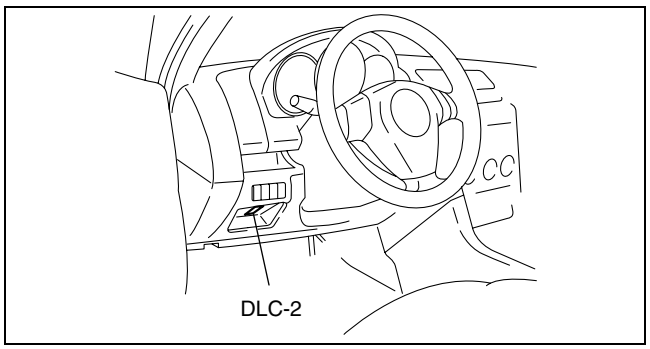
Warning
- **Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. To prevent this, complete the following inspection with the engine stopped.**

1. Follow “BEFORE SERVICE PRECAUTION” before performing any work operations to prevent fuel from spilling from the fuel system. (See 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the fuel injector and fuel distributor as a single unit. (See 01–14A–14 FUEL INJECTOR REMOVAL/INSTALLATION [L8, LF].)
4. Fix the fuel injector to the fuel distributor with a wire or the equivalent.
5. Connect the fuel hose.
6. Connect the negative battery cable.



B3E0114W028

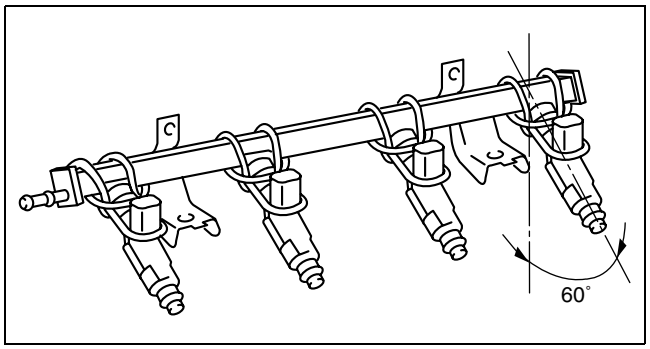
7. Connect the WDS or equivalent to the DLC-2.
8. Turn the ignition switch to the ON position.
9. Using the simulation function “FP”, start the fuel pump.



DPE102ZW2001

10. Tilt the fuel injector at an angle of **60**° to inspect for leakage.
    - If not within the specification, replace the fuel injector.

    Leakage amount
    1 drop or less/2 min



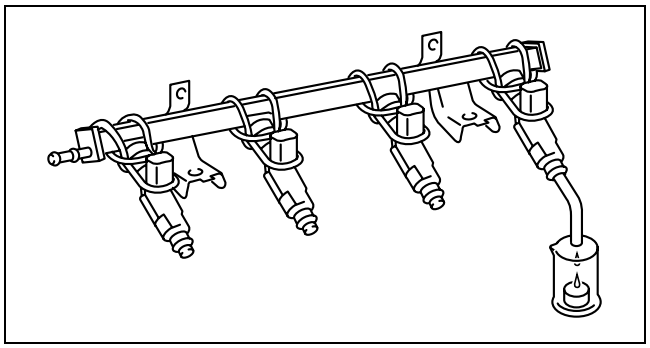
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11. Turn the ignition switch to the LOCK position and stop the fuel pump.
12. Remove the wire or the equivalent securing the fuel injector.
13. Install the fuel injector.(See 01–14A–14 FUEL INJECTOR REMOVAL/INSTALLATION [L8, LF].)
14. Inspect all related parts by performing “AFTER SERVICE PRECAUTION”. (See 01–14A–3 AFTER SERVICE PRECAUTION [L8, LF])

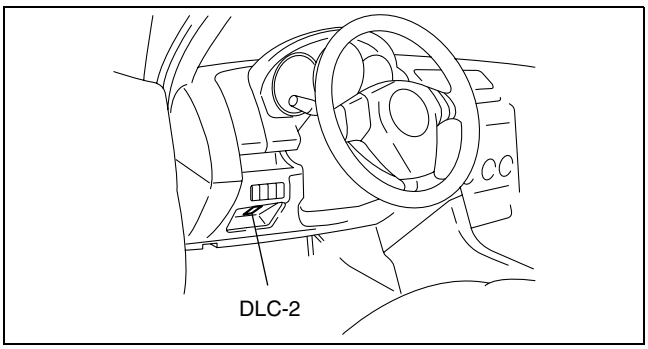
Injection Volume Inspection

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 01–14A–3 BEFORE SERVICE PRECAUTION [L8, LF].)
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 01–14A–14 FUEL INJECTOR REMOVAL/INSTALLATION [L8, LF].)
6. Fix the fuel injector to the fuel distributor with a wire or the equivalent.
7. Connect the corresponding fuel injector connector.
8. Connect the negative battery cable.


B3E0114W032

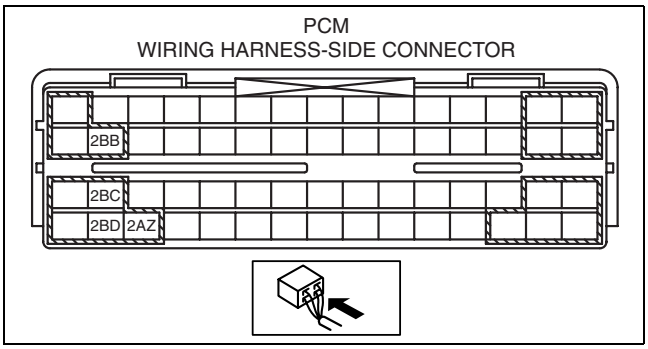
9. Connect the WDS or equivalent to the DLC-2.
10. Turn the ignition switch to the ON position.
11. Using the simulation function “FP”, start the fuel pump.



DPE102ZW2001

12. Ground the following PCM terminals using a jumper wire and measure the injection volume of each fuel injector.
    - If not within the specification, replace the fuel injector.

    Injection volume
    46—66 ml {44—66 cc, 2.8—4.0 cu in}/15 s



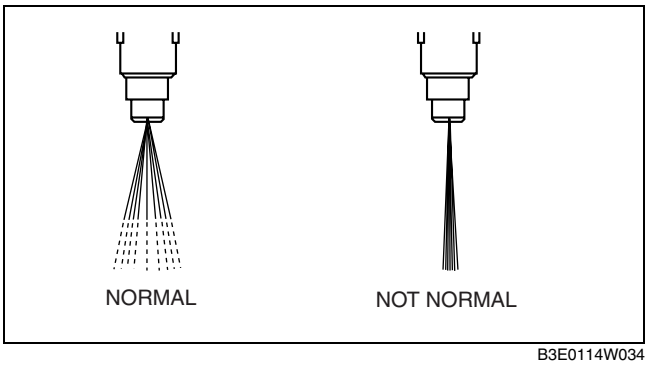
B3E0114W050

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 01–14A–14 FUEL INJECTOR REMOVAL/INSTALLATION [L8, LF].)
16. Inspect all related parts by performing “AFTER SERVICE PRECAUTION”. (See 01–14A–3 AFTER SERVICE PRECAUTION [L8, LF].)

Atomization Inspection

1. Inspect the atomization status.
    - If not normal, replace the fuel injector.



B3E0114W034

01–15A EXHAUST SYSTEM [L8, LF]

EXHAUST SYSTEM INSPECTION [L8, LF] 01–15A–1
EXHAUST SYSTEM REMOVAL/INSTALLATION [L8, LF] 01–15A–1

EXHAUST SYSTEM INSPECTION [L8, LF]

DPE011500000W01

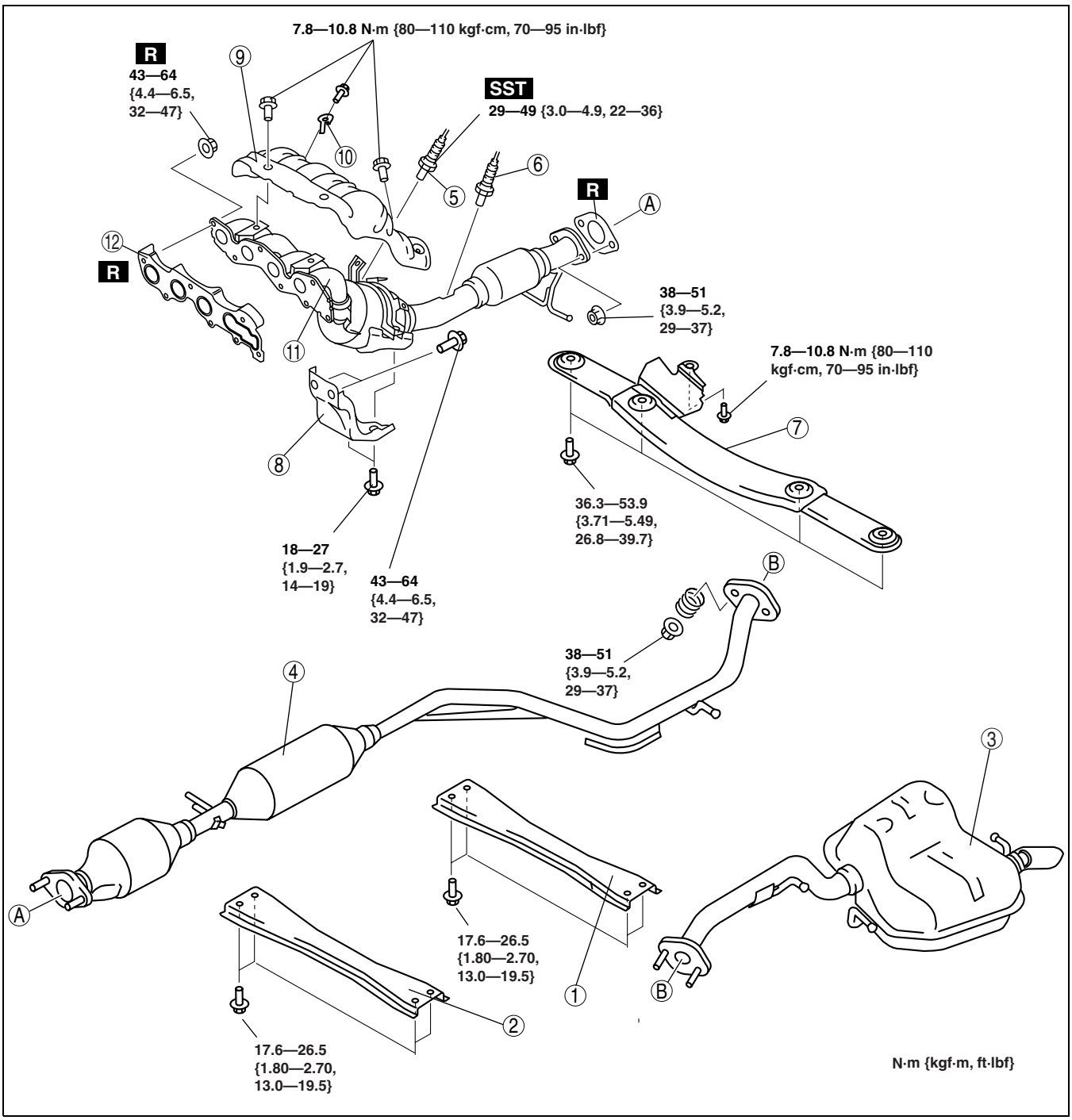
1. Start the engine and inspect each exhaust system component for exhaust gas leakage.
   - If there is leakage, repair or replace the appropriate component.

EXHAUST SYSTEM REMOVAL/INSTALLATION [L8, LF]

DPE011500000W02

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 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
2. Remove the battery cover and battery duct. (See 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, 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.
7. Inspect the wheel alignment and adjust it if necessary.



DPE0115ZW200

1	Rear tunnel member
2	Front tunnel member
3	Main silencer
4	Pre-silencer
5	Front heated oxygen sensor (See 01–40–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF].)

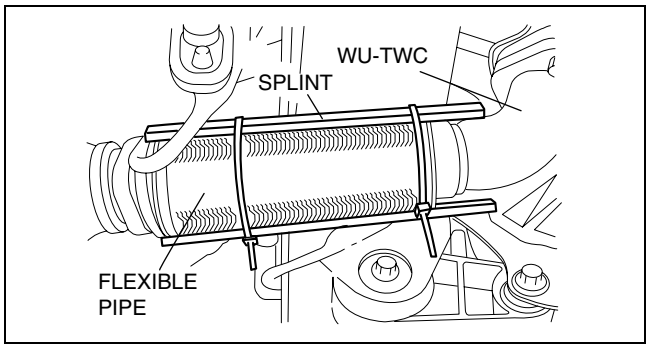
6	Rear heated oxygen sensor (See 01–40–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF].)
7	Member
8	Exhaust manifold bracket
9	Exhaust manifold insulator
10	CLIP
11	Exhaust manifold
12	Exhaust manifold gasket

Exhaust Manifold Removal Note

Caution

- **Over bending of the exhaust flexible pipe may cause damage resulting in failure.**

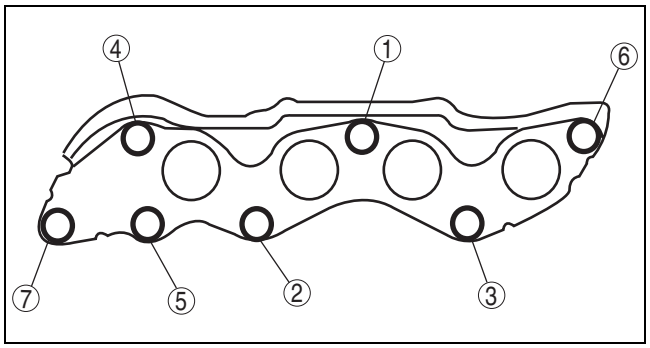
1. Remove the front wheels and tires.
2. Disconnect the steering shaft from the steering gear and linkage side. (See 06-14–11 STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.)
3. Remove the No.1 engine mount rubber. (See 01–10A–26 ENGINE REMOVAL/INSTALLATION [L8, LF].)
4. Loosen the exhaust manifold bolts.
5. Remove the installation bolts of the front stabilizer and front crossmember component. (See 02–13–11 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 02–13–11 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.



B3E0115W105

Exhaust Manifold Installation Note

1. Tighten the exhaust manifold installation nuts in the order shown in the figure.



B3E0115W103

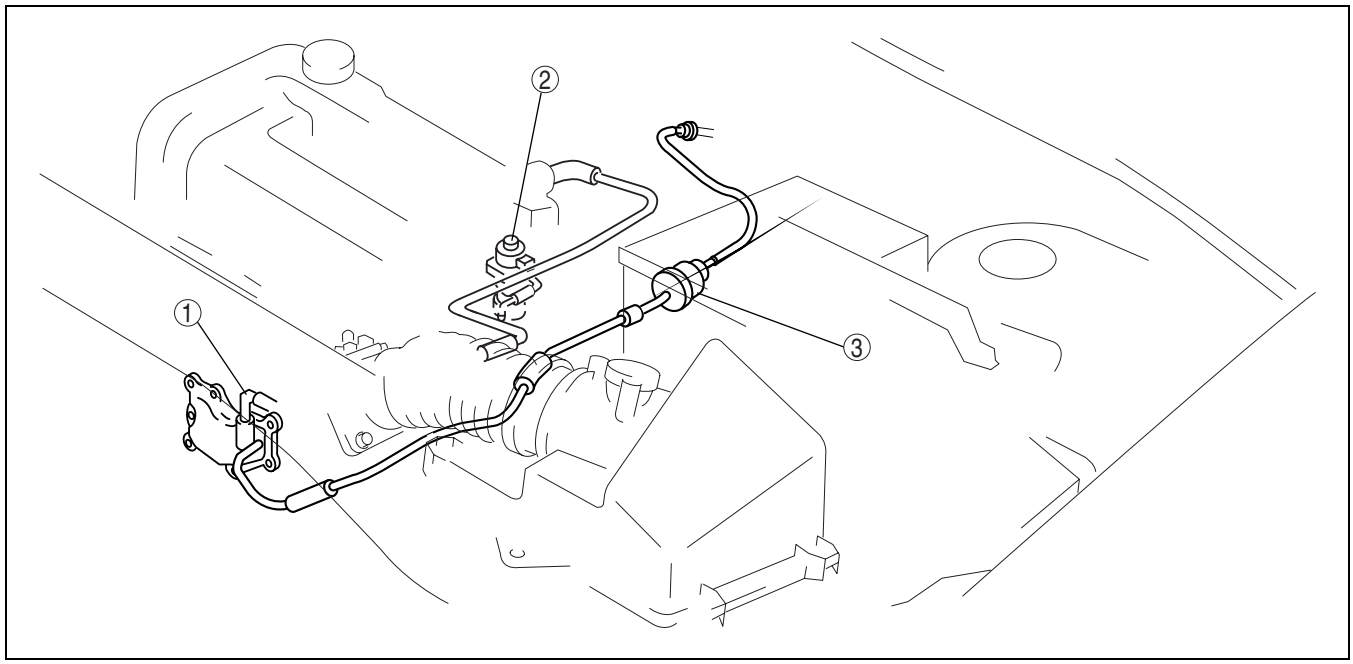
01–16A EMISSION SYSTEM [L8, LF]

EMISSION SYSTEM LOCATION INDEX [L8, LF] 01–16A–1
EMISSION SYSTEM DIAGRAM [L8, LF] 01–16A–2
POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [L8, LF]. 01–16A–2
PURGE SOLENOID VALVE REMOVAL/INSTALLATION [L8, LF] 01–16A–3
PURGE SOLENOID VALVE INSPECTION [L8, LF] 01–16A–3
EGR VALVE REMOVAL/INSTALLATION [L8, LF] 01–16A–5
EGR VALVE INSPECTION [L8, LF] 01–16A–5
CHARCOAL CANISTER REMOVAL/INSTALLATION [L8, LF] 01–16A–7
CHARCOAL CANISTER INSPECTION [L8, LF] 01–16A–7
ROLLOVER VALVE REMOVAL/INSTALLATION [L8, LF] 01–16A–8
ROLLOVER VALVE INSPECTION [L8, LF] 01–16A–8
CHECK VALVE (TWO-WAY) REMOVAL/INSTALLATION [L8, LF]. 01–16A–8
CHECK VALVE (TWO-WAY) INSPECTION [L8, LF] 01–16A–8
EVAPORATIVE CHAMBER INSPECTION [L8, LF] 01–16A–8

EMISSION SYSTEM LOCATION INDEX [L8, LF]

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Engine Compartment Side

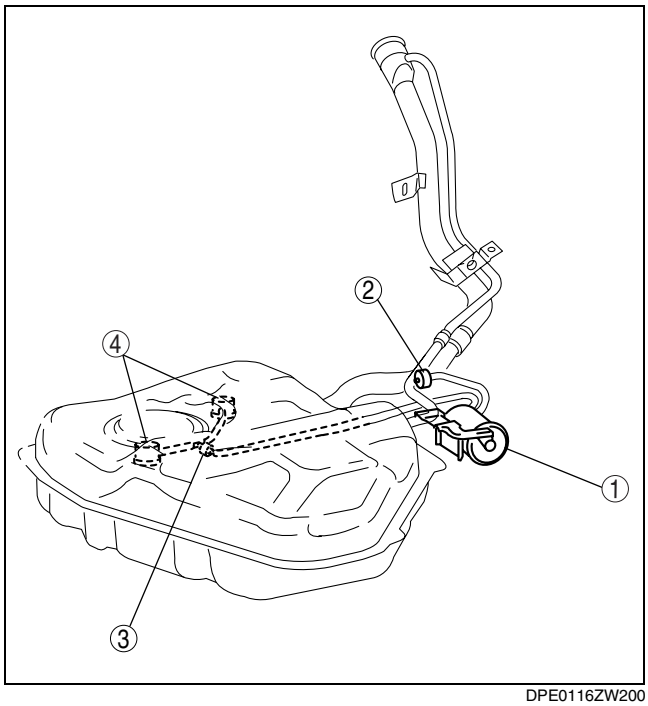


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1	PCV valve (See 01–16A–2 POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [L8, LF].)
2	EGR valve (See 01–16A–5 EGR VALVE REMOVAL/INSTALLATION [L8, LF].) (See 01–16A–5 EGR VALVE INSPECTION [L8, LF].)
3	Purge solenoid valve (See 01–16A–3 PURGE SOLENOID VALVE REMOVAL/INSTALLATION [L8, LF].) (See 01–16A–3 PURGE SOLENOID VALVE INSPECTION [L8, LF].)

Fuel Tank Side

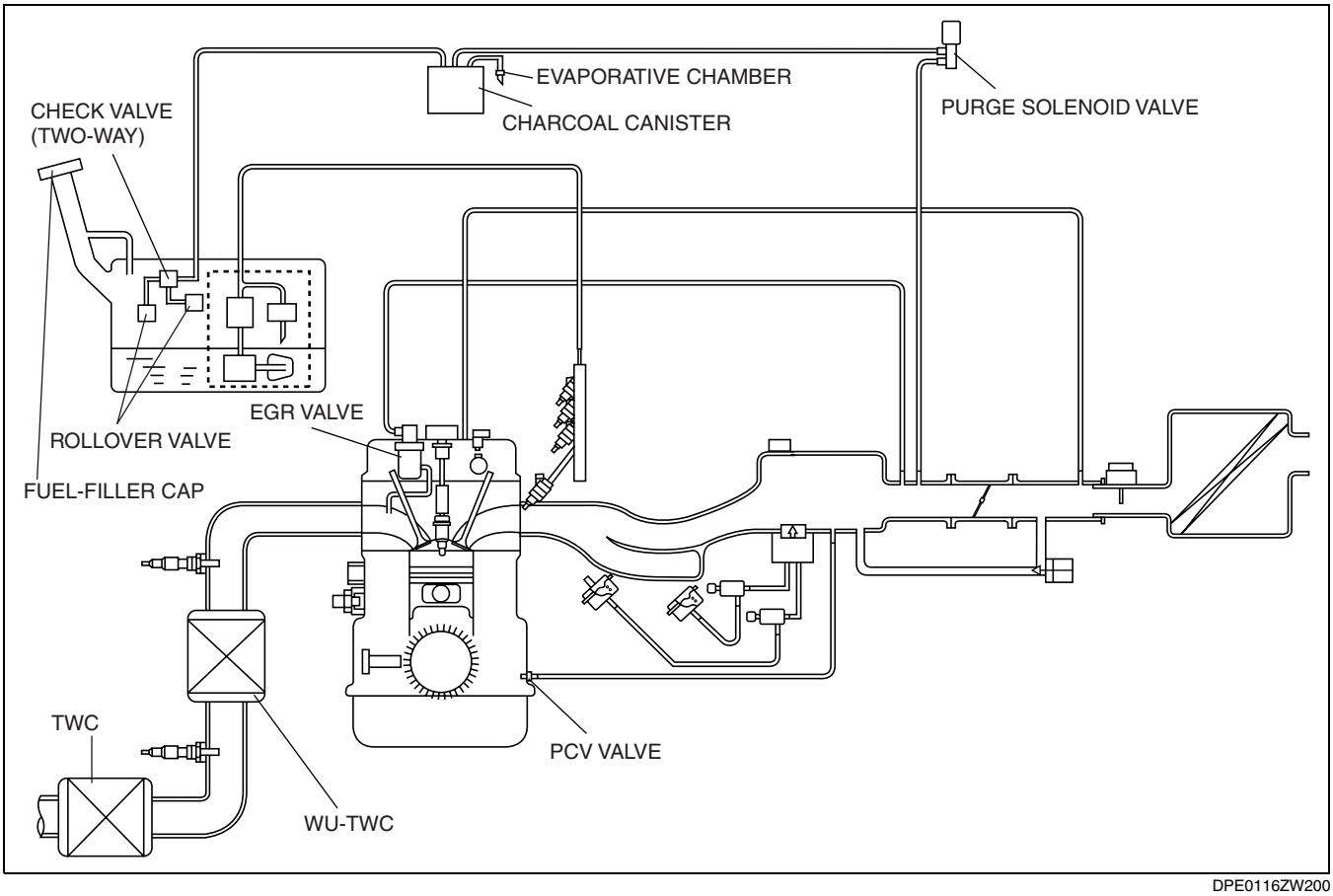
1	Charcoal canister (See 01–16A–7 CHARCOAL CANISTER REMOVAL/INSTALLATION [L8, LF].) (See 01–16A–7 CHARCOAL CANISTER INSPECTION [L8, LF].)
2	Evaporative chamber (See 01–16A–8 EVAPORATIVE CHAMBER INSPECTION [L8, LF].)
3	Check valve (two-way) (See 01–16A–8 CHECK VALVE (TWO-WAY) REMOVAL/INSTALLATION [L8, LF]) (See 01–16A–8 CHECK VALVE (TWO-WAY) INSPECTION [L8, LF])
4	Rollover valve (See 01–16A–8 ROLLOVER VALVE REMOVAL/INSTALLATION [L8, LF]) (See 01–16A–8 ROLLOVER VALVE INSPECTION [L8, LF])



DPE0116ZW200

EMISSION SYSTEM DIAGRAM [L8, LF]

DPE011600000W02



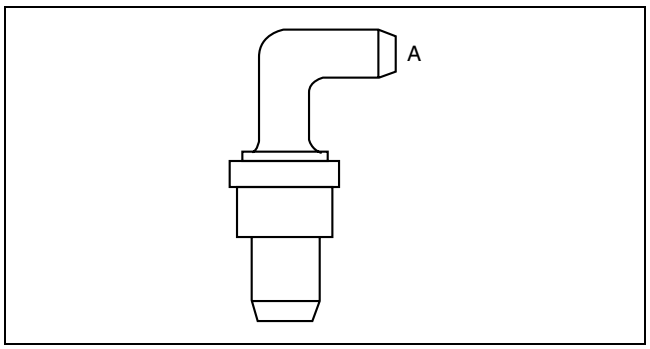
DPE0116ZW200

POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [L8, LF]

DPE011613890W01

1. Remove the intake manifold.
2. Remove the PCV valve.

3. Verify that there is no airflow when pressure is applied to port A.
   - 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.

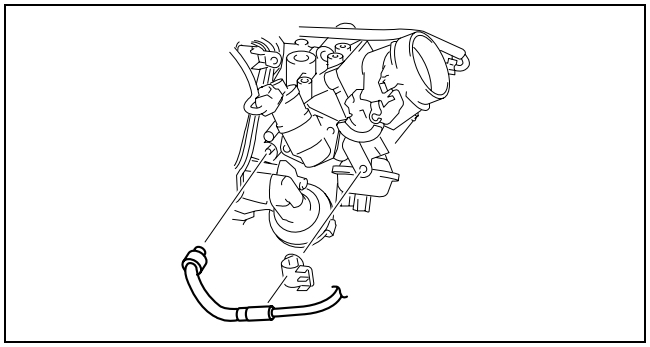


B3E0116W023

PURGE SOLENOID VALVE REMOVAL/INSTALLATION [L8, LF]

DPE011618744W02

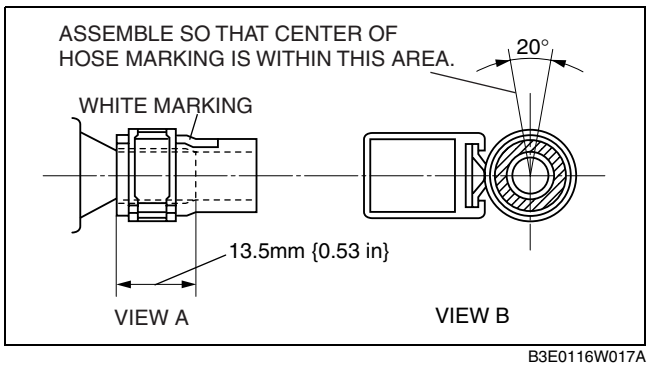
1. Remove the plug hole plate.
2. Remove the battery cover. (See 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
3. Disconnect the negative battery cable.
4. Remove using the following procedure:
   (1) Pull the vacuum tube from the intake manifold.
5. Install in the reverse order of removal.



B3E0116W009

Evaporative Hose Installation Note

1. Install the evaporative hose and clamp as shown in the figure.



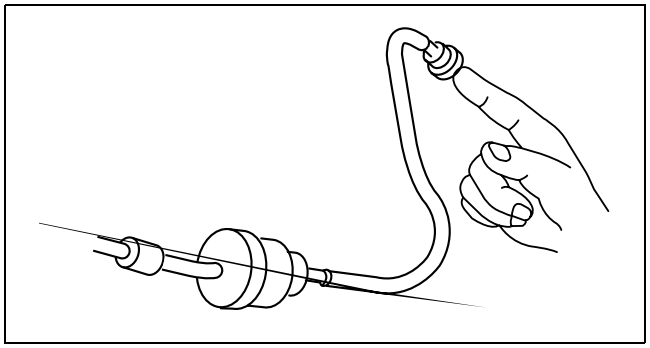
B3E0116W017A

PURGE SOLENOID VALVE INSPECTION [L8, LF]

DPE011618744W03

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.
   - 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,



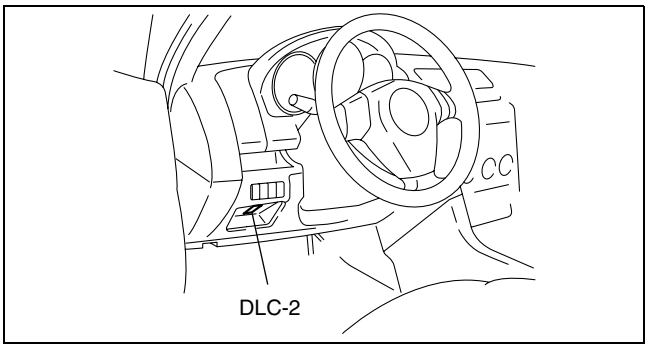
B3E0116W020

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

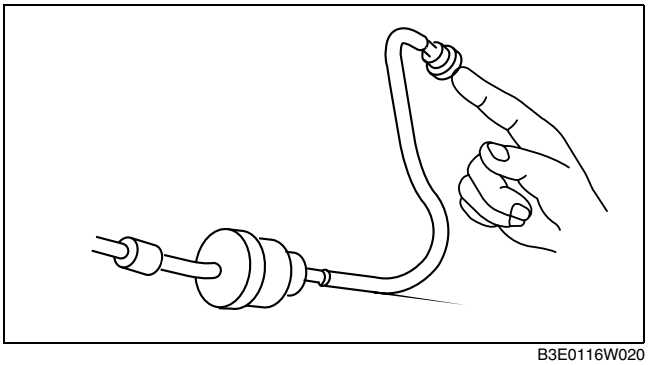
Using WDS or equivalent

1. Connect the WDS or equivalent to the DLC-2.
2. Warm up the engine and idle it.
3. Disconnect the vacuum hose which is connected to the charcoal canister from purge solenoid valve.



DPE102ZW2001

4. Place your finger onto the purge solenoid valve as shown in the figure and verify that vacuum is applied.
   - 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:

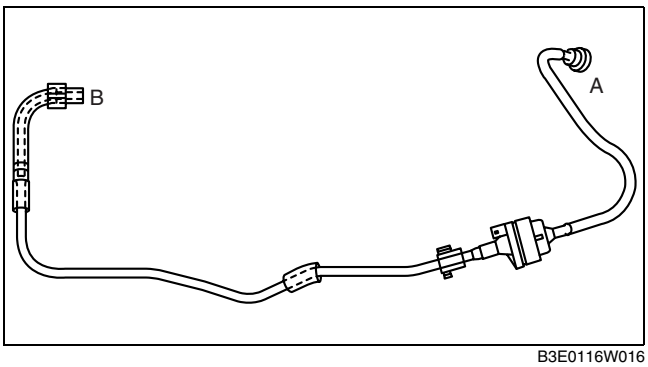

B3E0116W020

(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.
   - 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 not applied between terminals A and B	No airflow
When voltage is applied between terminals A and B	Airflow detected



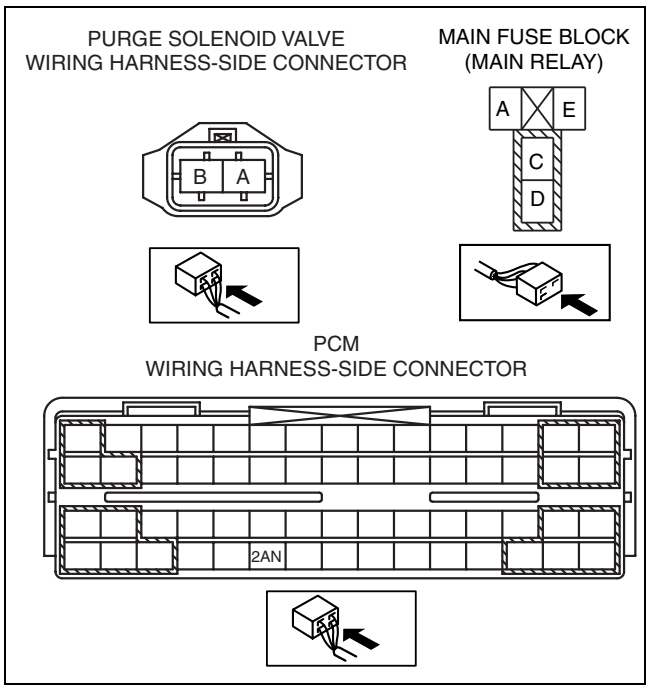
B3E0116W016

Circuit Open/Short Inspection

1. Disconnect the PCM connector. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, 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 C

   Short circuit
   - If there is continuity, the circuit is short. Repair or replace the harness.
     — Purge solenoid valve terminal A and body ground

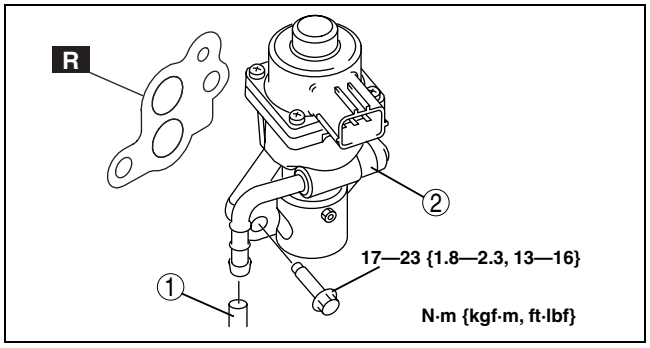


DPE116AW9901

EGR VALVE REMOVAL/INSTALLATION [L8, LF]

DPE011620300W02

1. Remove the plug hole plate.
2. Remove the battery cover. (See 01–17–1 BATTERY REMOVAL/INSTALLATION [L8, 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 01–16A–5 Water Hose Removal Note [L8, LF].)
2	EGR valve (See 01–16A–5 EGR Valve Removal Note [L8, LF].)

6. Install in the reverse order of removal.

Water Hose Removal Note [L8, LF]

1. Drain the engine coolant from the radiator. (See 01–12A–3 ENGINE COOLANT REPLACEMENT [L8, LF].)

EGR Valve Removal Note [L8, LF]

1. Remove the air cleaner and air hose. (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, LF].)
2. Remove the radiator hose (upper). (See 01–12A–6 RADIATOR REMOVAL/INSTALLATION [L8, LF].)

EGR VALVE INSPECTION [L8, LF]

DPE011620300W03

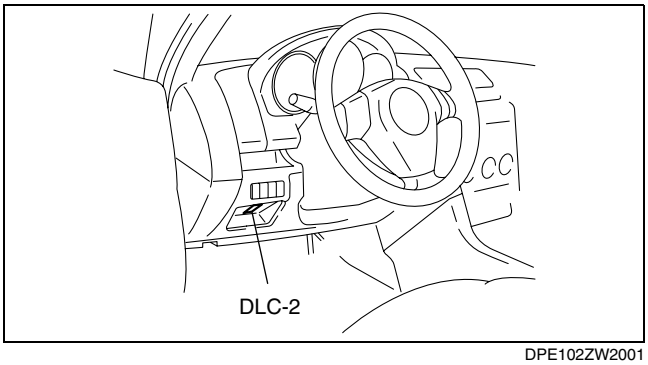
EGR Control Inspection
Without using WDS or equivalent

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.



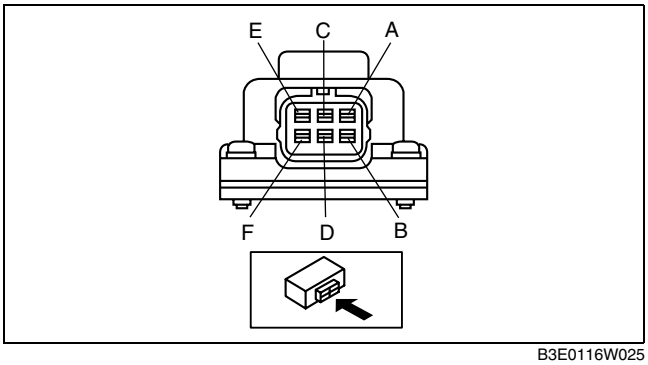
DPE102ZW2001

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.



B3E0116W025

Standard

Terminal	Resistance (ohm)
C—E C—A D—B D—F	12—16

Circuit Open/Short Inspection

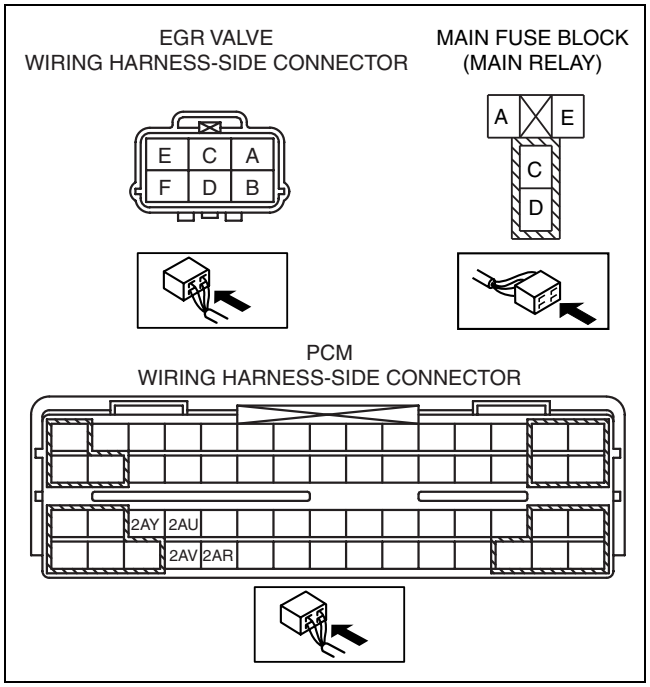
1. Disconnect the PCM connector. (See 01–40–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Inspect the following wiring harnesses for an open or short circuit (continuity check).

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 C
  - — EGR valve terminal D and main relay terminal C

Short circuit

- If there is continuity, the circuit is short. Repair or replace the wiring harness.
  - — EGR valve terminal A and body ground
  - — EGR valve terminal B and body ground
  - — EGR valve terminal E and body ground
  - — EGR valve terminal F and body ground

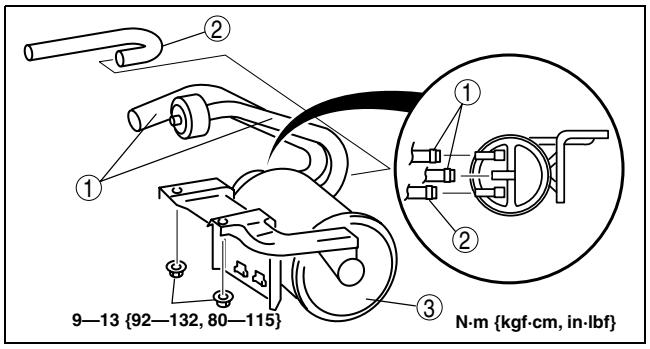


DPE116AW9902

CHARCOAL CANISTER REMOVAL/INSTALLATION [L8, LF]

DPE011613970W01

1. Remove in the order indicated in the table.



DPE0116ZW200

1	Evaporative hose
2	Fuel hose
3	Charcoal canister

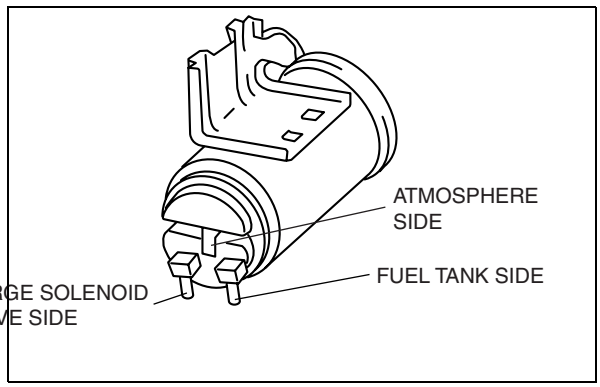
2. Install in the reverse order of removal.

CHARCOAL CANISTER INSPECTION [L8, LF]

DPE011613970W02

1. Remove the charcoal canister.

2. Plug the atmosphere side and purge solenoid valve side of the charcoal canister.
3. Inspect for air leakage when blowing air by mouth from the fuel tank side.
   - If air leaks, replace the charcoal canister.



DPE0116ZW200

ROLLOVER VALVE REMOVAL/INSTALLATION [L8, LF]

DPE011642720W01

Note
- The rollover valve cannot be removed as it is built into the fuel tank.

ROLLOVER VALVE INSPECTION [L8, LF]

DPE011642720W02

Note
- The rollover valve cannot be disassembled and inspected as it is built into the fuel tank.

1. Perform the fuel tank inspection. (See 01–14A–7 FUEL TANK INSPECTION [L8, LF].)

CHECK VALVE (TWO-WAY) REMOVAL/INSTALLATION [L8, LF]

DPE011642913W03

Note
- The check valve (two-way) cannot be removed as it is built into the fuel tank.

CHECK VALVE (TWO-WAY) INSPECTION [L8, LF]

DPE011642913W04

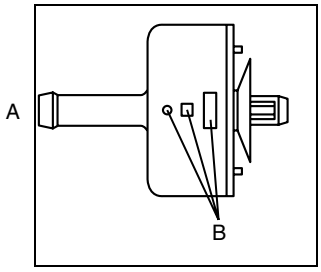
Note
- The check valve (two-way) cannot be disassembled and inspected as it is built into the fuel tank.

1. Perform the fuel tank inspection. (See 01–14A–7 FUEL TANK INSPECTION [L8, LF].)

EVAPORATIVE CHAMBER INSPECTION [L8, LF]

DPE011642590W02

1. Remove the evaporative chamber.
2. Blow from part A and verify that there is airflow from port B.
   - If not as specified, replace the evaporative chamber.



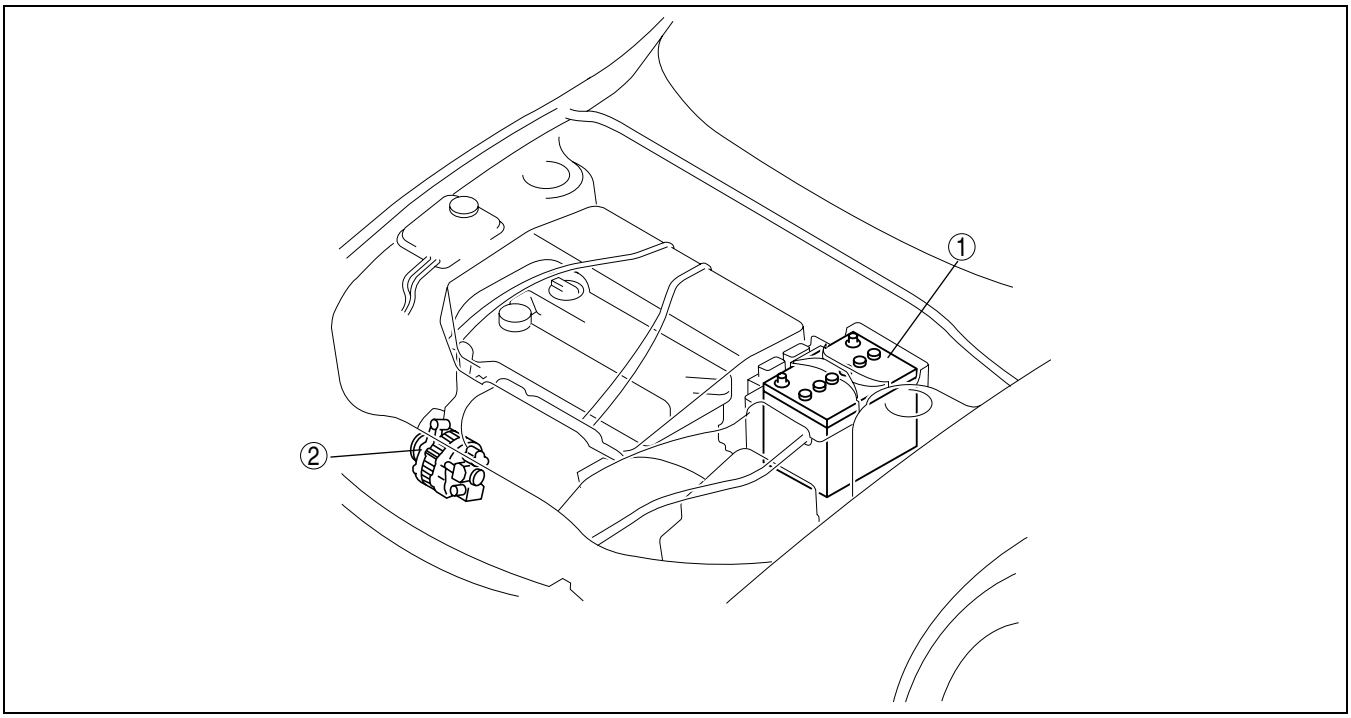
DPE116BW2100

01–17A CHARGING SYSTEM [L8, LF]

CHARGING SYSTEM LOCATION INDEX [L8, LF] 01–17A–1
BATTERY REMOVAL/INSTALLATION [L8, LF] 01–17A–1
BATTERY INSPECTION [L8, LF] 01–17A–5
BATTERY RECHARGING [L8, LF] 01–17A–6
GENERATOR REMOVAL/INSTALLATION [L8, LF] 01–17A–7
GENERATOR INSPECTION [L8, LF] 01–17A–7
GENERATOR DISASSEMBLY/ASSEMBLY [L8, LF] 01–17A–12

CHARGING SYSTEM LOCATION INDEX [L8, LF]

DPE011700000W01



CPJ117ZWB001

1	Battery (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].) (See 01–17A–5 BATTERY INSPECTION [L8, LF].) (See 01–17A–6 BATTERY RECHARGING [L8, LF].)

2	Generator (See 01–17A–7 GENERATOR REMOVAL/INSTALLATION [L8, LF].) (See 01–17A–7 GENERATOR INSPECTION [L8, LF].) (See 01–17A–12 GENERATOR DISASSEMBLY/ASSEMBLY [L8, LF].)

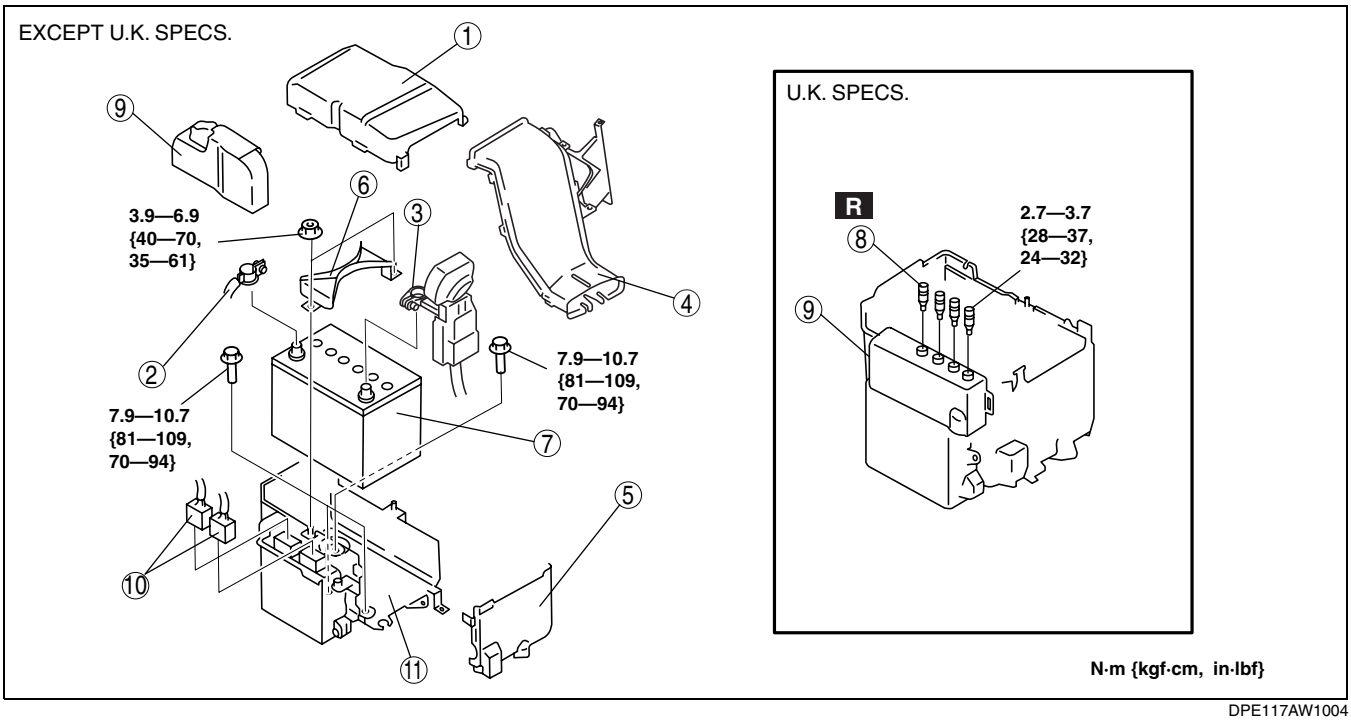
BATTERY REMOVAL/INSTALLATION [L8, LF]

DPE011718520W01

1. Remove in the order indicated in the table.

Note
- Remove the parts 8 to 11 in the table if necessary.

2. Install in the reverse order of removal.



DPE117AW1004

1	Battery cover (See 01–17A–4 Battery Cover Installation Note.)
2	Negative battery cable
3	Positive battery cable
4	Battery duct (See 01–17A–4 Battery Duct Installation Note.)
5	Battery box (See 01–17A–4 Battery Box Installation Note.)
6	Battery clamp (See 01–17A–3 Battery Clamp Installation Note.)

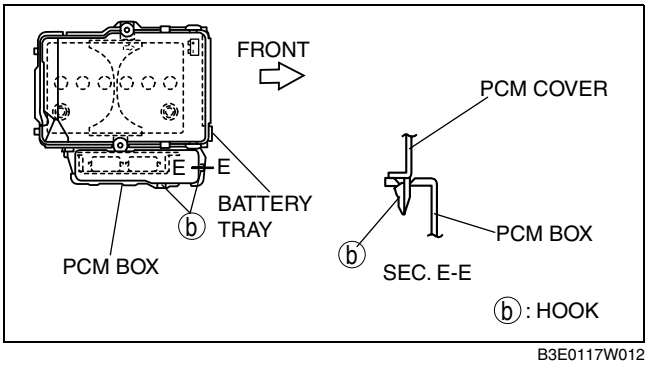
7	Battery
8	Set bolt (See 01–17A–2 Set Bolt Removal Note.) (See 01–17A–3 Set Bolt Installation Note.)
9	PCM cover (See 01–17A–2 PCM Cover Installation Note (Except U.K. Specs.).) (See 01–17A–3 PCM Cover Installation Note (U.K. Specs.).)
10	Connectors
11	Battery tray and PCM component

Set Bolt Removal Note

1. Drill the set bolts using a drill bit with a diameter larger than the shanks until the heads are removed.
   - If the shanks remain, remove them using locking pliers.
2. Clean all foreign material from the PCM connectors.

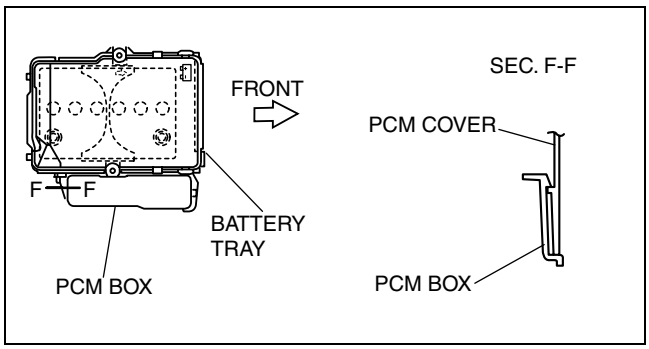
PCM Cover Installation Note (Except U.K. Specs.)

1. Install with the PCM cover hooks B aligned with the PCM box holes at two points.



B3E0117W012

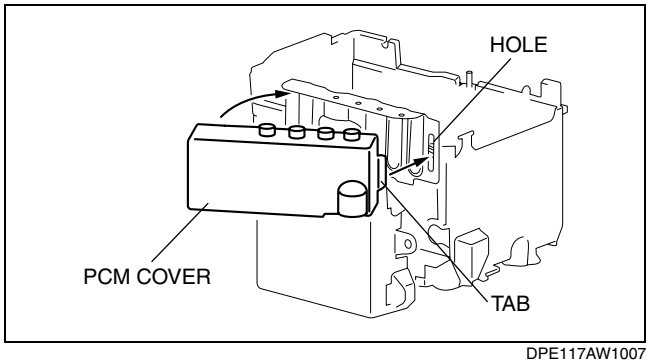
2. Install the PCM cover to the PCM box hook.



B3E0117W010

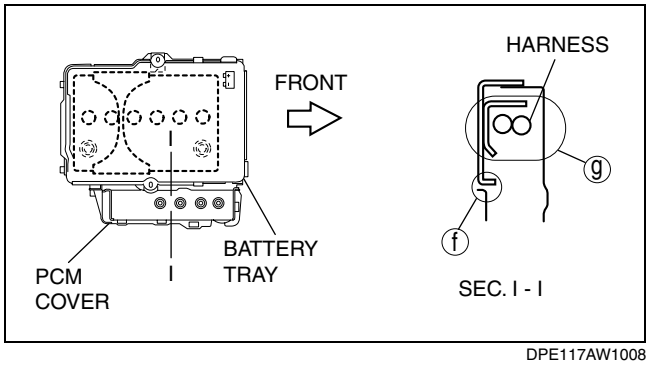
PCM Cover Installation Note (U.K. Specs.)

1. Insert the tab of the PCM cover to the hole.



DPE117AW1007

2. Rotate until area F is parallel. The harness and the PCM cover should be located at area G.



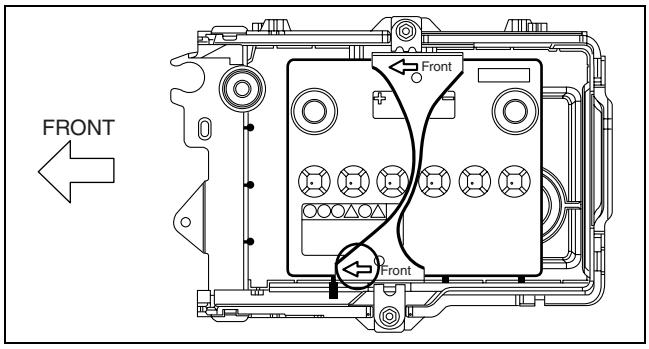
DPE117AW1008

Set Bolt Installation Note

1. Install new set bolts and temporarily tighten them first, then tighten them until the necks of the bolts break off.

Battery Clamp Installation Note

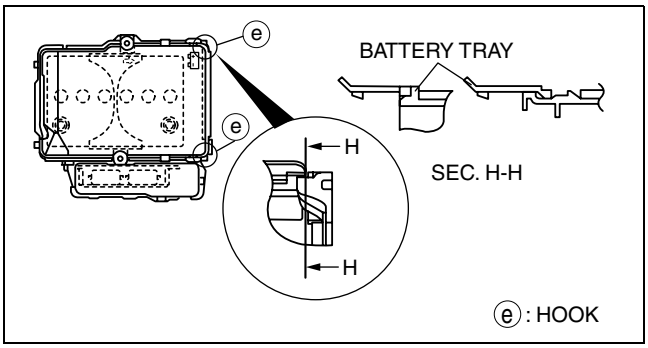
1. Assemble the battery clamp so that the arrow on it is pointed toward the front of the vehicle.



DPE117AW1003

Battery Box Installation Note

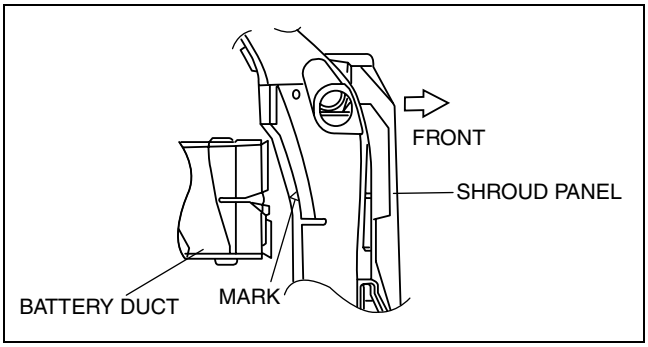
1. Assemble with battery box hooks E aligned with the battery tray holes at two points.



B3E0117W015

Battery Duct Installation Note

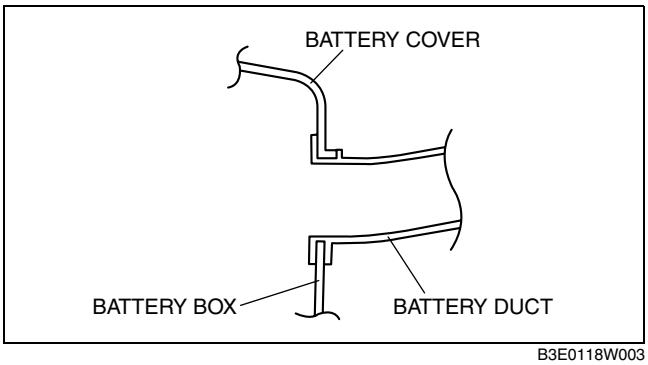
1. Match the mark of the shroud panel and notch in the battery duct, and install the battery duct to the shroud panel.



B3E0117W008

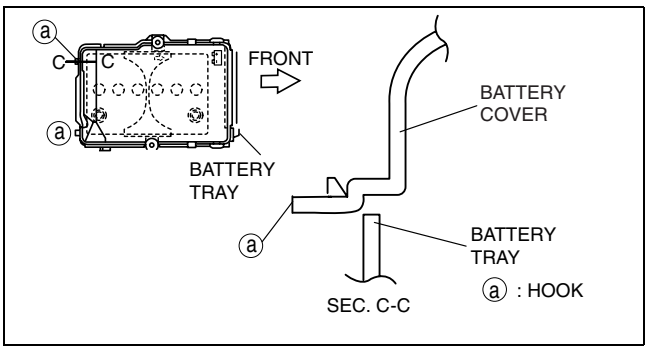
Battery Cover Installation Note

1. Install the battery duct between the battery cover and the battery box.



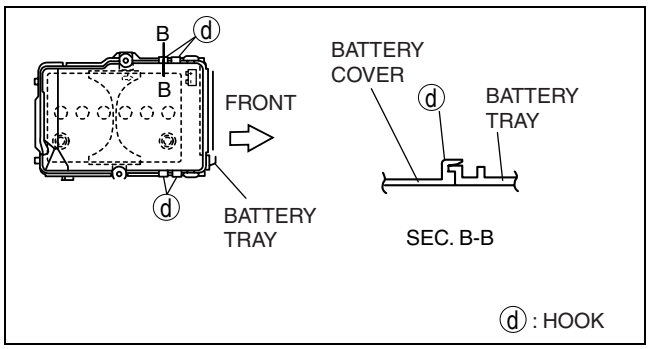
B3E0118W003

2. Install with battery cover hooks A aligned with the battery tray holes at two points.



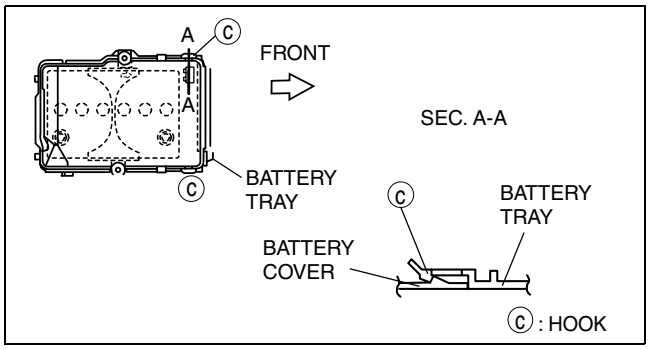
B3E0117W032

3. Install with battery cover hooks D aligned with the battery tray flange at four points.



DPE117AW1005

4. Set the battery cover to battery tray hooks C at two points.



B3E0117W013

BATTERY INSPECTION [L8, LF]

DPE011718520W02

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 specific gravity

1. Measure the electrolyte specific gravity using a hydrometer.
   - If it is less than the specification, recharge the battery. (See 01–17A–6 BATTERY RECHARGING [L8, LF].)

Battery electrolyte specific gravity [20 °C {68 °F}]
1.22—1.29

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 battery load test current) and record battery voltage after 15 s. Is voltage more than specification?	Yes	Normal
		No	Replace the battery.

Battery load test current
50D20L (40): 150 A
75D23L (52): 195 A

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 (key has been removed) and that all doors are closed.
2. Disconnect the negative battery cable.
3. Connect the tester between the negative battery terminal and negative battery cable, leave the battery undisturbed for 15 min., and then measure the back-up current.
   - 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.

Note
- If the battery is not left undisturbed for 15 min, the tester will indicate a high value (approx. 200 mA).
- If the key or any electrical accessory is operated within approx. 15 min after the tester is connected, the battery must be left undisturbed for approx. 15 min from that point.

Caution
- **Operating electrical loads while the back-up current is being measured can damage the tester.**

Battery back-up current
30 mA max.

4. Inspect and repair wiring harnesses and connectors of the fuse where the current has decreased.

BATTERY RECHARGING [L8, LF]

DPE011718520W03

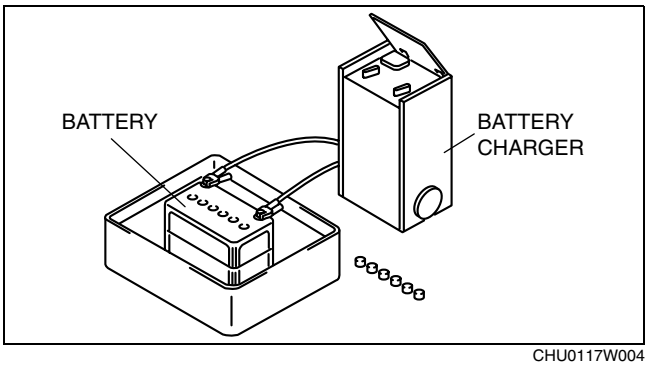
Warning
- **Keep all flames away from the battery, otherwise evaporated gas from the battery fluid may catch fire, and cause serious injury.**
- **Remove the battery filler caps when recharging to prevent battery deformation or damage.**

Caution
- **Do not quick charge for more than 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.

Battery slow charge current
50D20L (40): 4.0—5.0 A
75D23L (52): 5.0—6.0 A

Battery quick charge current [30 min.]
50D20L (40): 25 A
75D23L (52): 35 A



CHU0117W004

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

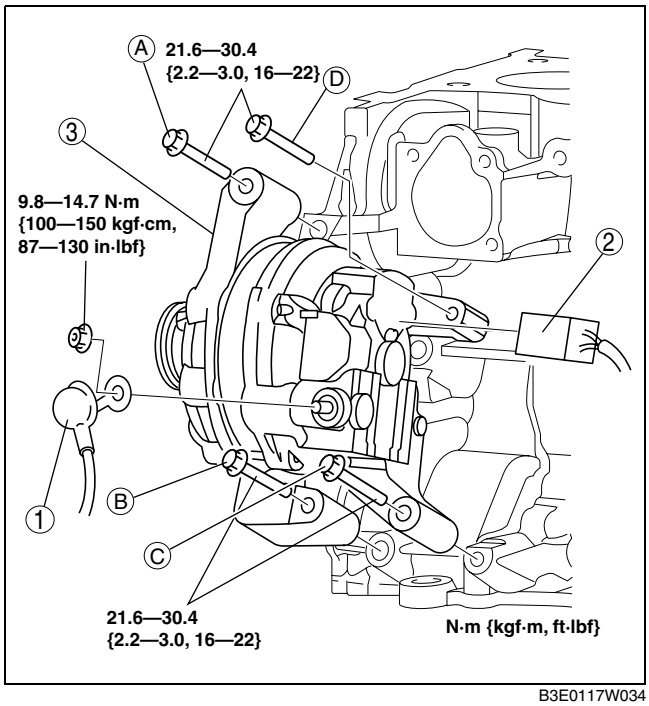
GENERATOR REMOVAL/INSTALLATION [L8, LF]

DPE011718300W01

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 cable before performing the following operation.**

1. Remove the battery cover. (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, 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 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
5. Position the coolant reserve tank out of the way.
6. Position the drive belt out of the way. (See 01–10A–3 DRIVE BELT REPLACEMENT [L8, LF].)
7. Remove in the order indicated in the table.
8. Install in the reverse order of removal.

1	B terminal cable
2	Generator connector
3	Generator (See 01–17A–7 Generator Installation Note.)



B3E0117W034

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. Tighten the generator installation bolts in the order A, B, C, and D.

GENERATOR INSPECTION [L8, LF]

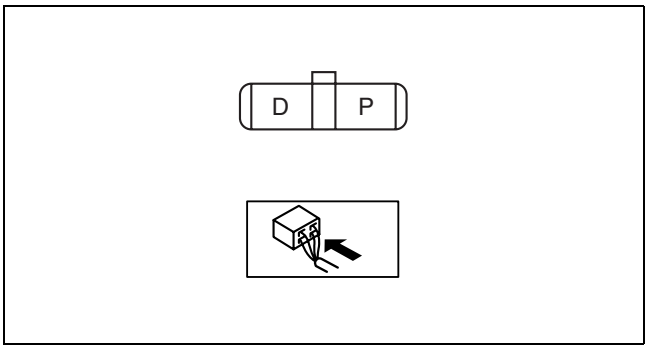
DPE011718300W02

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 01–10A–2 DRIVE BELT INSPECTION [L8, LF].)
3. With the ignition switch turned to the ON position, 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 go out, inspect if any one of the following DTCs in the on-board diagnostic system are displayed: P0112, P0113, P2502, P2503, P2504. (See 01–02A–9 DTC TABLE [L8, LF].)

Generator
Voltage
1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is correct. (See 01–10A–2 DRIVE BELT INSPECTION [L8, 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.



BME0117W104

Generator standard voltage [IG-ON]
Terminal B: B+
Terminal P: Approx. 1 V or less
Terminal D: Approx. 0 V

Generator standard voltage [Idle, 20 °C {68 °F}]
Terminal B: 13—15 V
Terminal P: Approx. 3—8 V
Terminal D: Turn the electrical loads (headlights, blower motor, rear window defroster) on and verify that the voltage reading increases.

Current

Note
- Since the charging current decreases rapidly after starting the engine, carry out the following procedure quickly, and read the maximum current value.

1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is correct. (See 01–10A–2 DRIVE BELT INSPECTION [L8, LF].)
3. Disconnect the negative battery cable.
4. Connect a tester, which can read **120 A or more,** 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 to **2,500 rpm**.

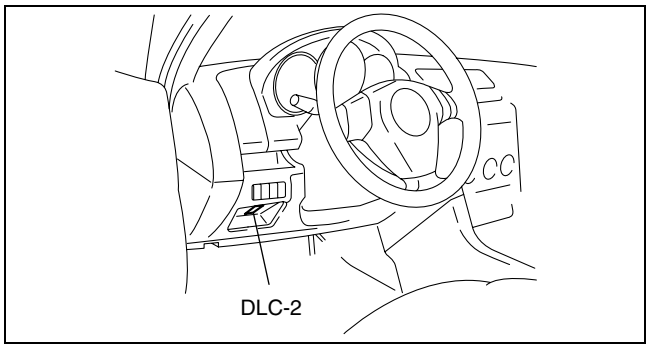
Note
- When the electrical load of the vehicle is low, specified current will not be verified although the generator is normal. In this case, increase the electrical load (by turning on the headlight and leave it for a while, then discharge the battery or by similar methods) and recheck.
- When the generator itself or the ambient temperature are too high, specified current will also not be verified. In this case, cool down the generator and recheck.

9. Turn the following electrical loads on and verify that the current reading increases more than the minimum value indicated below.
   — If it is not as specified, go to PCM and generator shearing inspection. (See 01–17A–9 PCM and generator shearing inspection.)
   - Headlights (high-beam)
   - Blower motor (HI)
   - Rear window defroster
   - Brake light

Generator generated current minimum value
70 % of the nominal output current (nominal output current: 90 A)
[ambient temp. 20 °C {68 °F}, voltage 13.0—15.0 V, both engine and generator are hot]

PCM and generator shearing inspection

1. Connect the WDS or equivalent to the DLC-2.
2. Inspect as follows:



DPE102ZW2001

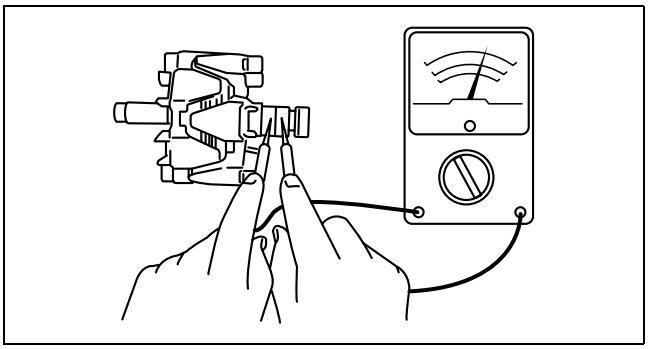
Step	Inspection		Action
1	Measure the generator terminal B voltage when the electrical loads*1 are on and off.	15 V or more	Go to Step 2.
		13—15 V	Normal*2
		13 V or less	Go to Step 3.
2	Monitor the ALTT V PID using WDS or equivalent, or measure the voltage of PCM terminal 2AM using a tester. Is the voltage between 13 and 15 V ?	Yes	Go to Step 4.
		No	PCM input error.
3	Monitor the ALTT V PID using WDS or equivalent, or measure the voltage of PCM terminal 2AM using a tester. Is the voltage between 13 and 15 V ?	Yes	Go to Step 5.
		No	PCM input error.
4	Monitor the ALTF PID using WDS or equivalent, or calculate the duty value of the PCM terminal 2AQ using oscilloscope. Is the duty value 100 **%** ?  $\frac{A}{B}$ x 100 (%) = DUTY (%)	Yes	PCM input error.
		No	PCM, generator, or both are not normal.
5	Monitor the ALTF PID using WDS or equivalent, or calculate the duty value of the PCM terminal 2AQ using oscilloscope. Is the duty value 0 **%** ?  $\frac{A}{B}$ x 100 (%) = DUTY (%)	Yes	PCM input error.
		No	PCM, generator, or both are not normal.

*1 : Headlights, blower motor, rear window defroster, and brake light.
*2 : If the generator field coil duty value does not change when electrical loads (such as headlights, blower motor, rear window defroster, brake light) are on or off, inspection with discharged battery is needed.

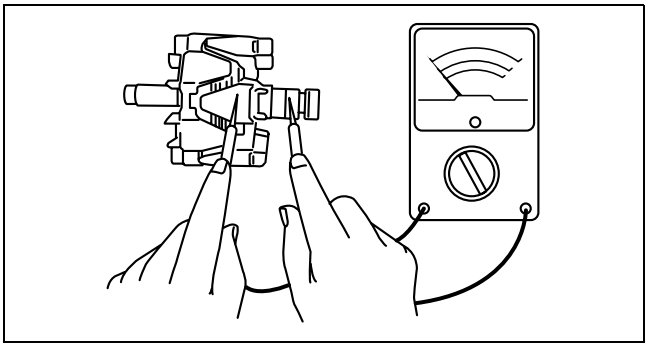
Generator Inner Parts
Rotor

1. Measure the resistance between the slip rings using a tester.
   - If not as specified, replace the rotor.

   Generator rotor resistance (between slip rings) [20 °C {68 °F}]
   1.7—2.1 ohms

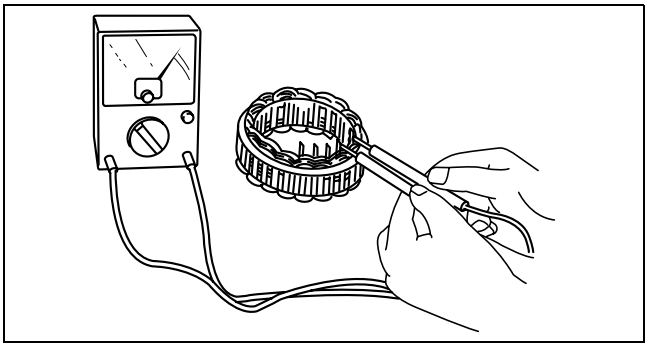

CHU0117W005

2. Verify that there is no continuity between the slip ring and core using a tester.
   - If there is continuity, replace the rotor.
3. Inspect the slip ring surface condition.
   - If the slip ring surface is rough, use a lathe or fine sandpaper to repair it.

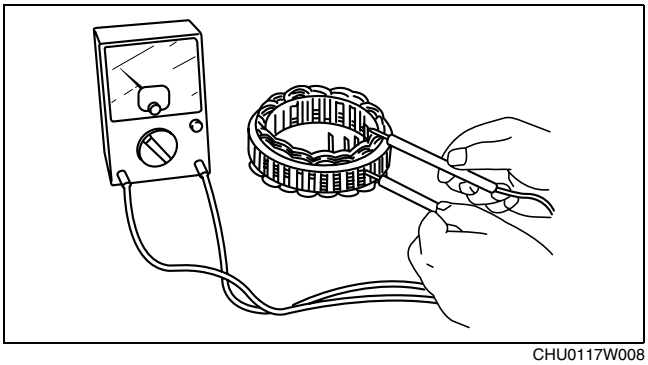

CHU0117W006

Stator coil

1. Inspect for continuity between the stator coil leads using a tester.
   - If there is no continuity, replace the stator.


CHU0117W007

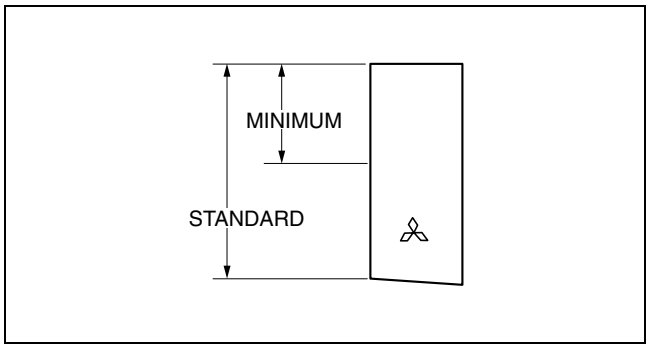
2. Verify that there is no continuity between the stator coil leads and the core using a tester.
   - If there is continuity, replace the stator coil.


CHU0117W008

Brush

1. Inspect brushes for wear.
   - If any brush is worn almost to or beyond the limit, replace all of the brushes.

   Generator brush length
   Standard: 18.5 mm {0.73 in}
   Minimum: 5.0 mm {0.2 in}

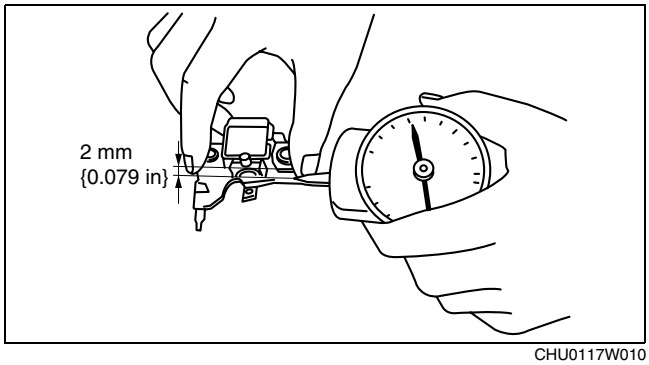


CHU0117W009

Brush spring

1. Measure the force of the brush spring using a spring pressure gauge.
2. Read the spring pressure gauge at the brush tip projection of **2 mm {0.079 in}**.
   - Replace the brush spring if necessary.

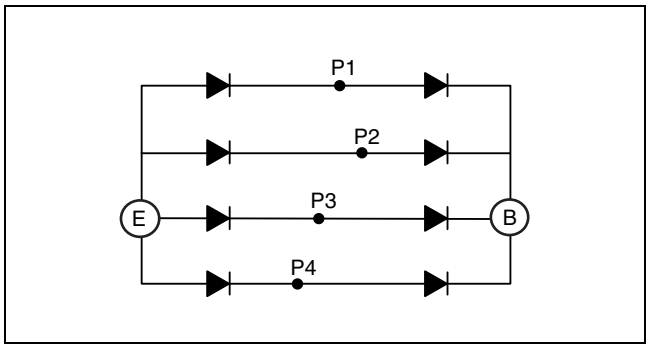
   Generator brush spring force
   Standard: 4.8—6.0 N {0.49—0.61 kgf, 1.08—1.34 lbf}
   Minimum: 2.16 N {0.22 kgf, 0.49 lbf}



CHU0117W010

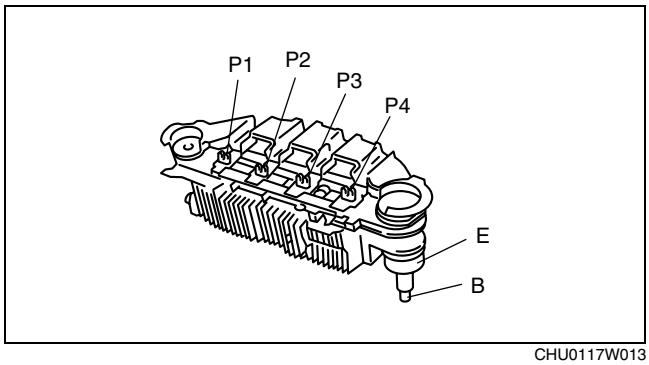
Rectifier

1. Inspect for continuity of the diodes using a tester.



CHU0117W011

   - If not as specified, replace the rectifier.



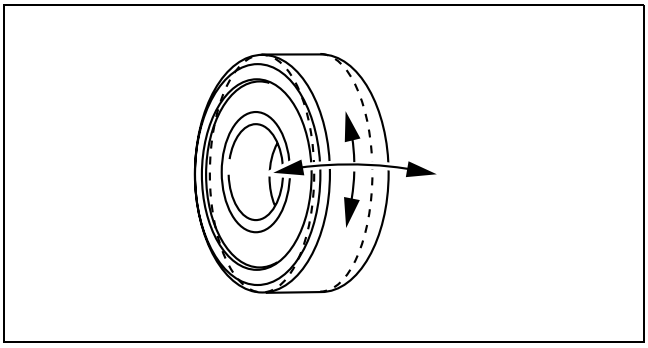
CHU0117W013

Specification

Tester		Continuity
Negative	Positive	
E	P1, P2, P3, P4	Yes
B		No
P1, P2, P3, P4	E	No
	B	Yes

Bearing

1. Inspect for abnormal noise, looseness, and sticking.
   - Replace the bearing if necessary.



CHU0117W015

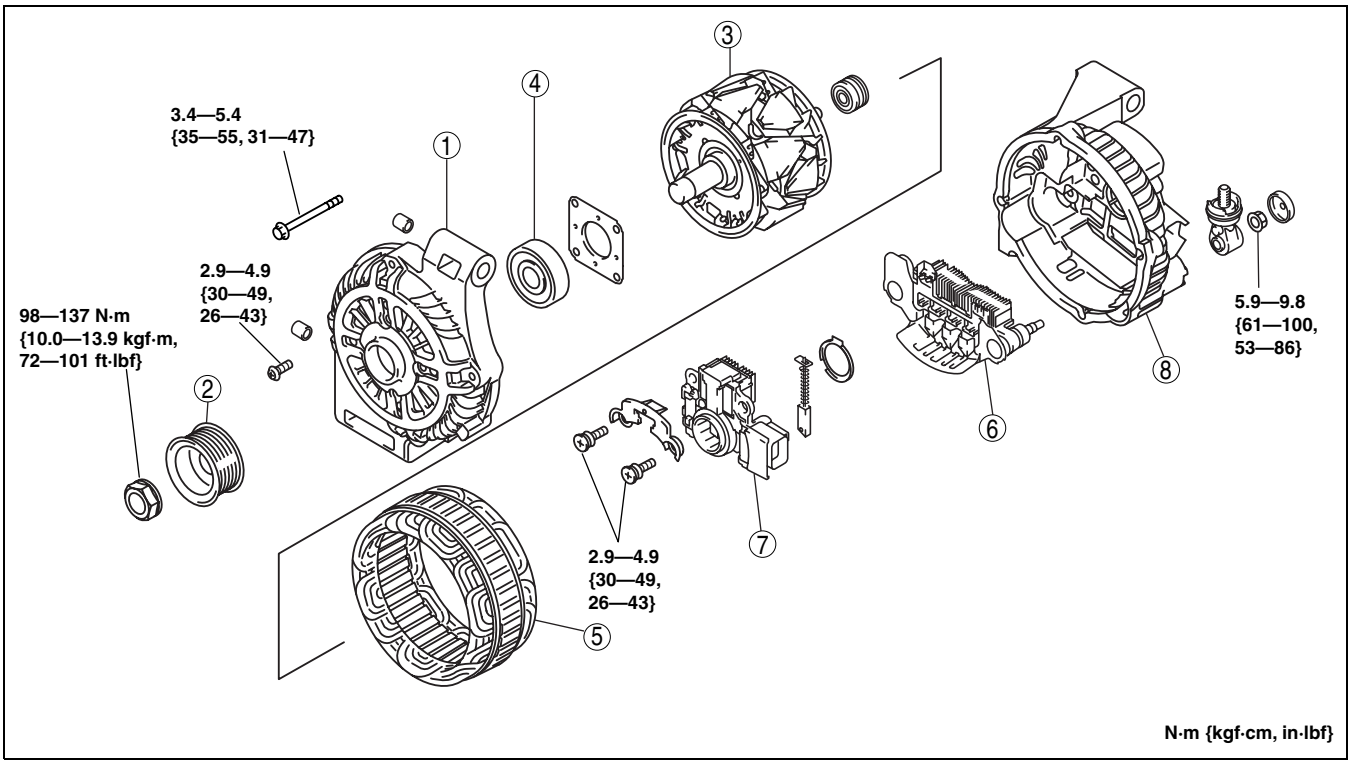
GENERATOR DISASSEMBLY/ASSEMBLY [L8, LF]

DPE011718300W05

Caution

- **Melt the solder quickly, otherwise the diodes (rectifier) and regulator will be damaged by excessive heat.**

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



DPE117AW1006

1	Front cover
2	Pulley
3	Rotor
4	Bearing

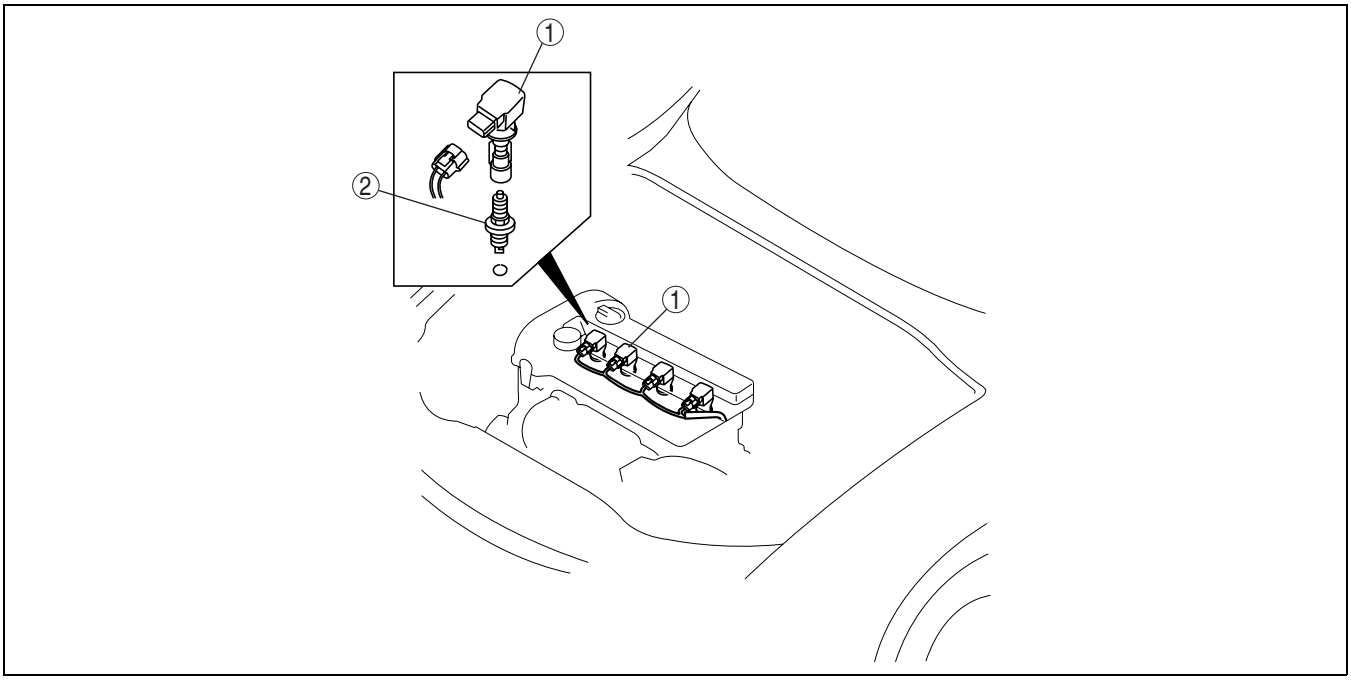
5	Stator coil
6	Rectifier
7	Brush holder
8	Rear bracket

01–18 IGNITION SYSTEM [L8, LF]

IGNITION SYSTEM LOCATION INDEX [L8, LF] 01–18–1
IGNITION COIL REMOVAL/INSTALLATION [L8, LF] 01–18–1
IGNITION COIL INSPECTION [L8, LF] . . 01–18–2
SPARK PLUG REMOVAL/INSTALLATION [L8, LF] 01–18–3
SPARK PLUG INSPECTION [L8, LF] . . . 01–18–3

IGNITION SYSTEM LOCATION INDEX [L8, LF]

DPE011800000W01



CPJ118ZWB002

1	Ignition coil (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, LF].) (See 01–18–2 IGNITION COIL INSPECTION [L8, LF].)
2	Spark plug (See 01–18–3 SPARK PLUG REMOVAL/INSTALLATION [L8, LF].) (See 01–18–3 SPARK PLUG INSPECTION [L8, LF].)

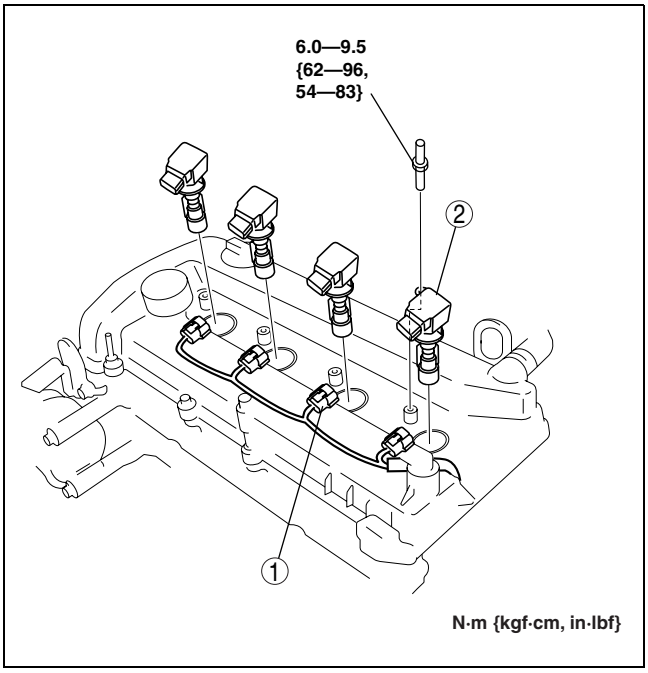
IGNITION COIL REMOVAL/INSTALLATION [L8, LF]

DPE011818100W01

1. Remove the battery cover. (See 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
4. Remove in the order indicated in the table.

5. Install in the reverse order of removal.

1	Connector
2	Ignition coil



DPE118AW1001

IGNITION COIL INSPECTION [L8, LF]

DPE011818100W03

Ignition Coil Inspection

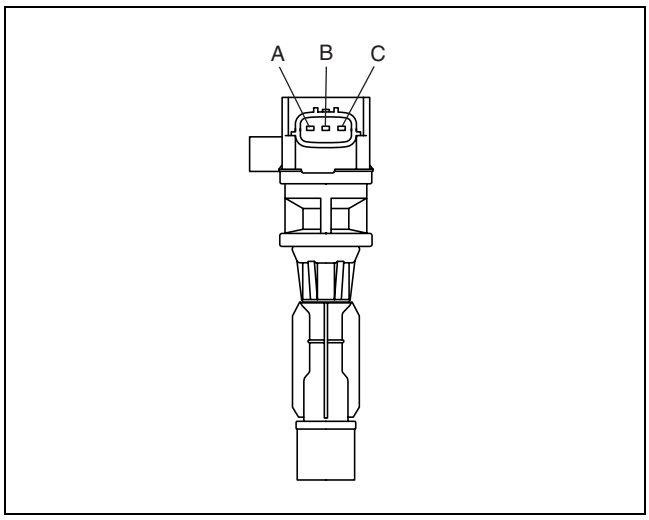
Note
- It is unlikely that all four ignition coils fail to operate properly. To prevent replacing a normal component, perform the following procedure, identify the malfunctioning ignition coil, and replace it.

1. Perform the spark test and identify the malfunctioning cylinder.
2. Replace the ignition coil of the malfunctioning cylinder with that of a normal cylinder, and reperform the spark test.
   - If the spark is not normal due to a malfunctioning ignition coil, replace that ignition coil.

Ignition Coil with Built-In Igniter Inspection

1. Remove the ignition coil connector.
2. Measure the resistance between each terminal on the ignition coil connector using an analog circuit tester.
   - If the measurement corresponds to the table, replace the ignition coil.

Item	Tester Connection Position		Condition
	Positive	Negative	
Terminal	C	A	0 ohm is not normal (∞ ohm is normal)
	A	C	
	C	B	
	B	C	
	A	B	∞ or 0 ohm is not normal (several kilohm is normal)
	B	A	



CPJ118ZWB003

SPARK PLUG REMOVAL/INSTALLATION [L8, LF]

DPE011818110W01

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 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the plug hole plate. (See 01–10A–2 PLUG HOLE PLATE REMOVAL/INSTALLATION [L8, LF].)
4. Remove the ignition coil. (See 01–18–1 IGNITION COIL REMOVAL/INSTALLATION [L8, 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—1.4 kgf·m, 8—10 ft·lbf}

SPARK PLUG INSPECTION [L8, LF]

DPE011818110W02

Specification

Spark plug type
L303 18 110

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 exceeds the specification, replace the spark plug.

Spark plug gap
1.25—1.35 mm {0.049—0.053 in}

Cleaning

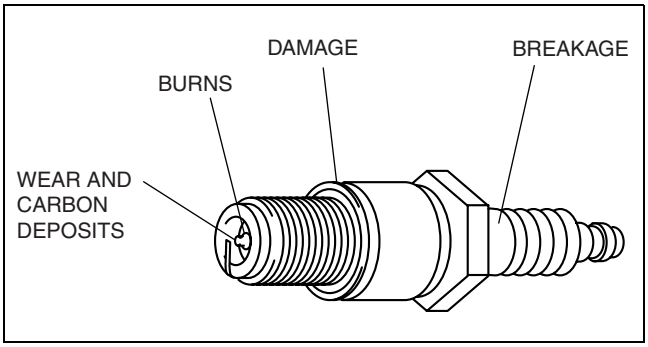
Caution
- **Carbon may adhere to the tip of the spark plug during vehicle delivery or repeated short distance driving during the winter time. If there is any malfunction such as rough idling or start difficulty due to carbon adhesion causing plug fouling, burn off the carbon by performing no-load racing of the engine.**
- **When performing the no-load racing, apply the side brake and foot brake, move the shift lever to neutral (MTX), or the selector lever to P position (ATX) to prevent accident and serious injury.**
- **To avoid possible damage to the spark plug tip, do not use a wire brush for cleaning.**

Note
- To avoid possible damage to the tip, use gasoline to clean the spark plugs after removing dirt.

1. If there is carbon adhering to the spark plug, perform no-load racing at **3,000 rpm for 3 min**.

Visual inspection

1. Inspect the following items:
   - If any of the following malfunction are indicated, replace the spark plug.
     — Insulator breakage
     — Worn electrode
     — Damaged gasket
     — Badly burned insulator (sparking side)

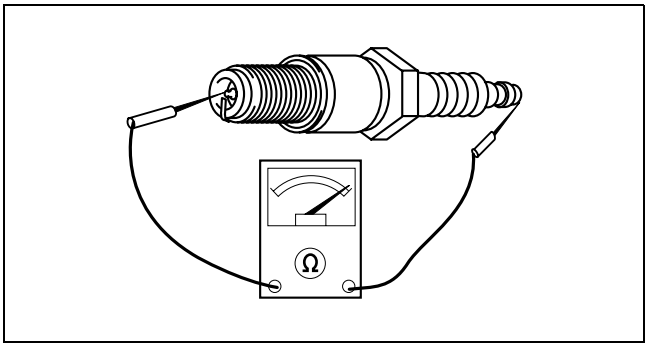


CHU0118W012

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.

Spark plug resistance [25 °C {77 °F}]
3.0—7.5 kilohms



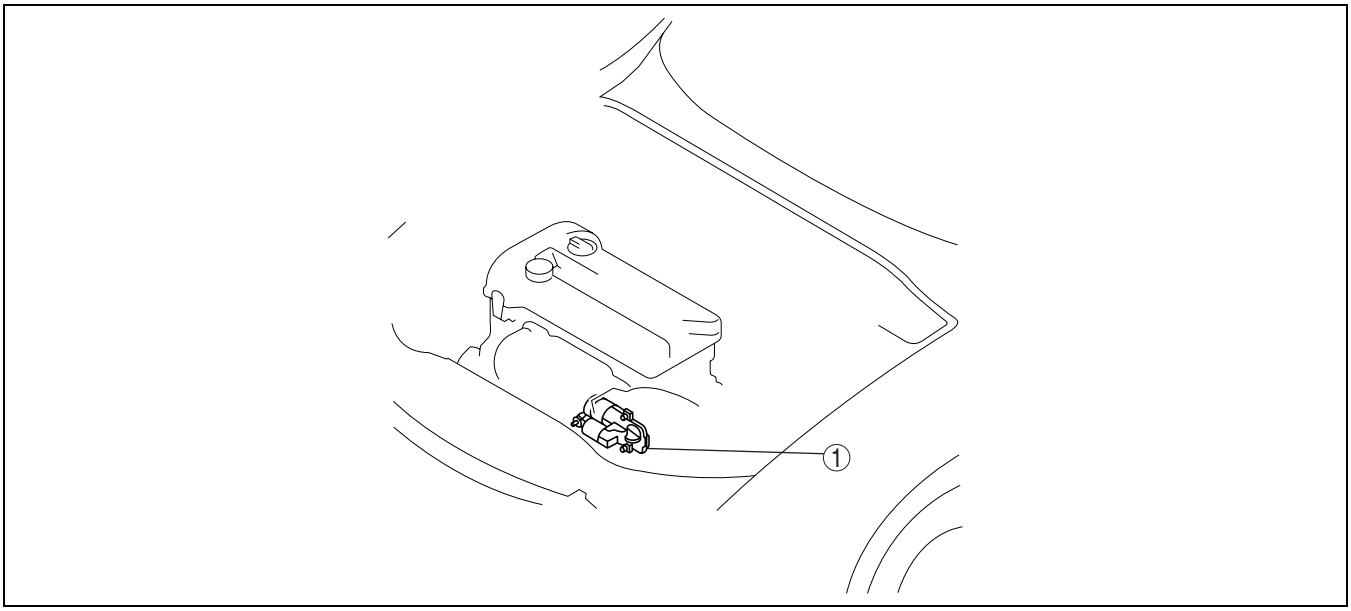
BHJ0118W015

01–19A STARTING SYSTEM [L8, LF]

STARTING SYSTEM LOCATION INDEX [L8, LF] 01–19A–1
STARTER REMOVAL/INSTALLATION [L8, LF] 01–19A–1
STARTER INSPECTION [L8, LF]. 01–19A–2
STARTER DISASSEMBLY/ASSEMBLY [L8, LF] 01–19A–6

STARTING SYSTEM LOCATION INDEX [L8, LF]

DPE011900000W01



CPJ119ZWB001

1	Starter (See 01–19A–1 STARTER REMOVAL/INSTALLATION [L8, LF].) (See 01–19A–2 STARTER INSPECTION [L8, LF].) (See 01–19A–6 STARTER DISASSEMBLY/ASSEMBLY [L8, LF].)

STARTER REMOVAL/INSTALLATION [L8, LF]

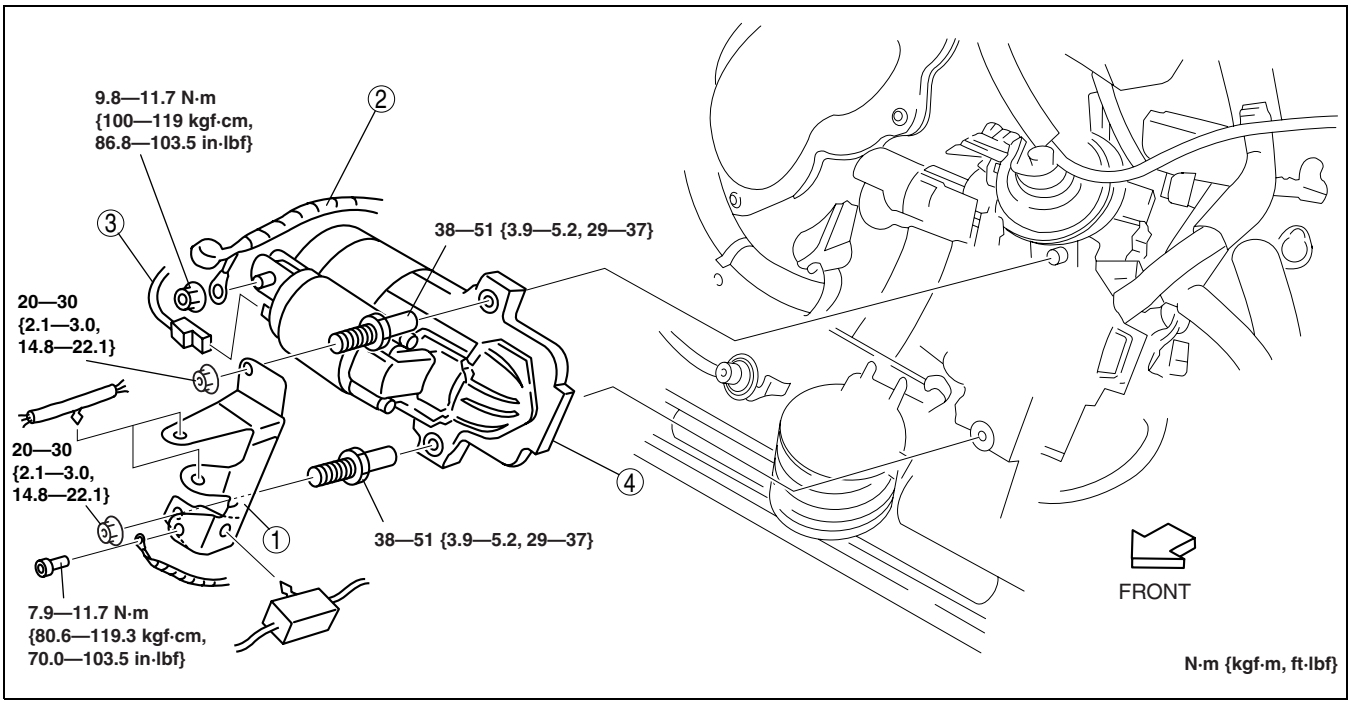
DPE011918400W01

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 01–17A–1 BATTERY REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the negative battery cable.
3. Remove the under cover.
4. Remove the clutch release cylinder with the pipes still connected. (MTX) (See 05–15–3 MANUAL TRANSAXLE REMOVAL/INSTALLATION [G35M-R].)
5. Remove in the order indicated in the table.

6. Install in the reverse order of removal.



DPE119AW1002

1	Wiring harness bracket
2	Terminal B cable
3	Terminal S connector
4	Starter

STARTER INSPECTION [L8, LF]

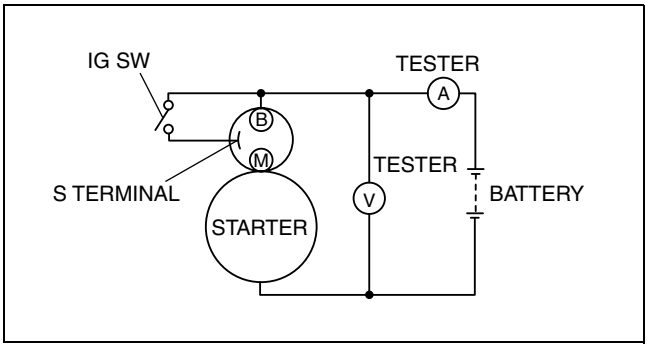
DPE011918400W02

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.



DPE119AW1003

Starter no load test voltage
11 V

Starter no load test current
90 A or less

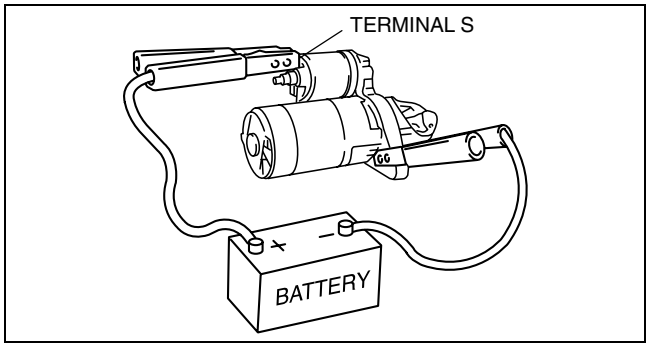
Magnetic Switch Operation Inspection

Pull-out test

Note
- Depending on the battery charge condition, the starter motor pinion may rotate while in a protracted state.

This is due to current flowing to the starter motor through the pull-in coil to turn the starter motor, and does not indicate an abnormality.

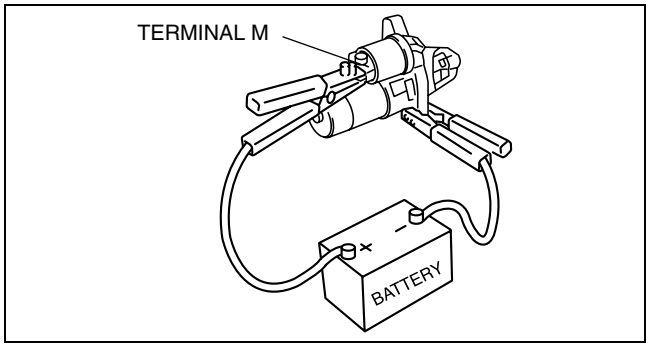
1. Verify that the starter motor pinion is protracted while battery positive voltage is connected to terminal S and the starter body is grounded.
   - If not pulled out, repair or replace the starter.



CHU0119W023

Return test

1. Disconnect the motor wire from terminal M.
2. Connect battery positive voltage to terminal M and ground the starter body.
3. Pull out the drive pinion with a screwdriver. Verify that it returns to its original position when released.
   - If it does not return, repair or replace the starter.

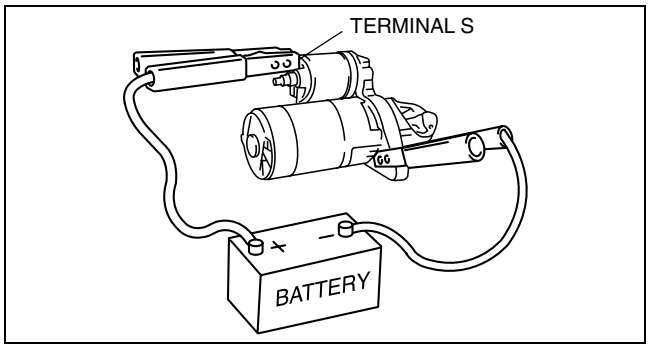


CHU0119W022

Pinion Gap Inspection

1. Pull out the drive pinion with the battery positive voltage connected to terminal S and the starter body grounded.

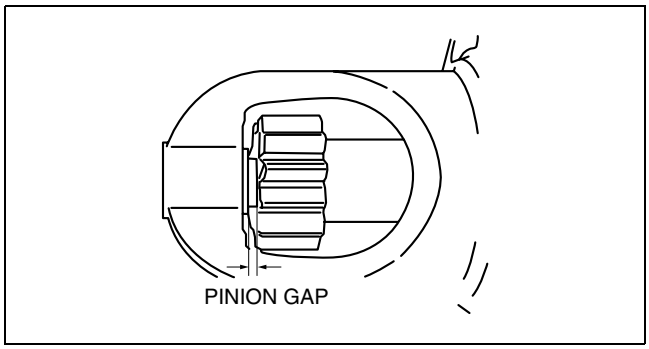
   Caution
   - **Applying power for more than 10 s can damage the starter. Do not apply power for more than 10 s.**



CHU0119W023

2. Measure the pinion gap while the drive pinion is pulled.
   - If not as specified, adjust with an adjustment washer (between drive housing front cover and magnetic switch).

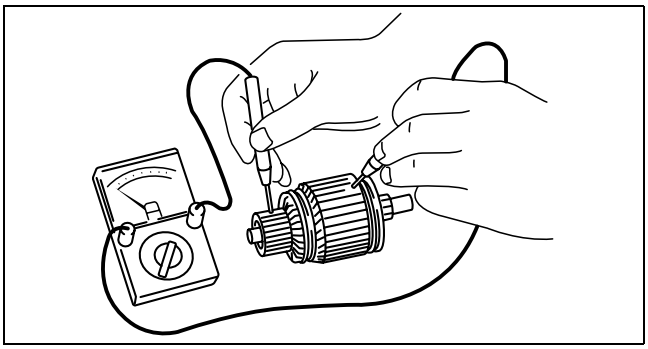
   Starter pinion gap
   0.5—2.0 mm {0.02—0.07 in}



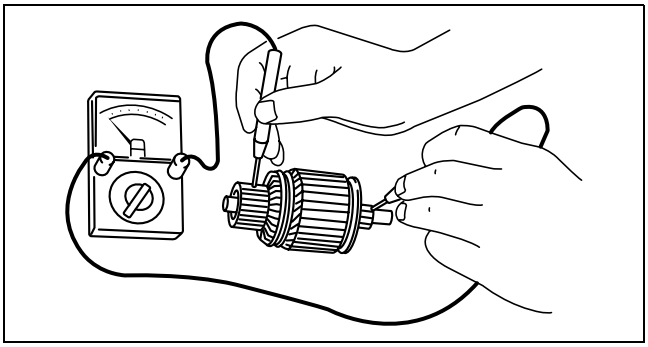
CHU0119W015

Starter Inner Parts Inspection
Armature

1. Verify that there is no continuity between the commutator and the core at each segment using a tester.
   - If there is continuity, replace the armature.

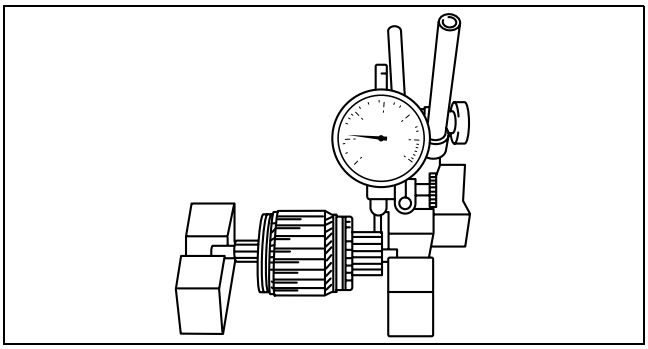

CHU0119W016

2. Verify that there is no continuity between the commutator and the shaft using a tester.
   - If there is continuity, replace the armature.


CHU0119W017

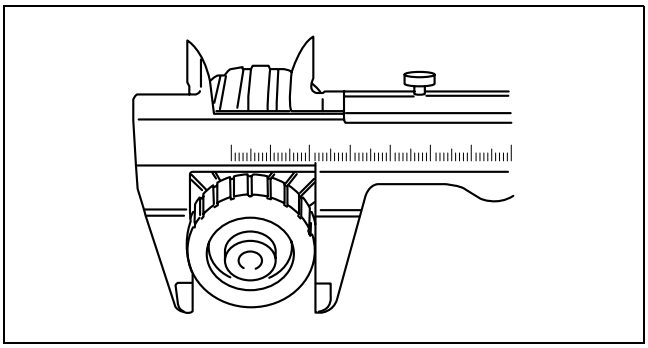
3. Place the armature on V-blocks, and measure the runout using a dial indicator.

   Starter armature runout
   0.05 mm {0.002 in} max.


CHU0119W018

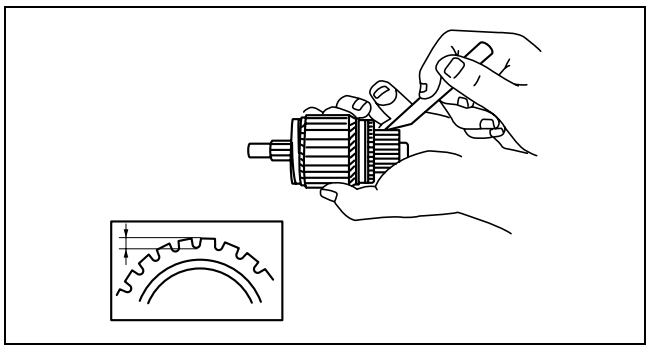
4. Measure the commutator diameter.
   - If not within the minimum specification, replace the armature.

   Starter commutator diameter
   Standard: 29.4 mm {1.16 in}
   Minimum: 28.8 mm {1.13 in}


CHU0119W019

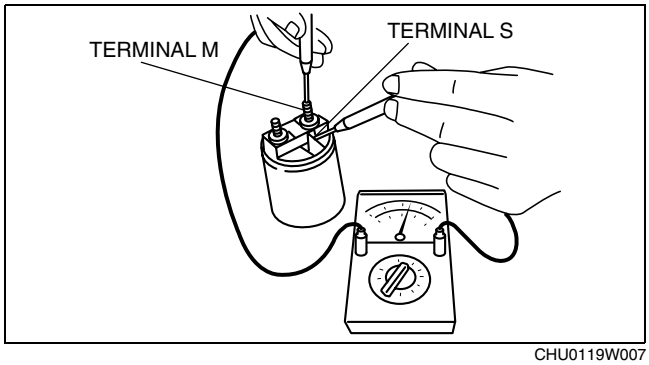
5. Measure the segment groove depth of the commutator.
   - If not within the minimum specification, undercut the grooves to the standard depth.

Segment groove depth of starter commutator
Standard: 0.4—0.6 mm {0.016—0.023 in}
Minimum: 0.2 mm {0.008 in}


CHU0119W020

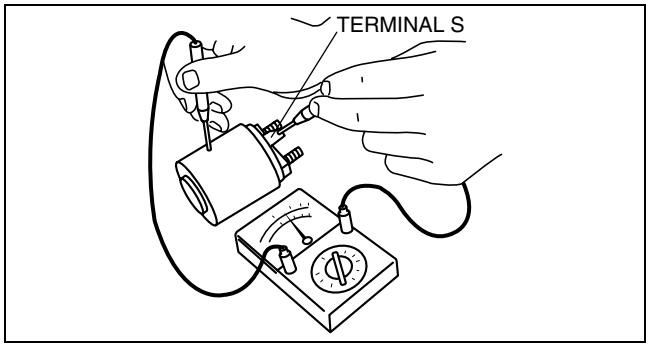
Magnetic switch

1. Inspect for continuity between terminals S and M using a tester.
   - If there is no continuity, replace the magnetic switch.
2. Inspect for continuity between terminal S and the body using a tester.
   - If there is no continuity, replace the magnetic switch.

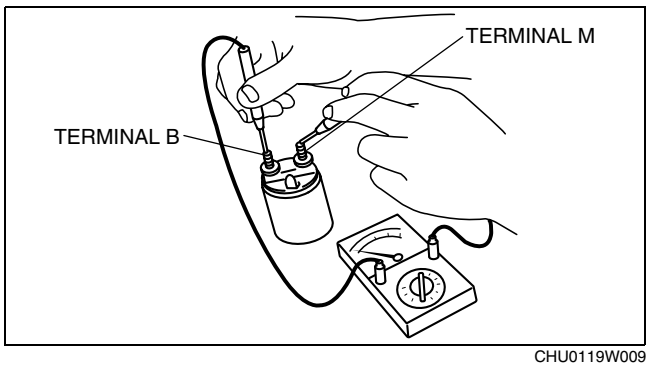


CHU0119W007

3. Verify that there is no continuity between terminals M and B using a tester.
   - If there is continuity, replace the magnetic switch.



CHU0119W008



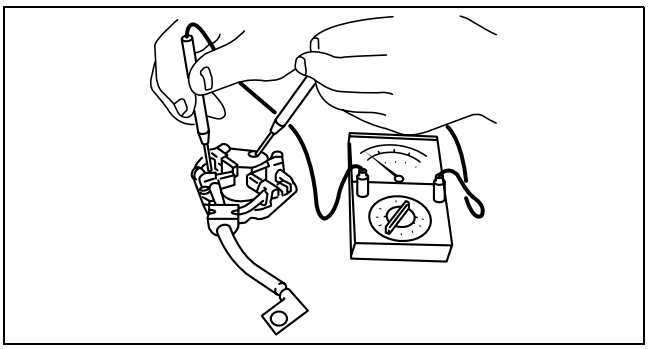
CHU0119W009

Brush and brush holder

1. Verify that there is no continuity between each insulated brush and plate using a tester.
   - If there is continuity, replace the brush holder.

2. Measure the brush length.
   - If any brush is worn almost to or beyond the minimum specification, replace all the brushes.

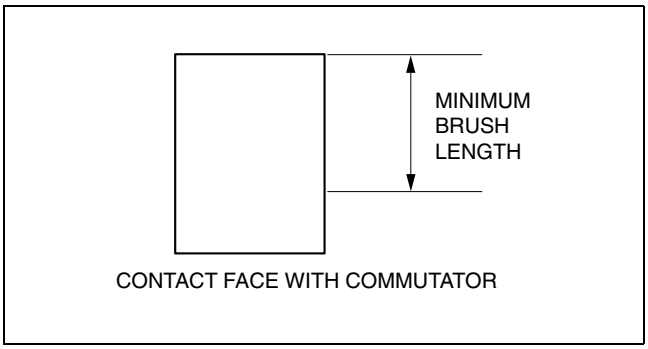
   Starter brush length
   Standard: 12.3 mm {0.48 in}
   Minimum: 7.0 mm {0.28 in}



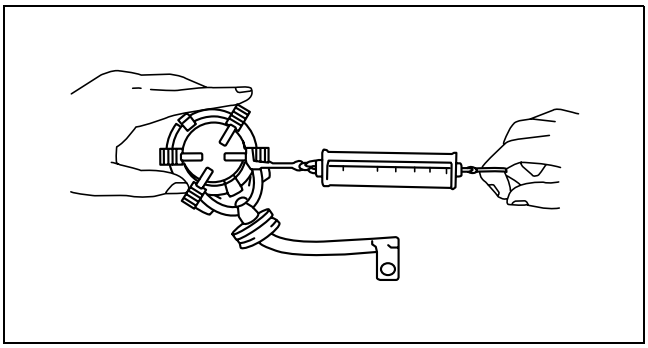
CHU0119W012

3. Measure the brush spring force using a spring balance.
   - If not within the minimum specification, replace the brush spring.

   Starter brush spring force
   Standard: 18.3—24.9 N {1.87—2.53 kgf, 4.12—5.59 lbf}
   Minimum: 5.9 N {0.6 kgf, 1.3 lbf}



CHU0119W013



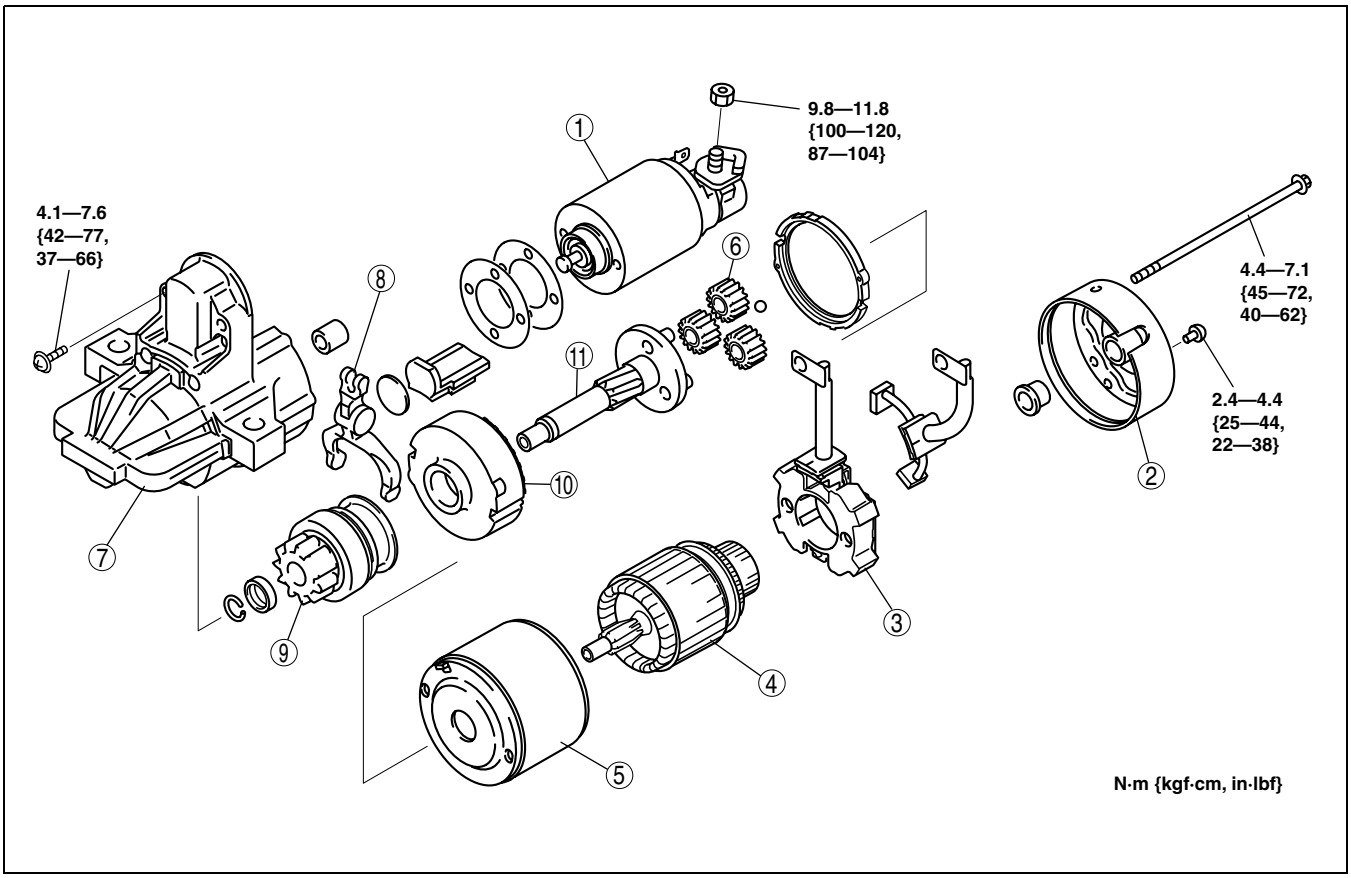
CHU0119W014

STARTER DISASSEMBLY/ASSEMBLY [L8, LF]

DPE011918400W05

1. Disassemble in the order indicated in the table.

2. Assemble in the reverse order of disassembly.



ADJ0119W001

1	Magnetic switch
2	Rear housing
3	Brush and brush holder
4	Armature
5	Yoke
6	Planetary gear

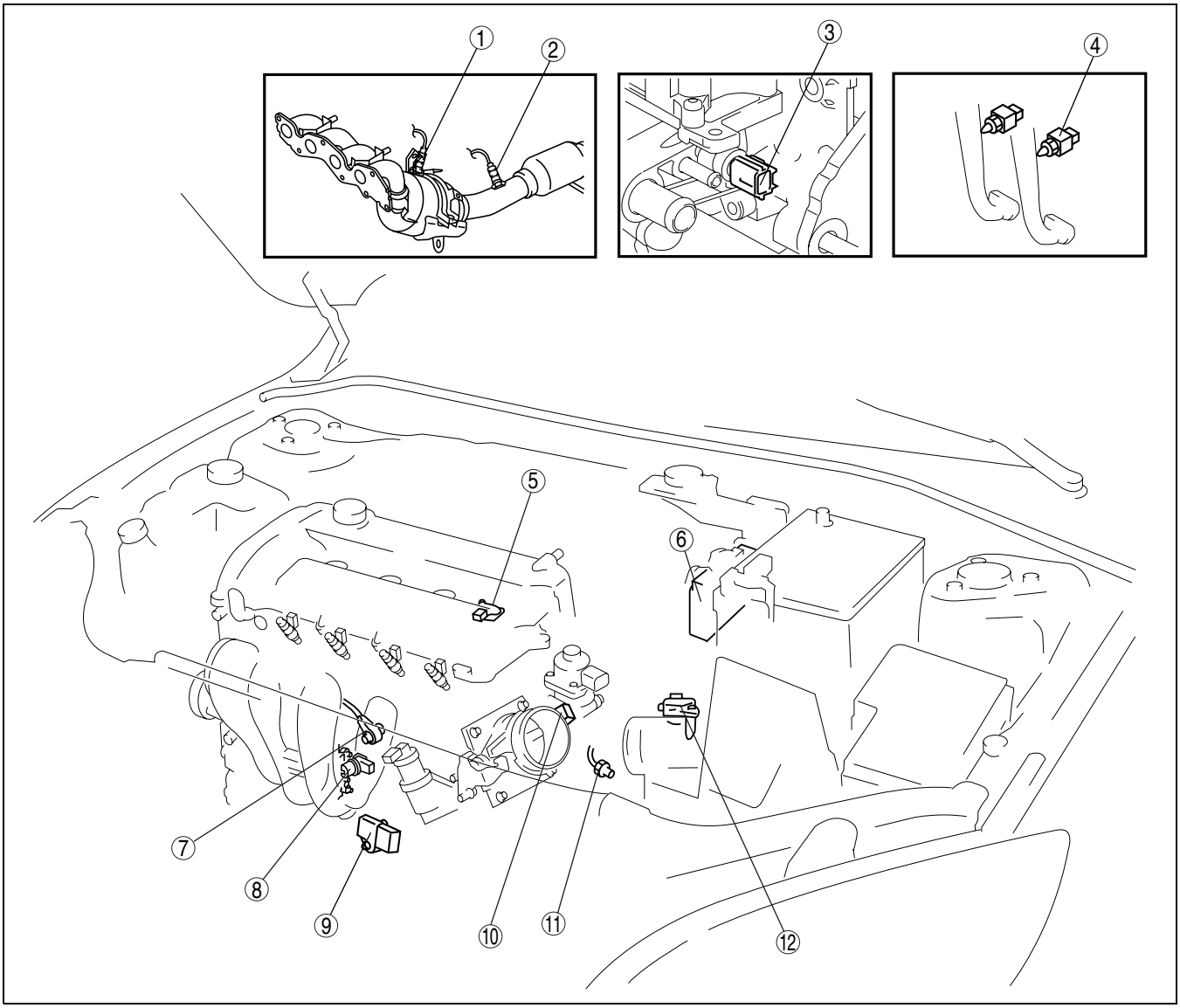
7	Front cover
8	Lever
9	Drive pinion
10	Internal gear
11	Gear shaft

01–40A CONTROL SYSTEM [L8, LF]

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CONTROL SYSTEM WIRING DIAGRAM [L8, LF] 01–40A–4
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PCM CONFIGURATION [L8, LF] 01–40A–24
NEUTRAL SWITCH INSPECTION [L8, LF] 01–40A–25
CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [L8, LF] 01–40A–25
ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [L8, LF] 01–40A–26
ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [L8, LF] 01–40A–26
INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [L8, LF] 01–40A–27
CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [L8, LF] 01–40A–28
CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF] . . . 01–40A–29
CAMSHAFT POSITION (CMP) SENSOR INSPECTION [L8, LF] 01–40A–30
CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [L8, LF] 01–40A–31
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MASS AIR FLOW (MAF) SENSOR INSPECTION [L8, LF] 01–40A–32
HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF] 01–40A–33
FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF] 01–40A–35
REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF] 01–40A–37
MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR INSPECTION [L8, LF] 01–40A–39
MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR REMOVAL/INSTALLATION [L8, LF] 01–40A–39
KNOCK SENSOR (KS) INSPECTION [L8, LF] 01–40A–40
KNOCK SENSOR (KS) REMOVAL/INSTALLATION [L8, LF] 01–40A–40
BAROMETRIC PRESSURE (BARO) SENSOR INSPECTION [LF (Vehicles equipped with BARO sensor built into PCM)] 01–40A–41

CONTROL SYSTEM LOCATION INDEX [L8, LF]

DPE014000000W01



DPE0140ZW200

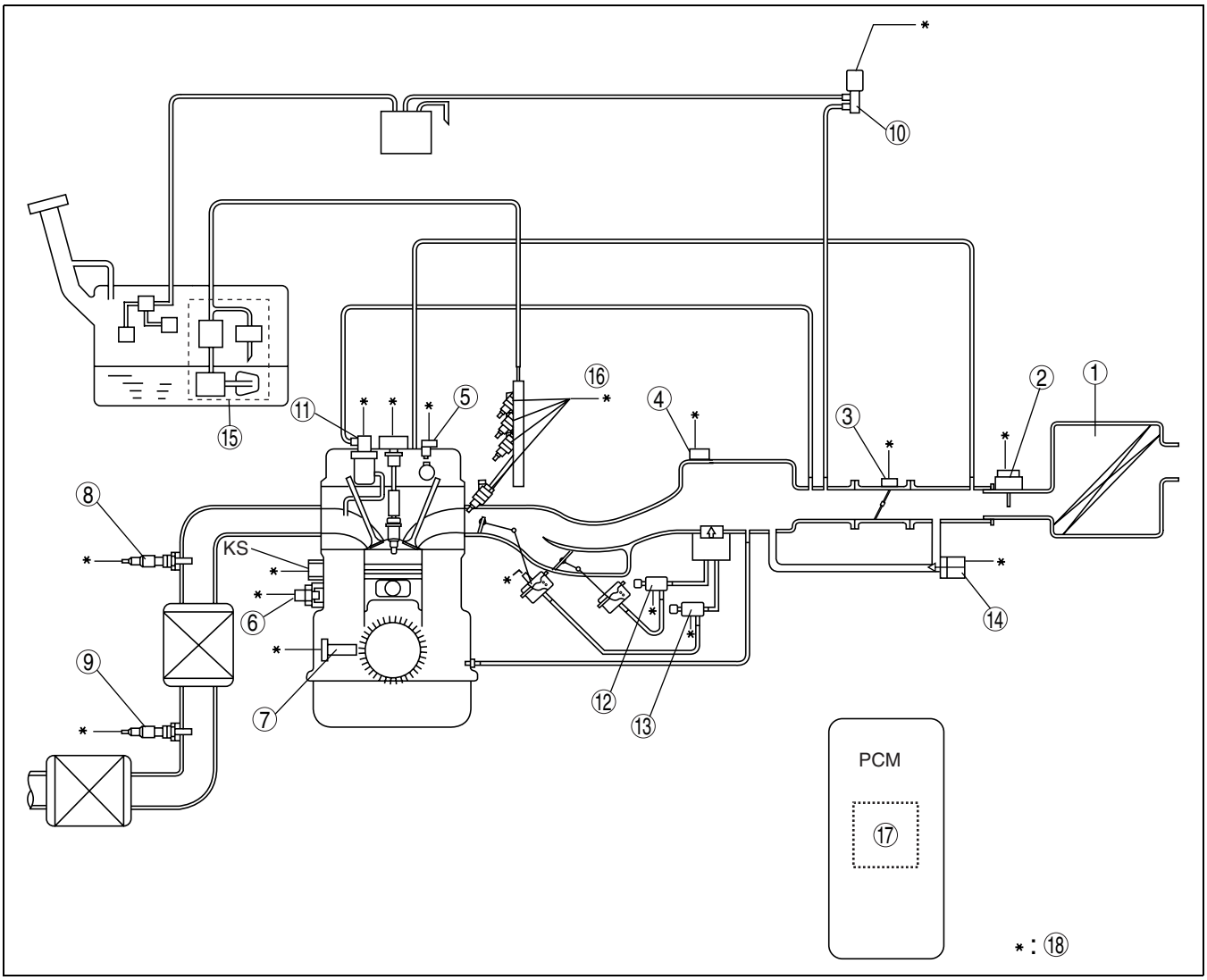
1	Front HO2S (See 01–40A–35 FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF].) (See 01–40A–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF].)
2	Rear HO2S (See 01–40A–37 REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF].) (See 01–40A–33 HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF].)
3	ECT sensor (See 01–40A–26 ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [L8, LF].) (See 01–40A–26 ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [L8, LF].)
4	CPP switch (See 01–40A–25 CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [L8, LF].)

5	CMP sensor (See 01–40A–31 CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [L8, LF].) (See 01–40A–30 CAMSHAFT POSITION (CMP) SENSOR INSPECTION [L8, LF].)
6	PCM (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, LF].) (See 01–40A–7 PCM INSPECTION [L8, LF].) (See 01–40A–24 PCM CONFIGURATION [L8, LF].)
7	KS (See 01–40A–40 KNOCK SENSOR (KS) REMOVAL/INSTALLATION [L8, LF].) (See 01–40A–40 KNOCK SENSOR (KS) INSPECTION [L8, LF].)
8	CKP sensor (See 01–40A–29 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF].) (See 01–40A–28 CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [L8, LF].)
9	MAP sensor (See 01–40A–39 MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR INSPECTION [L8, LF].)

10	TP sensor (See 01–40A–31 THROTTLE POSITION (TP) SENSOR INSPECTION [L8, LF].)
11	Neutral switch (See 01–40A–25 NEUTRAL SWITCH INSPECTION [L8, LF].)
12	MAF/IAT sensor (See 01–40A–32 MASS AIR FLOW (MAF) SENSOR INSPECTION [L8, LF].) (See 01–40A–27 INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [L8, LF].)

CONTROL SYSTEM DIAGRAM [L8, LF]

DPE014000000W02



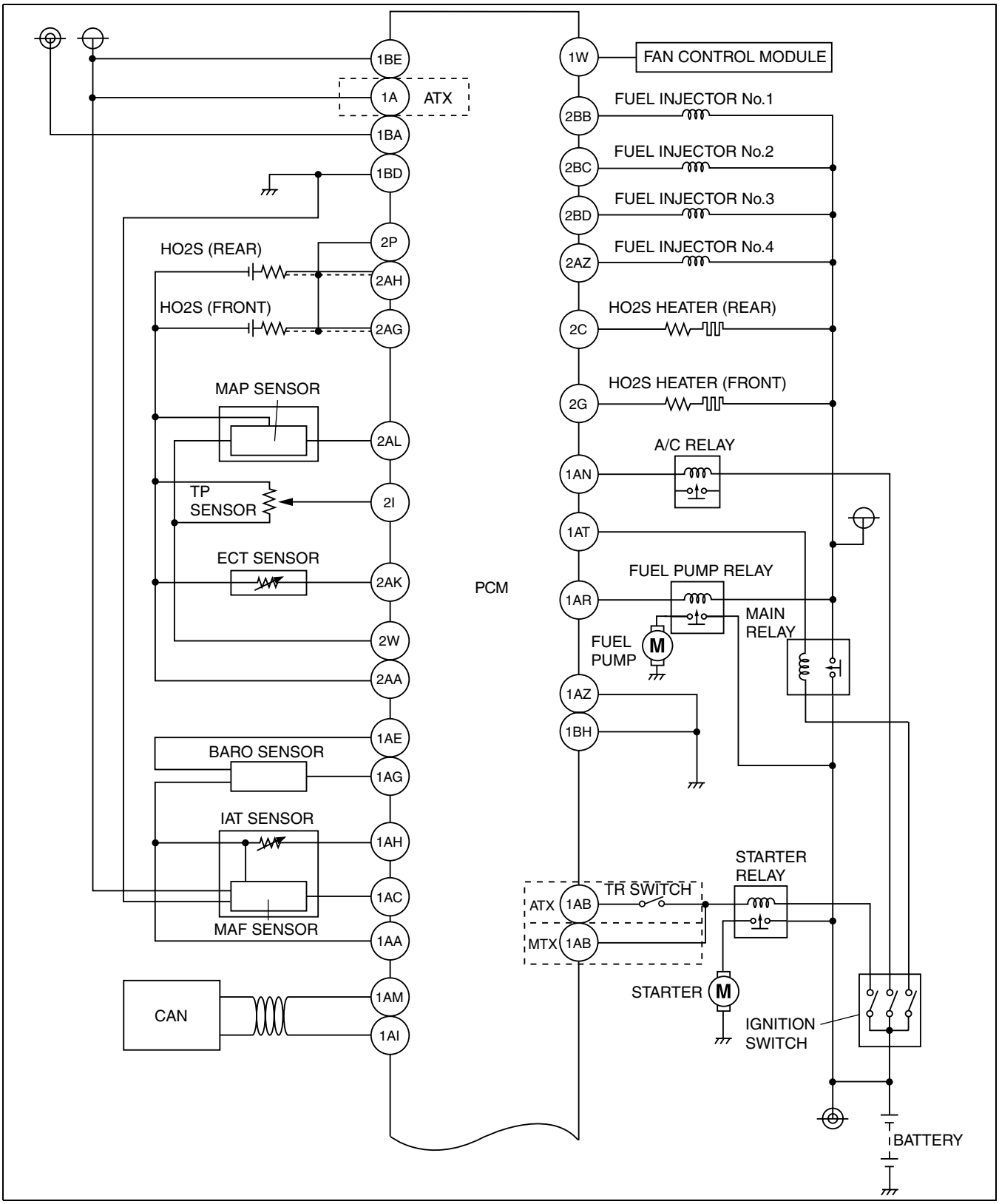
DPE0140ZW200

1	Air cleaner
2	MAF/IAT sensor
3	TP sensor
4	MAP sensor
5	CMP sensor
6	KS
7	ECT sensor
8	CKP sensor
9	Front HO2S
10	Rear HO2S

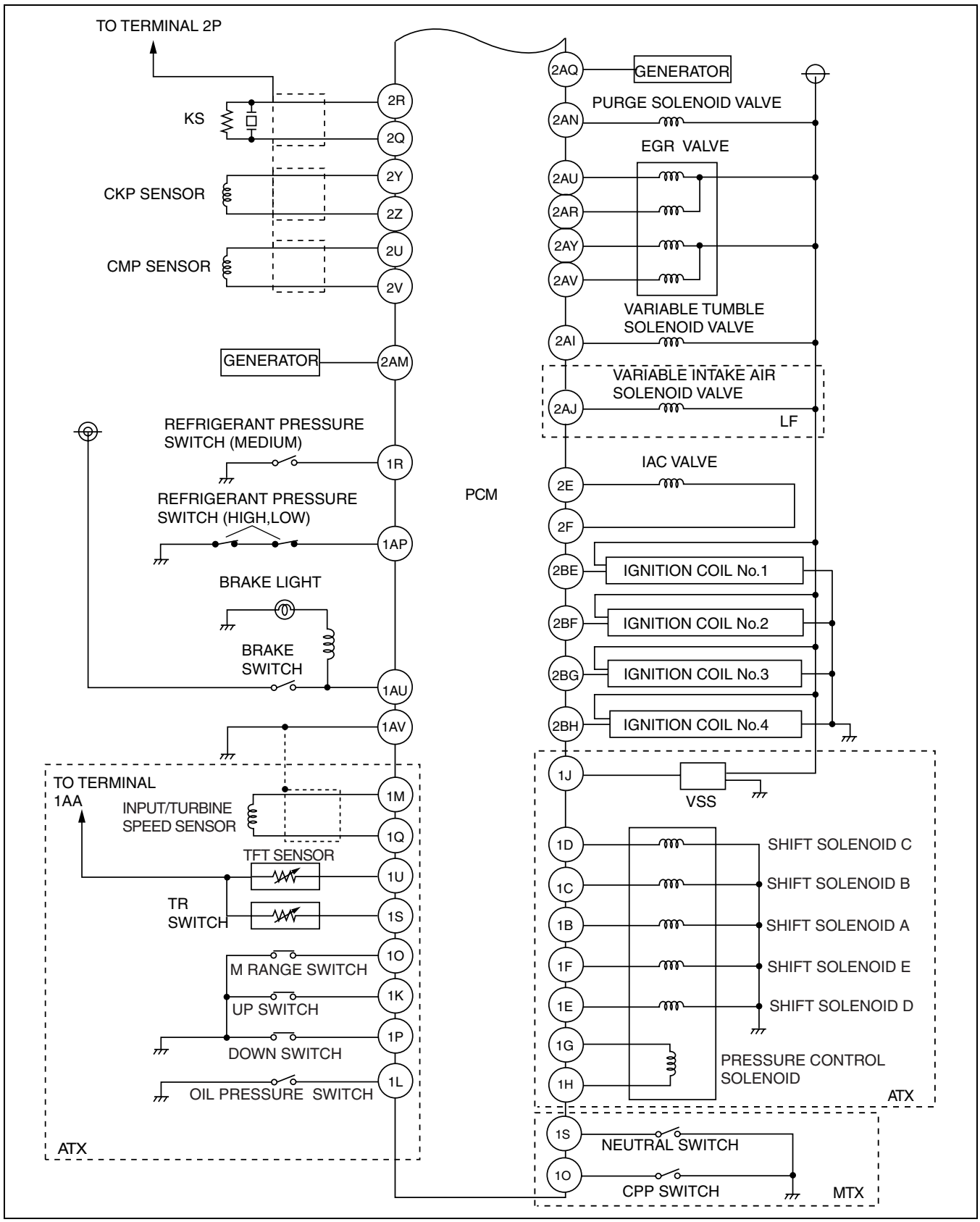
11	Purge solenoid valve
12	EGR valve
13	Variable intake air solenoid valve (LF)
14	Variable tumble solenoid valve
15	IAC valve
16	Fuel pump unit
17	Fuel injector
18	PCM
19	BARO sensor (Vehicles equipped with BARO sensor built into PCM)
20	To PCM

CONTROL SYSTEM WIRING DIAGRAM [L8, LF]

DPE014000000W03



DPE102ZW2002



DPE102ZW2003

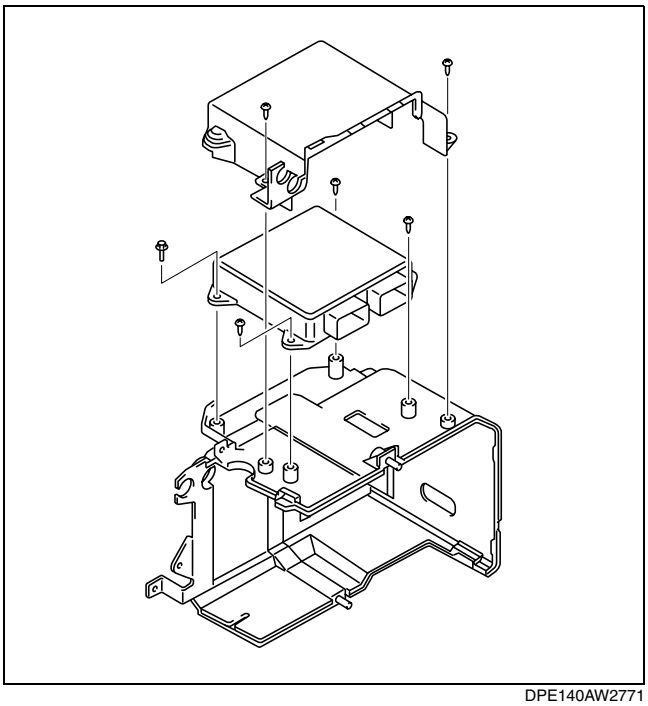
PCM REMOVAL/INSTALLATION [L8, LF]

DPE014000000W04

Except for U.K. Specs.

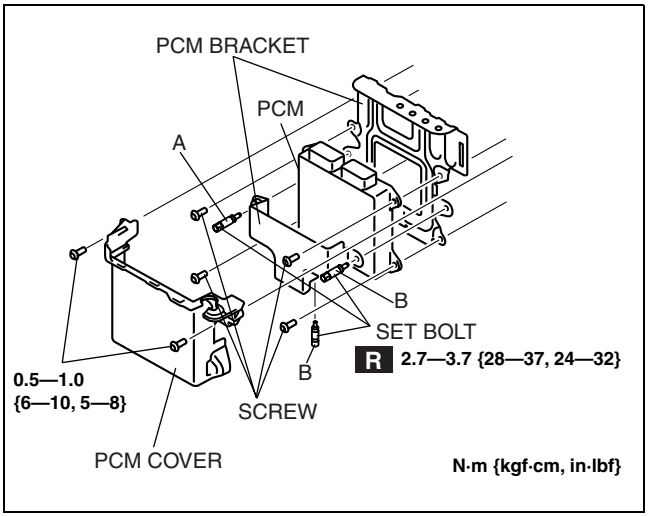
1. When replacing the PCM, perform the following:
   - PCM configuration (See 01–40A–24 PCM CONFIGURATION [L8, LF].)
2. Remove the battery cover, battery duct, battery, and battery tray. (See 01–17A–1 BATTERY REMOVAL/

INSTALLATION [L8, LF].)
3. Remove the PCM from the battery tray.
4. When replacing the PCM on the vehicles, perform the following:
   - PCM parameter reset (See 09–14–6 IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING [KEYLESS ENTRY SYSTEM].)(See 09–14–29 IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/ KEY ADDITION AND CLEARING [WITH ADVANCED KEYLESS SYSTEM].)
5. Install in the reverse order of removal.



DPE140AW2771

U.K. Specs.
1. When replacing the PCM, perform the following:
   - PCM configuration (See 01–40A–24 PCM CONFIGURATION [L8, LF].)
2. Remove the battery cover, battery duct, battery, and battery tray. (See 01–17A–1 BATTERY REMOVAL/ INSTALLATION [L8, LF].)
3. Remove the PCM cover.
4. Loosen the screws, then remove the PCM and PCM brackets from the battery tray.
5. Remove the set bolts. (See 01–40A–6 Set Bolt Removal Note.) (See 01–40A–6 Set Bolt Installation Note.)
6. When replacing the PCM on the vehicle, perform the following:
   - PCM parameter reset (See 09–14–6 IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING [KEYLESS ENTRY SYSTEM].)(See 09–14–29 IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/ KEY ADDITION AND CLEARING [WITH ADVANCED KEYLESS SYSTEM].)
7. Install in the reverse order of removal.



DPE140AW2702

Set Bolt Removal Note

A
1. Drill the set bolt using a drill bit with a diameter larger than the shank until the head is removed.
   - If the shank remains, remove it using locking pliers.
2. Clean all foreign material from the PCM connectors.

B
1. Remove the set bolt using pliers.

Set Bolt Installation Note
1. Install a new set bolt and tighten it until the neck of the bolt breaks off.

PCM INSPECTION [L8, LF]

DPE014000000W05

Without Using the SST

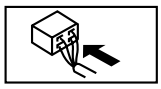
Note

- The PCM terminal voltage can vary with the conditions when measuring and changes due to aged deterioration on the vehicle, causing false diagnosis. Therefore determine comprehensively where the malfunction occurs among the input systems, output systems, and the PCM.

PCM
WIRING HARNESS-SIDE CONNECTOR

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

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



BDA3940W001

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1A*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+	
1B*1	Shift solenoid A	Shift solenoid A	(See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Shift solenoid A • Related wiring harness
1C*1	Shift solenoid B	Shift solenoid B	(See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Shift solenoid B • Related wiring harness
1D*1	Shift solenoid C	Shift solenoid C	(See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Shift solenoid C • Related wiring harness
1E*1	Shift solenoid D	Shift solenoid D	P or N position		B+	• Shift solenoid D • Related wiring harness
			Except above		1.0 or less	
1F*1	Shift solenoid E	Shift solenoid E	During TCC operation		B+	• Shift solenoid E • Related wiring harness
			Except above		1.0 or less	
1G*1	Pressure control solenoid (+)	Pressure control solenoid	(See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
1H*1	Pressure control solenoid (–)	Pressure control solenoid	(See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Pressure control solenoid • Related wiring harness
1I	—	—	—		—	—
1J*1	Vehicle speed	VSS	(See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• VSS • Related wiring harness
1K*1	Manual up	Up switch	Ignition switch is turned to the ON position.	Detects up-shift operation of selector lever in M range	1.0 or less	• Selector lever • Related wiring harness
				Others	B+	
1L	Oil pressure switch	Oil pressure switch	Oil pressure switch OFF		B+	• Oil pressure switch • Related wiring harness
			Oil pressure switch ON		1.0 or less	

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1M*1	Input/turbine speed sensor (+)	Input/turbine speed sensor	(See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Input/turbine speed sensor • Related wiring harness
1N	—	—	—		—	—
1O	*2Clutch operation	CPP switch	Clutch pedal depressed		Below 1.0	• CPP • Related harness
			Clutch pedal released		B+	
	*1M range switch	M range switch	Ignition switch is turned to the ON position.	M range	1.0 or less	• Selector lever • Related wiring harness
				Except above	B+	
1P*1	Manual down	Down switch	Ignition switch is turned to the ON position.	Detects down-shift operation of selector lever in M range	1.0 or less	• Selector lever • Related wiring harness
				Others	B+	
1Q*1	Input/turbine speed sensor (–)	Input/turbine speed sensor	(See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Input/turbine speed sensor • Related wiring harness
1R	Refrigerant pressure switch (middle)	Refrigerant pressure switch (middle)	A/C ON	Refrigerant pressure is above 1.52 MPa {15.5 kgf/cm^2, 220 psi}	Below 1.0	• Refrigerant pressure switch • Related harness
				Refrigerant pressure is below 1.23 MPa {12.5 kgf/cm^2, 178 psi}	B+	
1S	*2Neutral position	Neutral switch	Shift lever is at neutral position		Below 1.0	• Neutral switch • Related harness
			Shift lever is not at neutral position		B+	
	*1Selector lever position	TR switch	Ignition switch is turned to the ON position.	P position	Approx. 4.6	• TR switch • Related wiring harness
				R position	Approx. 3.9	
				N position	Approx. 3.2	
				D range	Approx. 2.5	
				M range	Approx. 2.5	
1T	—	—	—		—	—
1U*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	
1V	—	—	—		—	—
1W	Cooling fan control	Fan control module	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Fan control module. • Related harness
1X	—	—	—		—	—
1Y	—	—	—		—	—
1Z	—	—	—		—	—
1AA	Sensor ground	MAF/IAT sensor, TFT sensor*1, TR switch*1	Under any condition		Below 1.0	• Related harness

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1AB	Starter relay control	Starter relay	Under any condition		Below 1.0	• Starter relay • Related harness
1AC	MAF	MAF sensor	Ignition switch ON		Approx. 0.7	• MAF sensor • Related harness
			Idle (after warm up)		Approx. 1.2	
1AD	—	—	—		—	—
1AE	—	—	—		—	—
1AF	—	—	—		—	—
1AG	—	—	—		—	—
1AH	IAT	MAF/IAT sensor	Ignition switch ON	IAT 0 °C {32 °F}	Approx. 3.43	• IAT sensor • Related harness
				IAT 20 °C {68 °F}	Approx. 2.38	
				IAT 40 °C {104 °F}	Approx. 1.49	
				IAT 60 °C {140 °F}	Approx. 0.89	
				IAT 80 °C {176 °F}	Approx. 0.53	
				IAT 100 °C {212 °F}	Approx. 0.33	
1AI	CAN (L)	Instrument cluster, ABS HU/CM, DSC HU/CM, Electrical P/S pump	Because this terminal is for CAN, good/no good determination by terminal voltage is not possible.			• Related harness
1AJ	—	—	—		—	—
1AK	—	—	—		—	—
1AL	—	—	—		—	—
1AM	CAN (H)	Instrument cluster, ABS HU/CM, DSC HU/CM, Electrical P/S pump	Because this terminal is for CAN, good/no good determination by terminal voltage is not possible.			• Related harness
1AN	A/C	A/C relay	Idle	A/C operating	Below 1.0	• A/C relay • Related harness
				A/C not operating	B+	
1AO	—	—	—		—	—
1AP	A/C on signal	Refrigerant pressure switch (high and low)	Idle	A/C switch and fan switch on	Below 1.0	• Refrigerant pressure switch • Related harness
				A/C switch off	B+	
1AQ	—	—	—		—	—
1AR	Fuel pump control	Fuel pump relay	Ignition switch ON		B+	• Fuel pump relay • Related harness
			Cranking		Below 1.0	
			Idle		Below 1.0	
1AS	—	—	—		—	—
1AT	Main relay control	Main relay	Ignition switch OFF		B+	• Main relay • Related harness
			Ignition switch ON		Below 1.0	
1AU	Brake	Brake switch	Brake pedal depressed		B+	• Brake switch • Related harness
			Brake pedal released		Below 1.0	
1AV*1	Internal ground	Input/turbine speed sensor shield wire	Under any condition		1.0 or less	• Related wiring harness
1AW	—	—	—		—	—
1AX	—	—	—		—	—
1AY	—	—	—		—	—
1AZ	ground	ground	Under any condition		Below 1.0	• Related harness
1BA	Back-up power supply	Battery (positive terminal)	Under any condition		B+	• Battery • Related harness
1BB	—	—	—		—	—

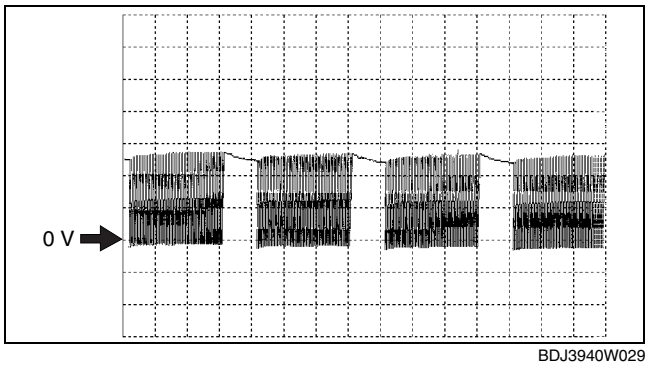
Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1BC	ground	ground	Under any condition		Below 1.0	• Related harness
1BD	ground	ground	Under any condition		Below 1.0	• Related harness
1BE	B+	Main relay	Ignition switch OFF		Below 1.0	• Battery • Related harness
			Ignition switch ON		B+	
1BF	—	—	—		—	—
1BG	ground	ground	Under any condition		Below 1.0	• Related harness
1BH	ground	ground	Under any condition		Below 1.0	• Related harness
2A	—	—	—		—	—
2B	—	—	—		—	—
2C	Rear HO2S heater control	HO2S (Rear) heater	Ignition switch ON	Engine speed below 3,900 rpm	B+	• HO2S (Front) heater. • Related harness
				Engine speed above 3,900 rpm	Below 1.0	
2D	—	—	—		—	—
2E	IAC (+)	IAC valve	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• IAC valve • Related harness
2F	IAC (–)	IAC valve	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• IAC valve • Related harness
2G	Front HO2S heater control	HO2S (Front) heater	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• HO2S (Front) heater. • Related harness
2H	—	—	—		—	—
2I	Throttle position	TP sensor	Ignition switch ON	CTP	0.65—1.15	• TP sensor • Related harness
				WOT	4.3—4.8	
2J	—	—	—		—	—
2K	—	—	—		—	—
2L	—	—	—		—	—
2M	—	—	—		—	—
2N	—	—	—		—	—
2O	—	—	—		—	—
2P	ground	ground	Under any condition		Below 1.0	• Related harness
2Q	Knocking (+)	KS	Ignition switch ON (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Approx. 4.3	• KS • Related harness
2R	Knocking (–)	KS	Ignition switch ON (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Below 1.0	• KS • Related harness
2S	—	—	—		—	—
2T	—	—	—		—	—
2U	CMP (+)	CMP sensor	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• CMP sensor • Related harness
2V	CMP (–)	CMP sensor	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• CMP sensor • Related harness
2W	Constant voltage (Vref)	BARO sensor, TP sensor	Ignition switch ON		Approx. 5.0	• Related harness
2X	—	—	—		—	—

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
2Y	CKP (+)	CKP sensor	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• CKP sensor • Related harness
2Z	CKP (–)	CKP sensor	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• CKP sensor • Related harness
2AA	Sensor ground	HO2S (Front, Rear), ECT sensor, TP sensor, MAP sensor	Under any condition		Below 1.0	• Related harness
2AB	—	—	—		—	—
2AC	—	—	—		—	—
2AD	—	—	—		—	—
2AE	—	—	—		—	—
2AF	—	—	—		—	—
2AG	Front HO2S	HO2S (front)	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• HO2S (front) • Related harness
2AH	Rear HO2S	HO2S (rear)	Ignition switch ON		Approx. 0	• HO2S (rear) • Related harness
			Idle (after warm up)		Alternates between 0 and 1.0	
2AI	Variable tumble control	Variable tumble solenoid valve	ECT above 63 °C {145 °F} while idling.		B+	• Variable tumble solenoid valve • Related harness
			ECT below 63 °C {145 °F} and engine speed below 3,750 rpm		Below 1.0	
2AJ*3	Variable intake air control	Variable intake air solenoid valve	Ignition switch ON		Below 1.0	• Variable intake air solenoid valve • Related harness
			Engine speed: below 4,750 rpm		Below 1.0	
			Engine speed: above 4,750 rpm		B+	
2AK	ECT	ECT sensor	Ignition switch ON	IAT 20 °C {68 °F}	3.04—3.14	• ECT sensor • Related harness
				IAT 40 °C {104 °F}	2.09—2.21	
				IAT 60 °C {140 °F}	1.29—1.39	
				IAT 80 °C {176 °F}	0.76—0.83	
				IAT 100 °C {212 °F}	0.45—0.49	
2AL	Manifold absolute pressure	MAP sensor	Ignition switch ON (at sea level)		Approx. 4.1	• MAP sensor • Related harness
			Idle		Approx. 1.2	
2AM	Generator output voltage	Generator (terminal P)	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Generator • Related harness
2AN	Purge control	Purge solenoid valve	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Purge solenoid valve • Related harness
2AO	—	—	—		—	—
2AP	—	—	—		—	—
2AQ	Generator field coil control	Generator (terminal D)	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)			• Following PIDs: IAT, ECT, RPM, VPWR, ALTT V. • Generator • Related harness
2AR	EGR valve #2 coil control	EGR valve (terminal A)	Ignition switch ON		B+	• EGR valve • Related harness
			Idle		B+	
2AS	—	—	—		—	—

Terminal	Signal	Connected to	Test condition	Voltage (V)	Inspection item
2AT	—	—	—	—	—
2AU	EGR valve #1 coil control	EGR valve (terminal E)	Ignition switch ON	Below 1.0	• EGR valve • Related harness
			Idle	Below 1.0	
2AV	EGR valve #4 coil control	EGR valve (terminal F)	Ignition switch ON	Below 1.0	• EGR valve • Related harness
			Idle	Below 1.0	
2AW	—	—	—	—	—
2AX	—	—	—	—	—
2AY	EGR valve #3 coil control	EGR valve (terminal B)	Ignition switch ON	B+	• EGR valve • Related harness
			Idle	B+	
2AZ	Fuel injection (#4)	Fuel injector No.4	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.4 • Related harness
2BA	—	—	—	—	—
2BB	Fuel injection (#1)	Fuel injector No.1	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.1 • Related harness
2BC	Fuel injection (#2)	Fuel injector No.2	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.2 • Related harness
2BD	Fuel injection (#3)	Fuel injector No.3	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)		• Fuel injector No.3 • Related harness
2BE	IGT1	Ignition coil (No.1 cylinders)	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)		• Ignition coil • Related harness
2BF	IGT2	Ignition coil (No.2 cylinders)	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)		• Ignition coil • Related harness
2BG	IGT3	Ignition coil (No.3 cylinders)	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)		• Ignition coil • Related harness
2BH	IGT4	Ignition coil (No.4 cylinders)	• Inspect using the wave profile. (See 01–40A–12 Inspection Using An Oscilloscope (Reference).)		• Ignition coil • Related harness

*1 : ATX
*2 : MTX
*3 : LF

Inspection Using An Oscilloscope (Reference)
Shift solenoid A signal



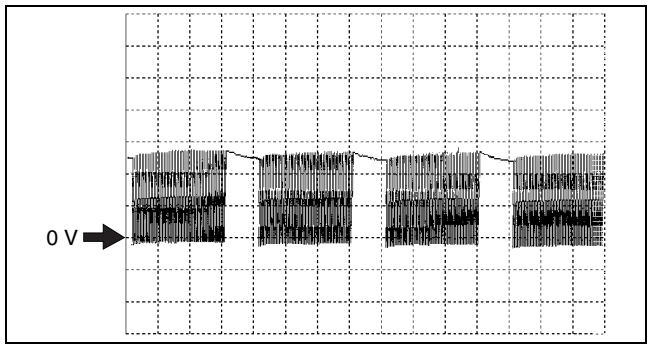
BDJ3940W029

PCM terminals
- 1B (+)—body ground (–)

Oscilloscope setting
- 5 V/DIV (Y), 5 ms/DIV (X), DC range

Vehicle condition
- 4GR

Shift solenoid B signal



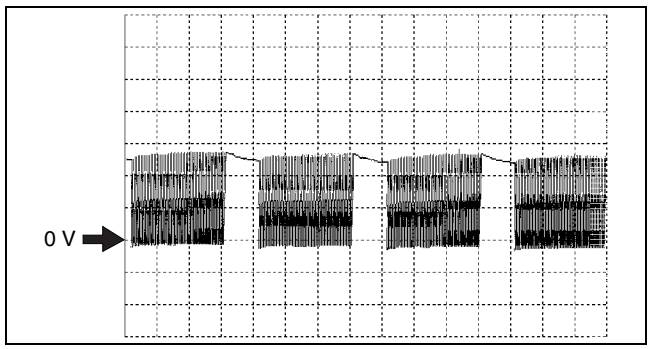
BDJ3940W030

PCM terminals
- 1C (+)—body ground (–)

Oscilloscope setting
- 5 V/DIV (Y), 5 ms/DIV (X), DC range

Vehicle condition
- 1GR (except L range (HOLD))

Shift solenoid C signal



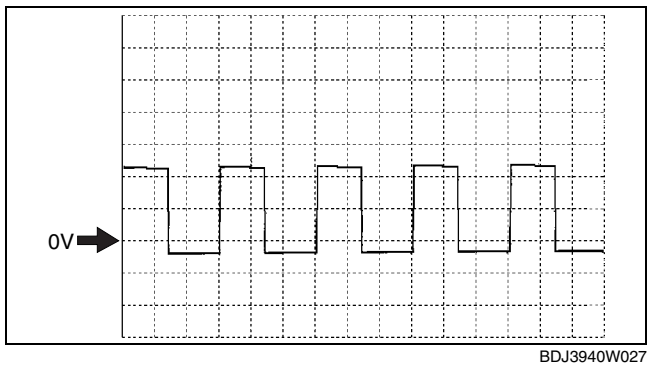
BDJ3940W031

PCM terminals
- 1D (+)—body ground (–)

Oscilloscope setting
- 5 V/DIV (Y), 5 ms/DIV (X), DC range

Vehicle condition
- 1GR or 2GR

Pressure control solenoid (+) signal



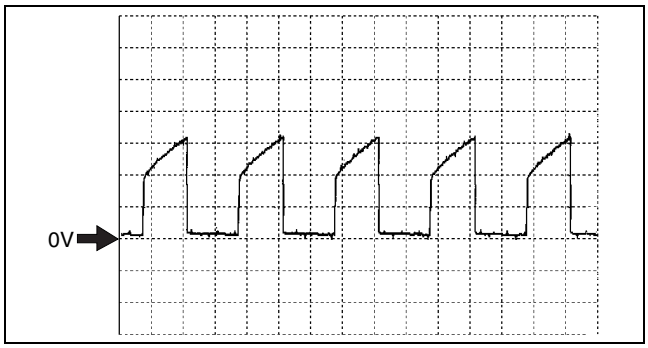
BDJ3940W027

PCM terminals
- 1G (+)—body ground (–)

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



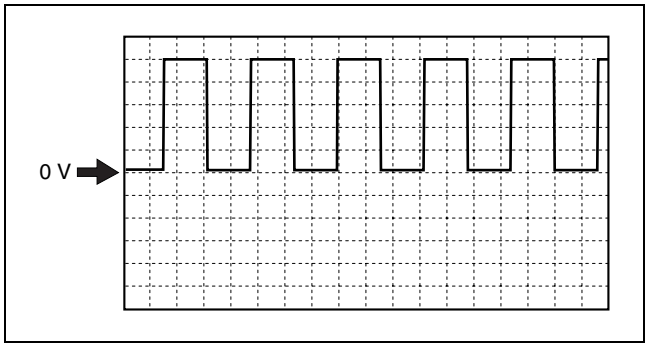
BDJ3940W028

PCM terminals
- 1H (+)—body ground (–)

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



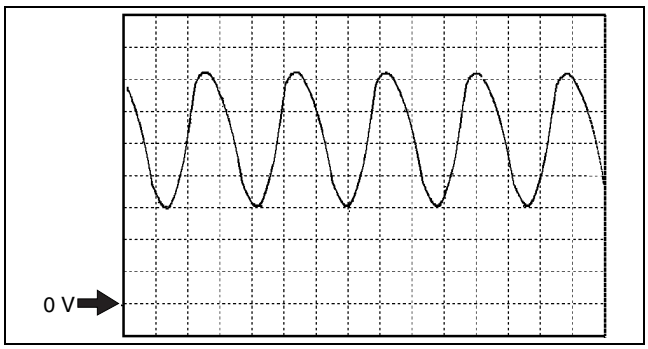
BDJ3940W032

PCM terminals
- 1J (+)—body ground (–)

Oscilloscope setting
- 1 V/DIV (Y), 2.5 ms/DIV (X), DC range

Vehicle condition
- Vehicle speed is 32 km/h {20 mph}.

Input/turbine speed sensor (+) signal



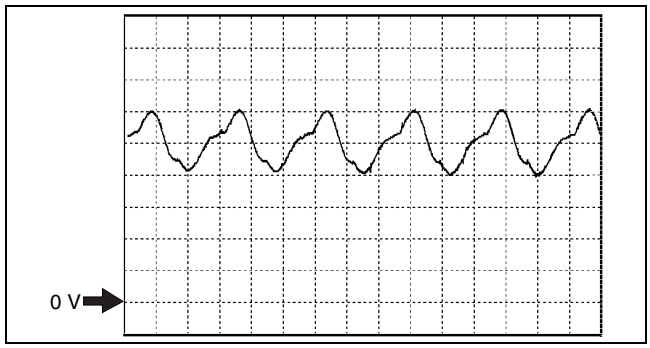
BDJ3940W025

PCM terminals
- 1M (+)—body ground (–)

Oscilloscope setting
- 500 mV/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition
- Idle after warm-up

Input/turbine speed sensor (–) signal



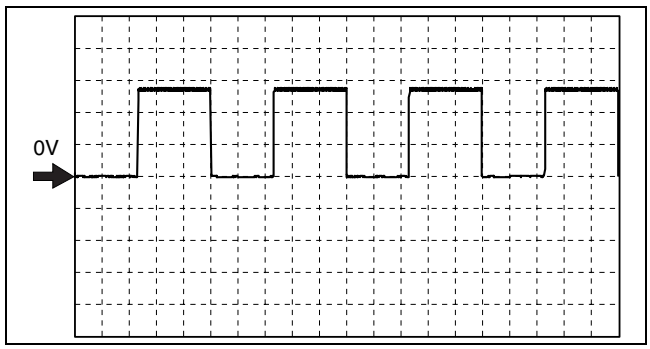
BDJ3940W026

PCM terminals
- 1Q (+)—body ground (–)

Oscilloscope setting
- 500 mV/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition
- Idle after warm-up

Cooling fan control signals



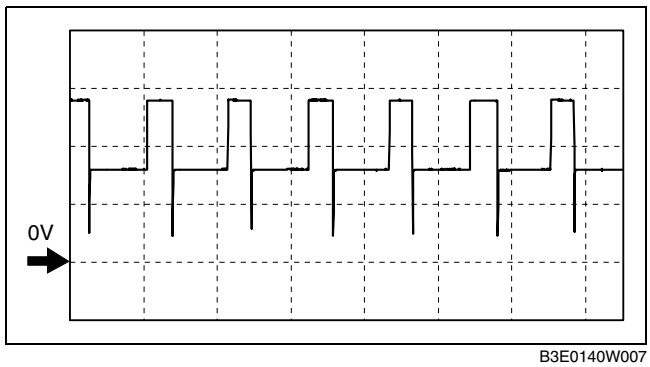
B3E0140W001

PCM terminals
- 1W (+)—body ground (–)

Oscilloscope setting
- 5 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C ON)

IAC signal
(+)



B3E0140W007

PCM terminals
- 2E (+)—body ground (–)

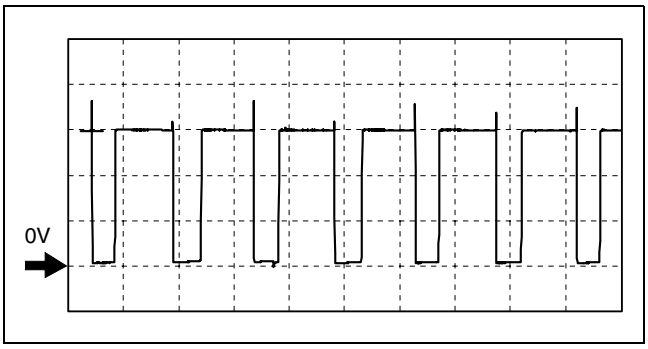
Oscilloscope setting
- 5 V/DIV (Y), 2 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)

(–)
PCM terminals
- 2F (+)—body ground (–)

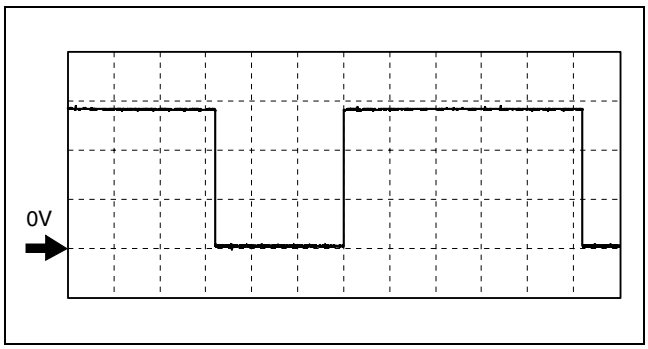
Oscilloscope setting
- 3 V/DIV (Y), 1.5 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)



B3E0140W008

HO2S (front) heater control signal



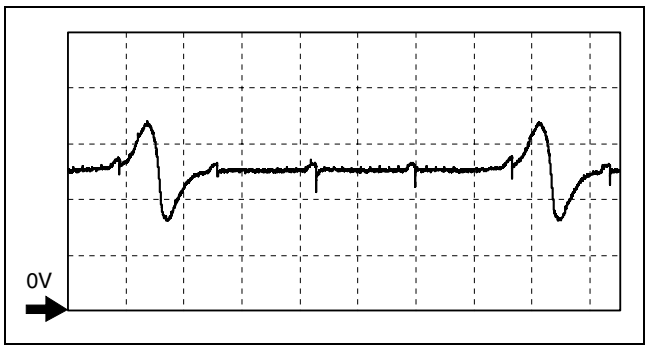
B3E0140W009

PCM terminals
- 2G (+)—body ground (–)

Oscilloscope setting
- 5 V/DIV (Y), 125 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)

CMP sensor signal
(+)



B3E0140W010

PCM terminals
- 2U (+)—body ground (–)

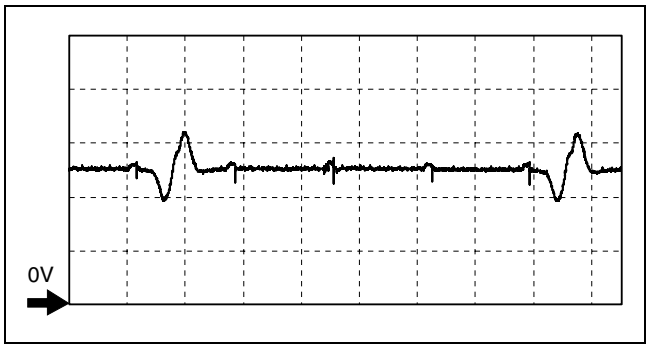
Oscilloscope setting
- 1 V/DIV (Y), 25 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)

(–)
PCM terminals
- 2V (+)—body ground (–)

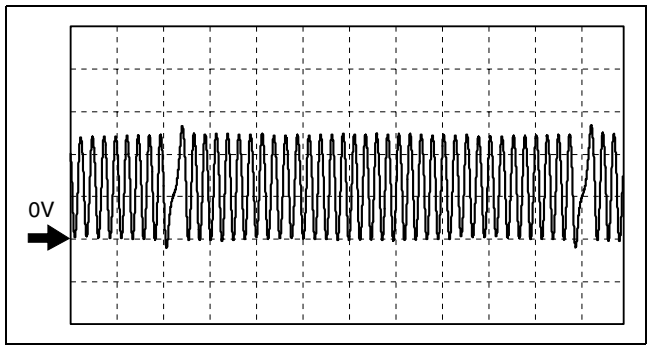
Oscilloscope setting
- 1 V/DIV (Y), 25 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)



B3E0140W011

CKP sensor signal
(+)



B3E0140W012

PCM terminals
- 2Y (+)—body ground (–)

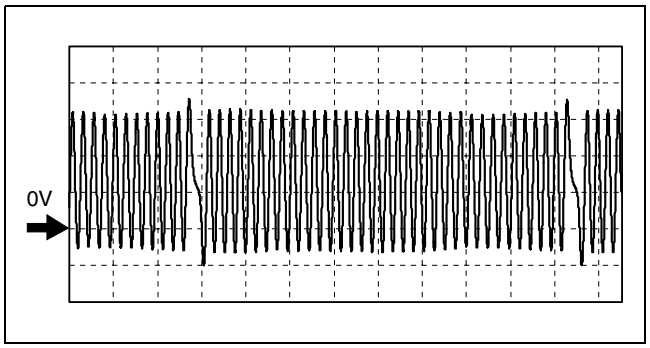
Oscilloscope setting
- 2 V/DIV (Y), 10 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)

(–)
PCM terminals
- 2Z (+)—body ground (–)

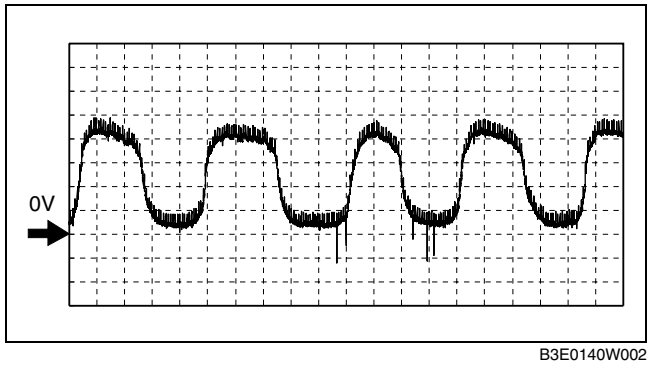
Oscilloscope setting
- 2 V/DIV (Y), 10 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)



B3E0140W013

HO2S (front) signal



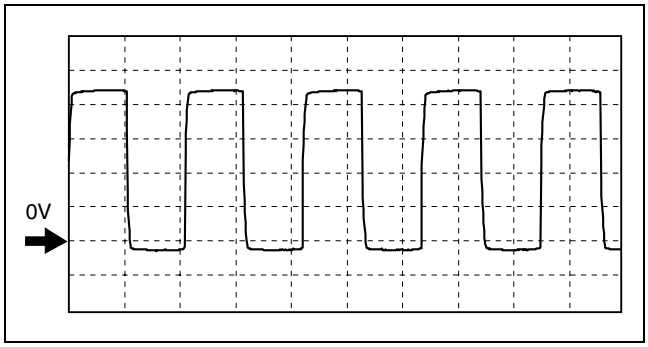
B3E0140W002

PCM terminals
- 2AG (+)—body ground (–)

Oscilloscope setting
- 0.2 V/DIV (Y), 500 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)

Generator output voltage signal



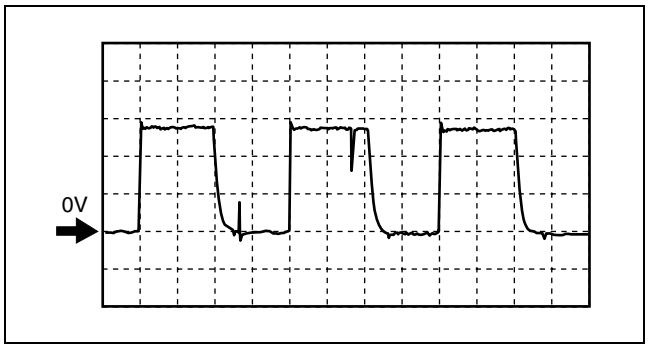
B3E0140W004

PCM terminals
- 2AM (+)—body ground (–)

Oscilloscope setting
- 2 V/DIV (Y), 2.5 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)

Generator field coil control signal



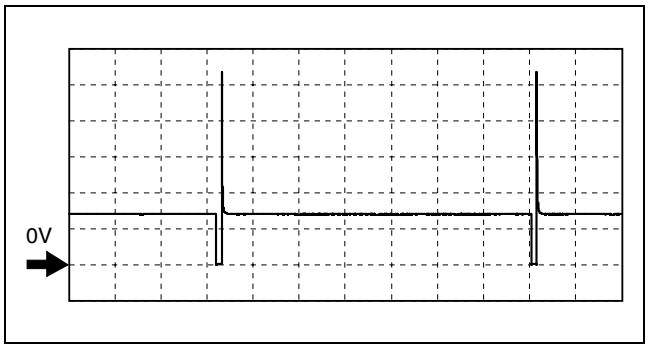
BHJ0140W010

PCM terminals
- 2AQ (+)—body ground (–)

Oscilloscope setting
- 0.5 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)

Fuel injection control



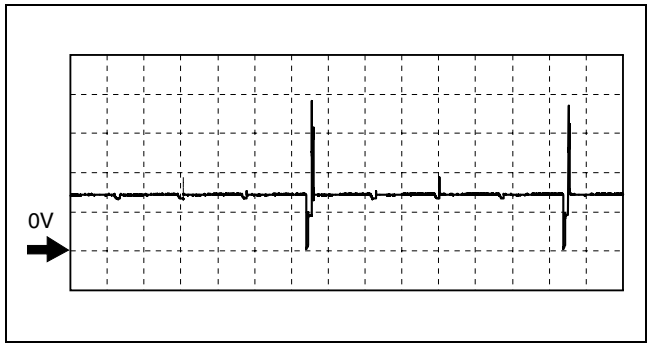
B3E0140W005

PCM terminals
- Fuel Injection No.1: 2BB (+)—body ground (–)
- Fuel Injection No.2: 2BC (+)—body ground (–)
- Fuel Injection No.3: 2BD (+)—body ground (–)
- Fuel Injection No.4: 2AZ (+)—body ground (–)

Oscilloscope setting
- 10 V/DIV (Y), 25 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)

IGT1, IGT2 control signals



B3E0140W006

PCM terminals
- IGT1 (No.1): 2BE (+)—body ground (–)
- IGT2 (No.2): 2BF (+)—body ground (–)
- IGT3 (No.3): 2BG (+)—body ground (–)
- IGT4 (No.4): 2BH (+)—body ground (–)

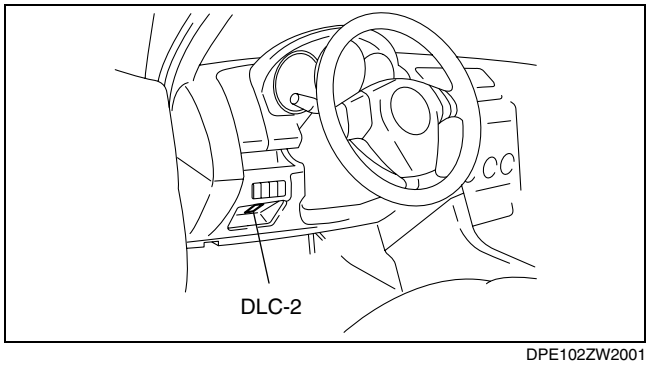
Oscilloscope setting
- 10 V/DIV (Y), 25 ms/DIV (X), DC range

Vehicle condition
- Idle after warm up (engine speed approx. 650 rpm, no load, A/C off)

Using SST (WDS or Equivalent)

Note
- PIDs for the following parts are not available on this model. Go to the appropriate part inspection page.
  — CMP sensor
  — Main relay

1. Connect the **SST** (WDS or equivalent) to the DLC-2.
2. Turn the ignition switch to ON position.
3. Measure the PID value.
   - If PID value is not within the specification, follow the instructions in Action column.



DPE102ZW2001

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.
- For input/output signals except those of the monitoring items, use a voltmeter to measure the PCM terminal voltage.
- 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

PID/DATA monitor table (reference)

Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Inspection item	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)	1AP
ACCS (A/C relay)	On/Off	• Ignition switch ON: Off • A/C switch ON and fan switch ON at idle: On	The following PIDs: RPM, TP, ECT, ACSW. A/C relay	1AN
ALTF (Generator field coil control duty value)	%	• Ignition switch ON: 0% • Idle: 0—100% • Just after A/C switch ON and fan switch ON at idle: Duty value rises	The following PIDs: IAT, ECT, RPM, VPWR, ALTT V. Generator	2AQ
ALTT V (Generator output voltage)	V	• Ignition switch ON: 0 V • Idle: Approx. 14 V[*1] (E/L not operating)	Generator	2AM
ARPMDES (Target engine speed)	RPM	• Indicate the target engine speed	The following PIDs: CPP, CPP/PNP, PSP, ECT, IAT, RPM, TP, MAF, BARO, VSS, AC_REQ, COLP IAC valve	—
B+	V	• Ignition switch ON: B+	Battery	1BE
BARO[*8] (Barometric pressure)	KPa	• ignition switch ON: indicate the atmospheric pressure	BARO sensor	1AG
	V	• Approx. 4 V (at sea level)		
BOO (Brake switch)	On/Off	• Brake pedal depressed: On • Brake pedal released: Off	Brake switch	1AU
CATT11_DSD (Catalyst temperature)	°C	• Indicate the catalyst temperature	—	—
CHRGLP (Generator warning light)	On/Off	• Ignition switch ON: On • Idle: Off	Perform applicable DTC troubleshooting.	—
COLP (Refrigerant pressure switch (middle))	On/Off	• Refrigerant pressure switch (middle) ON[*4] at idle: On • Refrigerant pressure switch (middle) OFF[*5] at idle: Off	Refrigerant pressure switch	1R
CPP (Clutch pedal position)	On/Off	• Clutch pedal depressed: On • Clutch pedal released: Off	CPP switch	1O
CPP/PNP (Shift lever position)	Drive/ Neutral	• Neutral position: Neutral • Others: Drive	Neutral switch	1S
DTCCNT (Number of DTC detected)	—	—	Perform applicable DTC troubleshooting	—
DWN SW[*6]	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
ECT (Engine coolant temperature)	°C	• Ignition switch ON: indicate the ECT	ECT sensor	2AK
	V	• ECT 20 °C {68 °F}: 3.04—3.14 V • ECT 60 °C {140 °F}: 1.29—1.39 V		
EQ_RAT11_DSD	—	• Accelerator pedal depressed: Target lamvda ratio 1or more	The following PIDs: IAT, ECT, O2S11,O2S12, B+	—
EVAPCP (Purge solenoid valve duty value)	%	• Ignition switch ON: 0% • Idle: 0—9%	The following PIDs: IAT, RPM, ECT, MAF, O2S11,BARO, INGEAR, VPWR.	2AN
FAN_DUTY (Cooling fan control)	%	• When all of the following conditions are met: 90% — Test mode ON — WOT	The following PIDs: RPM, TP, ECT, ACSW, COLP, TEST. Fan control module	1W

Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Inspection item	PCM terminal
FP (Fuel pump relay)	On/Off	• Ignition switch ON: On (1 s)→ Off • Idle: ON • Cranking: On	The following PIDs: RPM. Fuel pump relay	1AR
FUELPW (Fuel injector duration)	ms	• Ignition switch ON: 0 ms • Idle (after warm up): approx. 2.0 ms	The following PIDs: IAT, MAF, TP, MAP, ECT, RPM, O2S11, O2S12, INGEAR, ACSW, VPWR, ALTT V. Fuel injector	2AZ 2BB 2BC 2BD
FUELSYS (Fuel system status)	OL/ OL_Fault/ CL_Fault/ CL/ OL_Drive	• Ignition switch ON: OL-Drive (Open loop) • Idle (after warm up): CL (Closed loop)	The following PIDs: IAT, MAF, TP, MAP, ECT, RPM, O2S11, O2S12, INGEAR, ACSW, VPWR, ALTT V. Fuel injector	—
GEAR*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
GENVDSD (Generator voltage desired)	V	• Indicate the generator voltage desired	Perform applicable DTC troubleshooting.	—
HTM_CNT	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
HTM_DIS	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
HTR11 (HO2S heater (front))	On/Off	• Idle (after warm up): On⇔Off	The following PIDs: IAT, MAF, TP, ECT, RPM, ACSW.	2G
HTR12 (HO2S heater (rear))	On/Off	• Ignition switch ON: Off (HO2S heater not operating) • Idle: On (HO2S heater operating)	The following PIDs: IAT, MAF, ECT, RPM, ACSW.	2C
IAC (IAC valve)	%	• Ignition switch ON: 0% • Idle: Approx. 20% (ECT 100 °C {212 °F} and E/L not operating)	The following PIDs: IAT, RPM, MAP, ECT, MAF, TP, INGEAR, ACSW. IAC valve	2E 2F
IAT (Intake air temperature)	°C	• Ignition switch ON: indicate the IAT	IAT sensor	1AH
	V	• IAT 20 °C {68 °F}: 2.4—2.6 V • IAT 30 °C {86 °F}: 1.7—1.9 V		
IMRC*7 (Variable tumble solenoid valve)	On/Off	• Engine speed is below approx. 3,750 rpm and low ECT: On • Others: Off	The following PIDs: TP, ECT, RPM. Variable tumble solenoid valve	2AI
IMTV (Variable intake air solenoid valve)	On/Off	• Engine speed is below approx. 4,750 rpm: On • Others: Off	The following PIDs: RPM. Variable intake air solenoid valve	2AJ
INGEAR (Load/no load condition)	On/Off	**MTX** • CPP or CPP/PNP is ON: Off • Others: On	Perform applicable DTC troubleshooting.	1O 1S
		ATX • Driving range: On • Except above: Off	• TR switch	—
IVS (CTP condition)	Idle/Off Idle	• CTP: Idle • Others: Off Idle	Perform applicable DTC troubleshooting.	—
KNOCKR (Knocking retard)	°	• Ignition switch ON: 0 ° • Idle: 0 °	KS	2Q 2R
LINEDES*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
LOAD (Engine load)	%	• Ignition switch ON: 0% • Idle (after warm up): approx.20%	MAF sensor	—
LONGFT1 (long term fuel trim)	%	• Idle (after warm up): –15—20%	Perform applicable DTC troubleshooting.	—
LPS*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
MAF (Mass airflow)	g/s	• Ignition switch ON: approx. 0 g/s • Idle (after warm up): approx. 2.5 g/s	MAF sensor	1AC
	V	• Ignition switch ON: approx. 0.7 V • Idle (after warm up): approx. 1.2 V		

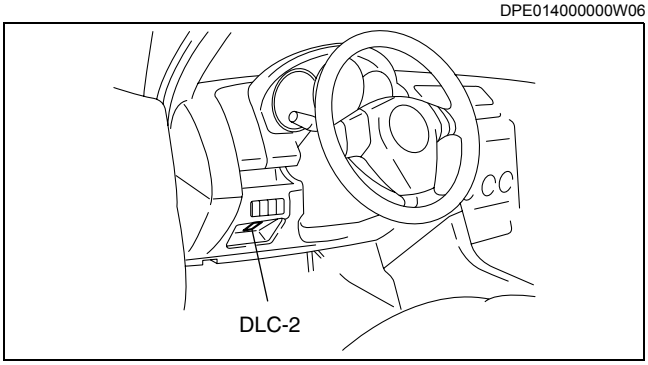
Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Inspection item	PCM terminal
MAP (Manifold absolute pressure)	KPa	• Ignition switch ON (at sea level): approx. 101 kPa • Idle: approx. 30 kPa	MAP sensor	2AL
	V	• Ignition switch ON (at sea level): approx. 4.1 V • Idle: approx. 1.2 V		
MIL (Malfunction indicator lamp)	On/Off	• DTC stored: On • DTC not stored: Off	Perform applicable DTC troubleshooting.	—
MIL_DIS (Travelled distance since MIL illuminated)	km	Indicate the travelled distance since the MIL illuminated		
MNL SW*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
O2S11 (Front HO2S)	V	• Ignition switch ON: 0—1.0 V • Idle (After warm up): 0—1.0 V • Acceleration (After warm up): 0.5—1.0 V • Deceleration (After warm up): 0—0.5 V	HO2S (front)	2AG
O2S12 (Rear HO2S)	V	• Ignition switch ON: 0—1.0 V • Idle (After warm up): 0—1.0 V • Acceleration (After warm up): 0.5—1.0 V • Deceleration (After warm up): 0—0.5 V	HO2S (rear)	2AH
OSS	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
RFCFLAG (Readness function code)	Learnt/Not Learnt	• Before running PCM adaptive memory procedure drive mode: Not Learnt • After running PCM adaptive memory procedure drive mode: Learnt	Run PCM adaptive memory procedure drive mode.	—
RO2FT1 (Rear oxygen sensor fuel trim)	—	• Idle (after warm up): approx. –2—2	Perform applicable DTC troubleshooting.	2AH
RPM (Engine speed)	RPM	• Indicate the engine speed	CKP sensor	2Y 2Z
SEGRP (EGR valve (stepping motor) position)	—	• Ignition switch ON: 0 step • Idle: 0 step • Cranking: 0—52 steps	The following PIDs: MAF, TP, ECT, RPM, VSS. EGR valve	2AR 2AU 2AV 2AY
SEGRP DSD (Desired EGR valve (stepping motor) position)	%	• When the PCM control the EGR system: indicate the desired EGR valve position	The following PIDs: MAF, TP, ECT, RPM, VSS. EGR valve	—
SELTESTDTC	—	• Indicate the Number of the DTCs detected by the KOEO/KOER self-test function		
SHRTFT1 (Short term fuel trim)	%	• Idle (after warm up): approx.–30—25 %	Perform applicable DTC troubleshooting.	—
SHRTFT11 (Short term fuel trim)	%	• Idle (after warm up): approx.–5—0 %	Perform applicable DTC troubleshooting.	2AG
SHRTFT12 (Short term fuel trim)	%	• Under any condition: approx. 99 %	Perform applicable DTC troubleshooting.	2AH
SPARKADV (Ignition timing)	° (BTDC)	• Indicate the ignition timing	The following PIDs: MAF, TP, ECT, RPM, INGEAR, ACSW, VPWR. Ignition timing	2BE 2BF 2BG 2BH
SSA/SS1*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
SSB/SS2*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
SSC/SS3*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
test (Test mode)	On/Off	—	—	—

Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Inspection item	PCM terminal
TFT*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
TFTV*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
THOP*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
TIRESIZE (Tire size)	rev /mile	• Indicate the tire revolution per mile		
TP (TP)	V	• CTP: 13—23 % • WOT: 86—96 %	TP sensor	2I
		• CTP: 0.65—1.15 V • WOT: 4.3—4.8 V		
TP REL (Relative TP)	%	• CTP: approx. 0 % • WOT: approx. 100 %	TP sensor	2I
TP1	%	• CTP: approx. 18 % • WOT: approx. 94 %	TP sensor	2I
TPCT (TP sensor voltage at CTP)	V	• Approx. 0.65—1.15 V	TP sensor	2I
TR*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
TR_SENS*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
TSS*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
UP SW*6	(See 05–02–77 PID/DATA MONITOR INSPECTION [FN4A-EL])			
VSS (Vehicle speed)	Km /h	• Ignition switch ON: indicate the vehicle speed	Perform applicable DTC troubleshooting.	—

*1 : Calculated value; differs from terminal voltage
*2 : A/C compressor pressure switch
*3 : Alternator generating current value
*4 : Refrigerant pressure switch (middle) turns on when the refrigerant pressure is 1.69—1.84 MPa {17.3—18.7 kgf/cm^2 , 247—265 psi}
*5 : Refrigerant pressure switch (middle) turns off when the refrigerant pressure is 1.26—1.49 MPa {12.9—15.1 kgf/cm^2 , 184—214 psi}
*6 : ATX
*7 : LF
*8 : Vehicles equipped with BARO sensor built into PCM

PCM CONFIGURATION [L8, LF]

DPE014000000W06



DPE102ZW2001

1. Connect the WDS or equivalent to the 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.
6. Select “Programmable Parameters”. [with DSC HU/CM]
7. Select “Tire Size/Axle Ratio”, then select the applicable body type on the WDS or equivalent screen. [with DSC HU/CM]

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.

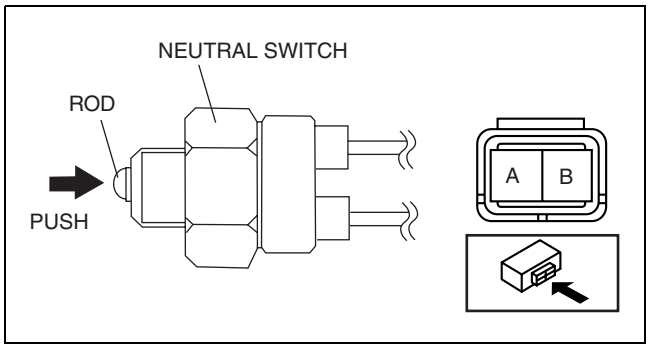
8. Retrieve DTCs by the WDS or equivalent, then verify that there in no DTC present.
   - If DTC is present, perform the applicable DTC inspection. (See 01–02A–9 DTC TABLE [L8, LF].)

NEUTRAL SWITCH INSPECTION [L8, LF]

DPE014017640W01

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

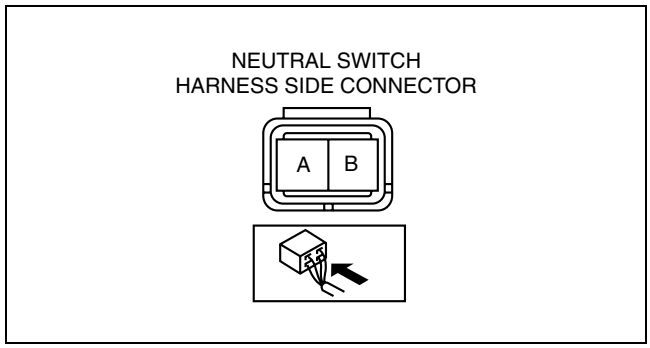
Continuity Inspection
1. Remove the neutral switch. (See 05–15–1 NEUTRAL SWITCH REMOVAL/INSTALLATION [G35M-R].)
2. Verify that the continuity between neutral switch terminals A and B is as indicated in the table.
   - If it can be verified, perform the “Circuit Open/ Short Inspection”.
   - If it cannot be verified, replace the neutral switch.



B3E0140W022

Measured condition	Continuity
Rod pushed	Continuity detected
Except above	No continuity

Circuit Open/Short Inspection



B3E0140W036

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Inspect the following harness for an open or short. (Continuity check)

Open circuit
- Neutral switch terminal A and PCM terminal 1S
- Neutral switch terminal B and body ground

Short circuit
- Neutral switch terminal B and body ground

CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [L8, LF]

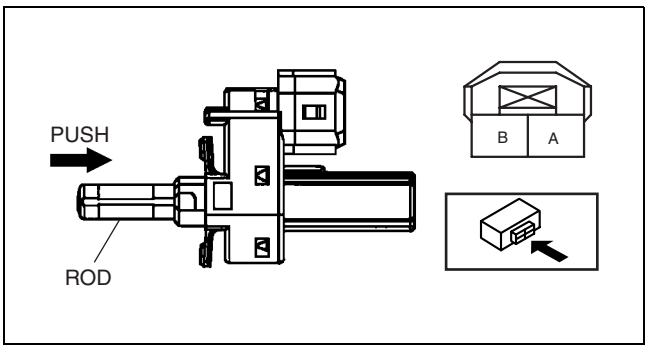
DPE014018660W01

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See 00–00–6 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 there is no malfunction, perform the “Circuit Open/Short Inspection”.
   - If there is any malfunction, replace the CPP switch.

Measurement condition	Continuity
Push the rod.	Continuity detected
Except above	No continuity



B3E0140W023

Circuit Open/Short Inspection
1. Disconnect the PCM connector.
2. Disconnect the CPP switch connector.
3. Inspect the following wiring harnesses for an open or short circuit. (Continuity inspection)

Open circuit
- If there is no continuity in the following wiring harnesses, there is an open circuit. Repair or replace the wiring harness.
  — CPP switch terminal B and PCM terminal 1O
  — CPP switch terminal A and body ground

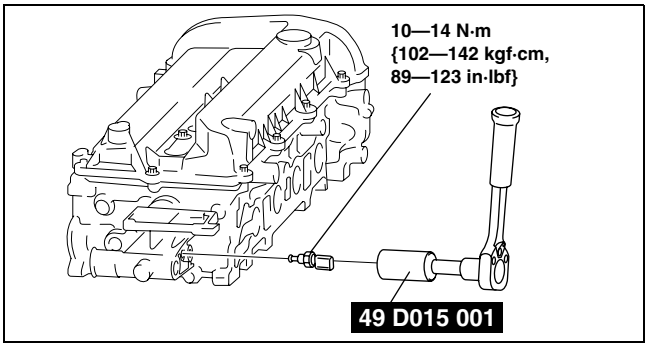
Short circuit
- If there is continuity in the following wiring harnesses, there is a short circuit. Repair or replace the wiring harness.
  — CPP switch terminal B and body ground
  — CPP switch terminal B and power supply

ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [L8, LF]

DPE014018841W01

1. Remove the battery cover.
2. Disconnect the negative battery cable.
3. Remove the plug hole cover.
4. Drain the engine coolant. (See 01–12A–3 ENGINE COOLANT REPLACEMENT [L8, LF].)
5. Disconnect the ECT sensor connector.
6. Remove the ECT sensor using the **SST**.
7. Install in the reverse order of removal.

Tightening torque
10—14 N·m {102—142 kgf·cm, 89—123 in·lbf}



B3E0140W014

ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [L8, LF]

DPE014018841W02

Resistance Inspection

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

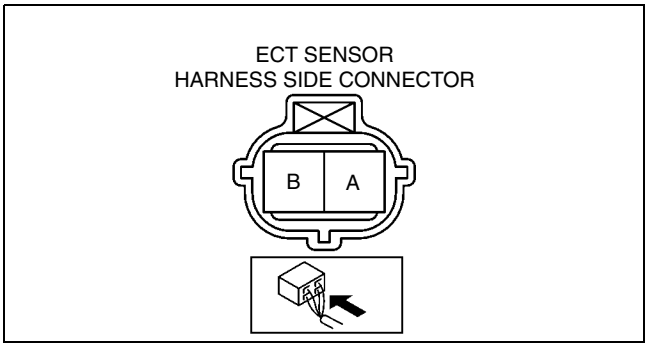
1. Disconnect the ECT sensor connector.
2. Remove the ECT sensor. (See 01–40A–26 ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [L8, LF].)
3. Place the ECT sensor in the water and while increasing the water temperature, measure the resistance between ECT sensor terminals A and B.
   - If the monitor item status/specification (reference) is not within the specification, even though the ECT sensor resistance is within the specification, perform the “Circuit Open/Short Inspection”.

- If not within the specification, replace the ECT sensor.

Standard

Water temperature (°C {°F})	Resistance (kilohm)
20 {68}	35.5—39.2
70 {158}	5.07—5.60
80 {176}	3.65—4.02

Circuit Open/Short Inspection



A6E3940W011

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, 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.
  - — ECT sensor terminal A and PCM terminal 2AK
  - — ECT sensor terminal B and PCM terminal 2AA

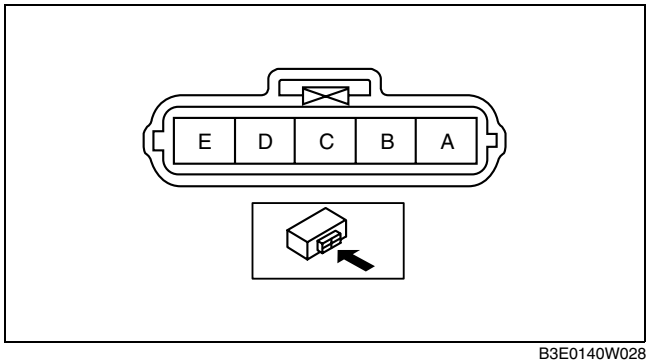
Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the harness.
  - — ECT sensor terminal A and power supply
  - — ECT sensor terminal A and body ground
  - — ECT sensor terminal B and power supply

INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [L8, LF]

DPE014018842W01

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

Resistance Inspection
1. Disconnect the mass air flow sensor connector.
2. Verify that the resistance between MAF sensor terminals D and E is within the specification.
   - If the monitor item status/specification (reference) is not within the specification, even though the IAT sensor resistance is within the specification, perform the “Circuit Open/Short Inspection”.
   - If not within the specification, replace the MAF sensor.

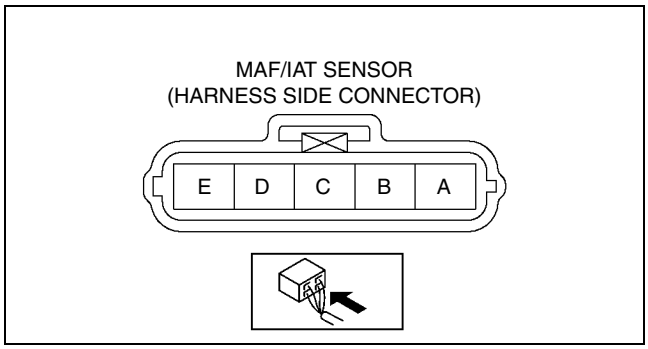


B3E0140W028

Standard

Ambient temperature (°C {°F})	Resistance (kilohm)
-20 {-4.0}	13.6—18.4
20 {68}	2.21—2.69
60 {140}	0.493—0.667

Circuit Open/Short Inspection



A6E3940W006

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, 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.
  - — MAF/IAT sensor terminal D and PCM terminal 1AH
  - — MAF/IAT sensor terminal E and PCM terminal 1AA

Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the harness.
  - — MAF/IAT sensor terminal E and power supply
  - — MAF/IAT sensor terminal D and power supply
  - — MAF/IAT sensor terminal D and body ground

CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [L8, LF]

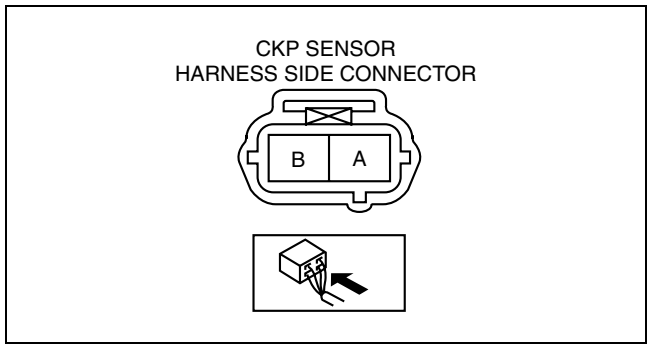
DPE014018220W01

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

Resistance Inspection
1. Disconnect the CKP sensor connector.
2. Measure the resistance between CKP sensor connector terminals A and B.
   - If not within the specification, replace the CKP sensor.
   - If the monitor item status/specification (reference) is not within the specification, even though the resistance is within the specification, perform the “Circuit Open/Short Inspection”, and repair or replace the malfunctioning part.

Resistance
400—550 ohms

Circuit Open/Short Inspection



B3E0140W033

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, 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 harness.
  — CKP sensor terminal A and PCM terminal 2Y
  — CKP sensor terminal B and PCM terminal 2Z

Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the harness.
  — CKP sensor terminal A and power supply
  — CKP sensor terminal A and body ground
  — CKP sensor terminal B and power supply
  — CKP sensor terminal B and body ground

CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [L8, LF]

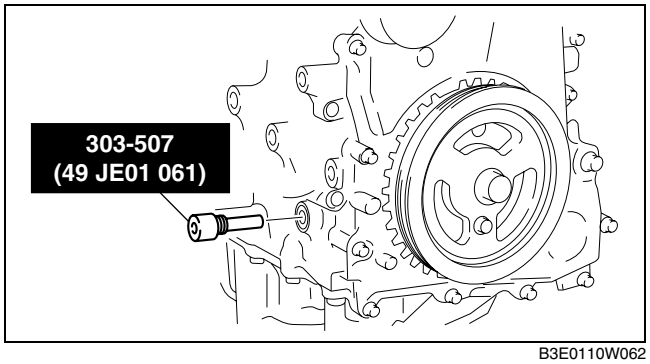
DPE014018220W02

Removal
1. Remove the battery cover.
2. Disconnect the negative battery cable.
3. Remove the plug hole cover.
4. Perform the following procedure for easier access.
   (1) Remove the front tire (RH).
   (2) Remove the splash shield.
5. Disconnect the CKP sensor connector.
6. Remove the installation bolt and remove the CKP sensor.

Installation

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.**
- **Do not install the CKP sensor using any method except for the following, or do not change the installation position. It might cause a deterioration in engine control for ignition timing and fuel injection.**

1. Perform the following procedure so that cylinder No.1 is at TDC.
   (1) Remove the cylinder block lower blind plug and install the **SST**.
   (2) Rotate the crankshaft pulley clockwise until the crank weight contacts the **SST** so that cylinder No.1 is at TDC.



B3E0110W062

2. Mark the center line on the pulse wheel teeth of the crankshaft pulley (9th tooth counting counterclockwise from the empty space) using a ruler.

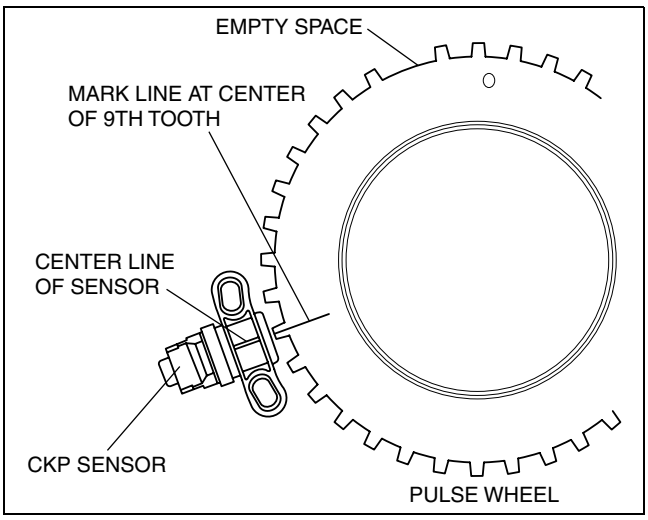
   Caution
   - **An inaccurately placed center line will cause improper installation resulting in a deterioration in engine control for ignition timing and fuel injection. Mark the center line carefully.**

3. Install the CKP sensor where the center line marked in Step 2 and the CKP sensor center line are aligned.
4. Tighten the CKP sensor installation bolt.

   Tightening torque
   5.5—7.5 N·m {57—76 kgf·cm, 49—66 in·lbf}

5. Remove the **SST** and install the blind plug.

   Tightening torque
   18—22 N·m {1.9—2.2 kgf·m, 14—16 ft·lbf}



B3E0140W017

CAMSHAFT POSITION (CMP) SENSOR INSPECTION [L8, LF]

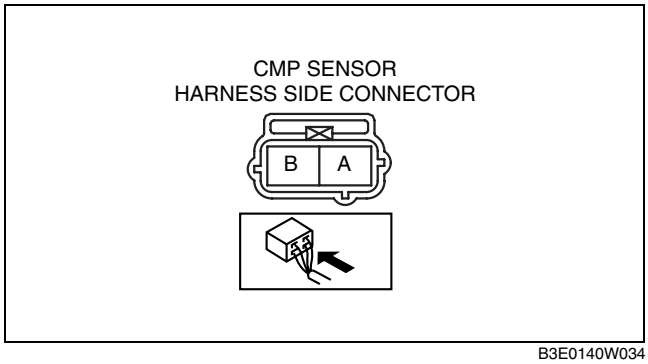
DPE014018230W01

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart. (See 00–00–6 Troubleshooting Procedure.)

Resistance Inspection
1. Disconnect the CMP sensor connector.
2. Measure the resistance between CMP sensor connector terminals A and B.
   - If not within the specification, replace the CMP sensor.
   - If the monitor item status/specification (reference) is not within the specification, even though the resistance is within the specification, perform the “Circuit Open/Short Inspection”, and repair or replace the malfunctioning part.

Resistance
400—550 ohms

Circuit Open/Short Inspection



B3E0140W034

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, 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 harness.
  — CMP sensor terminal A and PCM terminal 2V
  — CMP sensor terminal B and PCM terminal 2U

Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the harness.
  — CMP sensor terminal A and power supply
  — CMP sensor terminal A and body ground
  — CMP sensor terminal B and power supply
  — CMP sensor terminal B and body ground

CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [L8, LF]

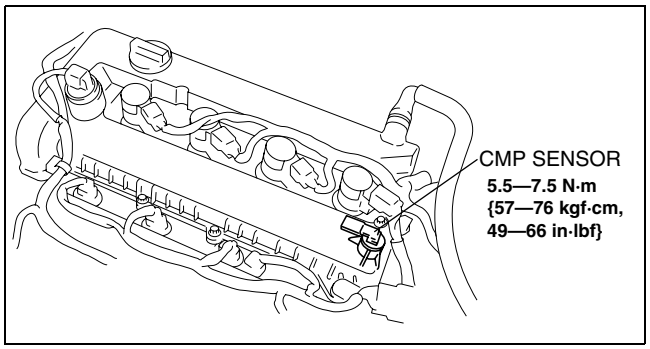
DPE014018230W02

1. Remove the battery cover.
2. Disconnect the negative battery cable.
3. Remove the plug hole cover.

Caution
- **When replacing the CMP 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.**

4. Disconnect the CMP sensor connector.
5. Remove the CMP sensor installation bolt.
6. Remove the CMP sensor from the cylinder head cover.
7. Install in the reverse order of removal.

Tightening torque
5.5—7.5 N·m {57—76 kgf·cm, 49—66 in·lbf}



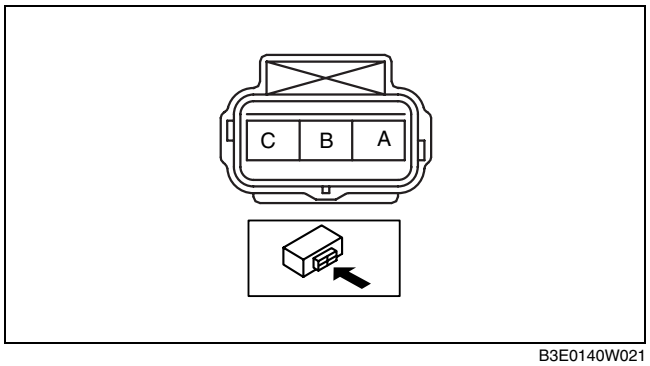
DPE140AW2703

THROTTLE POSITION (TP) SENSOR INSPECTION [L8, LF]

DPE014018910W01

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

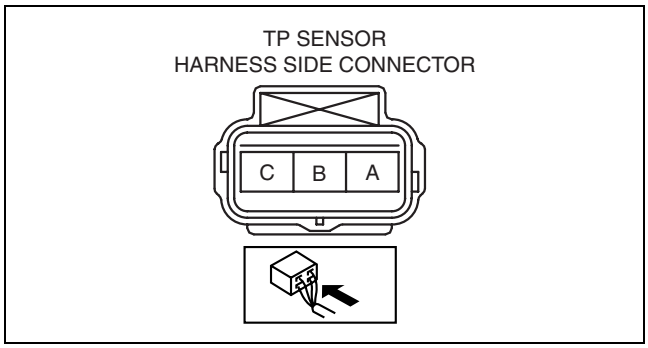
Resistance Inspection
1. Inspect the following items:
   - Throttle valve fully closed status
   - Accelerator cable play
     — If the PID value is not within the specification, even though the items above is normal, perform the following resistance variance inspection.
2. Disconnect the TP sensor connector.
3. Verify that the resistance between TP sensor terminals A and B changes moderately corresponding to the throttle valve openings.
   - If it can be verified, go to the next step.
   - If it cannot be verified, replace the TP sensor.
4. Measure the resistance between TP sensor terminals A and C.
   - If within the specification, perform the “Circuit Open/Short Inspection”, and repair or replace the malfunctioning part if necessary.
   - If not within the specification, replace the TP sensor.



B3E0140W021

Resistance
3.0—5.0 kilohm

Circuit Open/Short Inspection



B3E0140W037

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, 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 harness.
  - — TP sensor terminal A and PCM terminal 2AA
  - — TP sensor terminal B and PCM terminal 2I
  - — TP sensor terminal C and PCM terminal 2W

Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the harness.
  - — TP sensor terminal C and body ground
  - — TP sensor terminal B and power supply
  - — TP sensor terminal B and body ground
  - — TP sensor terminal A and power supply

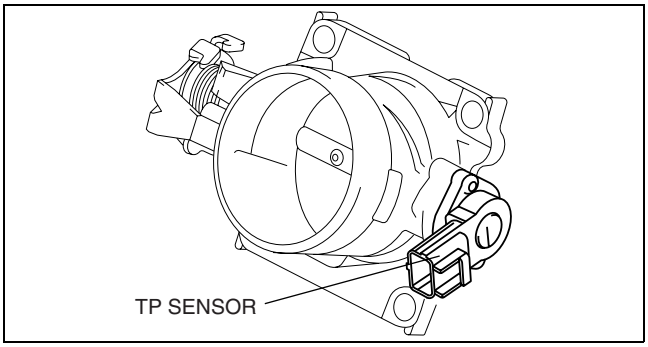
THROTTLE POSITION (TP) SENSOR REMOVAL/INSTALLATION [L8, LF]

DPE014018910W02

1. Remove the battery cover.
2. Disconnect the negative battery cable.
3. Remove the plug hole cover.
4. Remove the battery duct.
5. Disconnect the TP sensor connector.
6. Remove the TP sensor installation screw.
7. Remove the TP sensor from the throttle body.
8. Verify that the throttle valve is fully closed.
9. Install the TP sensor to the throttle body.
10. Tighten the TP sensor installation screw.

    Tightening torque
    1.0—1.4 N·m {11—14 kgf·cm, 8.9—12 in·lbf}

11. Verify that the throttle valve moves smoothly.
12. Connect the TP sensor connector.
13. Referring to the “PCM Terminal Voltage” in the PCM INSPECTION, verify that the output voltage is within the specification when it is fully open/closed.
    - If not within the specification, replace the throttle body.



B3E0140W020

MASS AIR FLOW (MAF) SENSOR INSPECTION [L8, LF]

DPE014013215W01

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

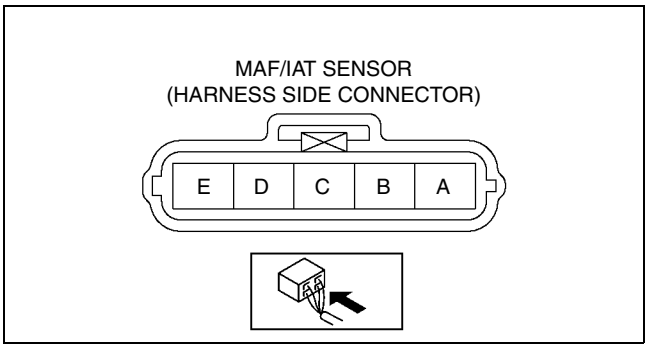
Visual Inspection
1. Visually inspect the MAF sensor for the following:
   - Damage, cracks
   - Rusted sensor terminal
   - Bent sensor terminal
     - — If there is any malfunction, replace the MAF sensor.

— If the monitor item status/specification (reference) is not within the specification even though there is no malfunction, perform the “Circuit Open/Short Inspection”.

Voltage Inspection

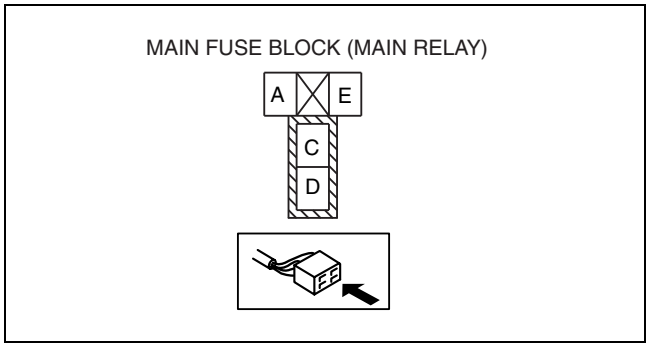
1. Remove the MAF/IAT sensor without disconnect the MAF/IAT sensor connector.
2. Turn the ignition switch to the ON position.
3. As the air gradually approaches the MAF detection part of the MAF/IAT sensor, verify that the voltage at PCM terminal 1AC (WDS PID: MAF) varies.
   - If it cannot be verified even though the related harnesses have no malfunction, replace the MAF/IAT sensor.

Circuit Open/Short Inspection



A6E3940W006

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the MAF sensor connector.
3. Inspect the following wiring harnesses for open or short. (Continuity check)



DPE140AW2701

Open circuit

- If there is no continuity, the circuit is open. Repair or replace the harness.
  — MAF sensor terminal A and main relay terminal C
  — MAF sensor terminal B and PCM terminal 1BD
  — MAF sensor terminal C and PCM terminal 1AC

Short circuit

- If there is continuity, the circuit is shorted. Repair or replace the harness.
  — MAF sensor terminal A and body ground
  — MAF sensor terminal C and power supply
  — MAF sensor terminal C and body ground
  — MAF sensor terminal B and power supply

HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [L8, LF]

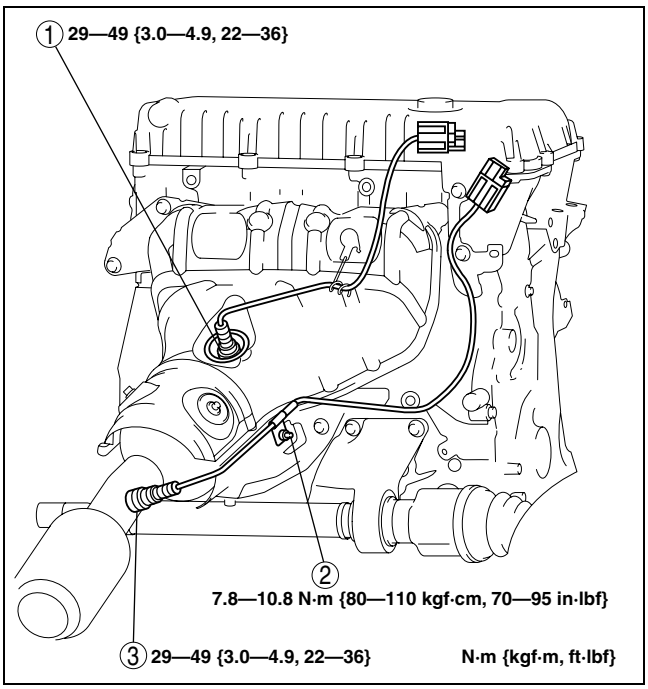
DPE014018860W01

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.
2. Disconnect the negative battery cable.
3. Remove the plug hole cover.
4. Disconnect the HO2S connector.

5. Remove in the order indicated in the table.

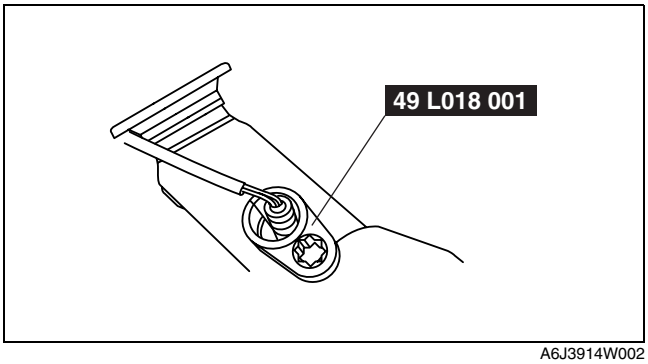


DPE0140AW270

1	Front HO2S (See 01–40A–34 HO2S Removal Note.)
2	Wiring harness bracket (See 01–40A–34 Wiring Harness Bracket Installation Note.)
3	Rear HO2S (See 01–40A–34 HO2S Removal Note.)

HO2S Removal Note

1. Remove the HO2S using the **SST**.

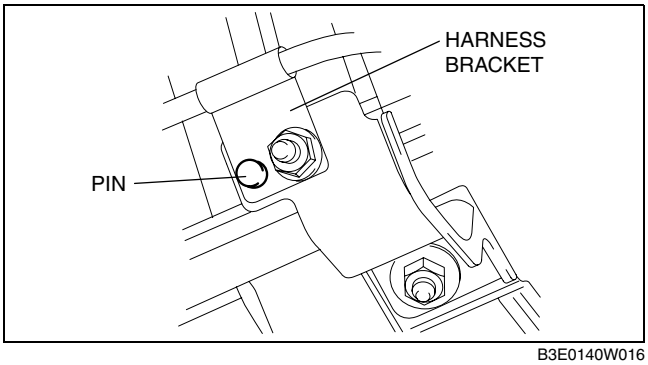


A6J3914W002

Wiring Harness Bracket Installation Note

Note

- There might be no pin. If there is no pin, lock the wiring harness bracket against rotation and tighten the nut.



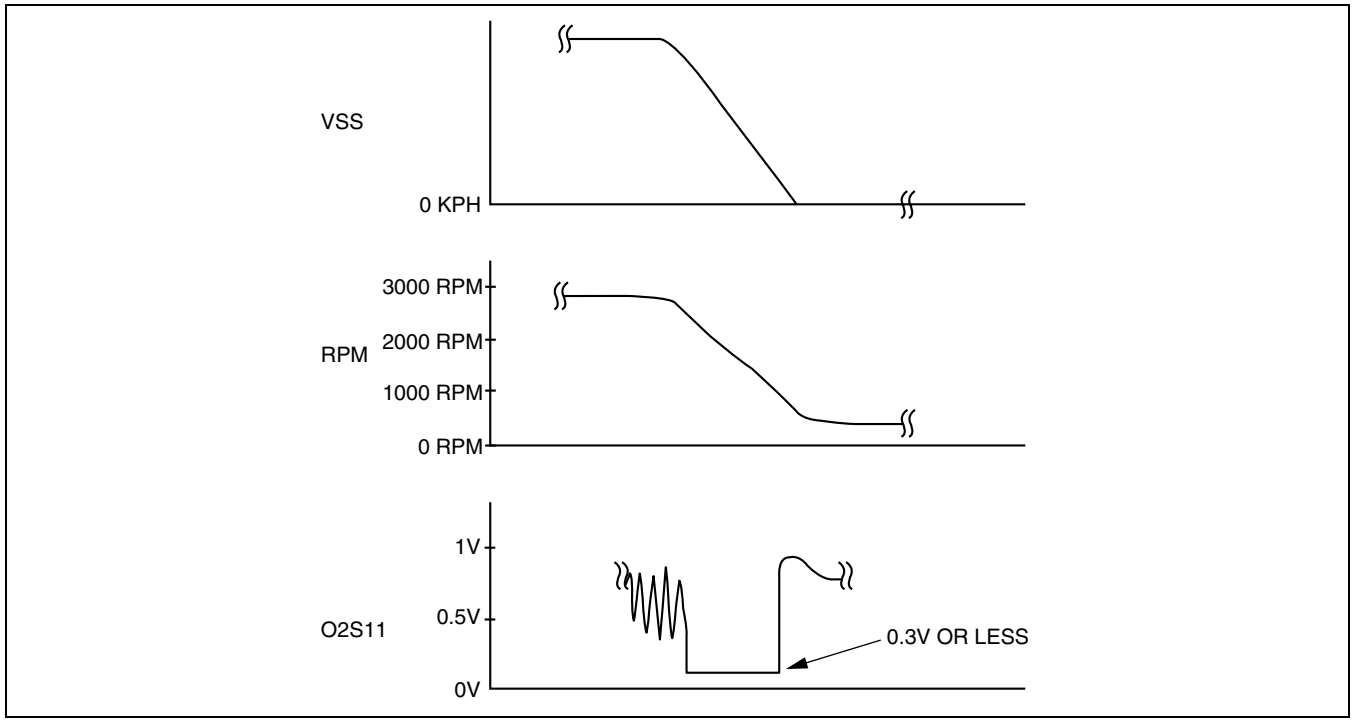
B3E0140W016

FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF]

DPE014018860W02

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

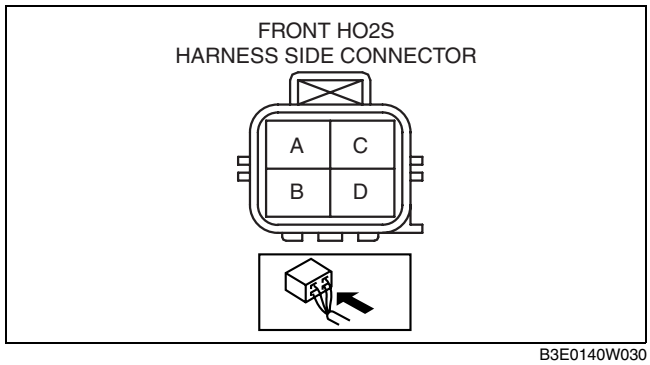
Front HO2S voltage inspection
1. Warm up the engine to normal operating temperature.
2. Using the WDS or equivalent, monitor the following:
   — Vehicle speed (PID: VSS)
   — Engine speed (PID: RPM)
   — Front HO2S voltage (PID: O2S11)
3. Drive the vehicle and decelerate the engine speed by releasing the accelerator pedal fully when the engine speed is **3,000 rpm** or more.
4. Verify that the front HO2S outputs a voltage of **0.6 V or more**, one time or more, then verify that the front HO2S voltage (PID: O2S11) is **0.3 V or less** while decelerating as shown in the figure.



C3U0140W020

- If not within the specification, inspect the HO2S for an open or short circuit. (See 01–40A–35 Front HO2S Circuit Open/Short Inspection (Sensor).) Then if there is no malfunction in the wiring harness, replace the front HO2S.

Front HO2S Circuit Open/Short Inspection (Sensor)



B3E0140W030

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the front HO2S connector.
3. Inspect the following wiring harnesses for open or short. (Continuity check)

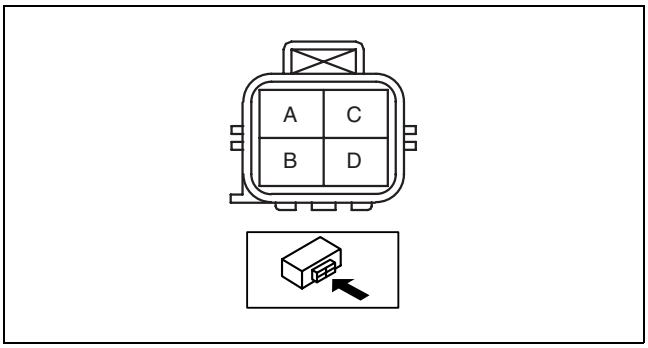
Open circuit
- If there is no continuity, the circuit is open. Repair or replace the harness.

— HO2S terminal A and PCM terminal 2AG
— HO2S terminal B and PCM terminal 2AA

Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the harness.
  — HO2S terminal A and body ground
  — HO2S terminal A and power supply
  — HO2S terminal B and power supply

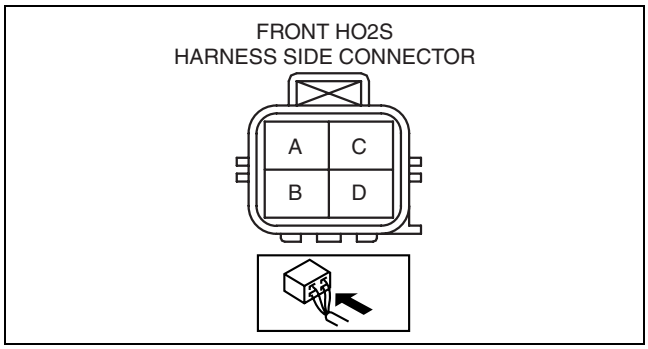
Front HO2S Heater Resistance Inspection
1. Disconnect the front HO2S connector.
2. Measure the resistance between front HO2S terminals C and D.
   - If not within the specification, replace the front HO2S.

   Front HO2S heater resistance
   2— 20 ohms



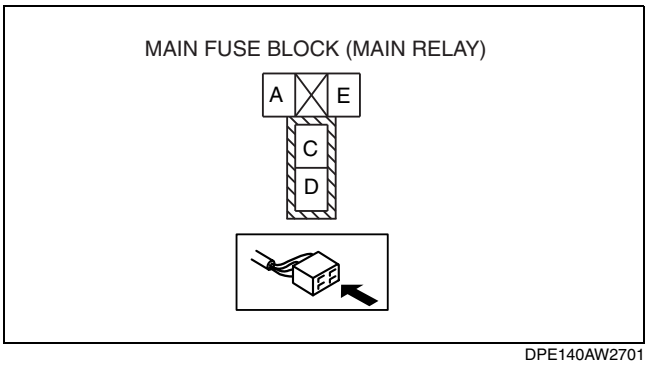
B3E0140W025

Front HO2S Circuit Open/Short Inspection (Heater)



B3E0140W030

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the front HO2S connector.
3. Inspect the following wiring harnesses for open or short. (Continuity check)



DPE140AW2701

Open circuit
- If there is no continuity, the circuit is open. Repair or replace the harness.
  — HO2S terminal C and main relay terminal C
  — HO2S terminal D and PCM terminal 2G

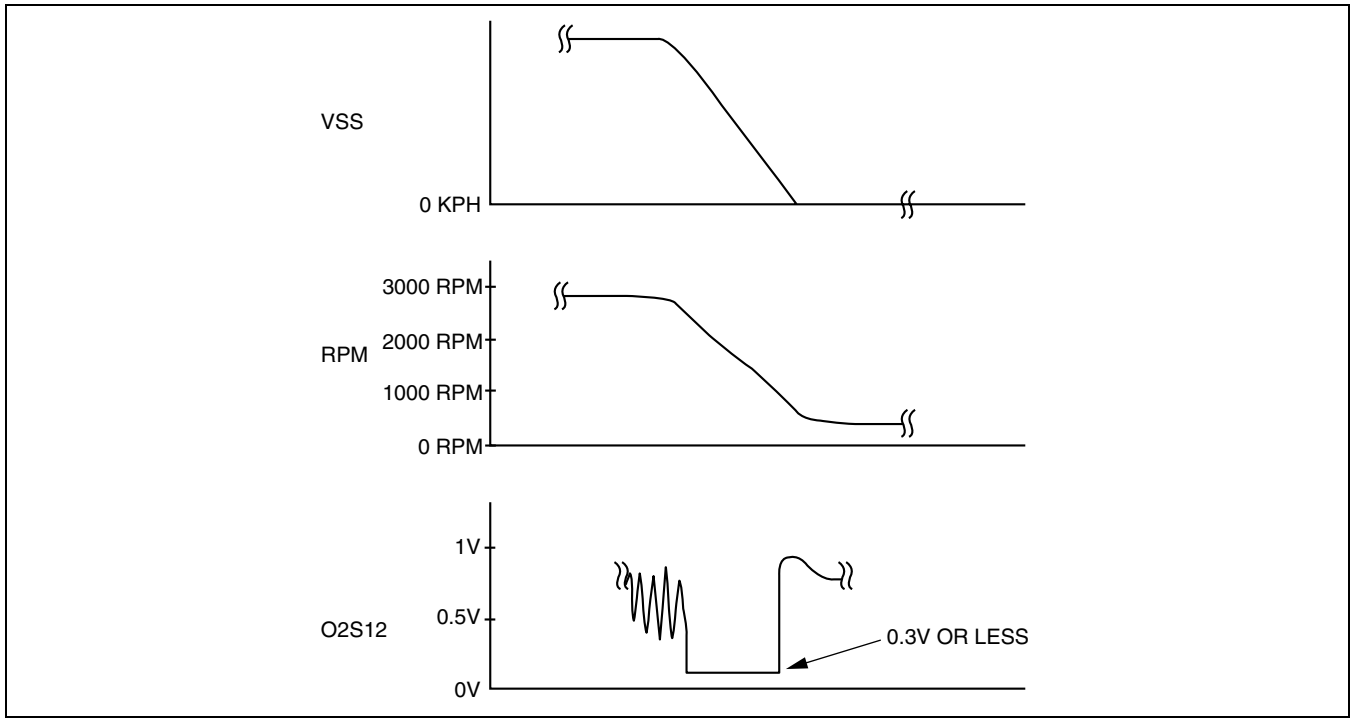
Short circuit
- If there is no continuity, the circuit is shorted. Repair or replace the harness.
  Front and rear
  — HO2S terminal C and body ground
  — HO2S terminal D and power supply
  — HO2S terminal D and body ground

REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [L8, LF]

DPE014018860W03

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

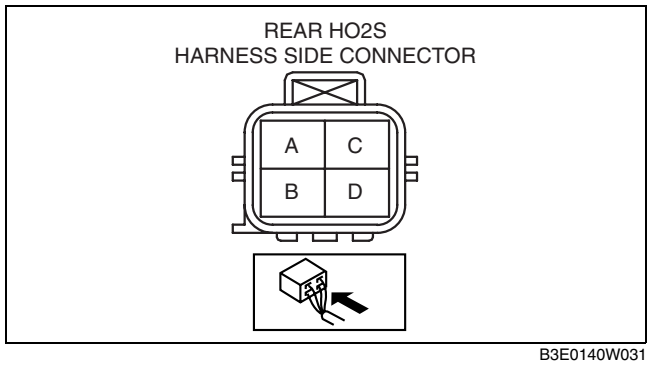
Rear HO2S voltage inspection
1. Warm up the engine to normal operating temperature.
2. Using the WDS or equivalent, monitor the following:
   — Vehicle speed (PID: VSS)
   — Engine speed (PID: RPM)
   — Front HO2S voltage (PID: O2S12)
3. Drive the vehicle and decelerate the engine speed by releasing the accelerator pedal fully when the engine speed is **3,000 rpm or more**.
4. Verify that the front HO2S outputs a voltage of **0.6 V or more**, one time or more, then verify that the front HO2S voltage (PID: O2S12) is **0.3 V or less** while decelerating as shown in the figure.



DPE140AW2901

- If not within the specification, inspect the HO2S for an open or short circuit. (See 01–40A–37 Rear HO2S Circuit Open/Short Inspection (Sensor).) Then if there is no malfunction in the wiring harness, replace the front HO2S.

Rear HO2S Circuit Open/Short Inspection (Sensor)



B3E0140W031

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Inspect the following wiring harnesses for open or short. (Continuity check)

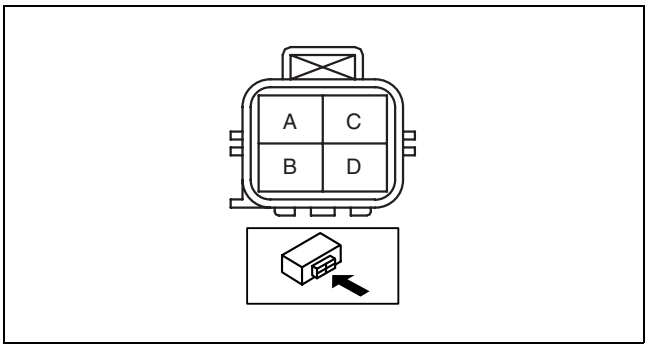
Open circuit
- If there is no continuity, the circuit is open. Repair or replace the harness.
  — HO2S terminal A and PCM terminal 2AH

— HO2S terminal B and PCM terminal 2AA

Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the harness.
  — HO2S terminal A and body ground
  — HO2S terminal A and power supply
  — HO2S terminal B and power supply

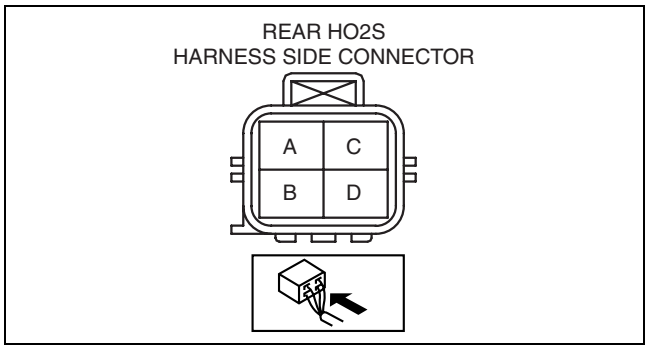
Rear HO2S Heater Resistance Inspection
1. Disconnect the PCM connector.
2. Disconnect the rear HO2S connector.
3. Measure the rear HO2S resistance between terminals C and D.
   - If not within the specification, replace the rear HO2S.

   Rear HO2S heater resistance
   2—50 ohms



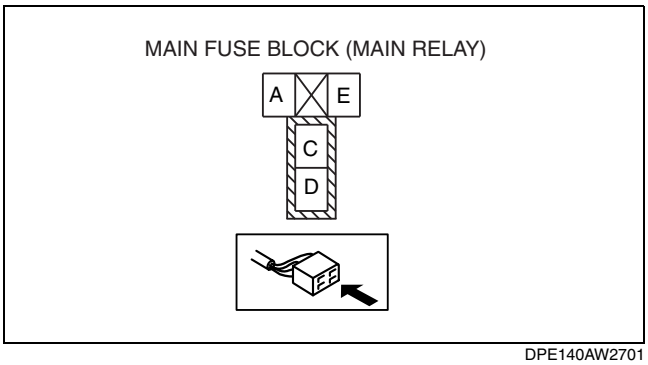
B3E0140W026

Rear HO2S Circuit Open/Short Inspection (Heater)



B3E0140W031

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the rear HO2S connector.
3. Inspect the following wiring harnesses for open or short. (Continuity check)



DPE140AW2701

Open circuit
- If there is no continuity, the circuit is open. Repair or replace the harness.
  — HO2S terminal C and main relay terminal C
  — HO2S terminal D and PCM terminal 2C

Short circuit
- If there is no continuity, the circuit is shorted. Repair or replace the harness.
  Front and rear
  — HO2S terminal C and body ground
  — HO2S terminal D and power supply
  — HO2S terminal D and body ground

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR INSPECTION [L8, LF]

DPE014018210W01

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

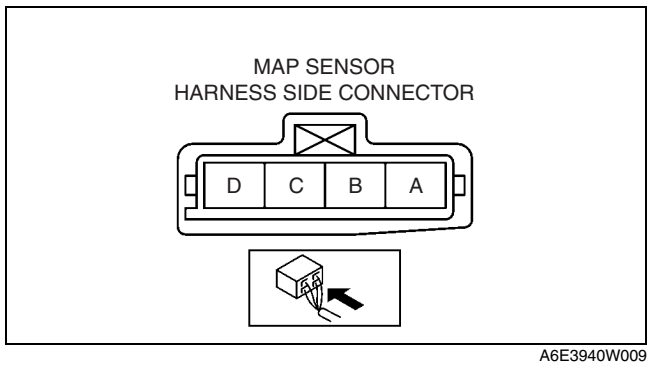
Voltage Inspection
1. Remove the MAP sensor with the connector still connected. (See 01–40A–39 MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR REMOVAL/INSTALLATION [L8, LF].)
2. Remove the vacuum hose of the MAP sensor.
3. Verify that the voltage at PCM terminal 2AL is within the specification when the ignition switch is turned to the ON position.
   - If not within the specification, replace the MAP sensor.

   Voltage
   2.69—4.37 V

4. Install the vacuum pump.
5. Turn the ignition switch to the ON position.
6. Verify that change in voltage is within the specification when a vacuum of **30 kPa {225 mmHg, 8.86 inHg}** is applied using a vacuum pump.
   - If not within the specification, replace the MAP sensor.

   Voltage variance
   1.16—1.27 V

Circuit Open/Short Inspection



A6E3940W009

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, LF].)
2. Inspect the following wiring harness for open or short. (Continuity check)

Open circuit
- If there is no continuity, the circuit is open. Repair or replace the harness.
  — MAP sensor terminal A and PCM terminal 2AA
  — MAP sensor terminal D and PCM terminal 2AL
  — MAP sensor terminal C and PCM terminal 2W

Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the harness.
  — MAP sensor terminal A and power supply.
  — MAP sensor terminal C and body ground.
  — MAP sensor terminal D and power supply.
  — MAP sensor terminal D and body ground

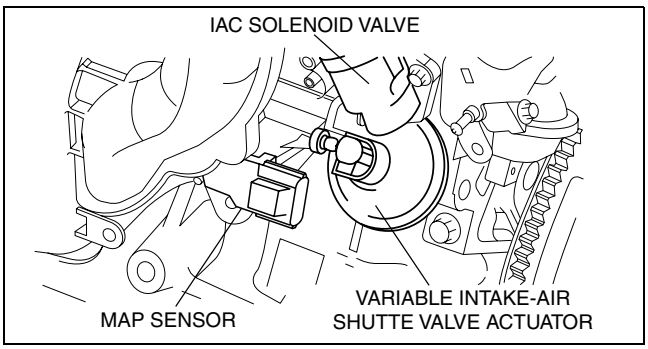
MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR REMOVAL/INSTALLATION [L8, LF]

DPE014018210W02

1. Remove the battery cover.
2. Disconnect the negative battery cable.
3. Remove the plug hole cover.
4. Remove the vacuum hose.
5. Disconnect the MAP sensor connector.

6. Remove the MAP sensor installation screw.
7. Remove MAP sensor from the intake manifold.
8. Install in the reverse order of removal.

Tightening torque
2.7—3.7 N·m {28—37 kgf·cm, 24—32 in·lbf}



B3E0140W032

KNOCK SENSOR (KS) INSPECTION [L8, LF]

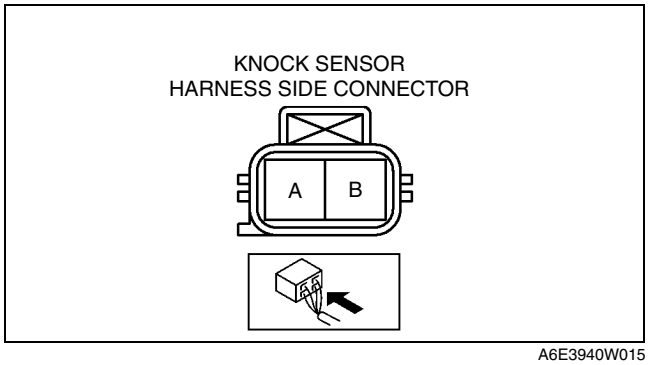
DPE014018920W01

Note
- Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flowchart.

Resistance Inspection
1. Disconnect the knock sensor connector.
2. Measure resistance between KS terminals A and B.
   - If not within the specification, replace the KS.
   - If the monitor item status/specification (reference) is not within the specification, even though the KS resistance is within the specification, perform the “Circuit Open/Short Inspection”.

Resistance
Approx. 4.87 megohms

Circuit Open/Short Inspection



A6E3940W015

1. Disconnect the PCM connector. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, 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 harness.
  — Knock sensor terminal A and PCM terminal 2Q
  — Knock sensor terminal B and PCM terminal 2R

Short circuit
- If there is continuity, the circuit is shorted. Repair or replace the harness.
  — Knock sensor terminal A and power supply
  — Knock sensor terminal A and body ground
  — Knock sensor terminal B and power supply
  — Knock sensor terminal B and body ground

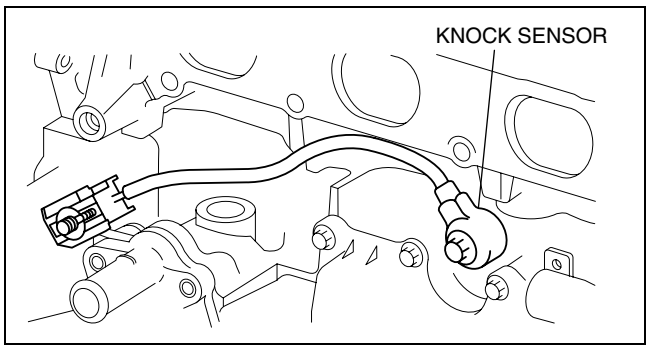
KNOCK SENSOR (KS) REMOVAL/INSTALLATION [L8, LF]

DPE014018920W02

1. Remove the following part for easier access.
   - Intake manifold (See 01–13A–4 INTAKE AIR SYSTEM REMOVAL/INSTALLATION [L8, LF].)
2. Disconnect the KS connector.

3. Remove the KS installation bolt, then remove the KS.
4. Install in the reverse order of removal.

Tightening torque
16—24 N·m {1.7—2.4 kgf·m, 12—17 ft·lbf}



B3E0140W027

BAROMETRIC PRESSURE (BARO) SENSOR INSPECTION [LF (VEHICLES EQUIPPED WITH BARO SENSOR BUILT INTO PCM)]

DPE014018211W02

Note
- Perform the following inspection only when directed.
- The following vacuum values are indicated by relative pressure from the PCM. (See 01–40A–5 PCM REMOVAL/INSTALLATION [L8, LF].)

1. Connect the WDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position.
3. Select BARO on the WDS or equivalent.
4. Verify that the BARO PID (pressure) and barometric pressure are practically equal.
   - If not as verified, perform the “Circuit Open/Short Inspection”.
     — If there is no open or short circuit, replace the PCM.

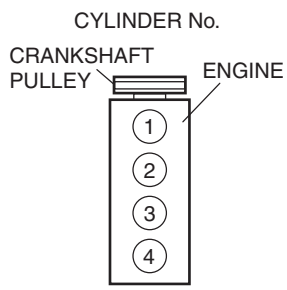
01–50A TECHNICAL DATA [L8, LF]

ENGINE TECHNICAL DATA [L8, LF] . . . 01–50A–1

ENGINE TECHNICAL DATA [L8, LF]

DPE015000000W01

Item	Specification
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}
Compression pressure (L8)	Standard: 1,750 kpa {17.845 kgf/cm^2, 253.816 psi} [300 rpm] Minimum: 1,225 kpa {12.492 kgf/cm^2, 177.64 psi} [300 rpm] Maximum difference between cylinders: 196.1 kpa {2.0 kgf/cm^2, 28.5 psi}
Compression pressure (LF)	Standard: 1,720 kpa {17.54 kgf/cm^2, 249.5 psi} [300 rpm] Minimum: 1,204 kpa {12.28 kgf/cm^2, 174.6 psi} [300 rpm] Maximum difference between cylinders: 196.1 kpa {2.0 kgf/cm^2, 28.5 psi}
Cylinder Head Bolt Length (standard)	145.2—145.8 mm {5.72—5.74 in}
Cylinder Head Bolt Length (Maximum)	146.5 mm {5.77 in}
Pushing distance of the front oil sael	0—0.5 mm {0—0.019 in}
Ignition timing	Approx. BTDC 8°
Oil pressure (reference value) [oil temperature: 100 °C {212 °F}]	234—521 kPa {2.39—5.31 kgf/cm^2, 33.9—75.5 psi} min [3,000 rpm]
Engine oil capacity (approx. quantity)	Oil replacement: 3.9 L {4.1 US qt, 3.4 Imp qt} Oil and oil filter replacement: 4.3 L {4.5 US qt, 3.8 Imp qt} Total (dry engine): 4.6 L {4.9 US qt, 4.0 Imp qt}
Engine coolant capacity (approx. quantity)	With heater: 7.0 L {7.4 US qt, 6.2 Imp qt} Without heater: 6.5 L {6.9 US qt, 5.7 Imp qt}
Cooling system cap valve opening pressure	93.2—122.6 kPa {0.95—1.25 kgf/cm^2, 13.5—17.8 psi}
Thermostat initial-opening temperature	80—84 °C {176—183 °F}
Thermostat full-open temperature	97 °C {207 °F}
Thermostat full-open lift	More than 8.0 mm {0.31 in}
Cooling fan motor current	17—23 A
Fuel pressure	350—410 kPa {3.57—4.18 kgf/cm^2, 50.8—59.4 psi}
Fuel hold pressure	250 kPa {2.55 kgf/cm^2, 36.2 psi} or more
Resistance	11.4—12.6 ohms [20 °C {68 °F}]
Leakage amount	1 drop or less/2 min
Injection volume	46—66 ml {44—66 cc, 2.8—4.0 cu in}/15 s
Battery electrolyte specific gravity [20 °C {68 °F}]	1.22—1.29
Battery load test current	50D20L (40): 150 A 75D23L (52): 195 A
Battery back-up current	30 mA max.
Battery slow charge current	50D20L (40): 4.0—5.0 A 75D23L (52): 5.0—6.0 A
Battery quick charge current [30 min.]	50D20L (40): 25 A 75D23L (52): 35 A
Generator standard voltage [IG-ON]	Terminal B: B+ Terminal P: Approx. 1 V or less Terminal D: Approx. 0 V
Generator standard voltage [Idle, 20 °C {68 °F}]	Terminal B: 13—15 V Terminal P: Approx. 3—8 V Terminal D: Turn the electrical loads (headlights, blower motor, rear window defroster) on and verify that the voltage reading increases.
Generator generated current minimum value	70 % of the nominal output current (nominal output current: 90 A) [ambient temp. 20 °C {68 °F}, voltage 13.0—15.0 V, both engine and generator are hot]
Generator rotor resistance (between slip rings) [20 °C {68 °F}]	1.7—2.1 ohms

Item	Specification
Generator brush length	Standard: 18.5 mm {0.73 in} Minimum: 5.0 mm {0.2 in}
Generator brush spring force	Standard: 4.8—6.0 N {0.49—0.61 kgf, 1.08—1.34 lbf} Minimum: 2.16 N {0.22 kgf, 0.49 lbf}
Firing order	1-3-4-2 (all cylinders independent firing) 
Spark plug type	L303 18 110
Spark plug gap	1.25—1.35 mm {0.049—0.053 in}
Spark plug resistance [25 °C {77 °F}]	3.0—7.5 kilohms
Starter no load test voltage	11 V
Starter no load test current	90 A or less
Starter pinion gap	0.5—2.0 mm {0.02—0.07 in}
Starter armature runout	0.05 mm {0.002 in} max.
Starter commutator diameter	Standard: 29.4 mm {1.16 in} Minimum: 28.8 mm {1.13 in}
Segment groove depth of starter commutator	Standard: 0.4—0.6 mm {0.016—0.023 in} Minimum: 0.2 mm {0.008 in}
Starter brush length	Standard: 12.3 mm {0.48 in} Minimum: 7.0 mm {0.28 in}
Starter brush spring force	Standard: 18.3—24.9 N {1.87—2.53 kgf, 4.12—5.59 lbf} Minimum: 5.9 N {0.6 kgf, 1.3 lbf}

Idle speed

Condition	Engine speed (rpm)*1			
	MTX		ATX	
	L8	LF		
	Neutral position		N range	D range
No load	650—750	600—700	650—750	550—650 600—700*3
Electrical loads*2 ON (38—48 A)	650—750	650—750	650—750	600—700
Electrical loads*2 ON (Above 48 A)	700—800	700—800	700—800	670—770
A/C ON and refrigerant pressure switch (middle) OFF	700—800	700—800	650—750	650—750
A/C ON and refrigerant pressure switch (middle) ON	700—800	700—800	670—770 750—800*3	670—770 750—850*3

*1 : Excludes temporary idle speed drop just after the electrical loads are turned on.

*2 : Alternator generating current value.

*3 : Israel specs.

Recommended engine oil

Item	Specifications			
	Europe			Except Europe
Grade	API SL or ACEA A3/A5	API SL or ACEA A3		API SG/SH/SJ/SL or 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.**		—	—

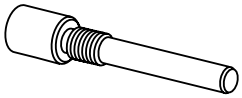
01–60A SERVICE TOOLS [L8, LF]

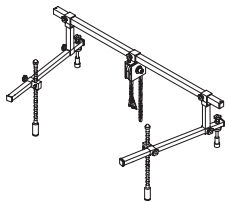
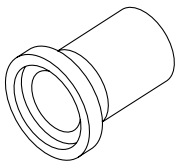
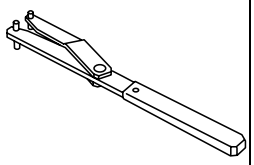
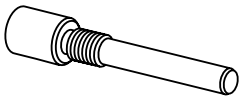
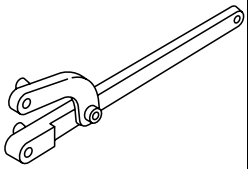
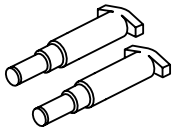
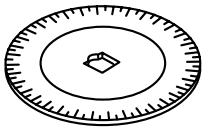
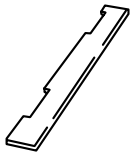
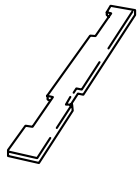
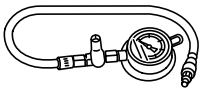
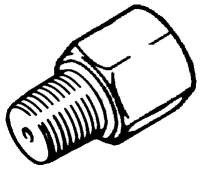
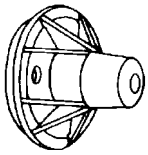
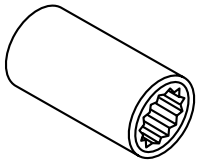
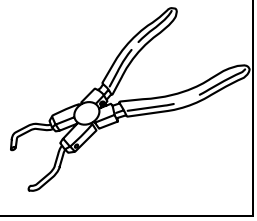
ENGINE SST [L8, LF] 01–60A–1

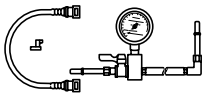
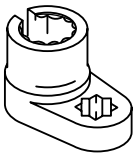
ENGINE SST [L8, LF]

DPE016000000W01

1: Mazda **SST** number
2: Global **SST** number
Example

1:49 JE01 061 2:303–507 Crankshaft TDC setting pin	

49 C017 5A0 2: – Engine support set 	1:49 H010 401 2: – Oil seal installer 	1:49 G032 354 2: – 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 UN30 3328 2:303-328 Rear oil seal replacer 	1:49 D015 001 2: – Box wrench 	1: 49 E042 001 2: – Remover 

1:49 N013 1A0C 2:– Fuel pressure gauge set 	1:49 L018 001 2: – O2 sensor wrench 	1:49 D015 0A0 2: – Radiator cap tester adapter set 