

2012 - Mazda6 - Engine

DTC P2196:00, P2198:00 [MZI 3.7 V6]

DTC P2196:00 DTC P2198:00	P2196:00: A/F sensor (RH) signal stuck rich P2198:00: A/F sensor (LH) signal stuck rich
DETECTION CONDITION	• P2196:00 indicates that A/F sensor (RH) signal is stuck rich • P2198:00 indicates that A/F sensor (LH) signal is stuck rich • An A/F sensor indicating rich at the end of a test is trying to correct for an over-lean condition. The test fails when the fuel control system no longer detects switching for a calibrated amount of time
POSSIBLE CAUSE	Electrical System : • Short to power supply in wiring harness or A/F sensor • Water in wiring harness connector • Open/shorted A/F sensor circuit • Open circuit in A/F sensor pumping current circuit • Corrosion or poor mating terminals and wiring • Damaged A/F sensor • Damaged HO2S • Damaged PCM Fuel System : • Restricted fuel pressure regulator/fuel supply line • Ethanol content in fuel • Excessive fuel pressure • Vapor recovery system • Leaking fuel injectors Intake Air System : • Vacuum Leaks • Positive crankcase ventilation (PCV) system • Incorrectly seated engine oil dipstick

- Air leaks after the mass air flow (MAF) sensor

Base Engine:

- Exhaust leaks before or near the HO2S(s)
- Oil overfill
- Cam Timing
- Cylinder compression

Diagnostic procedure

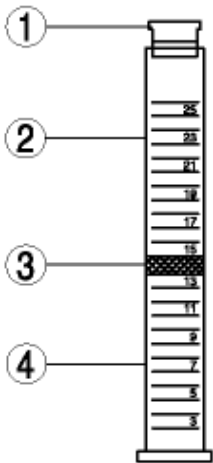
STEP	INSPECTION	ACTION
1	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	Yes Go to the next step.
		No Record FREEZE FRAME DATA on the repair order, then go to the next step.
2	VERIFY RELATED REPAIR INFORMATION AVAILABILITY • Verify related Service Bulletins and/or on-line repair information availability. • Is any related Service Bulletins available?	Yes Perform repair or diagnosis according to the available Service Bulletins. • If the vehicle is not repaired, go to the next step.
		No Perform the PCM reprogramming procedure. Then go to the next step.
3	VERIFY RELATED PENDING CODE OR STORED DTCs • Switch the ignition off then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs using the M-MDS. • Are any DTCs present other than the following: ▪ P0172:00, P0175:00, P2196:00 or P2198:00?	Yes Go to the appropriate DTC troubleshooting. (See DTC TABLE [MZI 3.7 V6] .)
		No Go to the next step.
4	INSPECT ENTIRE INTAKE AIR SYSTEM FOR DEBRIS, BLOCKAGE OR OTHER DAMAGE • Check the intake air system for obstructions, restrictions, and damage. • Inspect the throttle plate for obstructions or sludge. • Inspect the air filter element and housing for	Yes Repair if necessary. Then go to Step 28.
		No Go to the next step.

	blockage. • Verify that the engine oil dipstick, tube or oil fill cap is seated properly. • Is a concern present?		
5	INSPECT A/ F SENSOR PUMPING CURRENT CIRCUIT FOR OPEN CIRCUIT IN WIRING HARNESS NOTE: • Only the suspect A/F sensor needs to be diagnosed. • Switch the ignition off. • Disconnect suspect A/F sensor connector and PCM connector. • Measure the resistance between suspect A/F sensor harness-side connector terminal G and following PCM harness-side connector terminal: ▪ For P2196:00: A/F sensor (RH) terminal G—PCM terminal 2AS ▪ For P2198:00: A/F sensor (LH) terminal G—PCM terminal 2AO • Are the resistances less than 5 ohms?	Yes	Go to the next step.
		No	Repair for an open circuit, then go to Step 28.
6	INSPECT FUEL PRESSURE WARNING: • Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death. Fuel can also irritate skin and eyes. To prevent this, always complete the "BEFORE REPAIR PROCEDURE". NOTE: • For vehicle specific fuel pressure ranges, refer to the "FUEL LINE PRESSURE INSPECTION". • Remove the jumper wire(s). • Connect the A/F sensor connector. • Relieve the fuel pressure. • Connect the mechanical fuel pressure gauge. • Pressurize the fuel system. • Switch the ignition ON (Engine running). • Allow the fuel pressure to stabilize. • Switch the ignition off. • Switch the ignition ON (Engine running).	Yes	Go to Step 17.
		No	Go to the next step.

	• Measure the fuel pressure. • Is the fuel pressure within the range for the vehicle being diagnosed?		
7	INSPECT FUEL LINE PRESSURE • Switch the ignition off. • Connect the mechanical fuel pressure gauge. (See FUEL LINE PRESSURE INSPECTION [MZI 3.7 V6].) • Connect the FP connector. • Switch the ignition ON (Engine off). • Pressurize the fuel system. • Cycle the key several times to charge the fuel system. • Relieve the fuel pressure. • Is the fuel pressure within range?	Yes	Go to Step 10.
		No	Go to the next step.
8	INSPECT FUEL PUMP GROUND CIRCUIT FOR OPEN CIRCUIT IN WIRING HARNESS NOTE: • Refer to the Wiring Diagrams Manual for schematic and connector information. • Switch the ignition off. • Disconnect the FP and electronic fuel pump relay connectors. • Verify the continuity between FP (harness-side connector) terminal D and ground. • Is there any continuity?	Yes	Go to the next step.
		No	Repair for an open circuit, then go to Step 28.
9	INSPECT FUEL PUMP POWER CIRCUIT FOR OPEN CIRCUIT IN WIRING HARNESS NOTE: • Refer to the Wiring Diagrams Manual for schematic and connector information. • Switch the ignition off. • Disconnect the FP and fuel pump relay connectors. • Verify the continuity between FP (harness-side connector) terminal B and fuel pump relay (harness-side connector) terminal C. • Is there any continuity?	Yes	Go to Step 12.
		No	Repair for an open circuit, then go to Step 28.
	CALCULATE PERCENTAGE OF ETHANOL IN FUEL		

NOTE:

- Use the illustration as an example for calculating the percentage of ethanol using the following steps. If the separation level is at 14 ml the calculation is: 14 minus 4, then multiply by 5 to equal 50. The percentage of ethanol in the fuel is 50%



Item Number	Description
1	Stopper
2	Gasoline
3	Separation Point at 14ml
4	Ethanol / Water Mixture

- Switch the ignition off.
- Take the recorded separation level from the previous step and subtract the amount of water added.
- Multiply the new value by 5. This new value is the percentage of ethanol in the fuel.
- Record the calculated percentage of ethanol in the fuel.
- Is any ethanol present in the fuel?

YesGo to the next step.

No Go to Step 12.

DETERMINE IF PERCENTAGE OF ETHANOL IN FUEL IS LESS THAN 10%

- Verify the recorded (calculated) percentage of ethanol in the fuel.
- Is the calculated percentage of ethanol in the fuel less than 10%?

YesGo to the next step.

No Replace the fuel.

Advise the customer of the correct fuel type required for this vehicle. Refer to the Owner's Manual Literature for additional information.

Go to Step 28.

INSPECT FUEL PRESSURE LEAKDOWN

- Connect the mechanical fuel pressure gauge.

YesGo to Step 14.

	• Switch the ignition to ON (Engine running). • Allow the fuel pressure to stabilize. • Record the stabilized reading. • Switch the ignition to off. • Monitor the fuel pressure for 1 min. • Does the fuel pressure remain within 34 kPa {255 mmHg, 10.0 inHg} of the recorded reading after 1 min?	No	Go to the next step.
13	INSPECT FUEL INJECTOR FLOW AND LEAKAGE NOTE: • Observe the Warnings, Cautions, and Notes. • Inspect the fuel injectors for leakage and flow rate using the injector flow tester or other method such as inspecting the intake manifold for fuel. • Are the test results satisfactory?	Yes	Go to the next step.
		No	Replace the suspect fuel injector, then go to Step 28.
14	MONITOR FUEL PRESSURE WHILE ROAD TESTING VEHICLE WARNING: • Strict observance of posted speed limits and attention to driving conditions are mandatory when performing the road test. Failure to follow these instructions may result in personal injury. NOTE: • Some concerns may only be present during certain fuel level conditions. Determine the fuel level at the time of the concern. Access the information from the customer information worksheet and the customer. • Switch the ignition off. • Securely route the mechanical gauge so that the gauge is viewable while road testing the vehicle. • Start the engine and run it at idle. • Warm up the engine to normal operating temperature. • Monitor the mechanical gauge. • From a stop, accelerate to 89 km/h (55 mph) at full throttle. • Repeat 3 times.	Yes	Unable to duplicate or identify the concern at this time. Go to Step 28.
		No	Go to the next step.

	Is the fuel pressure always greater than 240 kPa {2.45 kgf/cm², 34.8 psi}?		
15	INSPECT FUEL SUPPLY LINE FOR RESTRICTION NOTE: - Observe the Warnings, Cautions, and Notes. - Switch the ignition off. - Disconnect the fuel supply line at the fuel rail. - Disconnect the fuel supply line at the fuel pump. - Verify the fuel supply line for restriction. - Apply 21—34 kPa {0.22—0.34 kgf/cm², 3.1—4.9 psi} air pressure to the fuel supply line. - Does air flow freely through the line?	Yes Replace the fuel filter (low-pressure side). Go to the next step.	
		No Repair the cause of the restriction, then go to Step 28.	
16	VERIFY FUEL SYSTEM REPAIRED WARNING: - Strict observance of posted speed limits and attention to driving conditions are mandatory when performing the road test. Failure to follow these instructions may result in personal injury. - Start the engine and run it at idle. - Warm up the engine to normal operating temperature. - Monitor the mechanical gauge. - From a stop, accelerate to 89 km/h (55 mph) at full throttle. - Repeat 3 times. - Is the fuel pressure always greater than 240 kPa {2.45 kgf/cm², 34.8 psi}?	Yes The test is complete and no concerns are present. Go to Step 28.	
		No Replace the fuel pump unit, then go to Step 28.	
17	VERIFY FUEL SYSTEM FOR PRESSURE STABILITY - FAST DECREASE - Mechanical fuel pressure gauge connected. - Switch the ignition ON (Engine running). - Allow the fuel pressure to stabilize. - Record the stabilized reading. - Switch the ignition to off. - Monitor the fuel pressure for 10 s. - Measure the fuel line pressure after 10 s.	Yes Go to Step 19.	
		No Go to the next step.	

	Does the fuel pressure remain within 34 kPa {0.35 kgf/cm², 4.9 psi} of the recorded reading after 10 s?		
18	INSPECT FOR EXTERNAL FUEL LEAK - Inspect the fuel tank, lines, and filler pipe for a fuel leak. - Is a concern present?	Yes	Repair for fuel leakage, then go to Step 28.
		No	Go to Step 21.
19	VERIFY FUEL SYSTEM FOR PRESSURE STABILITY - SLOW DECREASE - Continue to monitor the fuel pressure for 1 min. - Does the fuel pressure remain within 34 kPa {0.35 kgf/cm², 4.9 psi} of the recorded reading after 1 min?	Yes	Go to the next step.
		No	Go to Step 13.
20	DETERMINE IF THE PERCENTAGE OF ETHANOL IN THE FUEL IS LESS THAN 10% - Check the recorded (calculated) percentage of ethanol in the fuel referring to Step 10 and 11. - Is the calculated percentage of ethanol in the fuel less than 10%?	Yes	Go to the next step.
		No	Replace the fuel. Advise the customer of the correct fuel type required for this vehicle. Refer to the Owner's Manual Literature for additional information. Go to Step 28.
21	INSPECT FUEL INJECTOR OPERATION - Perform the "Fuel Injector Operation Inspection" for the right bank (with DTC P2196:00) or the left bank (with DTC P2198:00). (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI 3.7 V6] .) - Does the fuel injector operate properly?	Yes	Replace the suspected fuel injector, then go to Step 28. (See FUEL INJECTOR REMOVAL/ INSTALLATION [MZI 3.7 V6] .)
		No	Go to the next step.
22	ATTEMPT TO RETRIEVE DTC P2196 OR P2198 - Switch the ignition off. - Disconnect suspect HO2S connector. - Connect a 5 A fused jumper wire between suspect HO2S harness-side connector terminal C and body ground. - Perform the KOER self-test. (See KOEO/ KOER SELF TEST [MZI 3.7 V6] .) - Are DTCs P2196:00 or P2198:00 present?	Yes	Go to the next step.
		No	Go to Step 28. (The system is operating normally at this time. The concern may have been caused by a loose or corroded connector.)

23	INSPECT HO2S VOLTAGE - Remove the jumper wire(s). - HO2S connector disconnected. - Switch the ignition ON (Engine running). - Increase the engine speed to 2,000 RPM for 30 s. - Measure the voltage between suspect HO2S terminal C and D on component-side connector. - Perform the KOER self-test. (See KOEO/ KOER SELF TEST [MZI 3.7 V6].) - Monitor the signal voltage during the self-test. - Is the voltage less than 0.4 volt at any time during the self-test?	Yes	Go to the next step.
		No	Replace the HO2S, then go to Step 28.
24	PERFORM THOROUGH WIGGLE TEST ON HO2S HARNESS - HO2S connector connected. - Switch the ignition ON (Engine running). - Engine at normal operating temperature. - Access the PCM and monitor the suspect HO2S Signal PID. - Wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PID. - While monitoring the HO2S PID, does the HO2S stop switching?	Yes	Isolate the concern and repair if necessary. Then go to Step 28.
		No	Go to the next step.
25	TEST DRIVE VEHICLE WHILE MONITORING THE HO2S PID FOR SWITCHING - Access the PCM and monitor suspect HO2S signal PID. - Access the PCM and monitor the FUELSYS PID. - Start the engine and let it idle until the vehicle goes into the closed loop fuel condition. - Drive the vehicle in a manner consistent with the freeze frame data in an attempt to simulate original concern. - Does the HO2S PID switch?	Yes	Go to the next step.
		No	Replace the suspect HO2S, then go to Step 28.
26	VERIFY FUNCTIONALITY OF MAF SENSOR	Yes	Unable to duplicate or identify the

	NOTE: • MAF PID value of less than 0.6 V may indicate an incorrectly installed air cleaner or a leak in the intake-air system. • Start the engine and run it at idle. • Allow the engine to stabilize at the correct operating temperature. • Access and monitor the MAF PID. • Inspect that the MAF PID at idle and P/N position is not greater than 30% of the normal MAF listed. Reference Values or not greater than 1.3 V. (See PCM INSPECTION [MZI 3.7 V6].) • Is the PID value within the expected range?	concern at this time. Go to Step 28.
		No Go to the next step.
27	INSPECT TO ISOLATE MAF SENSOR FROM LEAN DRIVEABILITY OCCURRENCE NOTE: • Due to increasingly stringent emission/OBD requirements, a fuel system DTC on some vehicles can be generated without a noticeable drivability concern with or without the MAF sensor disconnected. Under these conditions, if the MAF PID indicates a MAF sensor concern, replace the MAF sensor. • Switch the ignition off. • Disconnect the MAF/IAT sensor connector. • Start the engine and run it at idle. • Drive the vehicle on the road. • Does the lean drivability symptom (lack of power, spark knock/detonation, buck/jerk or hesitation/surge on acceleration) disappear?	Yes Replace the MAF/IAT sensor, then go to the next step. (See MASS AIR FLOW (MAF)/ INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/ INSTALLATION [MZI 3.7 V6].)
		No Go to the next step. (The system is correctly at this time. The concern may have been caused by a loose or corroded connector.)
28	VERIFY TROUBLESHOOTING OF DTC P2196:00, P2198:00 HAS BEEN COMPLETED • Verify that all disconnected connectors are reconnected. • Switch the ignition ON (Engine off). • Clear the DTC from the PCM memory using the M-MDS. • Perform no load racing at the engine speed of 2,500—3,500 rpm for 60s or more, then idle the engine for 60s or more. • Perform the KOER self-test.	Yes Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/ INSTALLATION [MZI 3.7 V6].) Go to the next step.
		No Go to the next step.

	(See KOE0/ KOER SELF TEST [MZI 3.7 V6] .) • Is the PENDING CODE for this DTC present?		
29	VERIFY AFTER REPAIR PROCEDURE • Perform the “AFTER REPAIR PROCEDURE”. (See AFTER REPAIR PROCEDURE [MZI 3.7 V6] .) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [MZI 3.7 V6] .)
		No	Troubleshooting completed.

2012 - Mazda6 - Engine

DTC P2196:00, P2198:00 [MZI 3.7 V6]

DTC P2196:00 DTC P2198:00	P2196:00: A/F sensor (RH) signal stuck rich P2198:00: A/F sensor (LH) signal stuck rich
DETECTION CONDITION	• P2196:00 indicates that A/F sensor (RH) signal is stuck rich • P2198:00 indicates that A/F sensor (LH) signal is stuck rich • An A/F sensor indicating rich at the end of a test is trying to correct for an over-lean condition. The test fails when the fuel control system no longer detects switching for a calibrated amount of time
POSSIBLE CAUSE	Electrical System : • Short to power supply in wiring harness or A/F sensor • Water in wiring harness connector • Open/shorted A/F sensor circuit • Open circuit in A/F sensor pumping current circuit • Corrosion or poor mating terminals and wiring • Damaged A/F sensor • Damaged HO2S • Damaged PCM Fuel System : • Restricted fuel pressure regulator/fuel supply line • Ethanol content in fuel • Excessive fuel pressure • Vapor recovery system • Leaking fuel injectors Intake Air System : • Vacuum Leaks • Positive crankcase ventilation (PCV) system • Incorrectly seated engine oil dipstick

- Air leaks after the mass air flow (MAF) sensor

Base Engine:

- Exhaust leaks before or near the HO2S(s)
- Oil overfill
- Cam Timing
- Cylinder compression

Diagnostic procedure

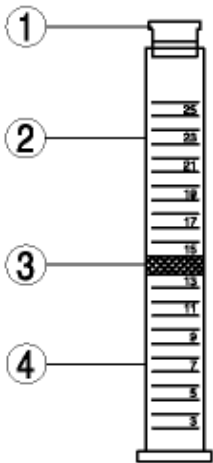
STEP	INSPECTION	ACTION
1	VERIFY FREEZE FRAME DATA HAS BEEN RECORDED • Has FREEZE FRAME DATA been recorded?	Yes Go to the next step.
		No Record FREEZE FRAME DATA on the repair order, then go to the next step.
2	VERIFY RELATED REPAIR INFORMATION AVAILABILITY • Verify related Service Bulletins and/or on-line repair information availability. • Is any related Service Bulletins available?	Yes Perform repair or diagnosis according to the available Service Bulletins. • If the vehicle is not repaired, go to the next step.
		No Perform the PCM reprogramming procedure. Then go to the next step.
3	VERIFY RELATED PENDING CODE OR STORED DTCs • Switch the ignition off then to the ON position (Engine off). • Verify the related PENDING CODE or stored DTCs using the M-MDS. • Are any DTCs present other than the following: ▪ P0172:00, P0175:00, P2196:00 or P2198:00?	Yes Go to the appropriate DTC troubleshooting. (See DTC TABLE [MZI 3.7 V6] .)
		No Go to the next step.
4	INSPECT ENTIRE INTAKE AIR SYSTEM FOR DEBRIS, BLOCKAGE OR OTHER DAMAGE • Check the intake air system for obstructions, restrictions, and damage. • Inspect the throttle plate for obstructions or sludge. • Inspect the air filter element and housing for	Yes Repair if necessary. Then go to Step 28.
		No Go to the next step.

	blockage. • Verify that the engine oil dipstick, tube or oil fill cap is seated properly. • Is a concern present?		
5	INSPECT A/ F SENSOR PUMPING CURRENT CIRCUIT FOR OPEN CIRCUIT IN WIRING HARNESS NOTE: • Only the suspect A/F sensor needs to be diagnosed. • Switch the ignition off. • Disconnect suspect A/F sensor connector and PCM connector. • Measure the resistance between suspect A/F sensor harness-side connector terminal G and following PCM harness-side connector terminal: ▪ For P2196:00: A/F sensor (RH) terminal G—PCM terminal 2AS ▪ For P2198:00: A/F sensor (LH) terminal G—PCM terminal 2AO • Are the resistances less than 5 ohms?	Yes	Go to the next step.
		No	Repair for an open circuit, then go to Step 28.
6	INSPECT FUEL PRESSURE WARNING: • Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death. Fuel can also irritate skin and eyes. To prevent this, always complete the "BEFORE REPAIR PROCEDURE". NOTE: • For vehicle specific fuel pressure ranges, refer to the "FUEL LINE PRESSURE INSPECTION". • Remove the jumper wire(s). • Connect the A/F sensor connector. • Relieve the fuel pressure. • Connect the mechanical fuel pressure gauge. • Pressurize the fuel system. • Switch the ignition ON (Engine running). • Allow the fuel pressure to stabilize. • Switch the ignition off. • Switch the ignition ON (Engine running).	Yes	Go to Step 17.
		No	Go to the next step.

	• Measure the fuel pressure. • Is the fuel pressure within the range for the vehicle being diagnosed?		
7	INSPECT FUEL LINE PRESSURE • Switch the ignition off. • Connect the mechanical fuel pressure gauge. (See FUEL LINE PRESSURE INSPECTION [MZI 3.7 V6].) • Connect the FP connector. • Switch the ignition ON (Engine off). • Pressurize the fuel system. • Cycle the key several times to charge the fuel system. • Relieve the fuel pressure. • Is the fuel pressure within range?	Yes	Go to Step 10.
		No	Go to the next step.
8	INSPECT FUEL PUMP GROUND CIRCUIT FOR OPEN CIRCUIT IN WIRING HARNESS NOTE: • Refer to the Wiring Diagrams Manual for schematic and connector information. • Switch the ignition off. • Disconnect the FP and electronic fuel pump relay connectors. • Verify the continuity between FP (harness-side connector) terminal D and ground. • Is there any continuity?	Yes	Go to the next step.
		No	Repair for an open circuit, then go to Step 28.
9	INSPECT FUEL PUMP POWER CIRCUIT FOR OPEN CIRCUIT IN WIRING HARNESS NOTE: • Refer to the Wiring Diagrams Manual for schematic and connector information. • Switch the ignition off. • Disconnect the FP and fuel pump relay connectors. • Verify the continuity between FP (harness-side connector) terminal B and fuel pump relay (harness-side connector) terminal C. • Is there any continuity?	Yes	Go to Step 12.
		No	Repair for an open circuit, then go to Step 28.
	CALCULATE PERCENTAGE OF ETHANOL IN FUEL		

NOTE:

- Use the illustration as an example for calculating the percentage of ethanol using the following steps. If the separation level is at 14 ml the calculation is: 14 minus 4, then multiply by 5 to equal 50. The percentage of ethanol in the fuel is 50%



Item Number	Description
1	Stopper
2	Gasoline
3	Separation Point at 14ml
4	Ethanol / Water Mixture

- Switch the ignition off.
- Take the recorded separation level from the previous step and subtract the amount of water added.
- Multiply the new value by 5. This new value is the percentage of ethanol in the fuel.
- Record the calculated percentage of ethanol in the fuel.
- Is any ethanol present in the fuel?

YesGo to the next step.

No Go to Step 12.

DETERMINE IF PERCENTAGE OF ETHANOL IN FUEL IS LESS THAN 10%

- Verify the recorded (calculated) percentage of ethanol in the fuel.
- Is the calculated percentage of ethanol in the fuel less than 10%?

YesGo to the next step.

No Replace the fuel.

Advise the customer of the correct fuel type required for this vehicle. Refer to the Owner's Manual Literature for additional information.

Go to Step 28.

INSPECT FUEL PRESSURE LEAKDOWN

- Connect the mechanical fuel pressure gauge.

YesGo to Step 14.

	• Switch the ignition to ON (Engine running). • Allow the fuel pressure to stabilize. • Record the stabilized reading. • Switch the ignition to off. • Monitor the fuel pressure for 1 min. • Does the fuel pressure remain within 34 kPa {255 mmHg, 10.0 inHg} of the recorded reading after 1 min?	No	Go to the next step.
13	INSPECT FUEL INJECTOR FLOW AND LEAKAGE NOTE: • Observe the Warnings, Cautions, and Notes. • Inspect the fuel injectors for leakage and flow rate using the injector flow tester or other method such as inspecting the intake manifold for fuel. • Are the test results satisfactory?	Yes	Go to the next step.
		No	Replace the suspect fuel injector, then go to Step 28.
14	MONITOR FUEL PRESSURE WHILE ROAD TESTING VEHICLE WARNING: • Strict observance of posted speed limits and attention to driving conditions are mandatory when performing the road test. Failure to follow these instructions may result in personal injury. NOTE: • Some concerns may only be present during certain fuel level conditions. Determine the fuel level at the time of the concern. Access the information from the customer information worksheet and the customer. • Switch the ignition off. • Securely route the mechanical gauge so that the gauge is viewable while road testing the vehicle. • Start the engine and run it at idle. • Warm up the engine to normal operating temperature. • Monitor the mechanical gauge. • From a stop, accelerate to 89 km/h (55 mph) at full throttle. • Repeat 3 times.	Yes	Unable to duplicate or identify the concern at this time. Go to Step 28.
		No	Go to the next step.

	Is the fuel pressure always greater than 240 kPa {2.45 kgf/cm², 34.8 psi}?		
15	INSPECT FUEL SUPPLY LINE FOR RESTRICTION NOTE: - Observe the Warnings, Cautions, and Notes. - Switch the ignition off. - Disconnect the fuel supply line at the fuel rail. - Disconnect the fuel supply line at the fuel pump. - Verify the fuel supply line for restriction. - Apply 21—34 kPa {0.22—0.34 kgf/cm², 3.1—4.9 psi} air pressure to the fuel supply line. - Does air flow freely through the line?	Yes	Replace the fuel filter (low-pressure side). Go to the next step.
		No	Repair the cause of the restriction, then go to Step 28.
16	VERIFY FUEL SYSTEM REPAIRED WARNING: - Strict observance of posted speed limits and attention to driving conditions are mandatory when performing the road test. Failure to follow these instructions may result in personal injury. - Start the engine and run it at idle. - Warm up the engine to normal operating temperature. - Monitor the mechanical gauge. - From a stop, accelerate to 89 km/h (55 mph) at full throttle. - Repeat 3 times. - Is the fuel pressure always greater than 240 kPa {2.45 kgf/cm², 34.8 psi}?	Yes	The test is complete and no concerns are present. Go to Step 28.
		No	Replace the fuel pump unit, then go to Step 28.
17	VERIFY FUEL SYSTEM FOR PRESSURE STABILITY - FAST DECREASE - Mechanical fuel pressure gauge connected. - Switch the ignition ON (Engine running). - Allow the fuel pressure to stabilize. - Record the stabilized reading. - Switch the ignition to off. - Monitor the fuel pressure for 10 s. - Measure the fuel line pressure after 10 s.	Yes	Go to Step 19.
		No	Go to the next step.

	Does the fuel pressure remain within 34 kPa {0.35 kgf/cm², 4.9 psi} of the recorded reading after 10 s?		
18	INSPECT FOR EXTERNAL FUEL LEAK - Inspect the fuel tank, lines, and filler pipe for a fuel leak. - Is a concern present?	Yes	Repair for fuel leakage, then go to Step 28.
		No	Go to Step 21.
19	VERIFY FUEL SYSTEM FOR PRESSURE STABILITY - SLOW DECREASE - Continue to monitor the fuel pressure for 1 min. - Does the fuel pressure remain within 34 kPa {0.35 kgf/cm², 4.9 psi} of the recorded reading after 1 min?	Yes	Go to the next step.
		No	Go to Step 13.
20	DETERMINE IF THE PERCENTAGE OF ETHANOL IN THE FUEL IS LESS THAN 10% - Check the recorded (calculated) percentage of ethanol in the fuel referring to Step 10 and 11. - Is the calculated percentage of ethanol in the fuel less than 10%?	Yes	Go to the next step.
		No	Replace the fuel. Advise the customer of the correct fuel type required for this vehicle. Refer to the Owner's Manual Literature for additional information. Go to Step 28.
21	INSPECT FUEL INJECTOR OPERATION - Perform the "Fuel Injector Operation Inspection" for the right bank (with DTC P2196:00) or the left bank (with DTC P2198:00). (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI 3.7 V6] .) - Does the fuel injector operate properly?	Yes	Replace the suspected fuel injector, then go to Step 28. (See FUEL INJECTOR REMOVAL/ INSTALLATION [MZI 3.7 V6] .)
		No	Go to the next step.
22	ATTEMPT TO RETRIEVE DTC P2196 OR P2198 - Switch the ignition off. - Disconnect suspect HO2S connector. - Connect a 5 A fused jumper wire between suspect HO2S harness-side connector terminal C and body ground. - Perform the KOER self-test. (See KOEO/ KOER SELF TEST [MZI 3.7 V6] .) - Are DTCs P2196:00 or P2198:00 present?	Yes	Go to the next step.
		No	Go to Step 28. (The system is operating normally at this time. The concern may have been caused by a loose or corroded connector.)

23	INSPECT HO2S VOLTAGE • Remove the jumper wire(s). • HO2S connector disconnected. • Switch the ignition ON (Engine running). • Increase the engine speed to 2,000 RPM for 30 s. • Measure the voltage between suspect HO2S terminal C and D on component-side connector. • Perform the KOER self-test. (See KOEO/ KOER SELF TEST [MZI 3.7 V6].) • Monitor the signal voltage during the self-test. • Is the voltage less than 0.4 volt at any time during the self-test?	YesGo to the next step.
24	PERFORM THOROUGH WIGGLE TEST ON HO2S HARNESS • HO2S connector connected. • Switch the ignition ON (Engine running). • Engine at normal operating temperature. • Access the PCM and monitor the suspect HO2S Signal PID. • Wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PID. • While monitoring the HO2S PID, does the HO2S stop switching?	YesIsolate the concern and repair if necessary. Then go to Step 28.
		NoGo to the next step.
25	TEST DRIVE VEHICLE WHILE MONITORING THE HO2S PID FOR SWITCHING • Access the PCM and monitor suspect HO2S signal PID. • Access the PCM and monitor the FUELSYS PID. • Start the engine and let it idle until the vehicle goes into the closed loop fuel condition. • Drive the vehicle in a manner consistent with the freeze frame data in an attempt to simulate original concern. • Does the HO2S PID switch?	YesGo to the next step.
		NoReplace the suspect HO2S, then go to Step 28.
26	VERIFY FUNCTIONALITY OF MAF SENSOR	YesUnable to duplicate or identify the

	NOTE: • MAF PID value of less than 0.6 V may indicate an incorrectly installed air cleaner or a leak in the intake-air system. • Start the engine and run it at idle. • Allow the engine to stabilize at the correct operating temperature. • Access and monitor the MAF PID. • Inspect that the MAF PID at idle and P/N position is not greater than 30% of the normal MAF listed. Reference Values or not greater than 1.3 V. (See PCM INSPECTION [MZI 3.7 V6].) • Is the PID value within the expected range?	concern at this time. Go to Step 28.
		No Go to the next step.
27	INSPECT TO ISOLATE MAF SENSOR FROM LEAN DRIVEABILITY OCCURRENCE NOTE: • Due to increasingly stringent emission/OBD requirements, a fuel system DTC on some vehicles can be generated without a noticeable drivability concern with or without the MAF sensor disconnected. Under these conditions, if the MAF PID indicates a MAF sensor concern, replace the MAF sensor. • Switch the ignition off. • Disconnect the MAF/IAT sensor connector. • Start the engine and run it at idle. • Drive the vehicle on the road. • Does the lean drivability symptom (lack of power, spark knock/detonation, buck/jerk or hesitation/surge on acceleration) disappear?	Yes Replace the MAF/IAT sensor, then go to the next step. (See MASS AIR FLOW (MAF)/ INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/ INSTALLATION [MZI 3.7 V6].) No Go to the next step. (The system is correctly at this time. The concern may have been caused by a loose or corroded connector.)
28	VERIFY TROUBLESHOOTING OF DTC P2196:00, P2198:00 HAS BEEN COMPLETED • Verify that all disconnected connectors are reconnected. • Switch the ignition ON (Engine off). • Clear the DTC from the PCM memory using the M-MDS. • Perform no load racing at the engine speed of 2,500—3,500 rpm for 60s or more, then idle the engine for 60s or more. • Perform the KOER self-test.	Yes Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/ INSTALLATION [MZI 3.7 V6].) Go to the next step. No Go to the next step.

	(See KOE0/ KOER SELF TEST [MZI 3.7 V6] .) • Is the PENDING CODE for this DTC present?		
29	VERIFY AFTER REPAIR PROCEDURE • Perform the “AFTER REPAIR PROCEDURE”. (See AFTER REPAIR PROCEDURE [MZI 3.7 V6] .) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [MZI 3.7 V6] .)
		No	Troubleshooting completed.