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1999 MAZDA MX-5 / Miata OEM Service and Repair Workshop Manual

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STEP	INSPECTION	RESULTS	ACTION
4	VERIFY IF MALFUNCTION CAUSE WAS CORRECTED BY REFUELING • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Perform the KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the same Pending DTC present?	Yes	Note • A malfunction has occurred because carbon has accumulated in combustion chamber. Overhaul the engine and remove the carbon in the combustion chamber. Go to the next step.
		No	Go to Step 6.
5	VERIFY DTC TROUBLESHOOTING COMPLETED • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Perform the KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) Go to the next step.
		No	Go to the next step.
6	VERIFY AFTER REPAIR PROCEDURE • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
		No	DTC troubleshooting completed.

STEP	INSPECTION	RESULTS	ACTION
6	**INSPECT APP SENSOR No.2** • Reconnect all disconnected connectors. • Inspect the APP sensor No.2. (See ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the accelerator pedal, then go to Step 9. (See ACCELERATOR PEDAL REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to Step 9.
7	**INSPECT APP SENSOR No.2 SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Switch the ignition off. • Disconnect the APP sensor connector. • Access the APP2 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Verify the APP2 PID value. • Is the APP2 PID value 5 V or B+?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between APP sensor terminal E and PCM terminal 2BB. **If there is a common connector:** • Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for a short to power supply. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has a short to power supply. Go to Step 9.
		No	Go to the next step.
8	**INSPECT APP SENSOR No.2 GROUND CIRCUIT FOR OPEN CIRCUIT** • Verify that the APP sensor connector is disconnected. • Switch the ignition off. • Disconnect the PCM connector. • Inspect for continuity between APP sensor terminal D (wiring harness-side) and PCM terminal 2BG (wiring harness-side). • Is there continuity?	Yes	Replace the accelerator pedal, then go to the next step. (See ACCELERATOR PEDAL REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Refer to the wiring diagram and verify whether or not there is a common connector between APP sensor terminal D and PCM terminal 2BG. **If there is a common connector:** • Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for an open circuit. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has ar open circuit. Go to the next step.
9	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) Go to the next step.
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
		No	DTC troubleshooting completed.

STEP	INSPECTION	RESULTS	ACTION
8	VERIFY DTC TROUBLESHOOTING COMPLETED • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) Go to the next step.
		No	Go to the next step.
9	VERIFY AFTER REPAIR PROCEDURE • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
		No	DTC troubleshooting completed.

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION Note • Recording can be facilitated using the screen capture function of the PC. • Record the snapshot data on the repair order.	–	Go to Troubleshooting Diagnostic Procedure to perform the procedure from Step 1.

Troubleshooting Diagnostic Procedure

Intention of troubleshooting procedure
• Step 1–6
— Perform an inspection of each signal transmission system.
• Step 7
— Perform a unit inspection of the generator.
• Step 8–10
— Verify that the primary malfunction is resolved and there are no other malfunctions.

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: VERIFY RELATED REPAIR INFORMATION AVAILABILITY • Verify related Service Bulletins and/or on-line repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
2	PURPOSE: VERIFY IF POOR CONNECTION OF EACH PART AFFECTS DIAGNOSTIC RESULTS • Switch the ignition off. • Inspect the connection condition (part installation condition, connector connection condition) for the following parts: — Battery — Generator — PCM • Is the connection condition (part installation condition, connector connection condition) for each part normal?	Yes	Go to the next step.
		No	Connect each part or the connector correctly, then go to Step 8.
3	PURPOSE: VERIFY IF CONNECTOR DAMAGE OF EACH PART AFFECTS DIAGNOSTIC RESULTS • Disconnect the connector of the following parts. — Battery — Generator — PCM • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the connector and/or terminals, then go to Step 8.
		No	Go to the next step.

DTC P2138:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))]

SM2896983

id0102t370880

DTC P2138:00	APP sensor No.1/No.2 voltage correlation problem
DETECTION CONDITION	• The PCM compares the input voltage from APP sensor No.1 with the input voltage from APP sensor No.2. If the difference is more than the specification, the PCM determines that there is an APP sensor No.1/No.2 angle correlation problem. Diagnostic support note • This is a continuous monitor (CCM). • The check engine light illuminates if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Restricts the upper limit of the engine speed. • Stops the drive-by-wire control (throttle valve is open at approx. 8 ° by return spring force).
POSSIBLE CAUSE	• APP sensor connector or terminals malfunction • PCM connector or terminals malfunction • APP sensor No.1 malfunction • APP sensor No.2 malfunction • PCM malfunction
SYSTEM WIRING DIAGRAM	• Not applicable

Caution

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

Related PIDs

Item	Definition	Unit	Condition/Specification
APP1	Accelerator pedal opening angle (absolute value) input from APP sensor No.1	%	• Accelerator pedal released: Approx. 15% • Accelerator pedal fully depressed: Approx. 90.58%
	APP sensor No.1 voltage	V	• Accelerator pedal released: Approx. 0.75 V • Accelerator pedal fully depressed: Approx. 4.52 V
APP2	Accelerator pedal opening angle (absolute value) input from APP sensor No.2	%	• Accelerator pedal released: Approx. 7.45% • Accelerator pedal fully depressed: Approx. 45.49%
	APP sensor No.2 voltage	V	• Accelerator pedal released: Approx. 0.38 V • Accelerator pedal fully depressed: Approx. 2.26 V

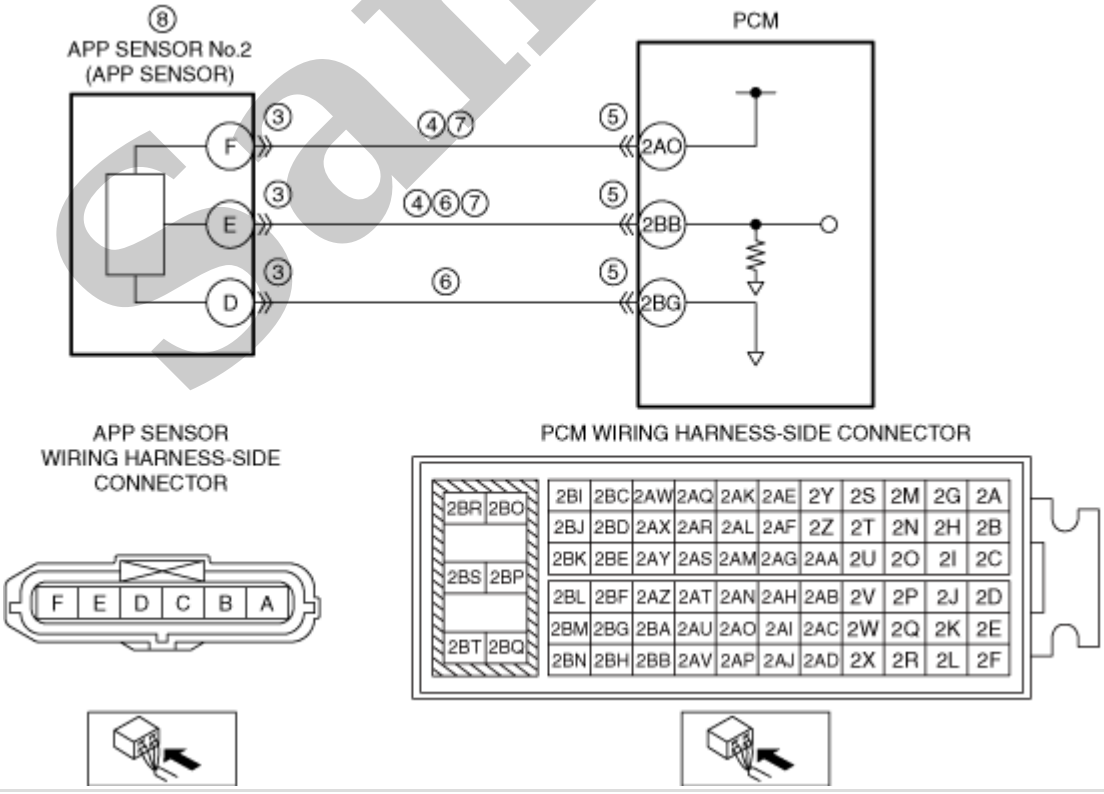
Diagnostic Procedure

DTC P2127:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))]

SM2896980

id0102t370850

DTC P2127:00	APP sensor No.2 circuit low input
DETECTION CONDITION	• The PCM monitors the input voltage from APP sensor No.2. If the input voltage at the PCM terminal 2BB is less than 0.1 V, the PCM determines that the APP sensor No.2 circuit has a malfunction. Diagnostic support note • This is a continuous monitor (CCM). • The check engine light illuminates if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Regulates the upper limit of the APP sensor output.
POSSIBLE CAUSE	• APP sensor connector or terminals malfunction • Short to ground in wiring harness between the following terminals: — APP sensor terminal F—PCM terminal 2AO — APP sensor terminal E—PCM terminal 2BB • PCM connector or terminals malfunction • APP sensor No.2 signal circuit and ground circuit are shorted to each other • Open circuit in wiring harness between the following terminals: — APP sensor terminal F—PCM terminal 2AO — APP sensor terminal E—PCM terminal 2BB • APP sensor No.2 malfunction • PCM malfunction



Caution

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

DTC P0524:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))]

SM2896923

id0102t333970

DTC P0524:00	Engine oil pressure too low
DETECTION CONDITION	• After 10 s have elapsed since engine start and 3 s have elapsed since the actual oil pressure falls below the specified value. *1 *1: With the conditions met, the engine oil warning light turns on. **Diagnostic support note** • This is a continuous monitor (other). • The check engine light illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA is not available. • Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Restricts the upper limit of the engine speed.
POSSIBLE CAUSE	• Engine oil leakage • Improper engine oil level • Engine oil temperature sensor/engine oil pressure sensor connector or terminals malfunction • Engine oil solenoid valve connector or terminals malfunction • PCM connector or terminals malfunction • Short to ground in wiring harness between the following terminals: — Engine oil temperature sensor/engine oil pressure sensor terminal A—PCM terminal 1D — Engine oil temperature sensor/engine oil pressure sensor terminal D—PCM terminal 1AS — Engine oil solenoid valve terminal B—PCM terminal 1CK • Engine oil pressure sensor malfunction • Engine oil solenoid valve connector malfunction • Oil pump malfunction • PCM malfunction

STEP	INSPECTION	RESULTS	ACTION
8	**INSPECT ENGINE OIL TEMPERATURE SENSOR/ENGINE OIL PRESSURE SENSOR OR ENGINE OIL SOLENOID VALVE CIRCUIT FOR SHORT TO GROUND** • Verify that the engine oil temperature sensor/engine oil pressure sensor, engine oil solenoid valve and PCM connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side) and body ground: — Engine oil temperature sensor/engine oil pressure sensor terminal A — Engine oil temperature sensor/engine oil pressure sensor terminal D — Engine oil solenoid valv terminal B • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: • Engine oil temperature sensor/engine oil pressure sensor terminal A—PCM terminal 1D • Engine oil temperature sensor/engine oil pressure sensor terminal D—PCM terminal 1AS • Engine oil solenoid valv terminal B—PCM terminal 1CK **If there is a common connector:** — Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for a short to ground. — Repair or replace the malfunctioning part. **If there is no common connector:** — Repair or replace the wiring harness which has a short to ground. Go to Step 11.
		No	Go to the next step.
9	**INSPECT ENGINE OIL PRESSURE SENSOR** • Inspect the engine oil pressure sensor. (See ENGINE OIL PRESSURE SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the engine oil pressure sensor, then go to the next step. (See ENGINE OIL TEMPERATURE SENSOR/ENGINE OIL PRESSURE SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
10	**INSPECT ENGINE OIL SOLENOID VALVE** • Inspect the engine oil solenoid valve. (See ENGINE OIL SOLENOID VALVE INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the engine oil solenoid valve, then go to the next step. (See ENGINE OIL SOLENOID VALVE REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Replace the oil pump, then go to the next step. (See OIL PUMP REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
11	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Start the engine. • Increase and keep the engine speed at 2,500 rpm for 5 s. • Perform the DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) Go to the next step.
		No	Go to the next step.
12	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
		No	DTC troubleshooting completed.

7. Drive the vehicle for 30 min at a speed of 50 km/h {31 mph} or more (to increase temperature in fuel tank and generate evaporative gas).

Note

• If driving the vehicle for 30 min at a speed of 50 km/h {31 mph} or more is not feasible, the vehicle can be driven for a continuous 15 min or more with the engine coolant temperature at 80 °C {176 °F} or more.

8. Stop the engine.
9. Leave the vehicle for 1 h or more.

PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

Item	Definition	Unit	Condition/Specification
FTP	Fuel tank pressure input from fuel tank	Pa {KPA}, mBar {BAR}, psi, in H20	• Ignition switched ON (engine off): Approx. −23 Pa {−2.3 kgf/m ^{2}, −0.0033 psi} • Idle (after warm up): −282− −46 Pa {−28.7− −4.7 kgf/m ^{2}, −0.0409− −0.0067 psi} • Racing (Engine speed 2,000 rpm): −1.47− −0.869 kPa {−0.0149− −0.0089 kgf/cm ^{2}, −0.213− −0.127 psi} • Racing (Engine speed 4,000 rpm): −1.69− −1.07 kPa {−0.0172− −0.0110 kgf/cm ^{2}, −0.245− −0.156 psi}
	Fuel tank pressure sensor voltage	V	• Ignition switched ON (engine off): Approx. 2.6 V • Idle (after warm up): 2.2−2.62 V • Racing (Engine speed 2,000 rpm): 1.9−1.91 V • Racing (Engine speed 4,000 rpm): 1.73−1.76 V

Simulation item table

Item	Applicable component	Operation	Operation condition	
			Engine condition	Other condition
EVAPCP	Purge solenoid valve	Changes % and forcibly drives/stops purge solenoid valve.	• Under the following conditions: — Ignition is switched ON (engine off) — Idle (no load)	Not applicable