2012 - Mazda6 - Engine

DTC P2097:00 [MZR 2.5]

DTC P2097:00	Target A/F feedback system too rich
DETECTION CONDITION	• The PCM monitors the target A/F fuel trim when under the target A/F feedback control. If the fuel trim is less than specification, the PCM determines that the target A/F feedback system is too rich. **Diagnostic support note** • This is a continuous monitor (fuel system). • The MIL illuminates if the PCM detects the above malfunctioning 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 conditions during first drive cycle. • FREEZE FRAME DATA (Mode 2)/Snapshot data is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• HO2S malfunction • Exhaust gas leakage (between TWC and HO2S) • IAT sensor malfunction • Erratic signal to PCM ▪ ECT sensor signal malfunction ▪ MAF sensor signal malfunction ▪ TP sensor signal malfunction ▪ VSS signal malfunction • A/F sensor malfunction • Exhaust gas leakage (between exhaust manifold and A/F sensor) • Excessive fuel line pressure ▪ Pressure regulator malfunction ▪ Fuel pump malfunction

	▪ Fuel leakage on fuel line from fuel distributor to fuel pump ▪ Fuel filter restricted ▪ Fuel return hose restricted • Purge solenoid valve malfunction • Ignition system malfunction ▪ Ignition coil related wiring harness malfunction • Fuel injector malfunction • Insufficient engine compression • ECT sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA (MODE 2)** • Is the DTC P2097:00 on FREEZE FRAME DATA (Mode 2)?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA (Mode 2). (See **DTC TABLE [MZR 2.5]**.)
2	**VERIFY FREEZE FRAME DATA (MODE 2)/ SNAPSHOT DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA (Mode 2)/snapshot data been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA (Mode 2)/snapshot data on the repair order, then go to the next step.
3	**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.
4	**VERIFY RELATED PENDING AND STORED DTC** • Switch the ignition to off, then to ON (engine off).	Yes	Go to the applicable DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
		No	Go to the next step.

	• Verify pending and stored DTCs using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Are any other DTCs present?		
5	**VERIFY CURRENT INPUT SIGNAL STATUS OF HO2S** • Inspect the HO2S. (See **HEATED OXYGEN SENSOR (HO2S) INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 7.
6	**INSPECT EXHAUST GAS LEAKAGE** • Visually inspect for the exhaust gas leakage between the TWC and HO2S. • Is there any leakage?	Yes	Repair or replace the malfunctioning parts according to the inspection results, then go to Step 21.
		No	Replace the HO2S, then go to Step 21. (See **HEATED OXYGEN SENSOR (HO2S) REMOVAL/ INSTALLATION [MZR 2.5]**.)
7	**INSPECT IAT SENSOR** • Inspect the IAT sensor. (See **INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Replace the IAT sensor, then go to Step 21. (See **INTAKE-AIR SYSTEM REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
8	**VERIFY CURRENT INPUT SIGNAL STATUS** • Access the following PIDs using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) ▪ ECT ▪ MAF ▪ TP REL ▪ VSS	Yes	Inspect the suspected sensor and related wiring harness. Repair or replace the malfunctioning part according to the inspection results, then go to Step 21.
		No	Go to the next step.

	• Is there any signal that is far out of specification when the ignition is switched to ON and the engine runs? (See **PCM INSPECTION [MZR 2.5]**.)		
9	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER FREEZE FRAME DATA (MODE 2) CONDITION** **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 under the FREEZE FRAME DATA (Mode 2) condition. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) ▪ ECT ▪ MAF ▪ TP REL ▪ VSS • Is there any signal which causes drastic changes?	Yes	Inspect the suspected sensor and related wiring harness. Repair or replace the malfunctioning part according to the inspection results, then go to Step 21.
		No	Go to the next step.
10	**VERIFY CURRENT INPUT SIGNAL STATUS OF A/F SENSOR**	Yes	Go to the next step.

	Inspect the A/F sensor. (See **AIR FUEL RATIO (A/F) SENSOR INSPECTION [MZR 2.5]**.) • Is there any malfunction?	No	Go to Step 12.
11	**INSPECT EXHAUST GAS LEAKAGE** • Visually inspect for the exhaust gas leakage between the exhaust manifold and A/F sensor. • Is there any leakage?	Yes	Repair or replace the malfunctioning parts according to the inspection results, then go to Step 21.
		No	Replace the A/F sensor, then go to Step 21. (See **AIR FUEL RATIO (A/F) SENSOR REMOVAL/INSTALLATION [MZR 2.5]**.)
12	**INSPECT FUEL LINE PRESSURE** • Switch the ignition to off. **NOTE:** • If engine will not start, inspect fuel line pressure with ignition switches to ON. • Inspect the fuel line pressure with engine is running. (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	If fuel pressure is too high: • Replace the fuel pump unit, then go to Step 21. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [MZR 2.5]**.) If fuel pressure is low: • Go to the next step.
		No	Go to Step 14.
13	**INSPECT FUEL LINE FOR LEAKAGE** • Visually inspect the fuel line from fuel pump to fuel distributor. • Is there any leakage?	Yes	Repair or replace the malfunctioning parts according to the inspection results, then go to Step 21.
		No	Inspect the low-pressure side fuel filter for foreign materials or stain inside fuel filter. • If foreign materials or stain is found inside fuel filter (low-pressure side): ▪ Clean of fuel tank and filter. • If foreign materials or stain is not found: ▪ Replace the fuel pump unit. **FUEL PUMP UNIT**

			(See **REMOVAL/ INSTALLATION [MZR 2.5]**.) Go to Step 21.
14	**INSPECT LONG TERM FUEL TRIM** • Access the LONGFT1 PID using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Compare the LONGFT1 PID with recorded FREEZE FRAME DATA (Mode 2) at Step 2. • Is the LONGFT1 PID above FREEZE FRAME DATA (Mode 2)?	Yes	Go to the next step.
		No	Go to Step 16.
15	**INSPECT PURGE SOLENOID VALVE** • Inspect the purge solenoid valve. (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Replace the purge solenoid valve, then go to Step 21. (See **PURGE SOLENOID VALVE REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
16	**INSPECT IGNITION SYSTEM OPERATION** • Perform the Spark Test. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is strong blue spark visible at each cylinder?	Yes	Go to Step 18.
		No	Go to the next step.
17	**INSPECT IGNITION COIL RELATED WIRING HARNESS** • Inspect the ignition coil related wiring harness condition (intermittent open or short) for all cylinders. • Is there any malfunction?	Yes	Repair or replace the malfunctioning wiring harness, then go to Step 21.
		No	Repair or replace the malfunctioning parts according to the Spark Test results, then go to Step 21.
	INSPECT FUEL INJECTOR		

18	**OPERATION** • Inspect the fuel injector operation. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Repair or replace the malfunctioning parts according to the inspection results, then go to Step 21.
		No	Go to the next step.
19	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See **COMPRESSION INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Overhaul the engine for repair, then go to Step 21.
		No	Go to the next step.
20	**INSPECT ECT SENSOR** • Inspect the ECT sensor. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Replace the ECT sensor, then go to the next step. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
21	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See **AFTER REPAIR PROCEDURE [MZR 2.5]**.) • After warming up the engine, maintain the idle status for **1 min or more**. • Perform the Pending Trouble Code Access Procedure. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See **PCM REMOVAL/ INSTALLATION [MZR 2.5]**.) Go to the next step.
		No	Go to the next step.

	• Is the PENDING CODE for this DTC present?		
22	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See **AFTER REPAIR PROCEDURE [MZR 2.5]**.) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
		No	DTC troubleshooting completed.

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2012 - Mazda6 - Engine

DTC P2097:00 [MZR 2.5]

DTC P2097:00	Target A/F feedback system too rich
DETECTION CONDITION	• The PCM monitors the target A/F fuel trim when under the target A/F feedback control. If the fuel trim is less than specification, the PCM determines that the target A/F feedback system is too rich. **Diagnostic support note** • This is a continuous monitor (fuel system). • The MIL illuminates if the PCM detects the above malfunctioning 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 conditions during first drive cycle. • FREEZE FRAME DATA (Mode 2)/Snapshot data is available. • The DTC is stored in the PCM memory.
POSSIBLE CAUSE	• HO2S malfunction • Exhaust gas leakage (between TWC and HO2S) • IAT sensor malfunction • Erratic signal to PCM ▪ ECT sensor signal malfunction ▪ MAF sensor signal malfunction ▪ TP sensor signal malfunction ▪ VSS signal malfunction • A/F sensor malfunction • Exhaust gas leakage (between exhaust manifold and A/F sensor) • Excessive fuel line pressure ▪ Pressure regulator malfunction ▪ Fuel pump malfunction

	▪ Fuel leakage on fuel line from fuel distributor to fuel pump ▪ Fuel filter restricted ▪ Fuel return hose restricted • Purge solenoid valve malfunction • Ignition system malfunction ▪ Ignition coil related wiring harness malfunction • Fuel injector malfunction • Insufficient engine compression • ECT sensor malfunction • PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA (MODE 2)** • Is the DTC P2097:00 on FREEZE FRAME DATA (Mode 2)?	Yes	Go to the next step.
		No	Go to troubleshooting procedures for DTC on FREEZE FRAME DATA (Mode 2). (See **DTC TABLE [MZR 2.5]**.)
2	**VERIFY FREEZE FRAME DATA (MODE 2)/ SNAPSHOT DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA (Mode 2)/snapshot data been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA (Mode 2)/snapshot data on the repair order, then go to the next step.
3	**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.
4	**VERIFY RELATED PENDING AND STORED DTC** • Switch the ignition to off, then to ON (engine off).	Yes	Go to the applicable DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
		No	Go to the next step.

	• Verify pending and stored DTCs using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Are any other DTCs present?		
5	**VERIFY CURRENT INPUT SIGNAL STATUS OF HO2S** • Inspect the HO2S. (See **HEATED OXYGEN SENSOR (HO2S) INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 7.
6	**INSPECT EXHAUST GAS LEAKAGE** • Visually inspect for the exhaust gas leakage between the TWC and HO2S. • Is there any leakage?	Yes	Repair or replace the malfunctioning parts according to the inspection results, then go to Step 21.
		No	Replace the HO2S, then go to Step 21. (See **HEATED OXYGEN SENSOR (HO2S) REMOVAL/ INSTALLATION [MZR 2.5]**.)
7	**INSPECT IAT SENSOR** • Inspect the IAT sensor. (See **INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Replace the IAT sensor, then go to Step 21. (See **INTAKE-AIR SYSTEM REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
8	**VERIFY CURRENT INPUT SIGNAL STATUS** • Access the following PIDs using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) ▪ ECT ▪ MAF ▪ TP REL ▪ VSS	Yes	Inspect the suspected sensor and related wiring harness. Repair or replace the malfunctioning part according to the inspection results, then go to Step 21.
		No	Go to the next step.

	• Is there any signal that is far out of specification when the ignition is switched to ON and the engine runs? (See **PCM INSPECTION [MZR 2.5]**.)		
9	**VERIFY CURRENT INPUT SIGNAL STATUS UNDER FREEZE FRAME DATA (MODE 2) CONDITION** **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 under the FREEZE FRAME DATA (Mode 2) condition. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) ▪ ECT ▪ MAF ▪ TP REL ▪ VSS • Is there any signal which causes drastic changes?	Yes	Inspect the suspected sensor and related wiring harness. Repair or replace the malfunctioning part according to the inspection results, then go to Step 21.
		No	Go to the next step.
10	**VERIFY CURRENT INPUT SIGNAL STATUS OF A/F SENSOR**	Yes	Go to the next step.

	Inspect the A/F sensor. (See **AIR FUEL RATIO (A/F) SENSOR INSPECTION [MZR 2.5]**.) • Is there any malfunction?	No	Go to Step 12.
11	**INSPECT EXHAUST GAS LEAKAGE** • Visually inspect for the exhaust gas leakage between the exhaust manifold and A/F sensor. • Is there any leakage?	Yes	Repair or replace the malfunctioning parts according to the inspection results, then go to Step 21.
		No	Replace the A/F sensor, then go to Step 21. (See **AIR FUEL RATIO (A/F) SENSOR REMOVAL/INSTALLATION [MZR 2.5]**.)
12	**INSPECT FUEL LINE PRESSURE** • Switch the ignition to off. **NOTE:** • If engine will not start, inspect fuel line pressure with ignition switches to ON. • Inspect the fuel line pressure with engine is running. (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	If fuel pressure is too high: • Replace the fuel pump unit, then go to Step 21. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [MZR 2.5]**.) If fuel pressure is low: • Go to the next step.
		No	Go to Step 14.
13	**INSPECT FUEL LINE FOR LEAKAGE** • Visually inspect the fuel line from fuel pump to fuel distributor. • Is there any leakage?	Yes	Repair or replace the malfunctioning parts according to the inspection results, then go to Step 21.
		No	Inspect the low-pressure side fuel filter for foreign materials or stain inside fuel filter. • If foreign materials or stain is found inside fuel filter (low-pressure side): ▪ Clean of fuel tank and filter. • If foreign materials or stain is not found: ▪ Replace the fuel pump unit. **FUEL PUMP UNIT**

			(See **REMOVAL/ INSTALLATION [MZR 2.5]**.) Go to Step 21.
14	**INSPECT LONG TERM FUEL TRIM** • Access the LONGFT1 PID using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Compare the LONGFT1 PID with recorded FREEZE FRAME DATA (Mode 2) at Step 2. • Is the LONGFT1 PID above FREEZE FRAME DATA (Mode 2)?	Yes	Go to the next step.
		No	Go to Step 16.
15	**INSPECT PURGE SOLENOID VALVE** • Inspect the purge solenoid valve. (See **PURGE SOLENOID VALVE INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Replace the purge solenoid valve, then go to Step 21. (See **PURGE SOLENOID VALVE REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
16	**INSPECT IGNITION SYSTEM OPERATION** • Perform the Spark Test. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is strong blue spark visible at each cylinder?	Yes	Go to Step 18.
		No	Go to the next step.
17	**INSPECT IGNITION COIL RELATED WIRING HARNESS** • Inspect the ignition coil related wiring harness condition (intermittent open or short) for all cylinders. • Is there any malfunction?	Yes	Repair or replace the malfunctioning wiring harness, then go to Step 21.
		No	Repair or replace the malfunctioning parts according to the Spark Test results, then go to Step 21.
	INSPECT FUEL INJECTOR		

18	**OPERATION** • Inspect the fuel injector operation. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Repair or replace the malfunctioning parts according to the inspection results, then go to Step 21.
		No	Go to the next step.
19	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See **COMPRESSION INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Overhaul the engine for repair, then go to Step 21.
		No	Go to the next step.
20	**INSPECT ECT SENSOR** • Inspect the ECT sensor. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.) • Is there any malfunction?	Yes	Replace the ECT sensor, then go to the next step. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
21	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See **AFTER REPAIR PROCEDURE [MZR 2.5]**.) • After warming up the engine, maintain the idle status for **1 min or more**. • Perform the Pending Trouble Code Access Procedure. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.)	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See **PCM REMOVAL/ INSTALLATION [MZR 2.5]**.) Go to the next step.
		No	Go to the next step.

	• Is the PENDING CODE for this DTC present?		
22	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See **AFTER REPAIR PROCEDURE [MZR 2.5]**.) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
		No	DTC troubleshooting completed.

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