

2012 - Mazda6 - Engine

NO.6 CRANKS NORMALLY BUT WILL NOT START [MZI 3.7 V6]

6	CRANKS NORMALLY BUT WILL NOT START
DESCRIPTION	• The starter cranks engine at normal speed but the engine will not run. • Refer to the symptom troubleshooting "NO.5 ENGINE STALLS-AFTER START/AT IDLE" if this symptom appears after the engine stall. • Fuel is in the tank. • Battery is in normal condition.
POSSIBLE CAUSE	• Vacuum leakage • Poor fuel quality • Air leakage from intake-air system • Restriction in intake-air system • Disconnected electrical connector • External engine shut-off accessory • Restriction in exhaust system • Throttle valve restriction • No battery power supply to PCM • Open PCM ground or vehicle body ground • PCM DTC is stored. • Erratic signal to PCM ▪ APP sensor or related circuit malfunction ▪ TP sensor or related circuit malfunction • Improper operation of drive-by-wire control system • No signal from CKP sensor due to sensor, related wire or incorrect installation • No signal from CMP sensor due to sensor, related wire or incorrect installation • Ignition coil or related circuit malfunction • Fuel leakage from injector • Fuel injector is clogged. • Inadequate fuel pressure ▪ Open or short circuit in fuel pump body and related wiring harness ▪ Fuel pump mechanical malfunction ▪ Fuel line clogged ▪ Pressure regulator malfunction (built-in fuel pump unit) • Fuel leakage from fuel system • PCV valve malfunction

- Purge solenoid valve malfunction
- Air leakage in intake air system when engine runs high speed
- Low engine compression
- Improper variable valve timing control system operation
- Improper valve timing

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 [MZI 3.7 V6]** .) (See **AFTER SERVICE PRECAUTION [MZI 3.7 V6]** .)

CAUTION:

- Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean 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 for the following: ▪ Vacuum connection ▪ External fuel shut off or accessory (such as kill switch, alarm) ▪ Fuel quality: proper octane, contamination, winter/summer blend ▪ No air leakage from intake-air system ▪ Intake-air system restriction (such as air cleaner element, fresh air duct) ▪ Proper sealing of intake manifold and components attached to intake manifold ▪ Ignition wiring	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results. Repeat Step 1.

	▪ Electrical connections ▪ Fuses ▪ Smooth operation of throttle valve • Are all items normal?		
2	VERIFY PCM DTC • Switch the ignition to ON (Engine off). • Retrieve any DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [MZI 3.7 V6].) • Are there any DTCs displayed?	Yes DTC is displayed: • Go to the appropriate DTC inspection. (See DTC TABLE [MZI 3.7 V6].) Communication error message is displayed: • Inspect the following: ▪ Open circuit in wiring harness between main relay terminal C and PCM terminal 1BP or 1BK ▪ Open circuit in wiring harness between main relay terminal D and PCM terminal 1AZ ▪ Main relay is stuck open. ▪ Open or short circuit in wiring harness between the DLC-2 and PCM terminals 1AH or 1AL ▪ Open or poor ground circuit (PCM terminal 1B, 1J, 1E) ▪ Poor connection of vehicle body ground • Repair or replace the malfunctioning part according to the inspection results.	
		No No DTC is displayed: • Go to the next step.	
3	INSPECT APP SENSOR SIGNAL • Access the PCM PIDs APP1 and APP2 using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [MZI 3.7 V6].) • Crank the engine with accelerator pedal released. • Are the APP1 and APP2 PIDs indicating that the accelerator pedal is in the released position?	Yes Go to the next step.	
		No Inspect for the following: • APP sensor (See ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [MZI 3.7 V6].) • Wiring harnesses and connectors for following: ▪ PCM terminal 1Z—APP sensor terminal A ▪ PCM terminal 1U—APP sensor terminal B ▪ PCM terminal 1AD—APP sensor terminal C ▪ PCM terminal 1AB—APP sensor terminal D ▪ PCM terminal 1Y—APP sensor terminal E ▪ PCM terminal 1X—APP sensor terminal F Repair or replace the malfunctioning part according to the inspection results.	
	INSPECT TP SENSOR SIGNAL		

4	- Access the PCM PIDs TP1 and TP2 using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [MZI 3.7 V6] .) - Crank the engine with accelerator pedal released. - Are the TP1 and TP2 PIDs indicates the closed throttle position?	Yes	Go to the next step.
		No	Inspect for the following: - TP sensor (See THROTTLE POSITION (TP) SENSOR INSPECTION [MZI 3.7 V6] .) - Wiring harnesses and connectors for following: - PCM terminal 2BO—TP sensor terminal A - PCM terminal 2BR—TP sensor terminal B - PCM terminal 2AL—TP sensor terminal C - PCM terminal 2AP—TP sensor terminal D - PCM terminal 2Z—TP sensor terminal E - PCM terminal 2AN—TP sensor terminal F Repair or replace the malfunctioning part according to the inspection results.
5	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 drive-by-wire control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI 3.7 V6] .) Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
6	INSPECT DEFORMED IN 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.
7	DETERMINE IF MALFUNCTION CAUSE IS CKP SENSOR WIRING HARNESS OR OTHER - Access the PCM PID RPM using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [MZI 3.7 V6] .) - Is the RPM PID indicating engine speed during the engine cranking?	Yes	Go to the next step.
		No	Inspect for the following: - Open or short circuit in CKP sensor - Open or short circuit in wiring harness between CKP sensor terminal A and PCM terminal 2V - Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2R - Open or short circuit in CKP sensor wiring harnesses Repair or replace the malfunctioning part according to the inspection results. - If the CKP sensor and wiring harness are normal, go to the next step.
8	INSPECT CKP SENSOR - Inspect the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [MZI 3.7 V6] .) - Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
9	INSPECT CMP SENSOR	Yes	Repair or replace the malfunctioning part according to the inspection

	Inspect the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [MZI 3.7 V6].) Is there any malfunction?		results.
		No	Go to the next step.
10	INSPECT IGNITION SYSTEM RELATED WIRING HARNESS - Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. - Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair or replace suspect wiring harness and connector.
11	INSPECT IGNITION SYSTEM OPERATION - Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI 3.7 V6].) - Is 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.
12	VERIFY SPARK PLUG CONDITION - Verify the spark plug conditions when the spark plug removed in Step 11. - 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.
13	INSPECT FUEL LINE PRESSURE - Install the fuel pressure gauge between the fuel pipe and fuel distributor. - Measure the fuel line pressure. (See FUEL LINE PRESSURE INSPECTION [MZI 3.7 V6].) - Is the fuel line pressure correct?	Yes	Go to the next step.
		No	Zero or low: - Inspect for the following: - Fuel pump relay - Fuel pump circuit - Fuel line for clogging - If there is no malfunction, replace the fuel pump unit. (Fuel pump or pressure regulator malfunction) (See FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZI 3.7 V6].) High: - Replace the fuel pump unit. (Pressure regulator malfunction) (See FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZI 3.7 V6].)

14	INSPECT FUEL SYSTEM FOR FUEL LEAKAGE • Visually inspect for fuel leakage at fuel injector O-ring and fuel line. • Service if necessary. • Is the fuel line pressure held after ignition is switched to off? (See FUEL LINE PRESSURE INSPECTION [MZI 3.7 V6].)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See FUEL INJECTOR INSPECTION [MZI 3.7 V6] .) • If the fuel injector is normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZI 3.7 V6].)
15	INSPECT PCV VALVE NOTE: • The PCV valve cannot be reassembled once it is removed because the tabs will have been broken. Inspect the PCV valve without removing it from the vehicle. • Inspect the PCV valve with it installed. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [MZI 3.7 V6].) • Is there any malfunction?	Yes	Replace the PCV valve. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE REMOVAL/ INSTALLATION [MZI 3.7 V6] .)
		No	Go to the next step.
16	DETERMINE IF MALFUNCTION CAUSE IS EVAP CONTROL SYSTEM OR OTHER • Disconnect the vacuum hose between purge solenoid valve and intake manifold from purge solenoid side. • Plug opening end of vacuum hose. • Start the engine. • Is the starting condition improved?	Yes	Inspect the following: • Purge solenoid valve is stuck open. • EVAP control system Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
17	INSPECT INTAKE AIR SYSTEM FOR AIR LEAKAGE • Is the air leakage felt or heard at intake-air system components while racing the engine to higher speed?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
18	INSPECT VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION • Inspect variable valve timing control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI 3.7 V6].) • Does the variable valve timing control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
19	INSPECT IF MALFUNCTION CAUSE IS LOW ENGINE COMPRESSION OR VALVE TIMING • Is the engine compression correct?	Yes	Inspect the valve timing. Repair or replace the malfunctioning part according to the inspection results.

		No	Inspect for cause. Repair or replace the malfunctioning part according to the inspection results.
20	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [MZI 3.7 V6] .) • If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. ▪ If vehicle is repaired, troubleshooting completed. ▪ If vehicle is not repaired or additional diagnostic information is not available, reprogram the PCM if a later calibration is available. Retest.		

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POSSIBLE CAUSE	• Vacuum leakage • Poor fuel quality • Air leakage from intake-air system • Restriction in intake-air system • Disconnected electrical connector • External engine shut-off accessory • Restriction in exhaust system • Throttle valve restriction • No battery power supply to PCM • Open PCM ground or vehicle body ground • PCM DTC is stored. • Erratic signal to PCM ▪ APP sensor or related circuit malfunction ▪ TP sensor or related circuit malfunction • Improper operation of drive-by-wire control system • No signal from CKP sensor due to sensor, related wire or incorrect installation • No signal from CMP sensor due to sensor, related wire or incorrect installation • Ignition coil or related circuit malfunction • Fuel leakage from injector • Fuel injector is clogged. • Inadequate fuel pressure ▪ Open or short circuit in fuel pump body and related wiring harness ▪ Fuel pump mechanical malfunction ▪ Fuel line clogged ▪ Pressure regulator malfunction (built-in fuel pump unit) • Fuel leakage from fuel system • PCV valve malfunction

- Purge solenoid valve malfunction
- Air leakage in intake air system when engine runs high speed
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CAUTION:

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Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
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		No	Repair or replace the malfunctioning part according to the inspection results. Repeat Step 1.

	▪ Electrical connections ▪ Fuses ▪ Smooth operation of throttle valve • Are all items normal?		
2	VERIFY PCM DTC • Switch the ignition to ON (Engine off). • Retrieve any DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [MZI 3.7 V6].) • Are there any DTCs displayed?	Yes DTC is displayed: • Go to the appropriate DTC inspection. (See DTC TABLE [MZI 3.7 V6].) Communication error message is displayed: • Inspect the following: ▪ Open circuit in wiring harness between main relay terminal C and PCM terminal 1BP or 1BK ▪ Open circuit in wiring harness between main relay terminal D and PCM terminal 1AZ ▪ Main relay is stuck open. ▪ Open or short circuit in wiring harness between the DLC-2 and PCM terminals 1AH or 1AL ▪ Open or poor ground circuit (PCM terminal 1B, 1J, 1E) ▪ Poor connection of vehicle body ground • Repair or replace the malfunctioning part according to the inspection results.	
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3	INSPECT APP SENSOR SIGNAL • Access the PCM PIDs APP1 and APP2 using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [MZI 3.7 V6].) • Crank the engine with accelerator pedal released. • Are the APP1 and APP2 PIDs indicating that the accelerator pedal is in the released position?	Yes Go to the next step.	
		No Inspect for the following: • APP sensor (See ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [MZI 3.7 V6].) • Wiring harnesses and connectors for following: ▪ PCM terminal 1Z—APP sensor terminal A ▪ PCM terminal 1U—APP sensor terminal B ▪ PCM terminal 1AD—APP sensor terminal C ▪ PCM terminal 1AB—APP sensor terminal D ▪ PCM terminal 1Y—APP sensor terminal E ▪ PCM terminal 1X—APP sensor terminal F Repair or replace the malfunctioning part according to the inspection results.	
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4	- Access the PCM PIDs TP1 and TP2 using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [MZI 3.7 V6].) - Crank the engine with accelerator pedal released. - Are the TP1 and TP2 PIDs indicates the closed throttle position?	Yes	Go to the next step.
		No	Inspect for the following: - TP sensor (See THROTTLE POSITION (TP) SENSOR INSPECTION [MZI 3.7 V6].) - Wiring harnesses and connectors for following: - PCM terminal 2BO—TP sensor terminal A - PCM terminal 2BR—TP sensor terminal B - PCM terminal 2AL—TP sensor terminal C - PCM terminal 2AP—TP sensor terminal D - PCM terminal 2Z—TP sensor terminal E - PCM terminal 2AN—TP sensor terminal F Repair or replace the malfunctioning part according to the inspection results.
5	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 drive-by-wire control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI 3.7 V6] .) Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
6	INSPECT DEFORMED IN 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.
7	DETERMINE IF MALFUNCTION CAUSE IS CKP SENSOR WIRING HARNESS OR OTHER - Access the PCM PID RPM using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [MZI 3.7 V6].) - Is the RPM PID indicating engine speed during the engine cranking?	Yes	Go to the next step.
		No	Inspect for the following: - Open or short circuit in CKP sensor - Open or short circuit in wiring harness between CKP sensor terminal A and PCM terminal 2V - Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2R - Open or short circuit in CKP sensor wiring harnesses Repair or replace the malfunctioning part according to the inspection results. - If the CKP sensor and wiring harness are normal, go to the next step.
8	INSPECT CKP SENSOR - Inspect the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [MZI 3.7 V6].) - Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
9	INSPECT CMP SENSOR	Yes	Repair or replace the malfunctioning part according to the inspection

	Inspect the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [MZI 3.7 V6].) Is there any malfunction?		results.
		No	Go to the next step.
10	INSPECT IGNITION SYSTEM RELATED WIRING HARNESS - Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. - Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair or replace suspect wiring harness and connector.
11	INSPECT IGNITION SYSTEM OPERATION - Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI 3.7 V6].) - Is 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.
12	VERIFY SPARK PLUG CONDITION - Verify the spark plug conditions when the spark plug removed in Step 11. - 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.
13	INSPECT FUEL LINE PRESSURE - Install the fuel pressure gauge between the fuel pipe and fuel distributor. - Measure the fuel line pressure. (See FUEL LINE PRESSURE INSPECTION [MZI 3.7 V6].) - Is the fuel line pressure correct?	Yes	Go to the next step.
		No	Zero or low: - Inspect for the following: - Fuel pump relay - Fuel pump circuit - Fuel line for clogging - If there is no malfunction, replace the fuel pump unit. (Fuel pump or pressure regulator malfunction) (See FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZI 3.7 V6].) High: - Replace the fuel pump unit. (Pressure regulator malfunction) (See FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZI 3.7 V6].)

14	INSPECT FUEL SYSTEM FOR FUEL LEAKAGE • Visually inspect for fuel leakage at fuel injector O-ring and fuel line. • Service if necessary. • Is the fuel line pressure held after ignition is switched to off? (See FUEL LINE PRESSURE INSPECTION [MZI 3.7 V6].)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See FUEL INJECTOR INSPECTION [MZI 3.7 V6] .) • If the fuel injector is normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZI 3.7 V6].)
15	INSPECT PCV VALVE NOTE: • The PCV valve cannot be reassembled once it is removed because the tabs will have been broken. Inspect the PCV valve without removing it from the vehicle. • Inspect the PCV valve with it installed. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [MZI 3.7 V6].) • Is there any malfunction?	Yes	Replace the PCV valve. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE REMOVAL/ INSTALLATION [MZI 3.7 V6] .)
		No	Go to the next step.
16	DETERMINE IF MALFUNCTION CAUSE IS EVAP CONTROL SYSTEM OR OTHER • Disconnect the vacuum hose between purge solenoid valve and intake manifold from purge solenoid side. • Plug opening end of vacuum hose. • Start the engine. • Is the starting condition improved?	Yes	Inspect the following: • Purge solenoid valve is stuck open. • EVAP control system Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
17	INSPECT INTAKE AIR SYSTEM FOR AIR LEAKAGE • Is the air leakage felt or heard at intake-air system components while racing the engine to higher speed?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
18	INSPECT VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION • Inspect variable valve timing control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI 3.7 V6].) • Does the variable valve timing control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
19	INSPECT IF MALFUNCTION CAUSE IS LOW ENGINE COMPRESSION OR VALVE TIMING • Is the engine compression correct?	Yes	Inspect the valve timing. Repair or replace the malfunctioning part according to the inspection results.

		No	Inspect for cause. Repair or replace the malfunctioning part according to the inspection results.
20	Verify test results. • If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [MZI 3.7 V6] .) • If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. ▪ If vehicle is repaired, troubleshooting completed. ▪ If vehicle is not repaired or additional diagnostic information is not available, reprogram the PCM if a later calibration is available. Retest.		