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1993 MAZDA MX-3 OEM Service and Repair Workshop Manual

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STEP	INSPECTION	RESULTS	ACTION
4	**PURPOSE: VERIFY IF SHORT TO POWER SUPPLY IN GENERATOR CHARGE/DISCHARGE CIRCUIT AFFECTS DIAGNOSTIC RESULTS** • Verify that the battery, generator 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 generator terminal 1A (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 battery positive terminal and generator terminal 1A. **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 8.
5	**PURPOSE: INSPECT FUSE** • Switch the ignition off. • Remove the STR 200 A fuse. • Inspect the STR 200 A fuse. • Is there any malfunction?	Yes	If the fuse is blown: • Refer to the wiring diagram and verify whether or not there is a common connector between battery positive terminal and generator terminal 1A. **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. — Replace the fuse. If the fuse is damaged: • Replace the fuse. Go to Step 8.
		No	Reinstall the STR 200 A fuse, then go to the next step.
6	**PURPOSE: VERIFY IF OPEN CIRCUIT IN GENERATOR CHARGE/DISCHARGE CIRCUIT AFFECTS DIAGNOSTIC RESULTS** • Verify that the battery, generator and PCM connectors are disconnected. • Inspect for continuity between battery positive terminal (wiring harness-side) and generator terminal 1A (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 battery positive terminal and generator terminal 1A. **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 8.
7	**PURPOSE: DETERMINE INTEGRITY OF GENERATOR** • Inspect the generator. (See GENERATOR INSPECTION [SKYACTIV-G 2.5T].) • Is there any malfunction?	Yes	Replace the generator, then go to the next step. (See GENERATOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.
8	**PURPOSE: VERIFY CONDITIONS OF BATTERY** • Inspect the battery. (See BATTERY INSPECTION.)	–	Follow the inspection instructions, then 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 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 BATTERY** • Switch the ignition off. • Inspect the battery. (See BATTERY INSPECTION.) • Is there any malfunction?	Yes	Recharge or replace the battery, then go to Step 6. (See BATTERY RECHARGING.) (See BATTERY REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.

DTC P0011:00, P0012:00 [PCM (SKYACTIV-G 2.5T)]

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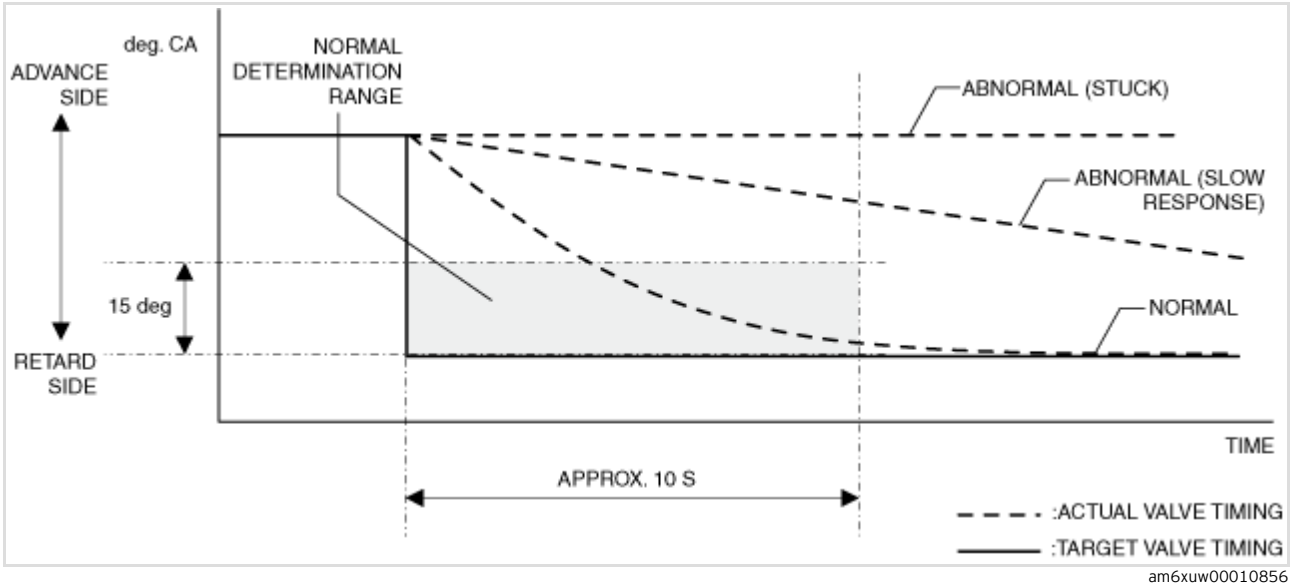
Note

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

Details On DTCs

DESCRIPTION	**Electric variable valve timing control system:** **• P0011:00: Over-advanced** **• P0012:00: Over-retarded**	
DETECTION CONDITION	Determination conditions	• P0011:00: For the advance amount from the maximum intake valve retard position, a condition in which the actual advance amount is larger than the target value continues for a specified period of time.
		• P0012:00: For the advance amount from the maximum intake valve retard position, a condition in which the actual advance amount is smaller than the target value continues for a specified period of time.
	Preconditions	• Battery voltage: above 11 V *1 • Engine speed: 5,000 rpm or less *1 • Engine coolant temperature: 20 °C {68 °F} or more *1 • The following DTCs are not detected: — P0010:00, P0335:00, P0340:00 *1: Standard can be verified by displaying PIDs using M-MDS
	Malfunction determination period	• 10 s period
	Drive cycle	• 1
	Self test type	• CMDTC self test
	Sensor used	• CKP sensor • Intake CMP sensor
FAIL-SAFE FUNCTION	• Not applicable	
VEHICLE STATUS WHEN DTCs ARE OUTPUT	• Illuminates check engine light.	



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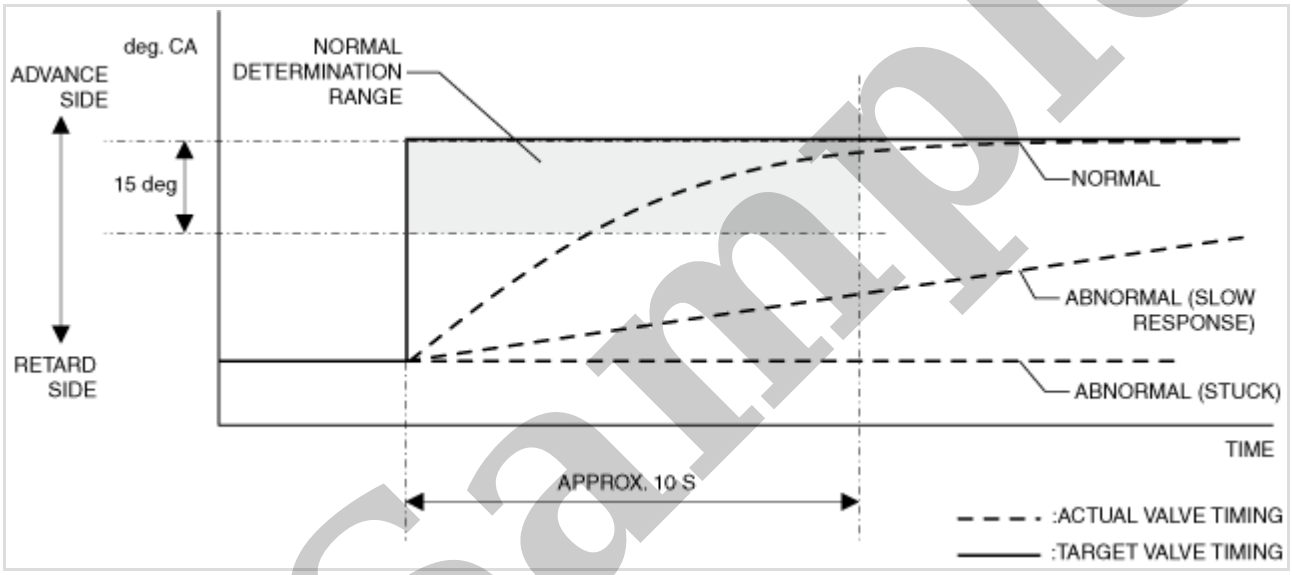
P0012:00

• With the preconditions met, the PCM verifies the conformity of the actual timing relative to the target valve timing. If it does not conform to the normal determination range (difference between target valve timing and actual valve timing is 15 degrees or less) during the malfunction determination period (approx. 10 s), even if the target valve timing is set to the advance side, the PCM determines an excess retard malfunction condition and stores a DTC.



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Repeatability Verification Procedure

1. Warm up the engine to allow the engine coolant temperature to reach 80 °C {176 °F} or more.

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.

2. 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

PID/DATA monitor item table

STEP	INSPECTION	RESULTS	ACTION
1	**PURPOSE: INSPECT ELECTRIC VARIABLE VALVE TIMING RELAY POWER SUPPLY CIRCUIT FOR SHORT TO GROUND OR OPEN CIRCUIT** • Switch the ignition off. • Remove the electric variable valve timing relay. (See RELAY LOCATION.) • Measure the voltage at the electric variable valve timing relay terminal D (wiring harness-side). • Is the voltage B+?	Yes	Go to the next step.
		No	Inspect the MAIN 200 A fuse and EVVT 20 A fuse. • If the fuse is blown: — Refer to the wiring diagram and verify whether or not there is a common connector between battery positive terminal and electric variable valve timing relay terminal D. **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. • Replace the malfunctioning fuse. • If the fuse is damaged: — Replace the malfunctioning fuse. • If all fuses are normal: — Refer to the wiring diagram and verify whether or not there is a common connector between battery positive terminal and electric variable valve timing relay terminal D. **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 12.
2	**PURPOSE: INSPECT ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER CONNECTOR CONDITION** • Disconnect the electric variable valve timing motor/driver 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 12.
		No	Go to the next step.

DTC P2302:00 [PCM (SKYACTIV-G 2.5T)]

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DTC P2302:00	Ion sensor No.1 circuit problem
DETECTION CONDITION	• After the engine is started, when the engine speed is 2,000 rpm or less, the signal input to the PCM from ion sensor No.1 is in error. Diagnostic support note • This is a continuous monitor (other). • 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	• Cylinder No.1 misfire • Ignition coil/ion sensor No.1 connector or terminals malfunction • Short to ground or open circuit in ion sensor No.1 power supply circuit — Short to ground in wiring harness between ENGINE2 15 A fuse and ignition coil/ion sensor No.1 terminal A — ENGINE2 15 A fuse malfunction — Open circuit in wiring harness between main relay terminal C and ignition coil/ion sensor No.1 terminal A • Open circuit in wiring harness between ignition coil/ion sensor No.1 terminal D and body ground • Short to ground in wiring harness between ignition coil/ion sensor No.1 terminal C and PCM terminal 1BA • PCM connector or terminals malfunction • Short to power supply in wiring harness between ignition coil/ion sensor No.1 terminal C and PCM terminal 1BA • Open circuit in wiring harness between ignition coil/ion sensor No.1 terminal C and PCM terminal 1BA • Ion sensor No.1 malfunction • PCM malfunction

STEP	INSPECTION	RESULTS	ACTION
5	**INSPECT ION SENSOR No.1 POWER SUPPLY CIRCUIT FOR SHORT TO GROUND OR OPEN CIRCUIT** • Verify that the ignition coil/ion sensor No.1 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 ignition coil/ion sensor No.1 terminal A (wiring harness-side). • Is the voltage B+?	Yes	Go to the next step.
		No	Inspect the ENGINE2 15 A fuse. • If the fuse is blown: — Refer to the wiring diagram and verify whether or not there is a common connector between ENGINE2 15 A fuse and ignition coil/ion sensor No.1 terminal A. **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. • Replace the fuse. • If the fuse is damaged: — Replace the fuse. • If the fuse is normal: — Refer to the wiring diagram and verify whether or not there is a common connector between main relay terminal C and ignition coil/ion sensor No.1 terminal A. **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 12.

DTC P2096:00, P2097:00 [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	**HO2S fuel injection control system:** **• P2096:00: Air fuel too lean** **• P2097:00: Air fuel too rich**	
DETECTION CONDITION	Determination conditions	• P2096:00: Depending on the correction deviation of the A/F sensor, a condition in which the fuel feedback correction amount (SHRTFT12) for the HO2S is the specified value (2%) or more and the sum (SHRTFT12+LONGFT12) of the fuel feedback correction amount and the fuel learning correction amount is the specified value (2.3–2.5%) or more continues for a period of 25 s.
		• P2097:00: Depending on the correction deviation of the A/F sensor, a condition in which the fuel feedback correction amount (SHRTFT12) for the HO2S is the specified value (−2%) or less and the sum (SHRTFT12+LONGFT12) of the fuel feedback correction amount and the fuel learning correction amount is the specified value (−2.5–−2.3%) or less continues for a period of 25 s.
	Preconditions	• HO2S estimated temperature: above 450 °C {842 °F}
	Malfunction determination period	• 25 s period
	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.	

Repeatability Verification Procedure

1. Warm up the engine to allow the engine coolant temperature to reach 80 °C {176 °F} or more.
2. Shift to 3rd gear and drive the vehicle for 20 min at an engine speed of 1,500 rpm or more and a vehicle speed of 50 km/h {31 mph} or more.

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.

3. 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

PID/DATA monitor item table

–: Not applicable

Item	Definition	Unit	Condition/Specification
EQ_RAT11_DSD	Target excess air factor (estimated value) to theoretical air/fuel ratio (14.7) by fuel feedback control	–	• Indicate target lambda (Excess air factor = supplied air amount / theoretical air/fuel ratio)
O2S11	A/F sensor current	μA	• Idle (after warm up): 0–50 μA • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 3.84 mA
O2S12	HO2S voltage	V	• 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

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%