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1994 MAZDA MX-5 / Miata OEM Service and Repair Workshop Manual

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Related PIDs

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
IAT2	°C, °F	Intake air temperature (No.2) input from IAT sensor No.2	• Displays IAT (No.2)
	V	IAT sensor No.2 voltage	• IAT2 is 20 °C {68 °F}: Approx. 3.57 V • IAT2 is 40 °C {104 °F}: Approx. 2.70 V • IAT2 is 60 °C {140 °F}: Approx. 1.87 V

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.
3	**INSPECT MAP SENSOR/IAT SENSOR No.2 CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the MAP sensor/IAT sensor No.2 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 8.
		No	Go to the next step.
4	**DETERMINE IF MAP SENSOR/IAT SENSOR No.2 OR WIRING HARNESS MALFUNCTION** • Verify that the MAP sensor/IAT sensor No.2 connector is disconnected. • Access the IAT2 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Connect a jumper wire between MAP SENSOR/IAT sensor No. 2 terminals A and B (wiring harness-side). • Verify the IAT2 PID value. • Is the voltage 0 V?	Yes	Replace the MAP sensor/IAT sensor No.2, then go to Step 8. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.2 REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.

DTC P0106:00 [PCM (SKYACTIV-G 2.5T)]

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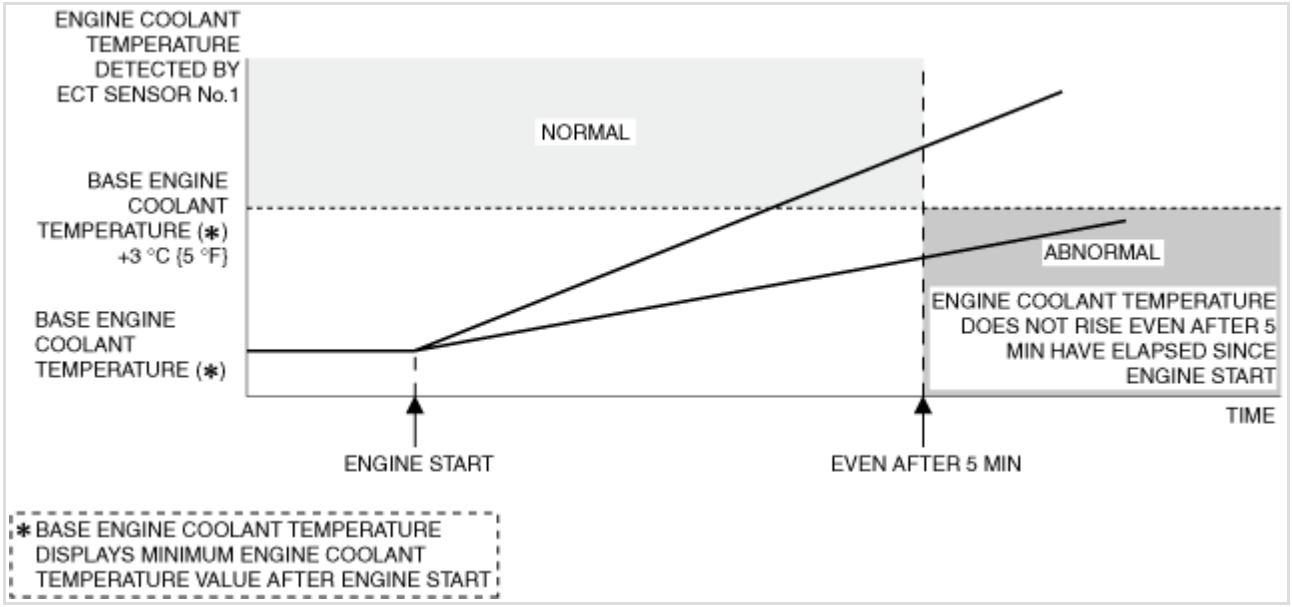
DTC P0106:00	MAP sensor circuit range/performance problem
DETECTION CONDITION	• Any one of the following conditions is met: — The condition has continued for 2 s in which difference in barometric pressure measured and manifold absolute pressure is more than 12.0 kPa {0.122 kgf/cm^2, 1.74 psi}, difference in manifold absolute pressure and turbocharger/supercharger boost pressure is less than -13.3 kPa {-0.136 kgf/cm^2, -1.93 psi} and difference in manifold absolute pressure and exhaust pressure is less than -30.7 kPa {-0.313 kgf/cm^2, -4.45 psi}. — The condition has continued for 2 s in which difference in barometric pressure measured and manifold absolute pressure is less than -12.0 kPa {-0.122 kgf/cm^2, -1.74 psi}, difference in manifold absolute pressure and turbocharger/supercharger boost pressure is more than 13.3 kPa {0.136 kgf/cm^2, 1.93 psi} and difference in manifold absolute pressure and exhaust pressure is more than 30.7 kPa {0.313 kgf/cm^2, 4.45 psi}. **MONITORING CONDITIONS** • Period vehicle being left: 6 h or more • Battery voltage: 10 V or more • Within 20 s after engine start • The following DTCs are not detected: — MAP sensor: P0107:00, P0108:00 — Boost pressure sensor: P0237:00, P0238:00 — Exhaust gas pressure sensor: P0472:00, P0473:00 — BARO sensor: P2228:00, P2229:00 **Diagnostic support note** • This is a continuous monitor (CCM). • 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/Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Not applicable
POSSIBLE CAUSE	• MAP sensor/IAT sensor No.2 connector or terminals malfunction • MAP sensor malfunction • PCM connector or terminals malfunction • PCM malfunction
SYSTEM WIRING DIAGRAM	• Not applicable

Diagnostic Procedure



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Repeatability Verification Procedure

1. Start the engine and leave it idling for 10 s.
2. Switch the ignition off.
3. Leave the vehicle for 6 h or more.
4. Start the engine and leave it idling for 6 min.

PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

Item	Definition	Unit	Condition/Specification
ECT	Engine coolant temperature input from ECT sensor	°C, °F	• Displays ECT
	ECT sensor voltage	V	**Ignition switched ON (engine off)** • ECT is 29 °C {84 °F}: Approx. 2.65 V **Idle (after warm up)** • ECT is 88 °C {190 °F}: Approx. 0.71 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.

DTC P0181:00 [PCM (SKYACTIV-G 2.5T)]

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DTC P0181:00	Fuel temperature sensor circuit range/performance problem
DETECTION CONDITION	• With the following conditions met, a condition has continued for 4 min in which the change in fuel temperature after engine start is less than 1 °C {2 °F}. MONITORING CONDITIONS — Battery voltage: 8 V or more — Ignition switched ON (engine on) — Vehicle speed: 0 km/h {0 mph} — Change in engine coolant temperature amount after engine start: 40 °C {72 °F} or more — Elapsed time after engine start: 5 min — The following DTCs are not detected: • ECT sensor: P0117:00, P0118:00 • Fuel temperature sensor: P0182:00, P0183:00 • VSS: P0500:00 Diagnostic support note • This is a continuous monitor (CCM). • The check engine light does not illuminate. • FREEZE FRAME DATA is not available. • Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Not applicable
POSSIBLE CAUSE	• Low fuel pressure sensor/fuel temperature sensor connector or terminals malfunction • Fuel temperature sensor malfunction • PCM connector or terminals malfunction • PCM malfunction
SYSTEM WIRING DIAGRAM	• Not applicable

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 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.

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 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.
3	**INSPECT LOW FUEL PRESSURE SENSOR/FUEL TEMPERATURE SENSOR CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the low fuel pressure sensor/fuel temperature sensor 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 8.
		No	Go to the next step.
4	**DETERMINE IF FUEL TEMPERATURE SENSOR OR WIRING HARNESS MALFUNCTION** • Verify that the low fuel pressure sensor/fuel temperature sensor connector is 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 low fuel pressure sensor/fuel temperature sensor terminal E (wiring harness-side). • Is the voltage approx. 5 V?	Yes	Replace the low fuel pressure sensor/fuel temperature sensor, then go to Step 8. (See LOW FUEL PRESSURE SENSOR/FUEL TEMPERATURE SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.

DTC P013A:00, P013B:00 [PCM (SKYACTIV-G 2.5T)]

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Note

• To determine the malfunctioning part, proceed with the diagnostics from "Function Inspection Using M-MDS".

Details On DTCs

DESCRIPTION	**P013A:00** **• HO2S: Slow response (during transition from rich to lean)** **P013B:00** **• HO2S: Slow response (during transition from lean to rich)**	
DETECTION CONDITION	Determination conditions	P013A:00 • The response speed of the HO2S input signal when the air/fuel ratio is fluctuated from rich to lean is slow.
		P013B:00 • The response speed of the HO2S input signal when the air/fuel ratio is fluctuated from lean to rich is slow.
	Preconditions	• Fuel injection control: during fuel cut *1 (P013A:00) • Catalytic converter estimated temperature: specified value or more • HO2S estimated temperature: specified value or more • HO2S output voltage during fuel cut: Specified value or more (P013A:00) • HO2S output voltage at fuel cut recovery: Specification or less (P013B:00) • The following DTCs are not detected: — HO2S heater: P0037:00, P0038:00 — MAF sensor: P0102:00, P0103:00 — ECT sensor: P0117:00, P0118:00 — HO2S: P0137:00, P0138:00, P0140:00 *1: Condition can be verified by displaying PIDs using M-MDS
	Drive cycle	• 2
	Self test type	• CMDTC self test
	Sensor used	• HO2S
FAIL-SAFE FUNCTION	• Not applicable	
VEHICLE STATUS WHEN DTCs ARE OUTPUT	• Illuminates check engine light.	

STEP	INSPECTION	RESULTS	ACTION
6	PURPOSE: VERIFY FLUCTUATION OF HO2S INPUT SIGNAL AT START OF FUEL CUT • Start the engine and warm it up completely. • Access the O2S12 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • 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 4,000 rpm, decelerate using engine braking. • Can a fluctuation in the displayed PID value be verified?	Yes	Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 10. • If a malfunction occurs, perform diagnosis from Step 1 of the malfunction diagnostic procedure.
		No	HO2S signal can be considered the cause. • Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 4.
7	PURPOSE: VERIFY FLUCTUATION OF HO2S INPUT SIGNAL AT FUEL CUT RECOVERY • Start the engine and warm it up completely. • Access the O2S12 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • 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 4,000 rpm, decelerate using engine braking. • Stop deceleration from engine braking. • After stopping deceleration from engine braking, can a fluctuation in the displayed PID value be verified?	Yes	Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 10. • If a malfunction occurs, perform diagnosis from Step 1 of the malfunction diagnostic procedure.
		No	HO2S signal can be considered the cause. • Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 4.

Troubleshooting Diagnostic Procedure

Intention of troubleshooting procedure

• Step 1–2

— Perform an emission system parts inspection.

• Step 3

— Perform an engine inspection.

• Step 4–9

— Perform inspection of HO2S signal related parts.

• Step 10–11

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

DTC P04F0:00 [PCM (SKYACTIV-G 2.5T)]

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Note

• To determine the malfunctioning part, proceed with the diagnostics from "Function Inspection Using M-MDS".

Details On DTCs

DESCRIPTION	**Evaporator system: Abnormal purge flow (during boost)**	
DETECTION CONDITION	Determination conditions	• Following conditions are met from when the CV solenoid valve closes: — Pressure difference detected by fuel tank pressure sensor is less than 100 Pa {10.2 kgf/m^2, 0.0145 psi} — Purge flow amount is 0.6 L/min or more
	Preconditions	• Purge flow amount: 3.6 l/min or more • IAT: 4.44–43.33 °C {40.0–109.9 °F} *1 • Barometric pressure: 72.23 Pa {7.365 kgf/m^2, 0.01048 psi} or more *1 • Period ignition is switched off before engine is started: 210 min or more • Fuel level in fuel tank: 15–85% *1 • Engine boost condition: During boost • Battery voltage: above 8 V *1 • The following DTCs are not detected: — ECT sensor: P0116:00, P0117:00, P0118:00 — Fuel tank pressure sensor: P0451:00, P0452:00, P0453:00 — Purge solenoid valve: P0443:00 — CV solenoid valve: P0446:00 — IAT sensor No.1: P0112:00, P0113:00 — BARO sensor: P2227:00, P2228:00, P2229:00 — Fuel gauge sender unit: P0460:00, P0461:00, P0462:00, P0463:00 *1: Standard can be verified by displaying PIDs using M-MDS
	Malfunction determination period	• 5 s period
	Drive cycle	• 2
	Self test type	• CMDTC self test
	Sensor used	• Fuel tank pressure sensor
FAIL-SAFE FUNCTION	• Not applicable	
VEHICLE STATUS WHEN DTCs ARE OUTPUT	• Illuminates check engine light.	

Simulation item table

Item	Applicable component	Unit/Condition	Engine condition	Other condition
EVAPCP	Purge solenoid valve	%	• Under the following conditions: — Ignition is switched ON (engine off) — Idle — Racing (not idle)	• Under the following conditions: — Override drive parameter input range: 0–100%
EVAPCV	CV solenoid valve	Off/On	• Under the following conditions: — Ignition is switched ON (engine off) — Idle — Racing (not idle)	**Caution** **• Do not add fuel with the CV solenoid valve closed. Otherwise, it will result in air pollution because the evaporative gas in the fuel tank will escape directly into the atmosphere.** **Note** **• Override drive parameter: Off** **— CV solenoid valve: open** **• Override drive parameter: On** **— CV solenoid valve: close**

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.
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 (EVAP system related) on the repair order.	–	Go to the next step.