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2003 MAZDA B Series / Bravo Freestyle Cab OEM Service and Repair Workshop Manual

Go to manual page

• Brake pedal depressed

— If the engine speed becomes approx. 1,200 rpm, clear the PCM DTC using the M-MDS. (System operation is normal.)
— If the engine speed does not become approx. 1,200 rpm, inspect for the following parts, then repair or replace the malfunctioning part:

• APP sensor (See ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
• Brake switch No.1 (See BRAKE SWITCH INSPECTION.)
• Brake switch No.2 (See BRAKE SWITCH INSPECTION.)
• Communication between PCM and TCM (See CONTROLLER AREA NETWORK (CAN) MALFUNCTION DIAGNOSIS FLOW [TYPE-A (SKYACTIV-G 2.5)].) (See CONTROLLER AREA NETWORK (CAN) MALFUNCTION DIAGNOSIS FLOW [TYPE-B].)

Fuel Injector Operation Inspection

If simulation function of M-MDS is used:

STEP	INSPECTION		ACTION
1	Start the engine and warm it up completely. Access the INJ_1, INJ_2, INJ_3 and INJ_4 PIDs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) Turn each fuel injector from on to off using the PIDs for each cylinder. Does the engine speed drop?	Yes	Fuel injectors work properly.
		No	Engine speed does not drop an any cylinder: • Go to the next step. Engine speed drops on some cylinders: • Go to Step 4.
2	Perform the Main Relay Operation Inspection. (See Main Relay Operation Inspection.) Does the main relay work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
3	Inspect the fuel injector of the suspected cylinder. (See FUEL INJECTOR INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) Is there any malfunction?	Yes	Replace the fuel injector. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
		No	Inspect the fuel injector power and/or ground systems related wiring harness and connectors for the suspected cylinder. • If all items normal: — Replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • If not: — Repair or replace the malfunctioning part according to the inspection results.

2.Remove the fuel-filler cap.

3.Switch the ignition ON (engine off).

4.Turn the fuel pump relay from off to on using the FP PID and inspect if the operation sound of the fuel pump is heard. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

- If operation sound is heard, fuel pump is normal.
- If no operation sound is heard, proceed to the next step.

5.Measure the voltage at the wiring harness side fuel pump unit terminal A with the FP PID turned on.

- If the voltage is as specified, inspect the following:
  - — Fuel pump continuity
  - — Fuel pump ground
  - — Wiring harness between the fuel pump relay and PCM terminal 2AW
- If not as specified, inspect the following:
  - — Fuel pump relay (See RELAY INSPECTION.)
  - — Wiring harness connector (Battery—Fuel pump relay—Fuel pump control module—Fuel pump unit)

Specification

8.0—11.5 V (Ignition switch at ON)

Fuel Pump (Low-pressure Side) Control System Inspection

If simulation function of M-MDS is used:

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

2.Switch the ignition ON (engine off).

3.Select the FP PID. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

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. (See RELAY INSPECTION.)
- If the fuel pump relay is normal, inspect the following:
  - — Wiring harness and connectors (IG1 relay—Fuel pump relay—PCM terminal 2AW)

6.Select the EVAPCP simulation item.

7.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, perform the purge solenoid valve inspection. (See PURGE SOLENOID VALVE INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

8.Warm up the engine to normal operating temperature.

9.Monitor the EVAPCP PID using the M-MDS, and drive the vehicle approx. 2000 rpm for 30 s or more. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

- If the EVAPCP PID is 0 %, inspect the following PIDs:
  - — MAF, APP1, APP2, TP REL and LOAD PIDs (See PCM INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

If simulation function of M-MDS is not used:

1.Start the engine.

2.Remove the plug hole plate. (See PLUG HOLE PLATE REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

3.Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.

4.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 1AW)
  - — Purge solenoid valve (See PURGE SOLENOID VALVE INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

5.Set the vehicle on a 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 contact or be caught up in any of the rotating parts.

1. Disconnect the OCV for hydraulic variable valve timing system connector. (See OCV FOR HYDRAULIC VARIABLE VALVE TIMING SYSTEM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
2. Warm up the engine and idle it.
3. Apply the battery voltage to the OCV for hydraulic variable valve timing system and verify that the engine idles rough or stalls.

- If the engine idles rough or stalls, inspect the timing chain component (valve timing deviation). (See HYDRAULIC VARIABLE VALVE TIMING ACTUATOR INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
- If the engine does not idle rough or stalls, go to the next step.

4. Remove the OCV for hydraulic variable valve timing system and perform the Spool Valve Operation Inspection. (See OCV FOR HYDRAULIC VARIABLE VALVE TIMING SYSTEM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

- If not as specified, inspect the following:

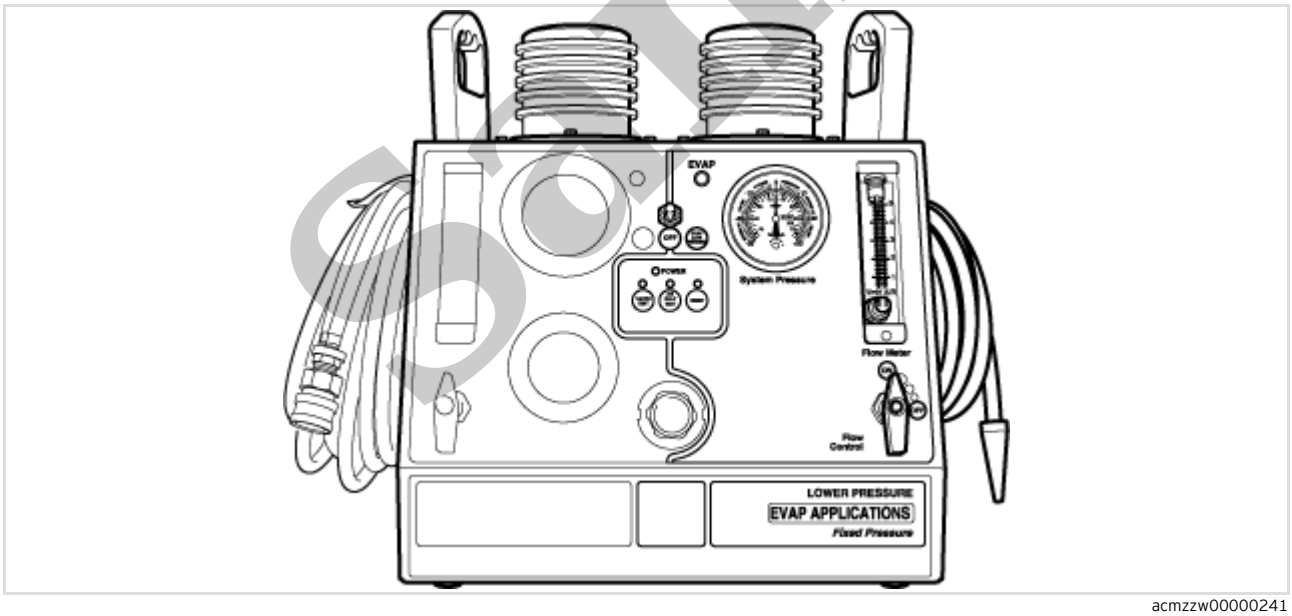
  — OCV for hydraulic variable valve timing system (See OCV FOR HYDRAULIC VARIABLE VALVE TIMING SYSTEM INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
  — Harnesses and connectors between OCV for hydraulic variable valve timing system and PCM have an open or short circuit
- If as specified, inspect the following hydraulic passages for restriction or leakage or both:

  — Engine oil solenoid valve–OCV for hydraulic variable valve timing system
  — OCV for hydraulic variable valve timing system–Exhaust camshaft
  — Exhaust camshaft internal passage

5. If they are normal, replace the hydraulic variable valve timing actuator. (See ELECTRIC VARIABLE VALVE TIMING ACTUATOR, HYDRAULIC VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

Evaporative Emission (EVAP) System Leak Inspection (U.S.A. and Canada specs.)

- Test the EVAP system for leakage using the dual purpose diagnostic leak detector.



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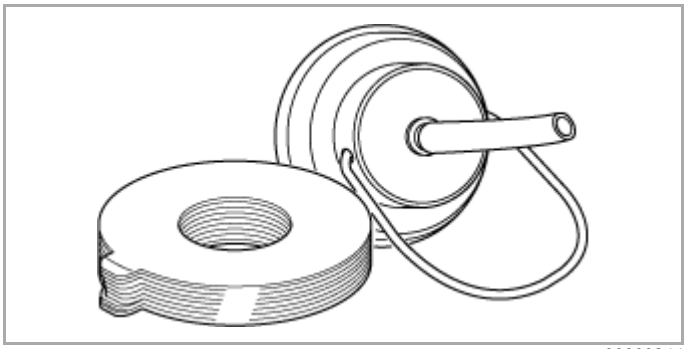
Safety precautions

- Use this equipment in the manner specified by the manufacturer.
- Fully Understand operating procedures for this equipment.
- Review, understand and complete the Initial set-up for this equipment.
- Follow all safety precautions.

Caution



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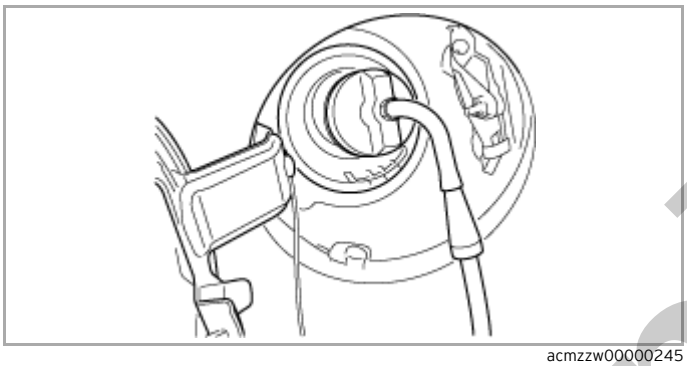
6.Insert the EVAP/low pressure vapor output hose nozzle into the gas cap single thread hose as shown in the figure.



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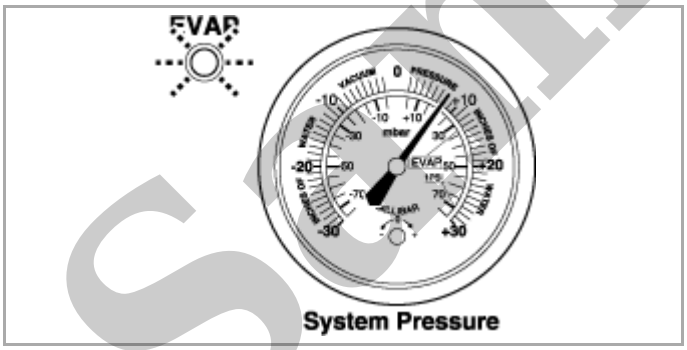
7.Toggle the power supply switch to the right to turn on the EVAP/low pressure testing (right side of tester) and verify that the green lamp turns on.



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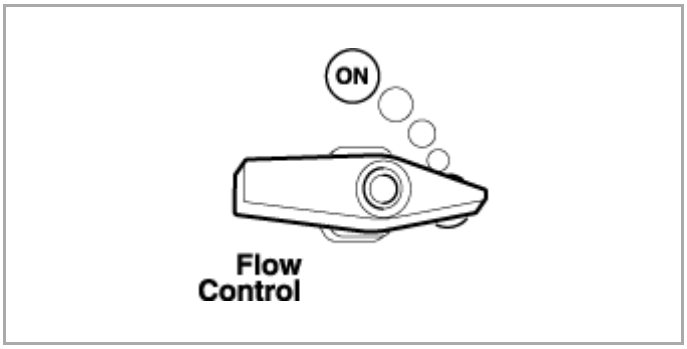
8.Verify that the flow control valves for the EVAP/low pressure testing (right side of tester) and turbo/high pressure testing (left side o tester) are OFF.



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There is no change in the value

• The EVAP system is normal in the passage between the fuel-filler cap installation surface and the purge solenoid valve, or between the charcoal canister and the CV solenoid valve.

— Perform inspections of the following part because malfunctions can be considered with them.

• Fuel-filler cap (See FUEL-FILLER CAP INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

There is change in the value

• The EVAP system has a malfunction between the fuel-filler cap and the purge solenoid valve, or between the charcoal canister and the CV solenoid valve.

— Perform the vapor test. (See Vapor test.)

Vapor test

1.Move the vehicle to a location where safety can be assured.

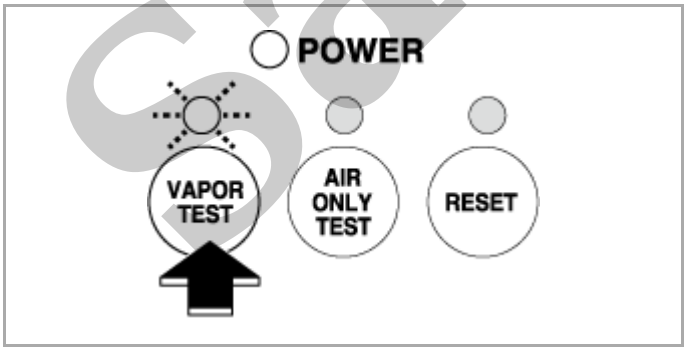
2.Ignition switched ON (engine off).

3.Access the following PIDs using the M-MDS. (See PCM INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

— EVAPCP

— EVAPCV

4.Press the [VAPOR TEST] button in the center of the tester and verify that the red lamp turns on.



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5.Turn the EVAP/low pressure flow control valve for the EVAP/low pressure testing (right side of tester) to ON.

NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)]

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13	KNOCKING/PINGING-ACCELERATION/CRUISE
DESCRIPTION	• Abnormal combustion occurs under the condition such as the temperature in the combustion chamber is too high resulting in abnormal noise. • Knocking sound occurs from the engine compartment during acceleration.
POSSIBLE CAUSE	• Poor fuel quality — Fuel RON is not specified — Excessive cleaning agents added in fuel • Poor connection of KS, wiring harness • The following information for calculating ignition timing is incorrect: — KS signal — ECT sensor signal — IAT sensor No.2 (integrated in MAP sensor) signal — MAF sensor signal • Air suction in intake-air system — MAP sensor signal • Combustion temperature is high — Cooling system malfunction — Carbon accumulation — Use of non-genuine spark plug 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 injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete “BEFORE SERVICE PRECAUTION” and “AFTER SERVICE PRECAUTION” described in this manual. (See BEFORE SERVICE PRECAUTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) (See AFTER SERVICE PRECAUTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) Caution • Disconnecting/connecting the quick release connector without cleaning it may possibly cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign matter.

Caution

• Verify the malfunction symptom according to not only the PID value but also the symptom troubleshooting.

Related PIDs

STEP	INSPECTION	RESULTS	ACTION
11	Verify the test results. • If normal, return to the diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • If the malfunction remains, inspect the related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. — If the vehicle is repaired, troubleshooting is completed. — If the vehicle is not repaired or additional diagnostic information is not available, reprogram the PCM if a later calibration is available. Retest.		

NO.27 NO CYLINDER DEACTIVATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)]

SM3065998

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Troubleshooting item	No cylinder deactivation
Description	• Cylinder deactivation control does not operate.
Possible cause	• Cylinder deactivation control is in inhibit mode due to any of the following conditions **Due to customer's driving operation or vehicle conditions** — Selector lever position is P, N or R position — Vehicle speed: 5 km/h {3 mph} or less — Engine speed: 1,000 rpm or less, or 3,600 rpm or more **Other** — Characteristic learning *1 for cylinder deactivation system-related parts is not completed — Engine torque is larger than specified value — Insufficient engine warm-up — Engine coolant or engine oil temperature is high — During or directly after DSC operation — Cylinder deactivation control continues for long periods — Cylinder deactivation system-related part malfunction — Battery voltage is extremely low *1: To perform cylinder deactivation control, the PCM performs the crankshaft installation tolerance learning and learns the individual differences (variations) of the sensor which occurs during the manufacturing of the engine oil pressure sensor relative to the cylinder deactivation control-related parts. **Warning** **• The crankshaft installation tolerance learning and the engine oil pressure sensor variation learning are performed at the following timing, however it could result in an accident. Explain to the customer that the vehicle is not to be driven to perform learning for the PCM intentionally.** **Crankshaft installation tolerance learning** • While deceleration continues for approx. 6 s with accelerator pedal released and brake pedal released while driving at a speed of approx. 60 km/h {37 mph} or more **Engine oil pressure sensor variation learning** • During 11 s while vehicle is stopped after ignition switched off
System wiring diagram	• Not applicable
Connector diagram	• Not applicable

Diagnostic Procedure