2012 - Mazda6 - Engine

ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]

Input Signal System Inspection Procedure

1. Find an irregular signal. (See **Finding irregular signals**.)
2. Locate source. (See **Locating the source of unusual signals**.)
3. Repair or replace the malfunctioning part.
4. Confirm that the irregular signal is no longer detected.

Finding irregular signals

- While referring to **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**, use the PID/DATA monitor and record function to inspect the input signal system relating to the problem.

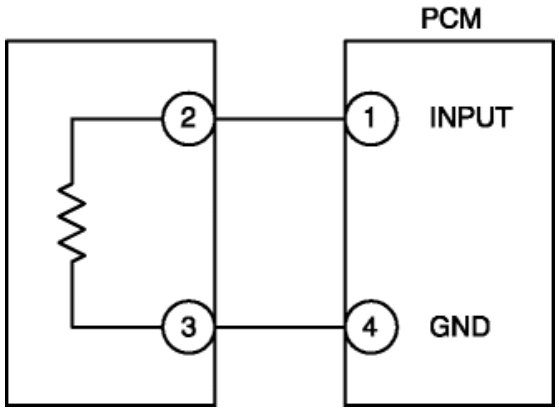
1. Start the engine and idle the vehicle. You can assume that any signals that are out of specification by a wide margin are irregular.
2. When recreating the problem, any sudden change in monitor input signals that is not intentionally created by the driver can be determined as irregular.

Locating the source of unusual signals

CAUTION:

- Compare the M-MDS monitor voltage with the measurement voltage using the digital measurement system function. If you use another tester, misreading may occur.
- When measuring voltage, attach the tester ground to the ground of the PCM that is being tested, or to the engine itself. If this is not performed, the measured voltage and actual voltage may differ.
- After connecting the pin to a waterproof coupler, confirming continuity and measuring the voltage, inspect the waterproof connector for cracks. If there are any, use sealant to fix them. Failure to do this may result in deterioration of the wiring harness or terminal from water damage, leading to problems with the vehicle.

Thermistor type (IAT sensor and ECT sensor)



Input signal system inspection for thermistor type

1. When an irregular signal is detected, measure the #1 PCM terminal voltage.
    - If the #1 terminal voltage and the M-MDS monitor voltage are the same, proceed to the next step.
    - If there is a difference of **0.5 V or more**, inspect the following points concerning the PCM connector:
        - Female terminal opening loose
        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
        - Harness/pin crimp is loose or disconnected.
2. Measure the #2 sensor terminal voltage.
    - If there is a **0.5 V or more** difference between the sensor and the M-MDS voltages, inspect the wiring harness for open or short circuits.
    - If the sensor and the M-MDS voltages are the same, inspect the following points concerning the sensor connector:
        - Female terminal opening is loose.
        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
        - Harness/pin crimp is loose or disconnected.
    - If there are no problems, proceed to next investigation below.

GND system inspection for thermistor type

- Confirm that terminal sensor #3 is at **0 V**.
    - If it is at **0 V**, inspect the sensor. If necessary, replace the sensor.
    - If not, inspect for the following:

- Open circuit in wiring harness
- Female terminal opening is loose.
- Coupler (pin holder) damage
- Pin discoloration (blackness)
- Harness/pin crimp is loose or disconnected.

Main Relay Operation Inspection

1. Verify that the main relay clicks when the ignition to ON and off.
    - If there is no operation sound, inspect the following:
        - Main relay (See **RELAY INSPECTION**.)
        - Harness and connector between ignition switch and main relay
        - Harness and connector between PCM terminal 1Q and main relay

Intake Manifold Vacuum Inspection

1. Verify air intake hoses are installed properly.
2. Start the engine and run it at idle.
3. Disconnect the vacuum hose between the intake manifold and purge solenoid valve from the intake manifold side.
4. Connect a vacuum gauge to the intake manifold and measure the intake manifold vacuum.
    - If not as specified, inspect the following:

      Specification
    - More than 60 kPa {450 mmHg, 18 inHg}

NOTE:

- Air suction can be located by engine speed change when lubricant is sprayed on the area where suction is occurring.
    - Air suction at throttle body, intake manifold and PCV valve installation points
    - EGR valve (stuck open)
    - Fuel injector insulator
    - Engine compression (See **COMPRESSION INSPECTION [MZR 2.5]**.)

Drive-by-Wire Control System Inspection

Engine coolant temperature compensation inspection

1. Connect the M-MDS to the DLC-2.
2. Access the following PCM PIDs: (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - ECT
    - IAT
    - RPM
3. Verify that the engine is cold, then start the engine.
4. Verify that the engine speed decreases as the engine warms up.
    - If the engine speed does not decrease or decreases slowly, inspect the following:
        - ECT sensor and related wiring harness (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.)
        - Throttle body and related wiring harness (See **THROTTLE BODY INSPECTION [MZR 2.5]**.)

Load compensation inspection

1. Start the engine and idle it.
2. Connect the M-MDS to the DLC-2.
3. Verify that P0506:00 or P0507:00 is not displayed. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - If the P0506:00 or P0507:00 are displayed, perform DTC inspection. (See **DTC P0506:00 [MZR 2.5]**.) (See **DTC P0507:00 [MZR 2.5]**.)
4. Access the PCM PID RPM. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)

NOTE:

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

5. Verify that the engine speed is within the specification under each load condition.
    - If load condition is not as specified, inspect the following:
        - A/C switch and related wiring harness (See **CLIMATE CONTROL UNIT INSPECTION [MANUAL AIR CONDITIONER]**.) (See **CLIMATE CONTROL UNIT INSPECTION [FULL-AUTO AIR CONDITIONER]**.)
        - Fan switch and related wiring harness (See **CLIMATE CONTROL UNIT INSPECTION [MANUAL AIR CONDITIONER]**.) (See **CLIMATE CONTROL UNIT INSPECTION [FULL-AUTO AIR CONDITIONER]**.)
        - PSP switch and related wiring harness (See **POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [MZR 2.5]**.)

Idle speed (ATX: P, N position, MTX: Neutral position)

- 600—700 rpm

Idle-up speed (ATX: P, N position, MTX: Neutral position)

- A/C on and: 600—850 rpm
- Electrical loads on: 650—750 rpm (MTX), 600—750 rpm (ATX)
- While turning steering wheel: 650—750 rpm

Throttle position (TP) sweep inspection

1. Connect the M-MDS to the DLC-2.
2. Switch the ignition to ON.
3. Verify that none of the following DTC are displayed: (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - P0122:00, P0123:00, P0222:00, P0223:00, P0638:00, P2100:00, P2101:00, P2107:00, P2108:00, P2119:00, P2122:00, P2123:00, P2127:00, P2128:00, P2135:00, P2138:00
        - If any one DTC is displayed, perform DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
4. Access the PCM PIDs APP1 and APP2 using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
5. Verify the APP1 and APP2 PIDs when the accelerator pedal released and depresses.

Specification

- Accelerator pedal released:
    - APP1: **Approx. 0.4 V**
    - APP2: **Approx. 0.4 V**
- Accelerator pedal depressed:
    - APP1: **Approx. 3.4 V**
    - APP2: **Approx. 3.4 V**
- If not as specified, inspect for the following harnesses and connectors:
    - APP sensor terminal A—PCM terminal 1W
    - APP sensor terminal B—PCM terminal 1AP
    - APP sensor terminal C—PCM terminal 1AV
    - APP sensor terminal D—PCM terminal 1AS
    - APP sensor terminal E—PCM terminal 1AO
    - APP sensor terminal F—PCM terminal 1AL
        - If there is no malfunction, replace the accelerator pedal. (See **ACCELERATOR PEDAL REMOVAL/ INSTALLATION [MZR 2.5]**.)

Brake override system operation inspection

NOTE:

- If the brake override system operates normally after performing the following inspection, the PCM detects DTC P2299:00.

1. Start the engine and run it is idling.
2. Verify that the engine speed becomes **less than 1,100 rpm** under the following conditions.

- Neutral (MTX)
- P or N position (ATX)
- Engine speed of **1,150 rpm or more** other than idle
- Brake pedal depressed
    - If the engine speed becomes **less than 1,100 rpm**, clear the PCM DTC using the M-MDS. (System operation is normal.) (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - If the engine speed does not become **less than 1,100 rpm**, inspect for the following parts, then repair or replace the malfunctioning part:
        - APP sensor (See **ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [MZR 2.5]**.)
        - Neutral switch (MTX) (See **NEUTRAL SWITCH INSPECTION [MZR 2.5]**.)
        - CPP switch (MTX) (See **CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [MZR 2.5]**.)
        - TR switch (ATX) (See **TRANSAXLE RANGE (TR) SWITCH INSPECTION [FS5A-EL]**.)
        - Brake switch No.1 (See **BRAKE SWITCH INSPECTION**.)
        - Brake switch No.2 (See **BRAKE SWITCH INSPECTION**.)
        - Communication between PCM and TCM (ATX) (See **FOREWORD [MULTIPLEX COMMUNICATION SYSTEM]**.)

Variable Intake Air Control Operation Inspection

1. Start the engine.
2. Inspect the rod operation under the following condition: **Rod operation**

Engine speed	4,400 rpm	
	Below	Above
Shutter valve actuator	Operate	Not operate

- If the rod operation is not as specified, inspect as follows:

a. Stop the engine.

b. Connect the M-MDS to the DLC-2.

c. Verify that DTC P0661:00 or P0662:00 is not displayed. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)

- If DTC P0661:00 or P0662:00 is shown, perform DTC inspection. (See **DTC P0661:00 [MZR 2.5]**.) (See **DTC P0662:00 [MZR 2.5]**.)

d. Inspect the variable intake air solenoid valve. (See **VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [MZR 2.5]**.)

- If the variable intake air solenoid valve is not normal, replace the variable intake air solenoid valve. (See **INTAKE-AIR**

SYSTEM REMOVAL/ INSTALLATION [MZR 2.5].)

- If the variable intake air solenoid valve is normal, inspect the following:
    - Vacuum hose and vacuum chamber for looseness or damage
    - Shutter valve actuator (See VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [MZR 2.5].)
    - Shutter valve stuck open or closed

Variable Tumble Control Operation Inspection

1. Connect the M-MDS to the DLC-2.
2. Access the PCM PID ECT. (See ON-BOARD DIAGNOSTIC TEST [MZR 2.5].)
3. Verify that ECT PID is **between 60 °C {140 °F} and 67 °C {153 °F}**.
4. Start the engine.
5. Inspect rod operation under the following conditions: **Rod operation**

Engine speed	3,750 rpm	
	Below	Above
Shutter valve actuator	Operate	Not operate

- If the rod operation is not specified, inspect as follows:

a. Verify that DTC P2009:00 or P2010:00 is not displayed. (See ON-BOARD DIAGNOSTIC TEST [MZR 2.5].)

- If DTC P2009:00 or P2010:00 are shown, perform DTC inspection. (See DTC P2009:00 [MZR 2.5].) (See DTC P2010:00 [MZR 2.5].)

b. Inspect the variable tumble solenoid valve. (See VARIABLE TUMBLE SOLENOID VALVE INSPECTION [MZR 2.5].)

- If the variable tumble solenoid valve is not normal, replace the variable tumble solenoid valve. (See INTAKE-AIR SYSTEM REMOVAL/ INSTALLATION [MZR 2.5].)
- If the variable tumble solenoid valve is normal, inspect the following:
    - Vacuum hose and vacuum chamber for looseness or damage
    - Shutter valve actuator (See VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [MZR 2.5].)
    - Shutter valve stuck open or closed

Fuel Injector Operation Inspection

If simulation function of M-MDS is used:

STEP	INSPECTION	RESULTS	ACTION
1	• Start the engine and warm it up until normal operating temperature. • Connect the M-MDS to the DLC-2. • Select the INJ#1, INJ#2, INJ#3 and INJ#4 PIDs. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Turn the fuel injector from on to off using the PIDs each cylinder. • Does the engine speed drop?	Yes	Fuel injector work properly.
		No	Go to the next step.
2	• Disconnect the fuel injector that the engine speed does not drop at Step 1. • Switch the ignition to ON. • Measure the voltage between suspect fuel injector terminal A (wiring harness-side) and body ground. • Is the voltage **B+** ?	Yes	Go to the next step.
		No	Repair or replace for open or short circuit between fuel injector terminal A and fuel pump relay terminal C.
3	• Inspect for open or short circuit between suspect fuel injector terminal B and following PCM terminals: ▪ Fuel injector No.1 • PCM terminal 2BB ▪ Fuel injector No.2 • PCM terminal 2BC ▪ Fuel injector No.3 • PCM terminal 2BD ▪ Fuel injector No.4 • PCM terminal 2AZ • Is there any malfunction?	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step.
4	• Inspect the suspect fuel injector. (See **FUEL INJECTOR INSPECTION [MZR 2.5]**.) • Is the fuel injector normal?	Yes	Replace the PCM. (See **PCM REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Replace the fuel injector. (See **FUEL INJECTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

If simulation function of M-MDS is used:

STEP	INSPECTION	RESULTS	ACTION
1	• While cranking the engine, inspect for fuel injector operation sound at each cylinder using a soundscope. • Is the operation sound heard?	Yes	Fuel injector work properly.
		No	Go to the next step.
2	• Disconnect the fuel injector that the fuel injector operation sound does not heard at Step 1. • Switch the ignition to ON. • Measure the voltage between suspect fuel injector terminal A (wiring harness-side) and body ground. • Is the voltage **B+** ?	Yes	Go to the next step.
		No	Repair or replace for open or short circuit between fuel injector terminal A and fuel pump relay terminal C.
3	• Inspect for open or short circuit between suspect fuel injector terminal B and following PCM terminals: ▪ Fuel injector No.1 • PCM terminal 2BB ▪ Fuel injector No.2 • PCM terminal 2BC ▪ Fuel injector No.3 • PCM terminal 2BD ▪ Fuel injector No.4 • PCM terminal 2AZ • Is there any malfunction?	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step.
4	• Inspect the suspect fuel injector. (See **FUEL INJECTOR INSPECTION [MZR 2.5]**.) • Is the fuel injector normal?	Yes	Replace the PCM. (See **PCM REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Replace the fuel injector. (See **FUEL INJECTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

Fuel Cut Control System Inspection

1. Warm up engine and idle it.
2. Turn off the electrical loads and A/C switch.

3. Connect the M-MDS to the DLC-2.
4. Access the PCM PID RPM. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
5. Listen for the fuel injector operation sound at all cylinders using the soundscope and monitor both PIDs while performing the following steps:

   a. Depress the accelerator pedal and increase the engine speed to **4,000 rpm**.

   b. Quickly release the accelerator pedal (brake pedal is not depressed) and verify that the fuel injector operation sound stops, and starts again when the engine speed drops below **1,200 rpm**.

   - If not as specified, inspect the following:
     - ECT sensor and related wiring harness (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.)
     - CPP switch and related wiring harness (MTX) (See **CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [MZR 2.5]**.)
     - Neutral switch and related wiring harness (MTX) (See **NEUTRAL SWITCH INSPECTION [MZR 2.5]**.)
     - TR switch and related wiring harness (ATX) (See **TRANSAXLE RANGE (TR) SWITCH INSPECTION [FS5A-EL]**.)

Fuel Pump Operation Inspection

1. Remove the fuel-filler cap.
2. Switch the ignition to ON.
3. Turn the fuel pump relay from off to on using the FP PID and inspect if the operation sound is heard. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
   - If no operation sounds is heard, proceed to next step.
4. Measure voltage at wiring harness side fuel pump terminal B

   Specification

   - B+ (Ignition at on)
   - If the voltage is as specified, inspect the following:
     - Fuel pump continuity
     - Fuel pump ground
     - Wiring harness between fuel pump relay and PCM terminal 1BG
   - If not as specified, inspect the following:
     - Fuel pump relay (See **RELAY INSPECTION**.)
     - Wiring harness connector (Main relay—Fuel pump relay—Fuel pump)

Fuel Pump Control System Inspection

1. Crank the engine and verify that fuel pump relay operation sound is heard.

2. If operation sound is not heard, inspect the following:
    - Fuel pump relay (See **RELAY INSPECTION**.)
    - Wiring harness and connectors (Main relay—Fuel pump relay—PCM terminal 1BG)

Spark Test

1. Disconnect 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 the ignition coil from the spark plugs. • Remove the spark plugs. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.) • Verify that the spark plugs do not have carbon deposits. • Are the spark plugs normal?	Yes	Go to the next step.
		No	Perform no-load racing at **4,000 rpm** for **2 min**, 2 times to burn off the carbon deposits. Repeat Step 1.
2	• Inspect the spark plugs for damage, wear, and proper plug gap. • Are the spark plugs normal?	Yes	Go to the next step.
		No	Replace the spark plugs, then go to Step 1. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.)
3	• Reconnect the spark plugs to the ignition coil. • Ground the spark plugs to the engine. • Is a strong blue spark visible at each cylinder while cranking the engine?	Yes	Ignition system is normal.
		No	Some cylinders do not spark: • Go to the next step. All cylinders do not spark: • Go to Step 5.
4	• Inspect the following wiring harnesses for open or short: ▪ Ignition coil No.1 terminal C—PCM terminal 2G	Yes	Inspect the ignition coil. (See **IGNITION COIL INSPECTION [MZR 2.5]**.)

	▪ Ignition coil No.2 terminal C—PCM terminal 2K ▪ Ignition coil No.3 terminal C—PCM terminal 2L ▪ Ignition coil No.4 terminal C—PCM terminal 2H • Are the wiring harnesses normal?		Repair or replace the malfunctioning part according to the inspection results.
		No	Repair or replace suspected wiring harness and connector, then go to Step 1.
5	• Switch the ignition to ON (engine off). • Measure the voltage at terminal A in each ignition coils. • Is the voltage **B+** ?	Yes	Go to the next step.
		No	Inspect the power supply circuit of ignition coils. Repair or replace suspected wiring harness and connector.
6	• Switch the ignition to off. • Disconnect the ignition switch connector. • Inspect for continuity between each ignition coil terminal B and body ground. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace suspected wiring harness and connector.
7	• Does the PCM connector or ignition coil connectors have a poor connection?	Yes	Repair or replace the connector, then go to Step 1.
		No	Go to the next step.
8	• Are the CKP sensor and crankshaft pulley normal?	Yes	Inspect for an open or short circuit in the wiring harness and connector of CKP sensor. Repair or replace suspected wiring harness and connector.
		No	Repair or replace the malfunctioning part according to the inspection results.

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 the M-MDS to the DLC-2 and verify that the DTC P0403:00 is shown. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
        - Perform DTC inspection. (See **DTC P0403:00 [MZR 2.5]**.)
2. Start the engine and idle it.
3. Warm up the engine to normal operating temperature.

4. Access the following PCM PIDs: (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - ECT, RPM, SEGRP_DSD, APP1, APP2, VSS
5. Idle the vehicle and verify that the SEGRP value is 0.

CAUTION:

- While performing this step, always operate the vehicle in a safe and lawful manner.
- When the M-MDS is used to observe monitor system status while driving, be sure to have another technician with you, or record the data in the M-MDS using the PID/DATA MONITOR AND RECORD capturing function and inspect later.

6. Put the vehicle in drive.
7. Depress the accelerator pedal and verify that the SEGRP_DSD value is increased.
    - If the EGR valve increases, inspect the following:
        - EGR valve (stuck open or close) (See **EGR VALVE INSPECTION [MZR 2.5]**.)
        - Wiring harness and connectors (Main relay—EGR valve—PCM)
    - If the SEGRP_DSD value does not increase, inspect the VSS, APP1, APP2, TP REL and ECT PIDs. (See **PCM INSPECTION [MZR 2.5]**.)
8. Stop the vehicle and verify that the SEGRP value returns to 0.

Purge Control System Inspection

If simulation function of M-MDS is used:

1. Start the engine.
2. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
3. Put a finger to the purge solenoid 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 solenoid valve—PCM terminal 2C)
        - Purge solenoid valve (stuck open) (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.)
4. Verify that the DTC P0443:00 is displayed. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - If the DTC P0443:00 is shown, perform the DTC inspection. (See **DTC P0443:00 [MZR 2.5]**.)
5. Access the PCM PID EVAPCP using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
6. Put a finger to the purge solenoid valve with Step 2 condition and verify that there is vacuum applied when set the present to 100 % duty value of the purge solenoid valve using the EVAPCP PID simulation function.
    - If there is no vacuum, inspect the following:
        - Increase the duty value of the purge solenoid valve to 50 % and inspect if the operation sound of the valve is heard.
    - If the operation sound is heard, inspect for loose or damaged vacuum hoses. (Intake manifold—Purge solenoid valve—Charcoal canister)

- If the operation sound is not heard, inspect the purge solenoid valve. (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.)

7. Warm up the engine to normal operating temperature.
8. Monitor the EVAPCP PID using the M-MDS, and drive the vehicle **approx. 2000 rpm** for **30 s or more**.
    - If the EVAPCP PID is 0 %, inspect the following:
        - MAF, APP1, APP2, TP REL and LOAD PIDs (See **PCM INSPECTION [MZR 2.5]**.)

If simulation function of M-MDS is not used:

1. Start the engine.
2. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
3. Put a finger to the purge solenoid 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 solenoid valve—PCM terminal 2C)
        - Purge solenoid valve (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.)
4. Warm up the engine to the normal operating temperature.
5. Stop the engine.
6. Verify that the DTC P0443:00 is displayed. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - If the DTC P0443:00 is shown, perform the DTC inspection. (See **DTC P0443:00 [MZR 2.5]**.)
7. Switch the ignition to ON.
8. Access the PCM PID ECT. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
9. Verify that the engine coolant temperature is **more than 78 °C {172 °F}** .
    - If the M-MDS indicates **less than 78 °C {172 °F}** , perform the ECT sensor inspection. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.)
10. Set the vehicle on the dynamometer or chassis roller.

WARNING:

- When the dynamometer or chassis roller is operating, there is a possibility that the operator may come into contact with or be caught up in the rotating parts, leading to serious injuries or death. When performing work while the dynamometer or chassis roller is operating, be careful not to come into contact with or be caught up in any of the rotating parts.

11. Drive vehicle at engine speed **approx. 2,000 rpm** for **30 s or more.**
12. Put a finger to the purge solenoid valve and verify that there is no vacuum applied while step 2.
    - If there is no vacuum, inspect the following:
        - Wiring harness and connector (Main relay—Purge solenoid valve—PCM terminal 2C)
        - Purge solenoid valve (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.)

MAF, APP1, APP2, TP REL and LOAD PIDs (See **PCM INSPECTION [MZR 2.5]**.)

- If there is vacuum, inspect the following:
    - Vacuum hose (Purge solenoid valve—Charcoal canister)

A/C Cut-off Control System Inspection

1. Start the engine.
2. Turn the A/C switch and the fan switch on.
3. Verify that the magnetic clutch actuates.
    - If it does not actuate, go to symptom troubleshooting "NO.23 A/C DOES NOT WORK SUFFICIENTLY". (See **NO.23 A/C DOES NOT WORK SUFFICIENTLY [MZR 2.5]**.)
4. Fully open the throttle valve and verify that the magnetic clutch does not actuate for **2—5 s**.
    - If it actuates, inspect as follows:
        - A/C relay (See **RELAY INSPECTION**.)
        - Open or short to ground circuit in wiring harness and connectors (Ignition switch (IG2) (without advanced keyless entry and push button start system)/IG2 relay (with advance keyless entry and push button start) —A/C relay—PCM terminal 1I)
        - A/C related parts
        - APP1, APP2 PIDs (See **PCM INSPECTION [MZR 2.5]**.)

Cooling Fan Control System Inspection

1. Connect the M-MDS to the DLC-2.
2. Start the engine and warm it up to normal operating temperature.
3. Perform the KOER self-test. (See **KOEO/KOER SELF TEST [MZR 2.5]**.)
4. Verify that the DTC P0480:00 is not shown and the cooling fan operates during the KOER self-test.
    - If DTC P0480:00 is shown, perform the DTC inspection. (See **DTC P0480:00 [MZR 2.5]**.)
    - If the cooling fans do not operate, indicated order in accordance with fan operation conditions.

Cooling fans do not operate

- Inspect for followings:
    - Open circuit between fan control module relay and battery positive terminal
    - Open circuit between fan control module relay and BCM
    - Open circuit between fan control module relay and fan control module

- Open circuit between fan control module and ground
- Poor connection of the fan control module connector
- Fan control module relay malfunction (See **RELAY INSPECTION**.)
    - If there is no malfunction, replace the cooling fan component. (See **COOLING FAN MOTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

Cooling fan motor No.1 does not operate

- Inspect for followings:
    - Open or short to ground circuit between the fan control module and cooling fan motor No.1
    - Poor connection of the fan control module connector or cooling fan motor No.1 connector
        - If there is no malfunction, replace the cooling fan component. (See **COOLING FAN MOTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

Cooling fan motor No.2 does not operate

- Inspect for followings:
    - Open or short to ground circuit between the fan control module and the cooling fan motor No.2
    - Poor connection of the fan control module connector or the cooling fan motor No.1 connector
        - If there is no malfunction, replace the cooling fan component. (See **COOLING FAN MOTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

Variable Valve Timing Control System Operation Inspection

When idling cannot be continued

1. Remove the OCV and verify that the spool valve is at maximum retard position.
2. Connect the OCV.
3. Switch the ignition to ON.
4. Verify that the spool valve is at maximum retard position.
    - If the spool valve is stuck in the advance direction, inspect for the following:
        - Short circuit in wiring harnesses or connectors between OCV and PCM
5. Inspect the variable valve timing actuator. (See **VARIABLE VALVE TIMING ACTUATOR INSPECTION [MZR 2.5]**.)

When idling can be continued

1. Disconnect OCV connector.
2. Warm up the engine and idle it.
3. Apply battery voltage to the OCV and verify that the engine idles roughly or stalls.
    - If the engine idles roughly or stalls, inspect the timing chain component (valve timing deviation).
    - If the engine does not idle roughly or stalls, go to the next step.
4. Remove the OCV and perform spool valve operation inspection. (See **OIL CONTROL VALVE (OCV) INSPECTION [MZR 2.5]**.)
    - If not as specified, inspect the following:
        - OCV (See **OIL CONTROL VALVE (OCV) INSPECTION [MZR 2.5]**.)
        - Harnesses and connectors between OCV and PCM open or short
    - If as specified, inspect the following hydraulic passages for clogging or leakage or both:
        - Oil pressure switch—OCV
        - OCV—Camshaft
        - Camshaft internal passage
5. If they are normal, replace the camshaft pulley (with built-in variable valve timing actuator).

Evaporative Emission (EVAP) System Leak Inspection

- To verify that the problem has been fixed properly after repairs, the run drive cycle or EVAP system leak inspection must be performed.

EVAP system leak inspection using the M-MDS

EVAP system test out line

- The EVAP system test, which can substituted for the run drive cycle as an EVAP control system repair confirmation method, can detect the small / large leak or blockage without run-drive cycle.

NOTE:

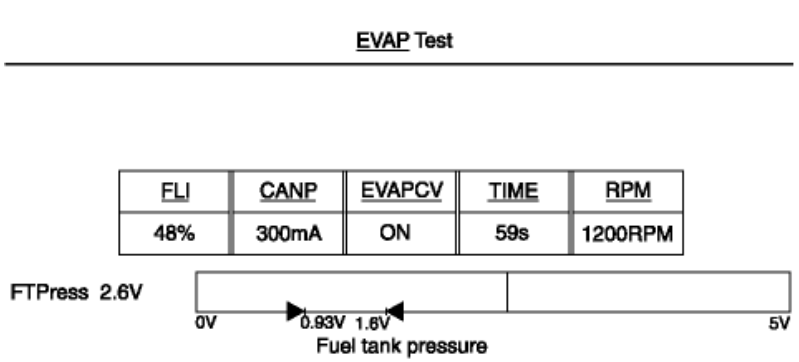
- M-MDS can not detect “VERY SMALL LEAK”. To identify the leak point, please use the leak tester or ultrasonic leak detector.

EVAP system test description

- The EVAP system test finds gas leaks or blockage of EVAP system using the changes of the fuel tank pressure.
    - This test starts after sending an on-demand test signal from the M-MDS to the PCM.
    - This test consists of three stages, and each stage is performed automatically as follows:

Stage 1 test (Test for large leak or blockage)

- M-MDS send the stage 1 test start signal to the PCM.

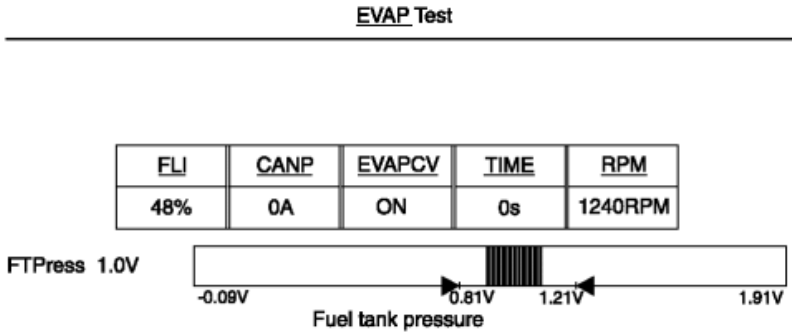


Pulling Target Vacuum

- PCM controls the CV solenoid valve and purge solenoid valve to control the tank pressure to the targeted value.
- M-MDS detect the large leak or the purge line blockage if the tank pressure does not arrive at the target vacuum in specified period.

Stage 2 test (Test for small leak)

- When fuel tank pressure arrived at the targeted pressure at stage 1 test, M-MDS send the stage 2 test signal to the PCM to turn off the purge solenoid to keep the tank pressure.

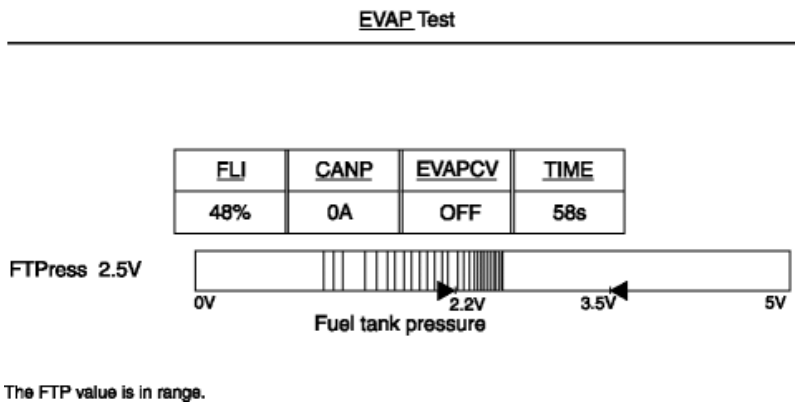


The vacuum bleed down and bleed up rate is in range

- M-MDS detect the small leak if the tank pressure can not keep within the target in specified period.

Stage 3 test (Test for blockage)

- M-MDS send the stage 3 test signal to the PCM to turn off the CV solenoid for check the blockage of EVAP system.



- M-MDS detect blockage of the CV solenoid valve or air filter if the tank pressure does not arrive at the target (atmosphere).

EVAP system malfunction judgment

- M-MDS detect the small/large leak or blockage based on fuel tank pressure at the end of EVAP Test.

The EVAP Test could not obtain the target vacuum. A large leak or blockage is suspect.

- This judgment means tank pressure could not arrive at target pressure at stage 1 test.
— Check for the large leakage or inspect the purge solenoid valve operation and related hoses.
— Repair or replace any malfunctioning parts.

The EVAP Test could not maintain the target vacuum. A small leak is suspect.

- This judgment means tank pressure could not stay in target pressure at stage 2 test.
— Run the EVAP Test again after Re-tighten the fuel filler cap.
— If small leak is suspected again, use the leak tester or ultrasonic leak detector for identify the leak point.
— Repair or replace any malfunctioning parts.

Blockage in EVAP system.

- This judgment means tank pressure could not return to atmosphere at stage 3 test.
— Inspect the CV solenoid, Air filter, Charcoal canister and related hoses for blockage.

No large leaks or blockage have been detected in the EVAP system at this time.

- M-MDS can not detect "VERY SMALL LEAK ".
— To identify the leak point, please use the leak tester or ultrasonic leak detector.

A small leak in the purge solenoid valve is suspect.

- This judgment means tank pressure goes to minus side at stage 2 test.
    - Check the purge solenoid valve. Refer to the workshop manual.

Evaporative system test procedure

- Verify that all PIDs within the following specifications.

Specification

PID	PID Range
BARO	74.9 kPa {562 mmHg, 22.1 inHg} or more
FLI	15—85 %
ECT	ECT minus IAT -10—25 ˚C {14—77 ˚F}
IAT	

NOTE:

- To successfully perform this procedure, all PIDs must be within the specifications before proceeding to the next step.

- Select the following items from the initialization screen of the M-MDS.
  - Select the "Powertrain".
  - Select the "Fuel".
  - Select the "EVAP Test".
    - Verify that ECT and IAT are within the specifications at the confirmation screen.To successfully perform this procedure, ECT and IAT must be within the spec before proceeding to the next step.
    - Fuel Level must be maintained within **15 % —85 %** . PCM will cancel the EVAP Test If the Fuel Level is **lower than 15 %** or **higher than 85 %** .
- Verify the test results described on the M-MDS and follow the instructions.

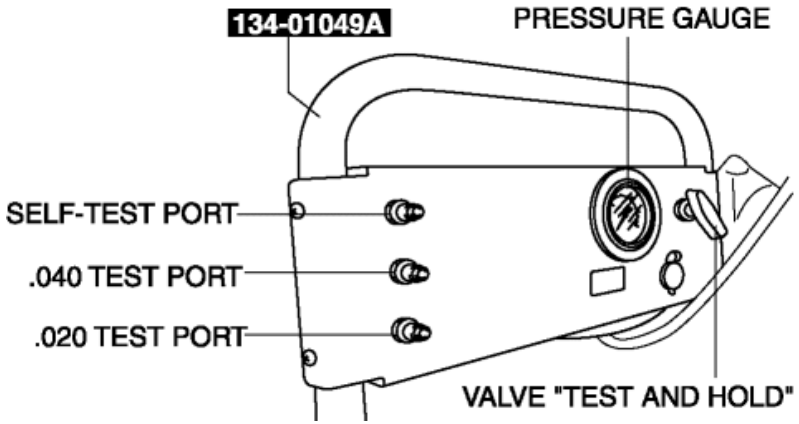
EVAP system leak inspection using leak tester

1. Perform the following **SST** (EVAP System Tester 134-01049A) self-test:

NOTE:

- If the tester does not work correctly during the self-test, refer to the tester operators manual for a more detailed self-test procedure.

a. Verify that the control valve on the panel is in the HOLD position then open the nitrogen bottle valve.



b. Connect the vehicle interface hose (part of the **SST**) to the SELF-TEST port located on the control panel. Hand tighten the fitting. (Do not overtighten.)

c. Turn the control valve to the TEST position.

d. The gauge should read **331—381 mm {13.1—15.0 in}** of water.

- If the gauge is not reading in this range, adjust the pressure by turning the black knob on the low pressure regulator at the nitrogen bottle.

e. Turn the control valve to the HOLD position.

f. Verify that the gauge holds pressure and that the flow meter reads no flow.

1. If there is no drop in pressure and no flow, the tester passes the self-test.
2. If the gauge leaks down, refer to the tester operators manual.

2. Connect the **SST** to the vehicle.

a. Verify that the control valve on the panel is in the HOLD position then open the nitrogen bottle valve.

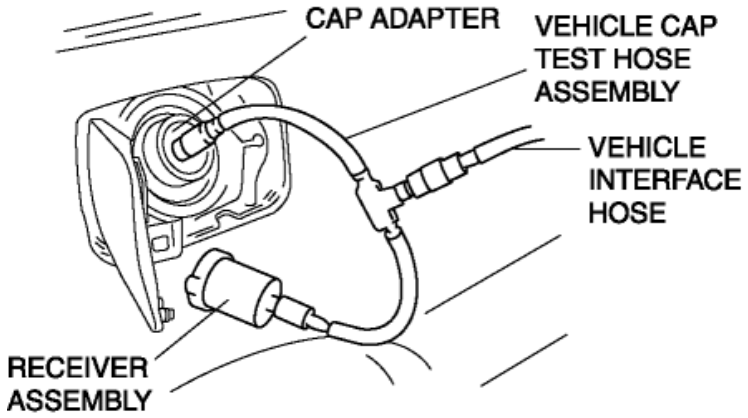
b. Remove the fuel-filler cap from the vehicle.

- If the fuel-filler cap is not a MAZDA part or equivalent, replace it.

NOTE:

- INSPECT FUEL FILLER CAP AND FILLER NECK
  - Visually inspect for damage, insufficient sealing, rust, cracks or warps for filler cap and filler neck.
  - Repair or replace if necessary.

c. Connect the receiver assembly (**SST**: 134-01059) to the vehicle cap test hose assembly (part of the **SST**) and the fuel-filler cap from the vehicle.



d. Connect the cap adaptor (**SST**: 134-01058) to the vehicle cap test hose assembly (part of the **SST**) and to the fuel-filler neck.

e. Connect the vehicle interface hose (part of the **SST**) to the center fitting of the vehicle cap test hose assembly (part of the **SST**).

3. Connect the M-MDS to the DLC-2.

4. Switch the ignition to ON (engine off).

5. Request the PCM on-board device control (Mode 08) using the M-MDS to close the canister vent value.

NOTE:

- The canister vent value is closed for **10 min** unless the following any actions are done:
  - The engine is started.
  - The ignition switch is turned off position.

6. Make sure the control valve on the 134-01049A is in the HOLD position and that the valve on the cylinder of nitrogen gas is open.

7. Turn the control valve to the open position and let the system fill. You should note a drop in the gauge pressure along with the flow meter being pegged at maximum flow for several minutes depending on how full or empty the fuel tank is, and how long it takes to completely fill and pressurize the EVAP system hoses.

8. If the gauge and the flow meter do not settle to a measurable level after **2—3 min**, then refer to the Mazda Workshop Manual to verify that the canister vent valve is properly closed. If canister vent valve is properly closed. The EVAP system has large leakage. Check for leakage and repair as necessary.

9. Verify the pressure gauge and flow meter reading to determine if there is an EVAP leak:

NO EVAPORATIVE LEAK:

- The flow meter registers "zero flow" and the pressure gauge returns to the pre-set pressure of **356 mm {14.0 in}** of water (H2O).

EVAPORATIVE LEAK:

- The pressure does not return to the preset level of **356 mm {14.0 in}** of water (H2O) when measuring the flow. See "SETTING LEAK STANDARD FOR TESTING" (.020 to.040 inch H2O) of the Evaporative Emissions Tester operators manual (134-01067).

NOTE:

1. Turn the control valve to the HOLD position then disconnect the **SST**.

2012 - Mazda6 - Engine

ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]

Input Signal System Inspection Procedure

1. Find an irregular signal. (See **Finding irregular signals**.)
2. Locate source. (See **Locating the source of unusual signals**.)
3. Repair or replace the malfunctioning part.
4. Confirm that the irregular signal is no longer detected.

Finding irregular signals

- While referring to **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**, use the PID/DATA monitor and record function to inspect the input signal system relating to the problem.

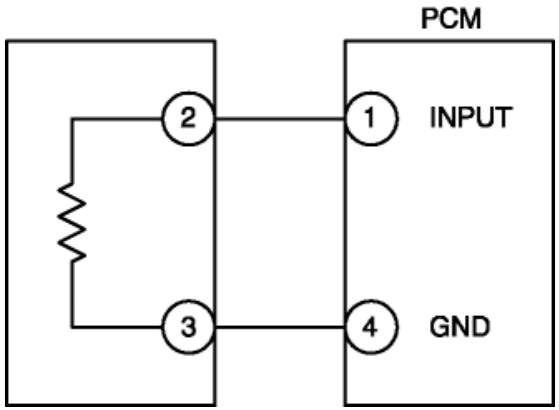
1. Start the engine and idle the vehicle. You can assume that any signals that are out of specification by a wide margin are irregular.
2. When recreating the problem, any sudden change in monitor input signals that is not intentionally created by the driver can be determined as irregular.

Locating the source of unusual signals

CAUTION:

- Compare the M-MDS monitor voltage with the measurement voltage using the digital measurement system function. If you use another tester, misreading may occur.
- When measuring voltage, attach the tester ground to the ground of the PCM that is being tested, or to the engine itself. If this is not performed, the measured voltage and actual voltage may differ.
- After connecting the pin to a waterproof coupler, confirming continuity and measuring the voltage, inspect the waterproof connector for cracks. If there are any, use sealant to fix them. Failure to do this may result in deterioration of the wiring harness or terminal from water damage, leading to problems with the vehicle.

Thermistor type (IAT sensor and ECT sensor)



Input signal system inspection for thermistor type

1. When an irregular signal is detected, measure the #1 PCM terminal voltage.
    - If the #1 terminal voltage and the M-MDS monitor voltage are the same, proceed to the next step.
    - If there is a difference of **0.5 V or more**, inspect the following points concerning the PCM connector:
        - Female terminal opening loose
        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
        - Harness/pin crimp is loose or disconnected.
2. Measure the #2 sensor terminal voltage.
    - If there is a **0.5 V or more** difference between the sensor and the M-MDS voltages, inspect the wiring harness for open or short circuits.
    - If the sensor and the M-MDS voltages are the same, inspect the following points concerning the sensor connector:
        - Female terminal opening is loose.
        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
        - Harness/pin crimp is loose or disconnected.
    - If there are no problems, proceed to next investigation below.

GND system inspection for thermistor type

- Confirm that terminal sensor #3 is at **0 V**.
    - If it is at **0 V**, inspect the sensor. If necessary, replace the sensor.
    - If not, inspect for the following:

- Open circuit in wiring harness
- Female terminal opening is loose.
- Coupler (pin holder) damage
- Pin discoloration (blackness)
- Harness/pin crimp is loose or disconnected.

Main Relay Operation Inspection

1. Verify that the main relay clicks when the ignition to ON and off.
    - If there is no operation sound, inspect the following:
        - Main relay (See **RELAY INSPECTION**.)
        - Harness and connector between ignition switch and main relay
        - Harness and connector between PCM terminal 1Q and main relay

Intake Manifold Vacuum Inspection

1. Verify air intake hoses are installed properly.
2. Start the engine and run it at idle.
3. Disconnect the vacuum hose between the intake manifold and purge solenoid valve from the intake manifold side.
4. Connect a vacuum gauge to the intake manifold and measure the intake manifold vacuum.
    - If not as specified, inspect the following:

      Specification
    - More than 60 kPa {450 mmHg, 18 inHg}

NOTE:

- Air suction can be located by engine speed change when lubricant is sprayed on the area where suction is occurring.
    - Air suction at throttle body, intake manifold and PCV valve installation points
    - EGR valve (stuck open)
    - Fuel injector insulator
    - Engine compression (See **COMPRESSION INSPECTION [MZR 2.5]**.)

Drive-by-Wire Control System Inspection

Engine coolant temperature compensation inspection

1. Connect the M-MDS to the DLC-2.
2. Access the following PCM PIDs: (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - ECT
    - IAT
    - RPM
3. Verify that the engine is cold, then start the engine.
4. Verify that the engine speed decreases as the engine warms up.
    - If the engine speed does not decrease or decreases slowly, inspect the following:
        - ECT sensor and related wiring harness (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.)
        - Throttle body and related wiring harness (See **THROTTLE BODY INSPECTION [MZR 2.5]**.)

Load compensation inspection

1. Start the engine and idle it.
2. Connect the M-MDS to the DLC-2.
3. Verify that P0506:00 or P0507:00 is not displayed. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - If the P0506:00 or P0507:00 are displayed, perform DTC inspection. (See **DTC P0506:00 [MZR 2.5]**.) (See **DTC P0507:00 [MZR 2.5]**.)
4. Access the PCM PID RPM. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)

NOTE:

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

5. Verify that the engine speed is within the specification under each load condition.
    - If load condition is not as specified, inspect the following:
        - A/C switch and related wiring harness (See **CLIMATE CONTROL UNIT INSPECTION [MANUAL AIR CONDITIONER]**.) (See **CLIMATE CONTROL UNIT INSPECTION [FULL-AUTO AIR CONDITIONER]**.)
        - Fan switch and related wiring harness (See **CLIMATE CONTROL UNIT INSPECTION [MANUAL AIR CONDITIONER]**.) (See **CLIMATE CONTROL UNIT INSPECTION [FULL-AUTO AIR CONDITIONER]**.)
        - PSP switch and related wiring harness (See **POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [MZR 2.5]**.)

Idle speed (ATX: P, N position, MTX: Neutral position)

- 600—700 rpm

Idle-up speed (ATX: P, N position, MTX: Neutral position)

- A/C on and: 600—850 rpm
- Electrical loads on: 650—750 rpm (MTX), 600—750 rpm (ATX)
- While turning steering wheel: 650—750 rpm

Throttle position (TP) sweep inspection

1. Connect the M-MDS to the DLC-2.
2. Switch the ignition to ON.
3. Verify that none of the following DTC are displayed: (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - P0122:00, P0123:00, P0222:00, P0223:00, P0638:00, P2100:00, P2101:00, P2107:00, P2108:00, P2119:00, P2122:00, P2123:00, P2127:00, P2128:00, P2135:00, P2138:00
        - If any one DTC is displayed, perform DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
4. Access the PCM PIDs APP1 and APP2 using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
5. Verify the APP1 and APP2 PIDs when the accelerator pedal released and depresses.

Specification

- Accelerator pedal released:
    - APP1: **Approx. 0.4 V**
    - APP2: **Approx. 0.4 V**
- Accelerator pedal depressed:
    - APP1: **Approx. 3.4 V**
    - APP2: **Approx. 3.4 V**
- If not as specified, inspect for the following harnesses and connectors:
    - APP sensor terminal A—PCM terminal 1W
    - APP sensor terminal B—PCM terminal 1AP
    - APP sensor terminal C—PCM terminal 1AV
    - APP sensor terminal D—PCM terminal 1AS
    - APP sensor terminal E—PCM terminal 1AO
    - APP sensor terminal F—PCM terminal 1AL
        - If there is no malfunction, replace the accelerator pedal. (See **ACCELERATOR PEDAL REMOVAL/ INSTALLATION [MZR 2.5]**.)

Brake override system operation inspection

NOTE:

- If the brake override system operates normally after performing the following inspection, the PCM detects DTC P2299:00.

1. Start the engine and run it is idling.
2. Verify that the engine speed becomes **less than 1,100 rpm** under the following conditions.

- Neutral (MTX)
- P or N position (ATX)
- Engine speed of **1,150 rpm or more** other than idle
- Brake pedal depressed
    - If the engine speed becomes **less than 1,100 rpm**, clear the PCM DTC using the M-MDS. (System operation is normal.) (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - If the engine speed does not become **less than 1,100 rpm**, inspect for the following parts, then repair or replace the malfunctioning part:
        - APP sensor (See **ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [MZR 2.5]**.)
        - Neutral switch (MTX) (See **NEUTRAL SWITCH INSPECTION [MZR 2.5]**.)
        - CPP switch (MTX) (See **CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [MZR 2.5]**.)
        - TR switch (ATX) (See **TRANSAXLE RANGE (TR) SWITCH INSPECTION [FS5A-EL]**.)
        - Brake switch No.1 (See **BRAKE SWITCH INSPECTION**.)
        - Brake switch No.2 (See **BRAKE SWITCH INSPECTION**.)
        - Communication between PCM and TCM (ATX) (See **FOREWORD [MULTIPLEX COMMUNICATION SYSTEM]**.)

Variable Intake Air Control Operation Inspection

1. Start the engine.
2. Inspect the rod operation under the following condition: **Rod operation**

Engine speed	4,400 rpm	
	Below	Above
Shutter valve actuator	Operate	Not operate

- If the rod operation is not as specified, inspect as follows:

a. Stop the engine.

b. Connect the M-MDS to the DLC-2.

c. Verify that DTC P0661:00 or P0662:00 is not displayed. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)

- If DTC P0661:00 or P0662:00 is shown, perform DTC inspection. (See **DTC P0661:00 [MZR 2.5]**.) (See **DTC P0662:00 [MZR 2.5]**.)

d. Inspect the variable intake air solenoid valve. (See **VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [MZR 2.5]**.)

- If the variable intake air solenoid valve is not normal, replace the variable intake air solenoid valve. (See **INTAKE-AIR**

SYSTEM REMOVAL/ INSTALLATION [MZR 2.5].)

- If the variable intake air solenoid valve is normal, inspect the following:
    - Vacuum hose and vacuum chamber for looseness or damage
    - Shutter valve actuator (See VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [MZR 2.5].)
    - Shutter valve stuck open or closed

Variable Tumble Control Operation Inspection

1. Connect the M-MDS to the DLC-2.
2. Access the PCM PID ECT. (See ON-BOARD DIAGNOSTIC TEST [MZR 2.5].)
3. Verify that ECT PID is **between 60 °C {140 °F} and 67 °C {153 °F}**.
4. Start the engine.
5. Inspect rod operation under the following conditions: **Rod operation**

Engine speed	3,750 rpm	
	Below	Above
Shutter valve actuator	Operate	Not operate

- If the rod operation is not specified, inspect as follows:

a. Verify that DTC P2009:00 or P2010:00 is not displayed. (See ON-BOARD DIAGNOSTIC TEST [MZR 2.5].)

- If DTC P2009:00 or P2010:00 are shown, perform DTC inspection. (See DTC P2009:00 [MZR 2.5].) (See DTC P2010:00 [MZR 2.5].)

b. Inspect the variable tumble solenoid valve. (See VARIABLE TUMBLE SOLENOID VALVE INSPECTION [MZR 2.5].)

- If the variable tumble solenoid valve is not normal, replace the variable tumble solenoid valve. (See INTAKE-AIR SYSTEM REMOVAL/ INSTALLATION [MZR 2.5].)
- If the variable tumble solenoid valve is normal, inspect the following:
    - Vacuum hose and vacuum chamber for looseness or damage
    - Shutter valve actuator (See VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION [MZR 2.5].)
    - Shutter valve stuck open or closed

Fuel Injector Operation Inspection

If simulation function of M-MDS is used:

STEP	INSPECTION	RESULTS	ACTION
1	• Start the engine and warm it up until normal operating temperature. • Connect the M-MDS to the DLC-2. • Select the INJ#1, INJ#2, INJ#3 and INJ#4 PIDs. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Turn the fuel injector from on to off using the PIDs each cylinder. • Does the engine speed drop?	Yes	Fuel injector work properly.
		No	Go to the next step.
2	• Disconnect the fuel injector that the engine speed does not drop at Step 1. • Switch the ignition to ON. • Measure the voltage between suspect fuel injector terminal A (wiring harness-side) and body ground. • Is the voltage **B+** ?	Yes	Go to the next step.
		No	Repair or replace for open or short circuit between fuel injector terminal A and fuel pump relay terminal C.
3	• Inspect for open or short circuit between suspect fuel injector terminal B and following PCM terminals: ▪ Fuel injector No.1 • PCM terminal 2BB ▪ Fuel injector No.2 • PCM terminal 2BC ▪ Fuel injector No.3 • PCM terminal 2BD ▪ Fuel injector No.4 • PCM terminal 2AZ • Is there any malfunction?	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step.
4	• Inspect the suspect fuel injector. (See **FUEL INJECTOR INSPECTION [MZR 2.5]**.) • Is the fuel injector normal?	Yes	Replace the PCM. (See **PCM REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Replace the fuel injector. (See **FUEL INJECTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

If simulation function of M-MDS is used:

STEP	INSPECTION	RESULTS	ACTION
1	• While cranking the engine, inspect for fuel injector operation sound at each cylinder using a soundscope. • Is the operation sound heard?	Yes	Fuel injector work properly.
		No	Go to the next step.
2	• Disconnect the fuel injector that the fuel injector operation sound does not heard at Step 1. • Switch the ignition to ON. • Measure the voltage between suspect fuel injector terminal A (wiring harness-side) and body ground. • Is the voltage **B+** ?	Yes	Go to the next step.
		No	Repair or replace for open or short circuit between fuel injector terminal A and fuel pump relay terminal C.
3	• Inspect for open or short circuit between suspect fuel injector terminal B and following PCM terminals: ▪ Fuel injector No.1 • PCM terminal 2BB ▪ Fuel injector No.2 • PCM terminal 2BC ▪ Fuel injector No.3 • PCM terminal 2BD ▪ Fuel injector No.4 • PCM terminal 2AZ • Is there any malfunction?	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step.
4	• Inspect the suspect fuel injector. (See **FUEL INJECTOR INSPECTION [MZR 2.5]**.) • Is the fuel injector normal?	Yes	Replace the PCM. (See **PCM REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Replace the fuel injector. (See **FUEL INJECTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

Fuel Cut Control System Inspection

1. Warm up engine and idle it.
2. Turn off the electrical loads and A/C switch.

3. Connect the M-MDS to the DLC-2.
4. Access the PCM PID RPM. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
5. Listen for the fuel injector operation sound at all cylinders using the soundscope and monitor both PIDs while performing the following steps:

   a. Depress the accelerator pedal and increase the engine speed to **4,000 rpm**.

   b. Quickly release the accelerator pedal (brake pedal is not depressed) and verify that the fuel injector operation sound stops, and starts again when the engine speed drops below **1,200 rpm**.

   - If not as specified, inspect the following:
     - ECT sensor and related wiring harness (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.)
     - CPP switch and related wiring harness (MTX) (See **CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [MZR 2.5]**.)
     - Neutral switch and related wiring harness (MTX) (See **NEUTRAL SWITCH INSPECTION [MZR 2.5]**.)
     - TR switch and related wiring harness (ATX) (See **TRANSAXLE RANGE (TR) SWITCH INSPECTION [FS5A-EL]**.)

Fuel Pump Operation Inspection

1. Remove the fuel-filler cap.
2. Switch the ignition to ON.
3. Turn the fuel pump relay from off to on using the FP PID and inspect if the operation sound is heard. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
   - If no operation sounds is heard, proceed to next step.
4. Measure voltage at wiring harness side fuel pump terminal B

   Specification

   - B+ (Ignition at on)
   - If the voltage is as specified, inspect the following:
     - Fuel pump continuity
     - Fuel pump ground
     - Wiring harness between fuel pump relay and PCM terminal 1BG
   - If not as specified, inspect the following:
     - Fuel pump relay (See **RELAY INSPECTION**.)
     - Wiring harness connector (Main relay—Fuel pump relay—Fuel pump)

Fuel Pump Control System Inspection

1. Crank the engine and verify that fuel pump relay operation sound is heard.

2. If operation sound is not heard, inspect the following:
    - Fuel pump relay (See **RELAY INSPECTION**.)
    - Wiring harness and connectors (Main relay—Fuel pump relay—PCM terminal 1BG)

Spark Test

1. Disconnect 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 the ignition coil from the spark plugs. • Remove the spark plugs. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.) • Verify that the spark plugs do not have carbon deposits. • Are the spark plugs normal?	Yes	Go to the next step.
		No	Perform no-load racing at **4,000 rpm** for **2 min**, 2 times to burn off the carbon deposits. Repeat Step 1.
2	• Inspect the spark plugs for damage, wear, and proper plug gap. • Are the spark plugs normal?	Yes	Go to the next step.
		No	Replace the spark plugs, then go to Step 1. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.)
3	• Reconnect the spark plugs to the ignition coil. • Ground the spark plugs to the engine. • Is a strong blue spark visible at each cylinder while cranking the engine?	Yes	Ignition system is normal.
		No	Some cylinders do not spark: • Go to the next step. All cylinders do not spark: • Go to Step 5.
4	• Inspect the following wiring harnesses for open or short: ▪ Ignition coil No.1 terminal C—PCM terminal 2G	Yes	Inspect the ignition coil. (See **IGNITION COIL INSPECTION [MZR 2.5]**.)

	▪ Ignition coil No.2 terminal C—PCM terminal 2K ▪ Ignition coil No.3 terminal C—PCM terminal 2L ▪ Ignition coil No.4 terminal C—PCM terminal 2H • Are the wiring harnesses normal?		Repair or replace the malfunctioning part according to the inspection results.
		No	Repair or replace suspected wiring harness and connector, then go to Step 1.
5	• Switch the ignition to ON (engine off). • Measure the voltage at terminal A in each ignition coils. • Is the voltage **B+** ?	Yes	Go to the next step.
		No	Inspect the power supply circuit of ignition coils. Repair or replace suspected wiring harness and connector.
6	• Switch the ignition to off. • Disconnect the ignition switch connector. • Inspect for continuity between each ignition coil terminal B and body ground. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace suspected wiring harness and connector.
7	• Does the PCM connector or ignition coil connectors have a poor connection?	Yes	Repair or replace the connector, then go to Step 1.
		No	Go to the next step.
8	• Are the CKP sensor and crankshaft pulley normal?	Yes	Inspect for an open or short circuit in the wiring harness and connector of CKP sensor. Repair or replace suspected wiring harness and connector.
		No	Repair or replace the malfunctioning part according to the inspection results.

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 the M-MDS to the DLC-2 and verify that the DTC P0403:00 is shown. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
        - Perform DTC inspection. (See **DTC P0403:00 [MZR 2.5]**.)
2. Start the engine and idle it.
3. Warm up the engine to normal operating temperature.

4. Access the following PCM PIDs: (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - ECT, RPM, SEGRP_DSD, APP1, APP2, VSS
5. Idle the vehicle and verify that the SEGRP value is 0.

CAUTION:

- While performing this step, always operate the vehicle in a safe and lawful manner.
- When the M-MDS is used to observe monitor system status while driving, be sure to have another technician with you, or record the data in the M-MDS using the PID/DATA MONITOR AND RECORD capturing function and inspect later.

6. Put the vehicle in drive.
7. Depress the accelerator pedal and verify that the SEGRP_DSD value is increased.
    - If the EGR valve increases, inspect the following:
        - EGR valve (stuck open or close) (See **EGR VALVE INSPECTION [MZR 2.5]**.)
        - Wiring harness and connectors (Main relay—EGR valve—PCM)
    - If the SEGRP_DSD value does not increase, inspect the VSS, APP1, APP2, TP REL and ECT PIDs. (See **PCM INSPECTION [MZR 2.5]**.)
8. Stop the vehicle and verify that the SEGRP value returns to 0.

Purge Control System Inspection

If simulation function of M-MDS is used:

1. Start the engine.
2. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
3. Put a finger to the purge solenoid 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 solenoid valve—PCM terminal 2C)
        - Purge solenoid valve (stuck open) (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.)
4. Verify that the DTC P0443:00 is displayed. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - If the DTC P0443:00 is shown, perform the DTC inspection. (See **DTC P0443:00 [MZR 2.5]**.)
5. Access the PCM PID EVAPCP using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
6. Put a finger to the purge solenoid valve with Step 2 condition and verify that there is vacuum applied when set the present to 100 % duty value of the purge solenoid valve using the EVAPCP PID simulation function.
    - If there is no vacuum, inspect the following:
        - Increase the duty value of the purge solenoid valve to 50 % and inspect if the operation sound of the valve is heard.
    - If the operation sound is heard, inspect for loose or damaged vacuum hoses. (Intake manifold—Purge solenoid valve—Charcoal canister)

- If the operation sound is not heard, inspect the purge solenoid valve. (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.)

7. Warm up the engine to normal operating temperature.
8. Monitor the EVAPCP PID using the M-MDS, and drive the vehicle **approx. 2000 rpm** for **30 s or more**.
    - If the EVAPCP PID is 0 %, inspect the following:
        - MAF, APP1, APP2, TP REL and LOAD PIDs (See **PCM INSPECTION [MZR 2.5]**.)

If simulation function of M-MDS is not used:

1. Start the engine.
2. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
3. Put a finger to the purge solenoid 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 solenoid valve—PCM terminal 2C)
        - Purge solenoid valve (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.)
4. Warm up the engine to the normal operating temperature.
5. Stop the engine.
6. Verify that the DTC P0443:00 is displayed. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
    - If the DTC P0443:00 is shown, perform the DTC inspection. (See **DTC P0443:00 [MZR 2.5]**.)
7. Switch the ignition to ON.
8. Access the PCM PID ECT. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)
9. Verify that the engine coolant temperature is **more than 78 °C {172 °F}** .
    - If the M-MDS indicates **less than 78 °C {172 °F}** , perform the ECT sensor inspection. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.)
10. Set the vehicle on the dynamometer or chassis roller.

WARNING:

- When the dynamometer or chassis roller is operating, there is a possibility that the operator may come into contact with or be caught up in the rotating parts, leading to serious injuries or death. When performing work while the dynamometer or chassis roller is operating, be careful not to come into contact with or be caught up in any of the rotating parts.

11. Drive vehicle at engine speed **approx. 2,000 rpm** for **30 s or more.**
12. Put a finger to the purge solenoid valve and verify that there is no vacuum applied while step 2.
    - If there is no vacuum, inspect the following:
        - Wiring harness and connector (Main relay—Purge solenoid valve—PCM terminal 2C)
        - Purge solenoid valve (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.)

MAF, APP1, APP2, TP REL and LOAD PIDs (See **PCM INSPECTION [MZR 2.5]**.)

- If there is vacuum, inspect the following:
    - Vacuum hose (Purge solenoid valve—Charcoal canister)

A/C Cut-off Control System Inspection

1. Start the engine.
2. Turn the A/C switch and the fan switch on.
3. Verify that the magnetic clutch actuates.
    - If it does not actuate, go to symptom troubleshooting "NO.23 A/C DOES NOT WORK SUFFICIENTLY". (See **NO.23 A/C DOES NOT WORK SUFFICIENTLY [MZR 2.5]**.)
4. Fully open the throttle valve and verify that the magnetic clutch does not actuate for **2—5 s**.
    - If it actuates, inspect as follows:
        - A/C relay (See **RELAY INSPECTION**.)
        - Open or short to ground circuit in wiring harness and connectors (Ignition switch (IG2) (without advanced keyless entry and push button start system)/IG2 relay (with advance keyless entry and push button start) —A/C relay—PCM terminal 1I)
        - A/C related parts
        - APP1, APP2 PIDs (See **PCM INSPECTION [MZR 2.5]**.)

Cooling Fan Control System Inspection

1. Connect the M-MDS to the DLC-2.
2. Start the engine and warm it up to normal operating temperature.
3. Perform the KOER self-test. (See **KOEO/KOER SELF TEST [MZR 2.5]**.)
4. Verify that the DTC P0480:00 is not shown and the cooling fan operates during the KOER self-test.
    - If DTC P0480:00 is shown, perform the DTC inspection. (See **DTC P0480:00 [MZR 2.5]**.)
    - If the cooling fans do not operate, indicated order in accordance with fan operation conditions.

Cooling fans do not operate

- Inspect for followings:
    - Open circuit between fan control module relay and battery positive terminal
    - Open circuit between fan control module relay and BCM
    - Open circuit between fan control module relay and fan control module

- Open circuit between fan control module and ground
- Poor connection of the fan control module connector
- Fan control module relay malfunction (See **RELAY INSPECTION**.)
    - If there is no malfunction, replace the cooling fan component. (See **COOLING FAN MOTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

Cooling fan motor No.1 does not operate

- Inspect for followings:
    - Open or short to ground circuit between the fan control module and cooling fan motor No.1
    - Poor connection of the fan control module connector or cooling fan motor No.1 connector
        - If there is no malfunction, replace the cooling fan component. (See **COOLING FAN MOTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

Cooling fan motor No.2 does not operate

- Inspect for followings:
    - Open or short to ground circuit between the fan control module and the cooling fan motor No.2
    - Poor connection of the fan control module connector or the cooling fan motor No.1 connector
        - If there is no malfunction, replace the cooling fan component. (See **COOLING FAN MOTOR REMOVAL/ INSTALLATION [MZR 2.5]**.)

Variable Valve Timing Control System Operation Inspection

When idling cannot be continued

1. Remove the OCV and verify that the spool valve is at maximum retard position.
2. Connect the OCV.
3. Switch the ignition to ON.
4. Verify that the spool valve is at maximum retard position.
    - If the spool valve is stuck in the advance direction, inspect for the following:
        - Short circuit in wiring harnesses or connectors between OCV and PCM
5. Inspect the variable valve timing actuator. (See **VARIABLE VALVE TIMING ACTUATOR INSPECTION [MZR 2.5]**.)

When idling can be continued

1. Disconnect OCV connector.
2. Warm up the engine and idle it.
3. Apply battery voltage to the OCV and verify that the engine idles roughly or stalls.
    - If the engine idles roughly or stalls, inspect the timing chain component (valve timing deviation).
    - If the engine does not idle roughly or stalls, go to the next step.
4. Remove the OCV and perform spool valve operation inspection. (See **OIL CONTROL VALVE (OCV) INSPECTION [MZR 2.5]**.)
    - If not as specified, inspect the following:
        - OCV (See **OIL CONTROL VALVE (OCV) INSPECTION [MZR 2.5]**.)
        - Harnesses and connectors between OCV and PCM open or short
    - If as specified, inspect the following hydraulic passages for clogging or leakage or both:
        - Oil pressure switch—OCV
        - OCV—Camshaft
        - Camshaft internal passage
5. If they are normal, replace the camshaft pulley (with built-in variable valve timing actuator).

Evaporative Emission (EVAP) System Leak Inspection

- To verify that the problem has been fixed properly after repairs, the run drive cycle or EVAP system leak inspection must be performed.

EVAP system leak inspection using the M-MDS

EVAP system test out line

- The EVAP system test, which can substituted for the run drive cycle as an EVAP control system repair confirmation method, can detect the small / large leak or blockage without run-drive cycle.

NOTE:

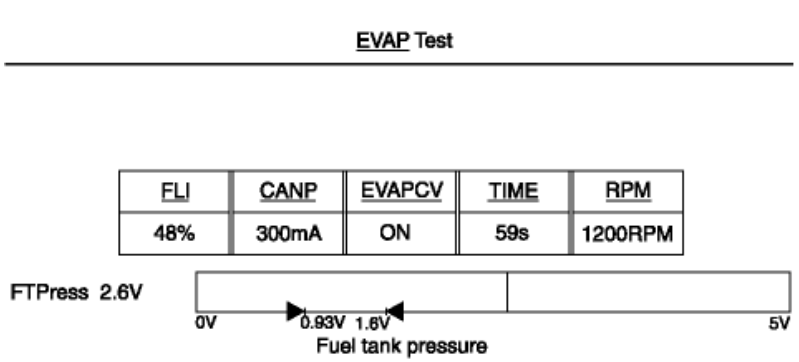
- M-MDS can not detect “VERY SMALL LEAK”. To identify the leak point, please use the leak tester or ultrasonic leak detector.

EVAP system test description

- The EVAP system test finds gas leaks or blockage of EVAP system using the changes of the fuel tank pressure.
    - This test starts after sending an on-demand test signal from the M-MDS to the PCM.
    - This test consists of three stages, and each stage is performed automatically as follows:

Stage 1 test (Test for large leak or blockage)

- M-MDS send the stage 1 test start signal to the PCM.

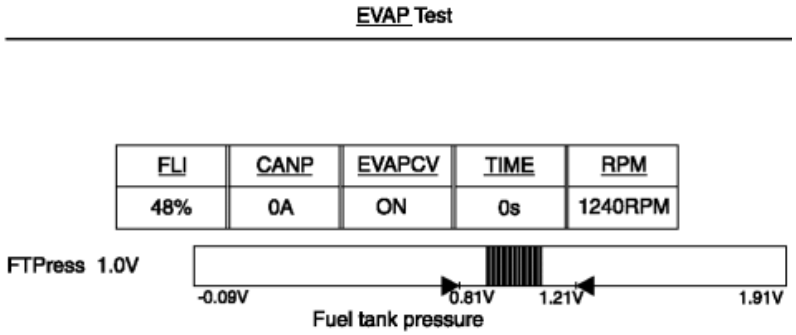


Pulling Target Vacuum

- PCM controls the CV solenoid valve and purge solenoid valve to control the tank pressure to the targeted value.
- M-MDS detect the large leak or the purge line blockage if the tank pressure does not arrive at the target vacuum in specified period.

Stage 2 test (Test for small leak)

- When fuel tank pressure arrived at the targeted pressure at stage 1 test, M-MDS send the stage 2 test signal to the PCM to turn off the purge solenoid to keep the tank pressure.

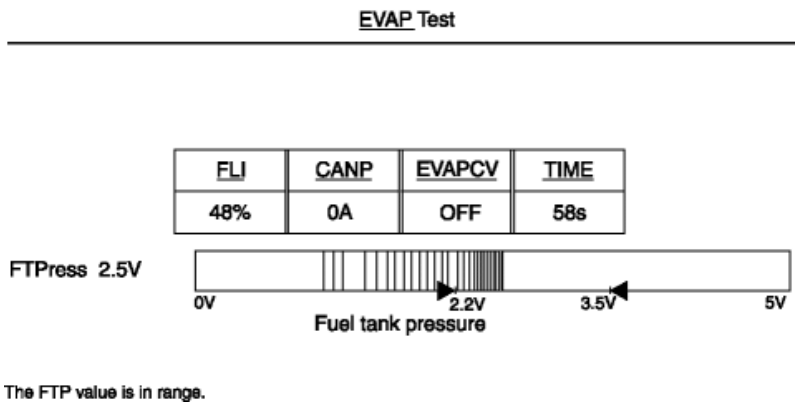


The vacuum bleed down and bleed up rate is in range

- M-MDS detect the small leak if the tank pressure can not keep within the target in specified period.

Stage 3 test (Test for blockage)

- M-MDS send the stage 3 test signal to the PCM to turn off the CV solenoid for check the blockage of EVAP system.



- M-MDS detect blockage of the CV solenoid valve or air filter if the tank pressure does not arrive at the target (atmosphere).

EVAP system malfunction judgment

- M-MDS detect the small/large leak or blockage based on fuel tank pressure at the end of EVAP Test.

The EVAP Test could not obtain the target vacuum. A large leak or blockage is suspect.

- This judgment means tank pressure could not arrive at target pressure at stage 1 test.
— Check for the large leakage or inspect the purge solenoid valve operation and related hoses.
— Repair or replace any malfunctioning parts.

The EVAP Test could not maintain the target vacuum. A small leak is suspect.

- This judgment means tank pressure could not stay in target pressure at stage 2 test.
— Run the EVAP Test again after Re-tighten the fuel filler cap.
— If small leak is suspected again, use the leak tester or ultrasonic leak detector for identify the leak point.
— Repair or replace any malfunctioning parts.

Blockage in EVAP system.

- This judgment means tank pressure could not return to atmosphere at stage 3 test.
— Inspect the CV solenoid, Air filter, Charcoal canister and related hoses for blockage.

No large leaks or blockage have been detected in the EVAP system at this time.

- M-MDS can not detect "VERY SMALL LEAK ".
— To identify the leak point, please use the leak tester or ultrasonic leak detector.

A small leak in the purge solenoid valve is suspect.

- This judgment means tank pressure goes to minus side at stage 2 test.
    - Check the purge solenoid valve. Refer to the workshop manual.

Evaporative system test procedure

- Verify that all PIDs within the following specifications.

Specification

PID	PID Range
BARO	74.9 kPa {562 mmHg, 22.1 inHg} or more
FLI	15—85 %
ECT	ECT minus IAT -10—25 ˚C {14—77 ˚F}
IAT	

NOTE:

- To successfully perform this procedure, all PIDs must be within the specifications before proceeding to the next step.

- Select the following items from the initialization screen of the M-MDS.
  - Select the "Powertrain".
  - Select the "Fuel".
  - Select the "EVAP Test".
    - Verify that ECT and IAT are within the specifications at the confirmation screen.To successfully perform this procedure, ECT and IAT must be within the spec before proceeding to the next step.
    - Fuel Level must be maintained within **15 % —85 %** . PCM will cancel the EVAP Test If the Fuel Level is **lower than 15 %** or **higher than 85 %** .
- Verify the test results described on the M-MDS and follow the instructions.

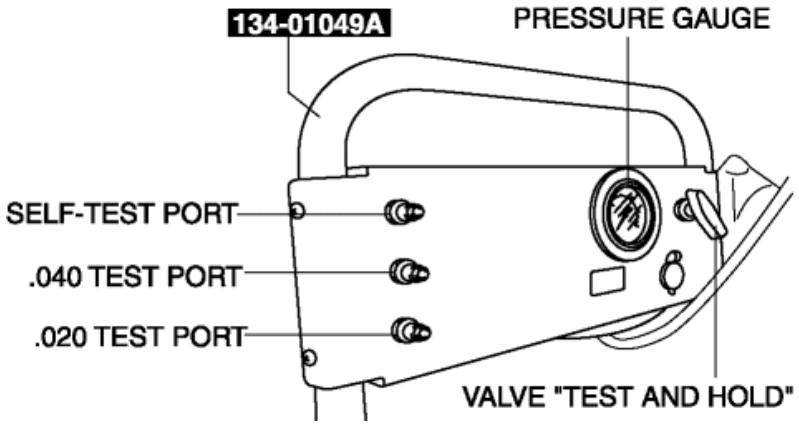
EVAP system leak inspection using leak tester

1. Perform the following **SST** (EVAP System Tester 134-01049A) self-test:

NOTE:

- If the tester does not work correctly during the self-test, refer to the tester operators manual for a more detailed self-test procedure.

a. Verify that the control valve on the panel is in the HOLD position then open the nitrogen bottle valve.



b. Connect the vehicle interface hose (part of the **SST**) to the SELF-TEST port located on the control panel. Hand tighten the fitting. (Do not overtighten.)

c. Turn the control valve to the TEST position.

d. The gauge should read **331—381 mm {13.1—15.0 in}** of water.

- If the gauge is not reading in this range, adjust the pressure by turning the black knob on the low pressure regulator at the nitrogen bottle.

e. Turn the control valve to the HOLD position.

f. Verify that the gauge holds pressure and that the flow meter reads no flow.

1. If there is no drop in pressure and no flow, the tester passes the self-test.
2. If the gauge leaks down, refer to the tester operators manual.

2. Connect the **SST** to the vehicle.

a. Verify that the control valve on the panel is in the HOLD position then open the nitrogen bottle valve.

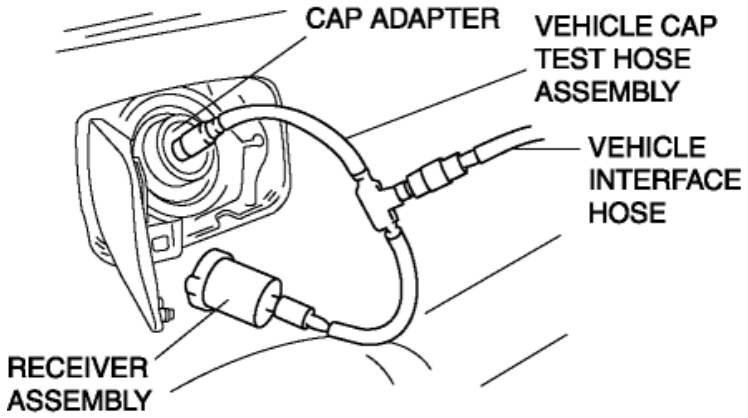
b. Remove the fuel-filler cap from the vehicle.

- If the fuel-filler cap is not a MAZDA part or equivalent, replace it.

NOTE:

- INSPECT FUEL FILLER CAP AND FILLER NECK
  - Visually inspect for damage, insufficient sealing, rust, cracks or warps for filler cap and filler neck.
  - Repair or replace if necessary.

c. Connect the receiver assembly (**SST**: 134-01059) to the vehicle cap test hose assembly (part of the **SST**) and the fuel-filler cap from the vehicle.



d. Connect the cap adaptor (**SST**: 134-01058) to the vehicle cap test hose assembly (part of the **SST**) and to the fuel-filler neck.

e. Connect the vehicle interface hose (part of the **SST**) to the center fitting of the vehicle cap test hose assembly (part of the **SST**).

3. Connect the M-MDS to the DLC-2.

4. Switch the ignition to ON (engine off).

5. Request the PCM on-board device control (Mode 08) using the M-MDS to close the canister vent value.

NOTE:

- The canister vent value is closed for **10 min** unless the following any actions are done:
  - The engine is started.
  - The ignition switch is turned off position.

6. Make sure the control valve on the 134-01049A is in the HOLD position and that the valve on the cylinder of nitrogen gas is open.

7. Turn the control valve to the open position and let the system fill. You should note a drop in the gauge pressure along with the flow meter being pegged at maximum flow for several minutes depending on how full or empty the fuel tank is, and how long it takes to completely fill and pressurize the EVAP system hoses.

8. If the gauge and the flow meter do not settle to a measurable level after **2—3 min**, then refer to the Mazda Workshop Manual to verify that the canister vent valve is properly closed. If canister vent valve is properly closed. The EVAP system has large leakage. Check for leakage and repair as necessary.

9. Verify the pressure gauge and flow meter reading to determine if there is an EVAP leak:

NO EVAPORATIVE LEAK:

- The flow meter registers "zero flow" and the pressure gauge returns to the pre-set pressure of **356 mm {14.0 in}** of water (H2O).

EVAPORATIVE LEAK:

- The pressure does not return to the preset level of **356 mm {14.0 in}** of water (H2O) when measuring the flow. See "SETTING LEAK STANDARD FOR TESTING" (.020 to.040 inch H2O) of the Evaporative Emissions Tester operators manual (134-01067).

NOTE:

1. Turn the control valve to the HOLD position then disconnect the **SST**.