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1993 MAZDA MX-5 / Miata OEM Service and Repair Workshop Manual

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STEP	INSPECTION	RESULTS	ACTION
8	PURPOSE: VERIFY A/F SENSOR AND HO2S INPUT SIGNAL • Start the engine and warm it up completely. • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) — O2S11 — O2S12 • Drive the vehicle under the following conditions. **Warning** **• 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.** **• While performing this step, always operate the vehicle in a safe and lawful manner.** — After increasing the engine speed to 3,000 rpm, decelerate using engine braking. • Is the displayed PID value as follows? — O2S11: 0.25 mA or more — O2S12: 0.3 V or less	Yes	Go to Step 10.
		No	Go to the next step.
9	PURPOSE: INSPECT RELATED SENSOR WIRING HARNESS AND CONNECTOR • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) — O2S11 — O2S12 • When the PCM, A/F sensor and HO2S are shaken, does the PID value include a PID item which has changed?	Yes	Inspect the related wiring harness and connector. • Repair or replace the malfunctioning part. Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 13.
		No	Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 1.
10	PURPOSE: VERIFY IF MALFUNCTION CAUSED BY FUEL INJECTOR IMPROPER OPERATION • Start the engine and idle it. • Access the following simulation items using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) — INJ_1 — INJ_2 — INJ_3 — INJ_4 • Using the simulation function, can the change in engine speed be verified when operation of each of the fuel injectors is stopped?	Yes	Go to the next step.
		No	Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 3.
11	PURPOSE: VERIFY IF MALFUNCTION CAUSED BY PURGE SOLENOID VALVE IMPROPER OPERATION • Start the engine and idle it. • Access the EQ_RAT11_DSD PID and simulation item EVAPCP using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Using the simulation function, does the EQ_RAT11_DSD PID value change when the purge solenoid valve is opened/closed?	Yes	Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 5.
		No	Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 4.

Troubleshooting Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
14	PURPOSE: VERIFY IF THERE IS ANY OTHER MALFUNCTION • Is any other DTC or pending code stored?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5T)].)
		No	DTC troubleshooting completed.

DESCRIPTION	Thermostat stuck open
POSSIBLE CAUSE	• ECT sensor malfunction • Poor assembly of ECT sensor • Poor assembly of engine coolant hose (engine coolant passage malfunction) • Engine coolant insufficient • Engine coolant leakage • Engine coolant frozen • Use of unspecified engine coolant • Foreign matter caught in thermostat (foreign matter penetration in engine coolant) • Thermostat (built-into coolant control valve) malfunction • PCM malfunction

System Wiring Diagram

• Not applicable

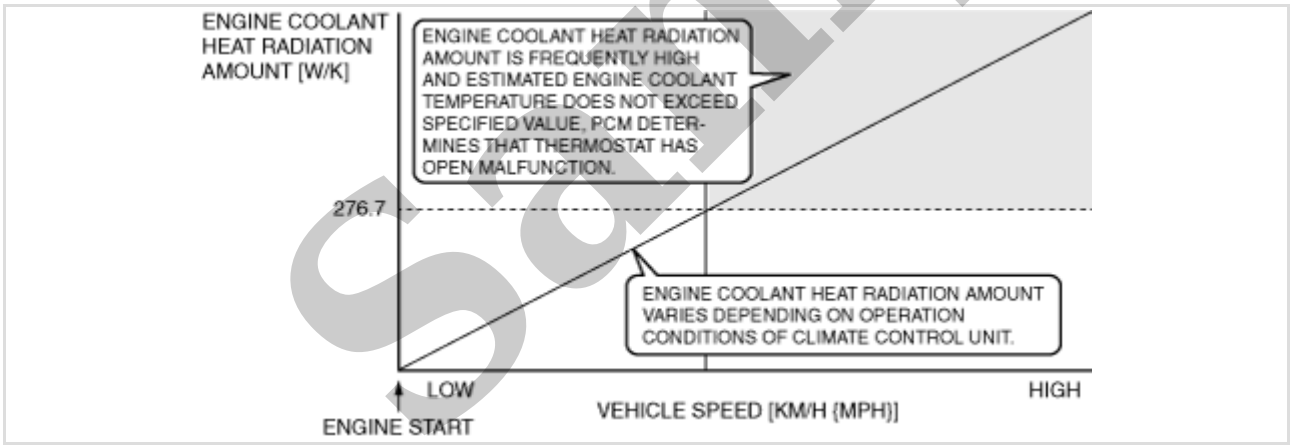
Function Explanation (DTC Detection Outline)

• The PCM calculates an estimate of the engine coolant temperature based on the following information.

— Vehicle speed
— Engine coolant temperature heat radiation amount
— Climate control unit operation condition

• The PCM determines that there is a malfunction and stores a DTC when it detects the following conditions.

— Engine coolant heat radiation amount is frequently high
— Engine coolant temperature estimated by PCM does not exceed 77°C {171°F}
— The condition in which the precondition of P0126:00 is met and the detection condition is also met was repeated 3 times during 1 drive cycle.



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Repeatability Verification Procedure

1. Switch the ignition off.
2. Leave the vehicle until the engine coolant temperature decreases to 35°C {95°F} or less.
3. Start the engine.

Note

• Match the engine coolant temperature in the recorded FREEZE FRAME DATA/snapshot data, the vehicle speed, and engine speed values to the best extent possible while driving the vehicle.

4. Try to reproduce the malfunction by driving the vehicle for 5 min based on the values in the FREEZE FRAME DATA/snapshot data.

PID Item/Simulation Item Used In Diagnosis

STEP	INSPECTION	RESULTS	ACTION
8	PURPOSE: VERIFY IF THERE IS ANY OTHER MALFUNCTION • Is any other DTC or pending code stored?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5T)].)
		No	DTC troubleshooting completed.

STEP	INSPECTION	RESULTS	ACTION
2	PURPOSE: RECORD FREEZE FRAME DATA/SNAPSHOT DATA AND DIAGNOSTIC MONITORING TEST RESULTS TO UTILIZE WITH REPEATABILITY VERIFICATION Note • Recording can be facilitated using the screen capture function of the PC. • Record the FREEZE FRAME DATA/snapshot data and DIAGNOSTIC MONITORING TEST RESULTS (A/F sensor, HO2S related) on the repair order.	–	Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 1.

Troubleshooting Diagnostic Procedure

Intention of troubleshooting procedure
• Step 1–4

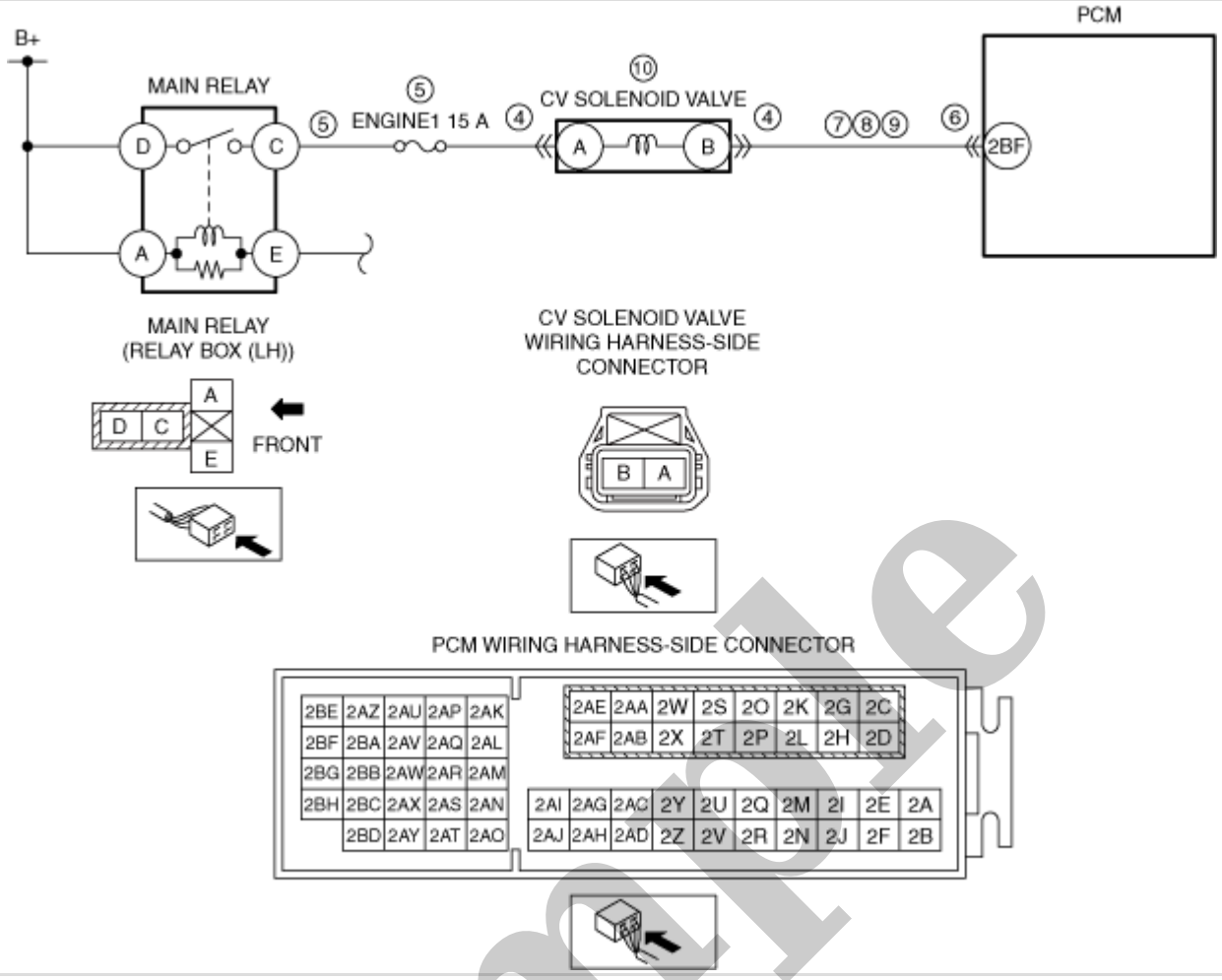
— Perform an inspection of the HO2S and PCM-related connectors and wiring harnesses.
• Step 5

— Perform a unit inspection of the HO2S.
• Step 6–7

— Verify that the primary malfunction is resolved and there are no other malfunctions.

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: INSPECT HO2S CONNECTOR CONDITION • Switch the ignition off. • Disconnect the HO2S connector. • 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 6.
		No	Go to the next step.
2	PURPOSE: INSPECT PCM CONNECTOR CONDITION • Disconnect the PCM connector. • 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 6.
		No	Go to the next step.
3	PURPOSE: INSPECT HO2S SIGNAL CIRCUIT FOR SHORT TO GROUND • Verify that the HO2S and PCM connectors are disconnected. • Inspect for continuity between HO2S terminal A (wiring harness-side) and body ground. • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between HO2S terminal A and PCM terminal 2AI. 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 6.
		No	Go to the next step.

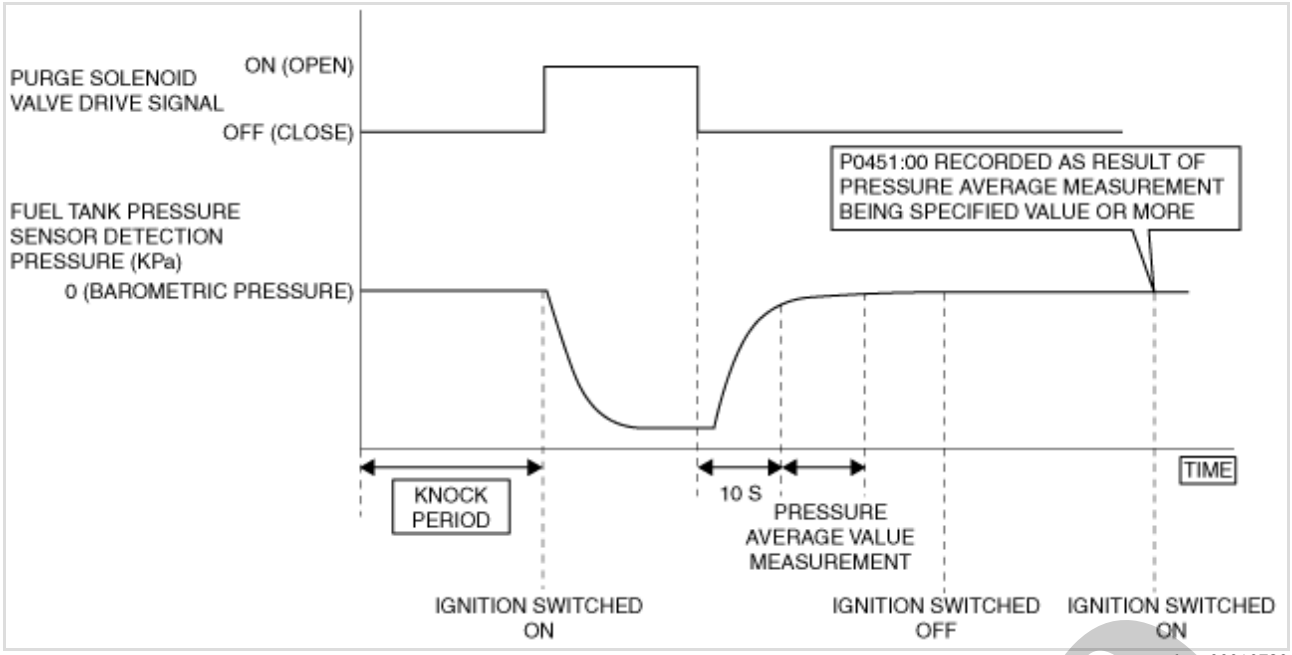
DTC P0446:00	CV solenoid valve control circuit problem



Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	**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 FREEZE FRAME DATA/snapshot data on the repair order.	–	Go to the next step.
2	**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.

STEP	INSPECTION	RESULTS	ACTION
7	**INSPECT CV SOLENOID VALVE CONTROL CIRCUIT FOR SHORT TO GROUND** • Verify that the CV solenoid valve and PCM connectors are disconnected. • Inspect for continuity between CV solenoid valve terminal B (wiring harness-side) and body ground. • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between CV solenoid valve terminal B and PCM terminal 2BF. **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.
8	**INSPECT CV SOLENOID VALVE CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Verify that the CV solenoid valve and PCM connectors are disconnected. • Switch the ignition ON (engine off). **Note** **• Another DTC may be stored by the PCM detecting an open circuit.** • Measure the voltage at the CV solenoid valve terminal B (wiring harness-side). • Is the voltage 0 V?	Yes	Go to the next step.
		No	Refer to the wiring diagram and verify whether or not there is a common connector between CV solenoid valve terminal B and PCM terminal 2BF. **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 11.
9	**INSPECT CV SOLENOID VALVE CONTROL CIRCUIT FOR OPEN CIRCUIT** • Verify that the CV solenoid valve and PCM connectors are disconnected. • Switch the ignition off. • Inspect for continuity between CV solenoid valve terminal B (wiring harness-side) and PCM terminal 2BF (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Refer to the wiring diagram and verify whether or not there is a common connector between CV solenoid valve terminal B and PCM terminal 2BF. **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 an open circuit. Go to Step 11.
10	**INSPECT CV SOLENOID VALVE** • Inspect the CV solenoid valve. (See CANISTER VENT (CV) SOLENOID VALVE INSPECTION [SKYACTIV-G 2.5T].) • Is there any malfunction?	Yes	Replace the CV solenoid valve, then go to the next step. (See CANISTER VENT (CV) SOLENOID VALVE REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.
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 2.5T)].) • Start the engine and warm it up completely. • Perform the KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5T)].) • 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 2.5T].) Go to the next step.
		No	Go to the next step.



Repeatability Verification Procedure

1. Switch the ignition off.
2. Leave the vehicle for 2 h or more.
3. Start the engine and leave it idling for 1 min.

PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

Item	Definition	Unit	Condition/Specification
AAT	Ambient air temperature	°C, °F	• Displays ambient air temperature
FTP	Fuel tank pressure	Pa {KPA}, mBar {BAR}, psi, in H20	• Displays fuel tank pressure
	Fuel tank pressure sensor voltage	V	• Fuel tank pressure is equal to barometric pressure: Approx. 2.6 V

Function Inspection Using M-MDS

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.

STEP	INSPECTION	RESULTS	ACTION
6	**PURPOSE: VERIFICATION OF VEHICLE REPAIR COMPLETION** • Reconnect all the removed parts. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5T)].) • Implement the repeatability verification procedure. (See Repeatability Verification Procedure.) • Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1 of the troubleshooting diagnostic procedure. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].) Go to the next step.
		No	Go to the next step.
7	**PURPOSE: VERIFY IF THERE IS ANY OTHER MALFUNCTION** • Is any other DTC or pending code stored?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5T)].)
		No	DTC troubleshooting completed.