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2003 MAZDA MX-5 / Miata OEM Service and Repair Workshop Manual

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NO.24 SPARK PLUG CONDITION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)]

SM3065999

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24	SPARK PLUG CONDITION
DESCRIPTION	• Incorrect spark plug condition.

STEP	INSPECTION	RESULTS	ACTION
6	INSPECT FUEL LINE PRESSURE • Inspect the fuel line pressure. (See FUEL LINE PRESSURE INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • Is the low side fuel pressure within specification? **Specification:** • 405–485 kPa {4.13–4.94 kgf/cm^2, 58.8–70.3 psi}	Yes	Inspect the fuel injector for the following: • Injection volume • Leakage • Open or short circuit in injector (See FUEL INJECTOR INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) — If there is any malfunction: • Repair or replace the malfunctioning part according to the inspection results.
		No	Zero or low: • Inspect the fuel pump relay and the fuel pump circuit. (See RELAY INSPECTION.) • Inspect the fuel line for restriction. — If there is any malfunction: • Repair or replace the malfunctioning part according to the inspection results. — If there is no malfunction: • Replace the fuel pump unit. (Pressure regulator or fuel pump malfunction) (See FUEL PUMP UNIT REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) High: • Replace the fuel pump unit. (Pressure regulator malfunction) (See FUEL PUMP UNIT REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
7	INSPECT SPARK PLUG • Inspect the spark plug for the following: — Air gap — Heat range • Is there any malfunction?	Yes	Replace the spark plug. (See SPARK PLUG REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
		No	Go to the next step.
8	INSPECT FUEL INJECTOR OPERATION • Perform the Fuel Injector Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • Do the fuel injectors operate properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
9	INSPECT AIR CLEANER ELEMENT • Is the air cleaner element clean?	Yes	Go to the next step.
		No	Replace the air cleaner element.

STEP	INSPECTION	RESULTS	ACTION
16	**INSPECT INTAKE-AIR SYSTEM FOR AIR SUCTION** • If the engine cannot be started: — Inspect the intake air system for air leakage. • If the engine can be started: — Perform the Intake Manifold Vacuum Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • Is air being sucked in from intake air system?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
17	**INSPECT FUEL LINE PRESSURE** • Inspect the fuel line pressure. (See FUEL LINE PRESSURE INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • Is the low side fuel pressure within specification? **Specification:** • 405–485 kPa {4.13–4.94 kgf/cm^2, 58.8–70.3 psi}	Yes	Inspect the PCM ground condition. • If there is any malfunction: — Repair or replace the malfunctioning part according to the inspection results.
		No	Zero or low: • Inspect the fuel pump relay and the fuel pump circuit. (See RELAY INSPECTION.) • Inspect the fuel line for restriction. — If there is any malfunction: • Repair or replace the malfunctioning part according to the inspection results. — If there is no malfunction: • Replace the fuel pump unit. (Pressure regulator or fuel pump malfunction) (See FUEL PUMP UNIT REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) High: • Replace the fuel pump unit. (Pressure regulator malfunction) (See FUEL PUMP UNIT REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
18	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.25 FUEL REFILL CONCERNS [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)]

SM3066001

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25	FUEL REFILL CONCERNS
DESCRIPTION	• Fuel tank does not fill smoothly.
POSSIBLE CAUSE	• PCM DTC is stored. • Evaporative emissions system hoses restriction • Non-return valve malfunction • Check valve malfunction (except U.S.A., CANADA and Israel) • Improper use of fuel nozzle • Inadequate fuel filling speed Warning • The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system: — Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel. — Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See 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 cause damage to the fuel pipe and the quick release connector. Always clean the quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign matter.

Diagnostic Procedure

STEP	INSPECTION		ACTION
1	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.
2	INSPECT EVAPORATIVE SYSTEM HOSES FOR RESTRICTION • Inspect for restriction in the evaporative system hoses. • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.

STEP	INSPECTION		ACTION
2	**DETERMINE IF MALFUNCTION CAUSE IS NON-RETURN VALVE** • Remove the fuel-filler pipe. • Make sure non-return valve is installed properly. • Inspect the non-return valve operation. • Is there any malfunction?	Yes	Replace the fuel tank. (See FUEL TANK REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
		No	U.S.A., CANADA and Israel: • Inspect the following: — Improper use of fuel nozzle — Inadequate fuel filling speed Except U.S.A., CANADA and Israel: • Go to the next step.
3	**DETERMINE IF MALFUNCTION CAUSE IS CHECK VALVE** • Inspect the check valve. (See CHECK VALVE INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the check valve. (See CHECK VALVE REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
		No	Inspect the following: • Improper use of fuel nozzle • Inadequate fuel filling speed Repair or replace the malfunctioning part according to the inspection results.
4	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.		

11	ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES
	— Electric variable valve timing motor malfunction — Electric variable valve timing actuator malfunction • Improper operation of hydraulic variable valve timing control system • Spark plug malfunction • Exhaust system and/or TWC restriction (PCM DTC is stored.) • PCV valve malfunction • Check valve malfunction (except U.S.A., CANADA and Israel) • Pressure control valve malfunction (U.S.A., CANADA and Israel) • Injector driver (built-into PCM) malfunction
POSSIBLE CAUSE	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 (WITHOUT 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 (WITHOUT CYLINDER DEACTIVATION)].) (See AFTER SERVICE PRECAUTION [SKYACTIV-G 2.5 (WITHOUT 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 material.

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)
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

STEP	INSPECTION	RESULTS	ACTION
6	VERIFY CURRENT INPUT SIGNAL STATUS 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. • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) — APP1 — APP2 — ECT — FUEL_PRES — IAT — MAF — MAP — MAP_V — O2S11 — O2S12 — SHRTFT1 — LONGFT1 • Do the PIDs indicate the correct values under the trouble condition? (See PCM INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)	Yes	Go to the next step.
		No	APP1, APP2 PIDs are not as specified: • Inspect the APP sensor. (See ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) ECT PID is not as specified: • Inspect the ECT sensor No.1. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) FUEL_PRES PID is not as specified: • Inspect the fuel pressure sensor. (See FUEL PRESSURE SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) IAT PID is not as specified: • Inspect the IAT sensor No.1. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) MAF PID is not as specified: • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) MAP, MAP_V PIDs are not as specified: • Inspect the MAP sensor. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) O2S11, SHRTFT1, LONGFT1 PIDs are not as specified: • Inspect the A/F sensor. (See AIR FUEL RATIO (A/F) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) O2S12 PID is not as specified: • Inspect the HO2S. (See HEATED OXYGEN SENSOR (HO2S) INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) Repair or replace the malfunctioning part according to the inspection results. • If the malfunction remains: — Inspect communication error between TCM and PCM. • Repair or replace the malfunctioning part according to the inspection results if necessary. — Perform the "INTERMITTENT CONCERN TROUBLESHOOTING" procedure. (See INTERMITTENT CONCERN TROUBLESHOOTING [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)

STEP	INSPECTION	RESULTS	ACTION
15	INSPECT RELATED PART CONDITION • Inspect the following: — Fuel quality (proper octane, contamination, winter/summer blend) — Air leakage from intake-air system — Vacuum leakage — Intake-air system restriction — Air cleaner element — Fuel leakage from fuel line — Engine mount loose — CKP sensor and intake CMP sensor • Installation condition (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Damaged trigger wheel (intake camshaft) — Exhaust CMP sensor • Installation condition (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Damaged trigger wheel (exhaust camshaft) • Is there any malfunction?	Yes	Service if necessary. • Repeat this step.
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
21	**INSPECT ELECTRIC VARIABLE VALVE TIMING DRIVER** • Inspect the electric variable valve timing driver. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the electric variable valve timing motor/driver. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
22	**INSPECT ELECTRIC VARIABLE VALVE TIMING MOTOR** • Inspect the electric variable valve timing motor. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the electric variable valve timing motor/driver. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
23	**INSPECT ELECTRIC VARIABLE VALVE TIMING ACTUATOR** • Inspect the electric variable valve timing actuator. (See ELECTRIC VARIABLE VALVE TIMING ACTUATOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the electric variable valve timing actuator. (See ELECTRIC VARIABLE VALVE TIMING ACTUATOR, HYDRAULIC VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
24	**INSPECT HYDRAULIC VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION** • Perform the Hydraulic Variable Valve Timing Control System Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
25	**INSPECT FOR MALFUNCTION DUE TO DEVIATED VALVE TIMING** • Inspect the valve timing (timing chain installation condition). (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is the valve timing normal?	Yes	Inspect for the following engine internal parts: • Cylinder • Piston ring • Intake valve • Exhaust valve • Such as cylinder head gasket — If there is any malfunction: • Repair or replace the malfunctioning part according to the inspection results.
		No	Adjust the valve timing to the correct timing.
26	**INSPECT IGNITION SYSTEM OPERATION** • Perform the Spark Test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is a strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
27	**INSPECT EXHAUST SYSTEM FOR RESTRICTION** • Inspect for restriction in the exhaust system and the TWC. • Is there any restriction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.