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

Go to manual page

Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	**INSPECT VEHICLE CONDITION FOR EFFECT ON MALFUNCTION** • Verify how the customer drives the vehicle by asking the customer the following: — Engine speed is high and remains high for continuous long periods like when climbing a long, steep grade. • Is the engine generating excessive heat when driven?	Yes	Explain to the customer that the vehicle is normal and give them advice how to use vehicle and provide a specific example of the conditions in which the engine overheats.
		No	Go to the next step.
2	**VERIFY PCM DTC** • Retrieve PCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)
		No	Go to the next step.
3	**DETERMINE IF MALFUNCTION CAUSE IS A/C SYSTEM OR OTHER** • Start the engine and run it at idle speed. • Turn the A/C switch off. • Does the A/C compressor disengaged?	Yes	Go to the next step.
		No	Perform the symptom troubleshooting "A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY". (See A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [FULL-AUTO AIR CONDITIONER].) (See A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MANUAL AIR CONDITIONER].)
4	**INSPECT ECT SENSOR SIGNAL** • Access the ECT PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) • Compare the ECT PID and low engine coolant temperature indicator light and high engine coolant temperature warning light operation. • Is the ECT PID value same as indicator/warning light readings?	Yes	Go to the next step.
		No	Inspect the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-G (WITHOUT EGR COOLER)].) (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-G (WITH EGR COOLER)].) • If there is any malfunction: — Replace the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • If there is no malfunction: — Perform the instrument cluster symptom troubleshooting "LOW ENGINE COOLANT TEMPERATURE INDICATOR LIGHT/HIGH ENGINE COOLANT TEMPERATURE WARNING LIGHT ILLUMINATES OR FLASHES CONTINUOUSLY". (See LOW ENGINE COOLANT TEMPERATURE INDICATOR LIGHT/HIGH ENGINE COOLANT TEMPERATURE WARNING LIGHT ILLUMINATES OR FLASHES CONTINUOUSLY [INSTRUMENT CLUSTER].)

STEP	INSPECTION	RESULTS	ACTION
14	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.		

STEP	INSPECTION	RESULTS	ACTION
8	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.		

Related PIDs

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
APP1	%	APP sensor No.1	• Accelerator pedal released: Approx. 15% • Accelerator pedal depressed: Approx. 90.58%
	V		• Accelerator pedal released: Approx. 0.75 V • Accelerator pedal depressed: Approx. 4.52 V
APP2	%	APP sensor No.2	• Accelerator pedal released: Approx. 7.45% • Accelerator pedal depressed: Approx. 45.49%
	V		• Accelerator pedal released: Approx. 0.38 V • Accelerator pedal depressed: Approx. 2.26 V
ECT	°C, °F	Engine coolant temperature	• Displays ECT
	V		• ECT is 20 °C {68 °F}: Approx. 3.10 V • ECT is 40 °C {104 °F}: Approx. 2.16 V • ECT is 60 °C {140 °F}: Approx. 1.40 V • ECT is 80 °C {176 °F}: Approx. 0.87 V • ECT is 100 °C {212 °F}: Approx. 0.54 V
FUEL_PRES	KPa {MPA}, mBar {BAR}, psi, in H20	Fuel pressure	• Displays fuel pressure
	V		Idle (ECT 80 °C {176 °F}) • Fuel pressure is 10 MPa {102 kgf/cm ^{2}, 1450 psi}: Approx. 1.4 V
IAT	°C, °F	IAT sensor No.1 voltage	• Displays IAT (No.1)
	V		• IAT is 20 °C {68 °F}: Approx. 2.70 V • IAT is 40 °C {104 °F}: Approx. 1.80 V • IAT is 60 °C {140 °F}: Approx. 1.20 V
LOAD	%	Engine load	• Idle (after warm up): Approx. 16.07% • Racing (engine speed is 2,000 rpm): Approx. 13.33% • Racing (engine speed is 4,000 rpm): Approx. 15.29%
LONGFT1	%	Long term fuel trim	• Idle (after warm up): Approx. -3.9% • Racing (engine speed is 2,000 rpm): Approx. -0.78% • Racing (engine speed is 4,000 rpm): Approx. -0.78%
MAF	g/Sec	Mass air flow	• Displays MAF
	V		• Ignition switched ON (engine off) (MAF: 0.00 g/s {0 lb/min}): Approx. 1.69 V (ECT is 53 °C {127 °F}) • Idle (after warm up) (MAF: 2.50 g/s {0.331 lb/min}): Approx. 1.89 V (ECT is 93 °C {199 °F}) • Racing (engine speed is 2,000 rpm) (MAF: 3.80 g/s {0.503 lb/min}): Approx. 2.02 V (ECT is 95 °C {203 °F})
MAP	KPa {MPA}, mBar {BAR}, psi, in H20	Manifold absolute pressure	• Displays MAP
MAP_V	V	MAP sensor voltage	• Ignition switched ON (engine off) (MAP: 100 kPa {1.02 kgf/cm ^{2}, 14.5 psi}): Approx. 4.04 V • Idle (after warm up) (MAP: 35 kPa {0.36 kgf/cm ^{2}, 5.1 psi}): Approx. 1.40 V • Racing (engine speed is 2,000 rpm) (MAP: 26 kPa {0.27 kgf/cm ^{2}, 3.8 psi}): Approx. 1.01 V
O2S11	µA	A/F sensor	• Idle (after warm up): Approx. -39 µA • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 3.84 mA
O2S12	V	HO2S	• Idle (after warm up): 0−1.0 V • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 0 V
RPM	RPM	Engine speed	• Displays engine speed
SHRTFT1	%	Short term fuel trim	• Idle (after warm up): Approx. 2.34% • Racing (engine speed is 2,000 rpm): Approx. 3.9% • Racing (engine speed is 4,000 rpm): Approx. 1.56%
TP_REL	%	Throttle position signal (relative value)	• Accelerator pedal released: Approx. 12% • Accelerator pedal depressed: Approx. 82%

STEP	INSPECTION	RESULTS	ACTION
8	**INSPECT EXHAUST SYSTEM FOR LEAKAGE** • Visually inspect for exhaust gas leakage from exhaust manifold. • Is there any leakage?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
9	**INSPECT FUEL PRESSURE (HIGH-SIDE)** • Start the engine and warm it up completely. • Access the FUEL_PRES PID using the M-MDS at idle. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) • Is the FUEL_PRES PID value approx. 10 MPa {102 kgf/cm^2, 1,450 psi}?	Yes	Go to Step 13.
		No	Lower than 10 MPa {102 kgf/cm^2, 1,450 psi}: • Inspect the following: — Fuel leakage at the fuel line and fuel injector — Fuel pump • Perform the Fuel Pump (Low-pressure Side) Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) — Fuel pressure sensor (See FUEL PRESSURE SENSOR INSPECTION [SKYACTIV-G (WITHOUT EGR COOLER)].) (See HIGH FUEL PRESSURE SENSOR INSPECTION [SKYACTIV-G (WITH EGR COOLER)].) — High pressure fuel pump (See HIGH PRESSURE FUEL PUMP INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • If there is any malfunction: — Repair or replace the malfunctioning part according to the inspection results. • If there is no malfunction: — Go to Step 12. Higher than 10 MPa {102 kgf/cm^2, 1,450 psi}: • Go to the next step.
10	**DETERMINE IF MALFUNCTION CAUSE IS FUEL PRESSURE SENSOR OR HIGH PRESSURE FUEL PUMP** • Is the vehicle acceleration performance normal?	Yes	Go to the next step.
		No	Go to Step 12.
11	**INSPECT FUEL PRESSURE SENSOR** • Inspect the fuel pressure sensor. (See FUEL PRESSURE SENSOR INSPECTION [SKYACTIV-G (WITHOUT EGR COOLER)].) (See HIGH FUEL PRESSURE SENSOR INSPECTION [SKYACTIV-G (WITH EGR COOLER)].) • Is there any malfunction?	Yes	Replace the fuel distributor. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
		No	Go to Step 13.

NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)]

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20	FUEL ODOR (IN ENGINE COMPARTMENT)
DESCRIPTION	• Gasoline fuel smell or visible leakage.
POSSIBLE CAUSE	• Missing or loose fuel filler cap • Fuel filler cap malfunction (seal malfunction) • Fuel leakage from fuel system • Charcoal canister damage • Vacuum hose (disconnection, damage) between fuel tank, charcoal canister, purge solenoid valve, and intake manifold • Fuel leakage at the fuel injector • Purge solenoid valve malfunction (stuck) 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

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
FUEL_PRES	KPa {MPA}, mBar {BAR}, psi, in H20	Fuel pressure	• Displays fuel pressure
	V		Idle (ECT 80 °C {176 °F}) • Fuel pressure is 10 MPa {102 kgf/cm ^{2}, 1450 psi}: Approx. 1.4 V
LOAD	%	Engine load	• Idle (after warm up): Approx. 16.07% • Racing (engine speed is 2,000 rpm): Approx. 13.33% • Racing (engine speed is 4,000 rpm): Approx. 15.29%

21	ENGINE NOISE
POSSIBLE CAUSE	**Buzzing sound is heard from exhaust pipe during cold engine start:** **Note** **• During a cold engine start, sound occurs for up to approx. 30 s with fast idle up for a drive-by-wire control and the warm-up promotion spark retard correction for ignition timing control.** • Sound occurs from drive-by-wire control, ignition control (vehicle is normal) • Dynamic damper loose • Exhaust system installation condition • Intake system installation condition **Squeal, click, or chirp noise:** • Improper engine oil level • Loose installation of solenoid valves • Improper drive belt tension • Generator installation • Auto tensioner bearing malfunction • Splash shield or under cover loose (splash water to drive belt) **Thumping/rattling or creaking sound noise:** • Improper drive belt tension • Loose parts • Loose fitting heater hoses vibrating the heater hose bracket protector **Hissing sound noise:** • Vacuum leakage • Loose spark plug • Air leakage from the intake-air system **Clattering noise:** • Loose parts **Pulsing sound is heard:** • Exhaust shutter valve malfunction **Lightly tapping or rumbling noise:** • Dynamic damper loose • Exhaust system loose • Intake-air system loose **Other noise:** • Electric variable valve timing actuator malfunction • Hydraulic variable valve timing actuator malfunction • Timing chain noise • Hydraulic lash adjuster (HLA) noise **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.** **— Highly pressurized fuel may spray out if the fuel line is cut. Due to the following dangers occurring with a fuel spray, always complete the "Fuel Line Safety Procedure" to prevent the fuel from spraying. (See BEFORE SERVICE PRECAUTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)** **• Fuel may cause irritation if it comes in contact with skin and eyes.** **• If fuel ignites and causes a fire, it may lead to serious injury or death, and damage to property and facilities.** **— Fuel is highly flammable and dangerous. Fuel line spills and leakage can cause serious injury or death, and damage to equipment. Always refer to the "Quick Release Connector Removal/Installation (fuel system)" before performing the fuel hose installation, and execute the "Fuel Leakage Inspection" after installation. (See QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) (See AFTER SERVICE PRECAUTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)** **Caution**

STEP	INSPECTION	RESULTS	ACTION
9	VERIFY IF THERE IS KNOCK SOUND • Is knocking noise present?	Yes	Perform the symptom troubleshooting "NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE". (See NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
		No	If noise comes from engine internal: • Inspect the following: — Timing chain — Hydraulic lash adjuster (HLA) noise — Electric variable valve timing actuator — Hydraulic variable valve timing actuator — Engine compression • Repair or replace the malfunctioning part according to the inspection results.
10	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.		

— Engine compression (See COMPRESSION INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

Electric Variable Valve Timing Driver Control System Inspection

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

2.Perform the KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

3.Verify that DTC P0010:00 or P1380:00 is not displayed. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

- If DTC P0010:00 or P1380:00 is displayed, perform the DTC inspection. (See DTC P0010:00 [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) (See DTC P1380:00 [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

4.Perform the Drive Mode 03 (Variable Valve Timing, A/F Sensor Heater, HO2S Heater, A/F Sensor, HO2S and TWC Repair Verification Drive Mode). (See OBD-II DRIVE MODE [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

5.Verify that DTC P0011:00 or P0012:00 is not displayed. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

- If DTC P0011:00 or P0012:00 is displayed, perform the DTC inspection. (See DTC P0011:00, P0012:00 [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

6.Access the following PCM PIDs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)

- VT_IN_ACT
- VT_IN_DES

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.

7.Accelerate and decelerate the vehicle, and drive at normal speed, and verify that the data monitor item VT_IN_ACT value changes in conjunction with the VT_IN_DES value.

- If this change cannot be verified, replace the electric variable valve timing motor/driver. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)

Engine Oil Solenoid Valve Control System Inspection

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