2012 - Mazda6 - Engine

NO.4 HARD TO START/ LONG CRANK/ ERRATIC START/ ERRATIC CRANK [MZR 2.5]

4	HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK
DESCRIPTION	• Starter cranks engine at normal speed but engine requires excessive cranking time before starting. • Battery is in normal condition.
POSSIBLE CAUSE	**NOTE:** • If the ignition is not switched off (to LOCK or ACC) after the engine stalls, and then an engine restart is attempted, the PCM corrects the difference between CKP sensor and CMP sensor signals caused by engine stalling, which may result in more time needed to restart the engine. • Vacuum leakage • Poor fuel quality • Low or dead battery • Restriction in intake-air system • Charging system malfunction • PCM DTC is stored. • Cooling system malfunction • Ignition coil related wiring harness malfunction • Ignition system malfunction • Spark plug malfunction • CKP sensor and teeth of crankshaft pulley malfunction • Improper operation of drive-by-wire control system • Excessive or insufficient fuel pressure ▪ Fuel pump relay or fuel pump circuit malfunction ▪ Restriction in fuel line ▪ Pressure regulator malfunction (built-into fuel pump unit) ▪ Fuel pump malfunction • Fuel leakage from fuel system • Purge solenoid valve malfunction • MAF sensor malfunction • Restriction in exhaust system • EGR valve malfunction • Starting system malfunction **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 [MZR 2.5]**.) (See **AFTER SERVICE PRECAUTION [MZR 2.5]**.)

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 material.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**INSPECT RELATED PART CONDITION** • Inspect the following: ▪ Vacuum leakage ▪ Proper fuel quality (such as proper octane, contamination, winter/summer blend) ▪ Loose bands on intake air system ▪ Cracks on intake air system parts ▪ Intake air system restriction (such as air cleaner element, fresh air duct) ▪ Low or dead battery ▪ Charging system • Are all items normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results. Repeat Step 1.
2	**VERIFY PCM DTC** • Retrieve any DTCs using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Are there any DTCs displayed?	Yes	Go to the appropriate DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
		No	Go to the next step.
3	**VERIFY IF MALFUNCTION CAUSE IS OVERHEATING** • Is the engine overheating?	Yes	Go to the symptom troubleshooting "NO.17 COOLING SYSTEM CONCERNS-OVERHEATING". (See **NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [MZR 2.5]**.)
		No	Go to the next step.
4	**DETERMINE IF MALFUNCTION CAUSE IS EVAP CONTROL SYSTEM OR OTHER**	Yes	Inspect if the purge solenoid valve is stuck open.

	• Disconnect the vacuum hose from purge solenoid valve and plug opening end of vacuum hose. • Start the engine. • Is the starting condition improved?		Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
5	**INSPECT MAF SENSOR** • Inspect the MAF sensor for following: ▪ Contamination ▪ MAF sensor terminal B voltage (ground circuit) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
6	**INSPECT PCM FOR POOR GROUND** • Verify the PCM ground point condition. • Is there any ground point looseness or lifting in the PCM?	Yes	Repair the ground point looseness and lifting.
		No	Go to the next step.
7	**INSPECT IGNITION SYSTEM RELATED WIRING HARNESS** • Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. • Are the wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair or replace suspected wiring harness and connector.
8	**INSPECT IGNITION SYSTEM OPERATION** • Perform the Spark Test. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • 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.
9	**VERIFY SPARK PLUG CONDITION** • Verify the spark plug conditions when the spark plug removed in Step 8. (See **SPARK PLUG INSPECTION [MZR 2.5]**.) • Is spark plug wet, covered with carbon or grayish white?	Yes	Spark plug is wet or covered with carbon: • Inspect for fuel leakage from fuel injector. Spark plug is grayish white: • Inspect the fuel injector for clogging. Repair or replace the malfunctioning part according to the inspection results.
		No	Install the spark plugs on original cylinders. Go to the next step.
10	**INSPECT CKP SENSOR AND PULSE WHEEL** • Visually inspect the CKP sensor and teeth of crankshaft pulley. • Are the CKP sensor and teeth of	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.

	crankshaft pulley normal?		
11	**DETERMINE IF MALFUNCTION CAUSE IS DRIVE-BY-WIRE CONTROL SYSTEM OR OTHER** • Attempt to start the engine at part throttle. • Does the engine run smoothly at part throttle?	Yes	Inspect the drive-by-wire control system operation. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
12	**INSPECT FUEL LINE PRESSURE** • Inspect the fuel line pressure. (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.) • Is the fuel line pressure correct?	Yes	Go to the next step.
		No	Zero or low: • Inspect the following: ▪ Fuel pump relay ▪ Fuel pump circuit ▪ Fuel line for clogging • If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.) High: • Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.)
13	**INSPECT FUEL LINE HOLD PRESSURE FOR FUEL LEAKAGE** • Is the fuel line pressure held after ignition is off? (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See **FUEL INJECTOR INSPECTION [MZR 2.5]**.) • If the fuel injector is normal, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.)
14	**INSPECT EXHAUST SYSTEM** • Visually inspect the exhaust system part. • Is there any deformed exhaust system part?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
15	**INSPECT EGR VALVE FOR STUCK** • Inspect the engine condition while tapping the EGR valve housing. • Does the engine condition improve?	Yes	Replace the EGR valve. (See **EGR VALVE REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
16	**INSPECT STARTING SYSTEM** • Inspect the starting system. (See **STARTER INSPECTION [MZR 2.5]**.) • Is the starting system normal?	Yes	Inspect for loose connectors or poor terminal contact. • If there is no malfunction, remove the EGR valve and visually inspect for a mechanically stuck EGR valve.
		No	Repair or replace the malfunctioning part according to the inspection

			results.
17	• Verify test results. ▪ If normal, return to the diagnostic index to service any additional symptoms. (See **SYMPTOM DIAGNOSTIC INDEX [MZR 2.5]**.) ▪ If a 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.		

< Previous **Next >**

Back to Top

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4	HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK
DESCRIPTION	• Starter cranks engine at normal speed but engine requires excessive cranking time before starting. • Battery is in normal condition.
POSSIBLE CAUSE	**NOTE:** • If the ignition is not switched off (to LOCK or ACC) after the engine stalls, and then an engine restart is attempted, the PCM corrects the difference between CKP sensor and CMP sensor signals caused by engine stalling, which may result in more time needed to restart the engine. • Vacuum leakage • Poor fuel quality • Low or dead battery • Restriction in intake-air system • Charging system malfunction • PCM DTC is stored. • Cooling system malfunction • Ignition coil related wiring harness malfunction • Ignition system malfunction • Spark plug malfunction • CKP sensor and teeth of crankshaft pulley malfunction • Improper operation of drive-by-wire control system • Excessive or insufficient fuel pressure ▪ Fuel pump relay or fuel pump circuit malfunction ▪ Restriction in fuel line ▪ Pressure regulator malfunction (built-into fuel pump unit) ▪ Fuel pump malfunction • Fuel leakage from fuel system • Purge solenoid valve malfunction • MAF sensor malfunction • Restriction in exhaust system • EGR valve malfunction • Starting system malfunction **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 [MZR 2.5]**.) (See **AFTER SERVICE PRECAUTION [MZR 2.5]**.)

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 material.

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**INSPECT RELATED PART CONDITION** • Inspect the following: ▪ Vacuum leakage ▪ Proper fuel quality (such as proper octane, contamination, winter/summer blend) ▪ Loose bands on intake air system ▪ Cracks on intake air system parts ▪ Intake air system restriction (such as air cleaner element, fresh air duct) ▪ Low or dead battery ▪ Charging system • Are all items normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results. Repeat Step 1.
2	**VERIFY PCM DTC** • Retrieve any DTCs using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Are there any DTCs displayed?	Yes	Go to the appropriate DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
		No	Go to the next step.
3	**VERIFY IF MALFUNCTION CAUSE IS OVERHEATING** • Is the engine overheating?	Yes	Go to the symptom troubleshooting "NO.17 COOLING SYSTEM CONCERNS-OVERHEATING". (See **NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [MZR 2.5]**.)
		No	Go to the next step.
4	**DETERMINE IF MALFUNCTION CAUSE IS EVAP CONTROL SYSTEM OR OTHER**	Yes	Inspect if the purge solenoid valve is stuck open.

	• Disconnect the vacuum hose from purge solenoid valve and plug opening end of vacuum hose. • Start the engine. • Is the starting condition improved?		Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
5	**INSPECT MAF SENSOR** • Inspect the MAF sensor for following: ▪ Contamination ▪ MAF sensor terminal B voltage (ground circuit) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
6	**INSPECT PCM FOR POOR GROUND** • Verify the PCM ground point condition. • Is there any ground point looseness or lifting in the PCM?	Yes	Repair the ground point looseness and lifting.
		No	Go to the next step.
7	**INSPECT IGNITION SYSTEM RELATED WIRING HARNESS** • Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. • Are the wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair or replace suspected wiring harness and connector.
8	**INSPECT IGNITION SYSTEM OPERATION** • Perform the Spark Test. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • 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.
9	**VERIFY SPARK PLUG CONDITION** • Verify the spark plug conditions when the spark plug removed in Step 8. (See **SPARK PLUG INSPECTION [MZR 2.5]**.) • Is spark plug wet, covered with carbon or grayish white?	Yes	Spark plug is wet or covered with carbon: • Inspect for fuel leakage from fuel injector. Spark plug is grayish white: • Inspect the fuel injector for clogging. Repair or replace the malfunctioning part according to the inspection results.
		No	Install the spark plugs on original cylinders. Go to the next step.
10	**INSPECT CKP SENSOR AND PULSE WHEEL** • Visually inspect the CKP sensor and teeth of crankshaft pulley. • Are the CKP sensor and teeth of	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.

	crankshaft pulley normal?		
11	**DETERMINE IF MALFUNCTION CAUSE IS DRIVE-BY-WIRE CONTROL SYSTEM OR OTHER** • Attempt to start the engine at part throttle. • Does the engine run smoothly at part throttle?	Yes	Inspect the drive-by-wire control system operation. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
12	**INSPECT FUEL LINE PRESSURE** • Inspect the fuel line pressure. (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.) • Is the fuel line pressure correct?	Yes	Go to the next step.
		No	Zero or low: • Inspect the following: ▪ Fuel pump relay ▪ Fuel pump circuit ▪ Fuel line for clogging • If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.) High: • Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.)
13	**INSPECT FUEL LINE HOLD PRESSURE FOR FUEL LEAKAGE** • Is the fuel line pressure held after ignition is off? (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See **FUEL INJECTOR INSPECTION [MZR 2.5]**.) • If the fuel injector is normal, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.)
14	**INSPECT EXHAUST SYSTEM** • Visually inspect the exhaust system part. • Is there any deformed exhaust system part?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
15	**INSPECT EGR VALVE FOR STUCK** • Inspect the engine condition while tapping the EGR valve housing. • Does the engine condition improve?	Yes	Replace the EGR valve. (See **EGR VALVE REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
16	**INSPECT STARTING SYSTEM** • Inspect the starting system. (See **STARTER INSPECTION [MZR 2.5]**.) • Is the starting system normal?	Yes	Inspect for loose connectors or poor terminal contact. • If there is no malfunction, remove the EGR valve and visually inspect for a mechanically stuck EGR valve.
		No	Repair or replace the malfunctioning part according to the inspection

			results.
17	• Verify test results. ▪ If normal, return to the diagnostic index to service any additional symptoms. (See **SYMPTOM DIAGNOSTIC INDEX [MZR 2.5]**.) ▪ If a 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.		

< Previous **Next >**

Back to Top