

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

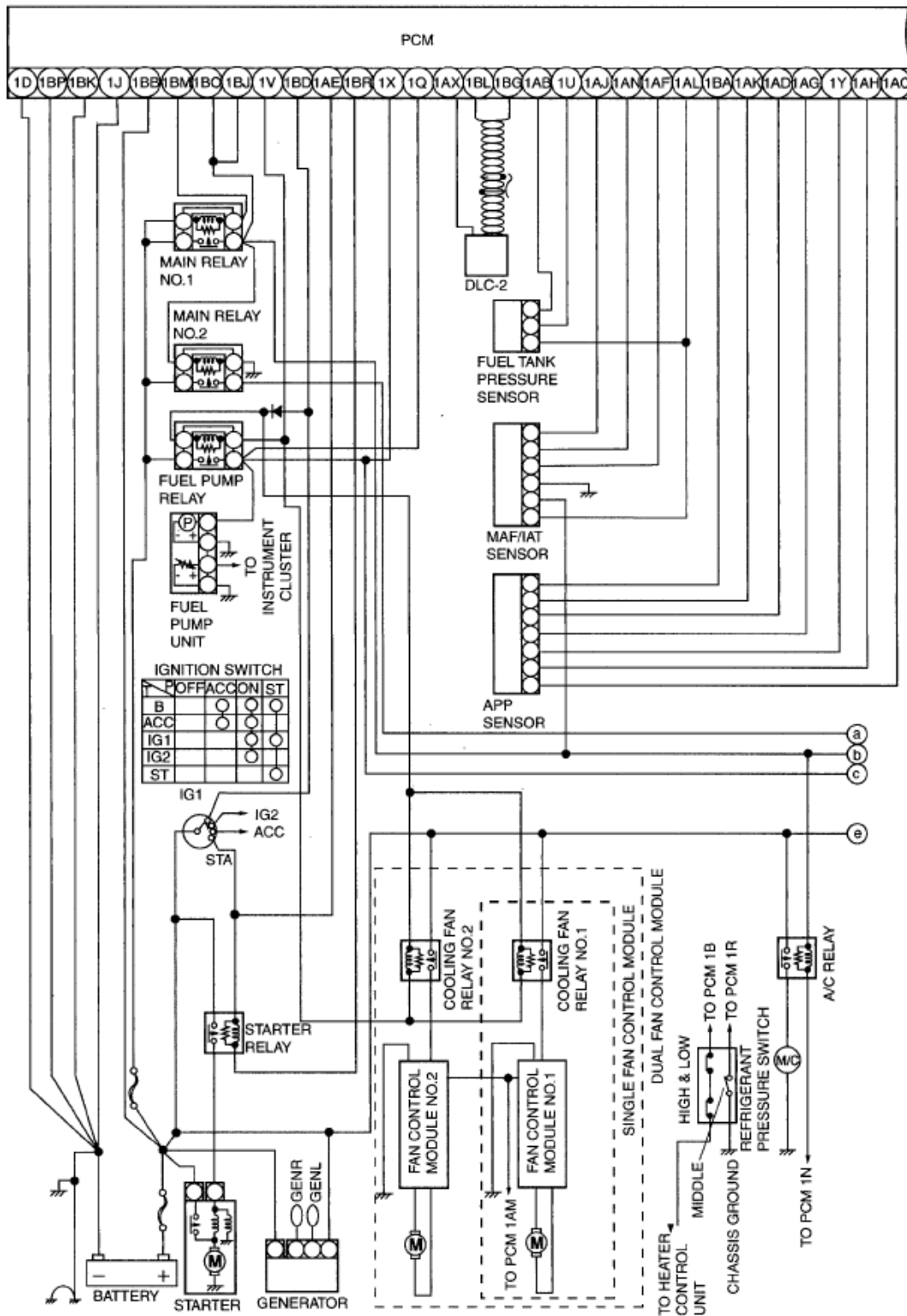
2008 ENGINE

Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

SYMPTOM TROUBLESHOOTING WIRING DIAGRAM [MZI-3.7]

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

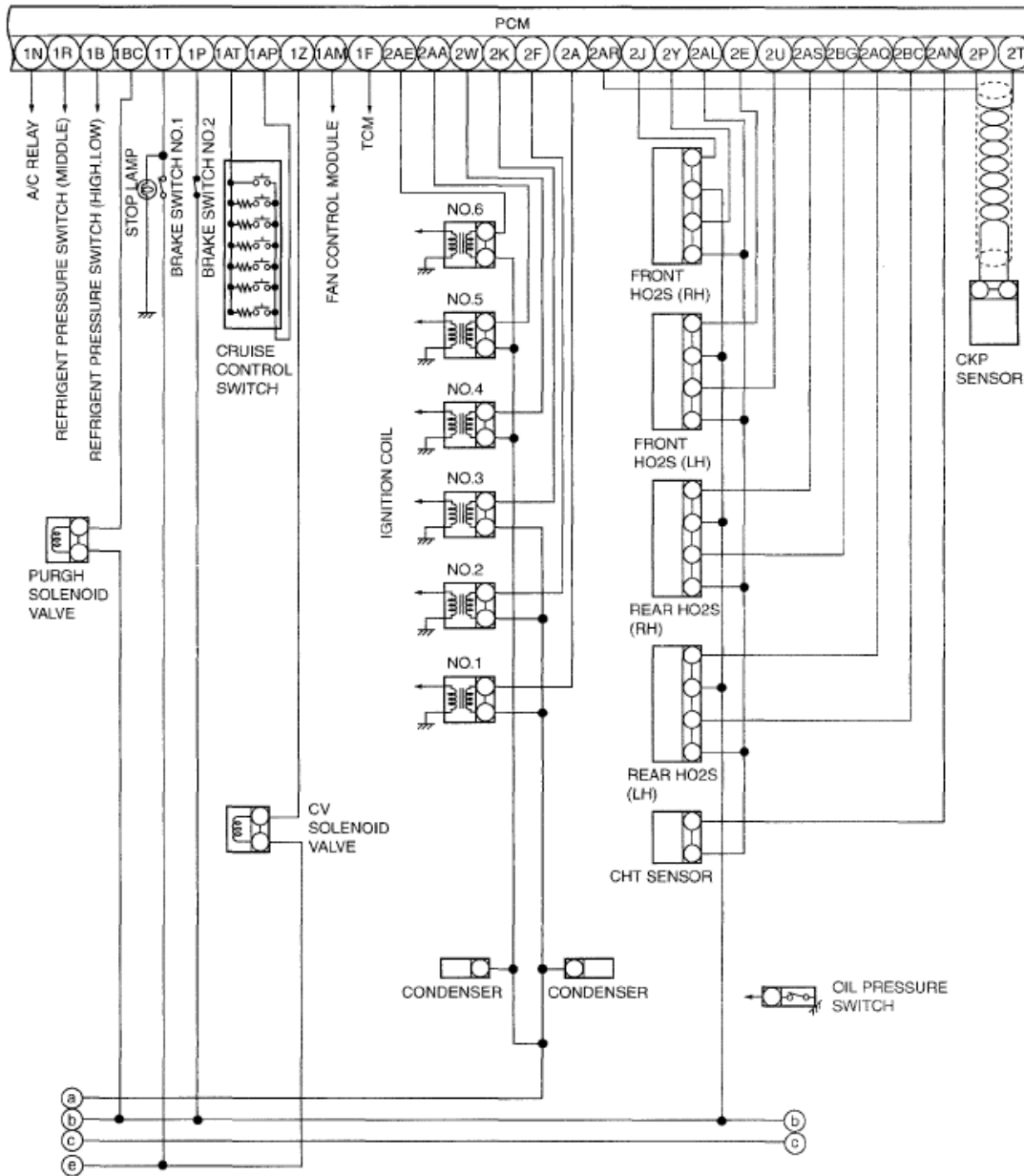


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Fig. 1: Symptom Troubleshooting Wiring Diagram (1 Of 3)
 Courtesy of MAZDA MOTORS CORP.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

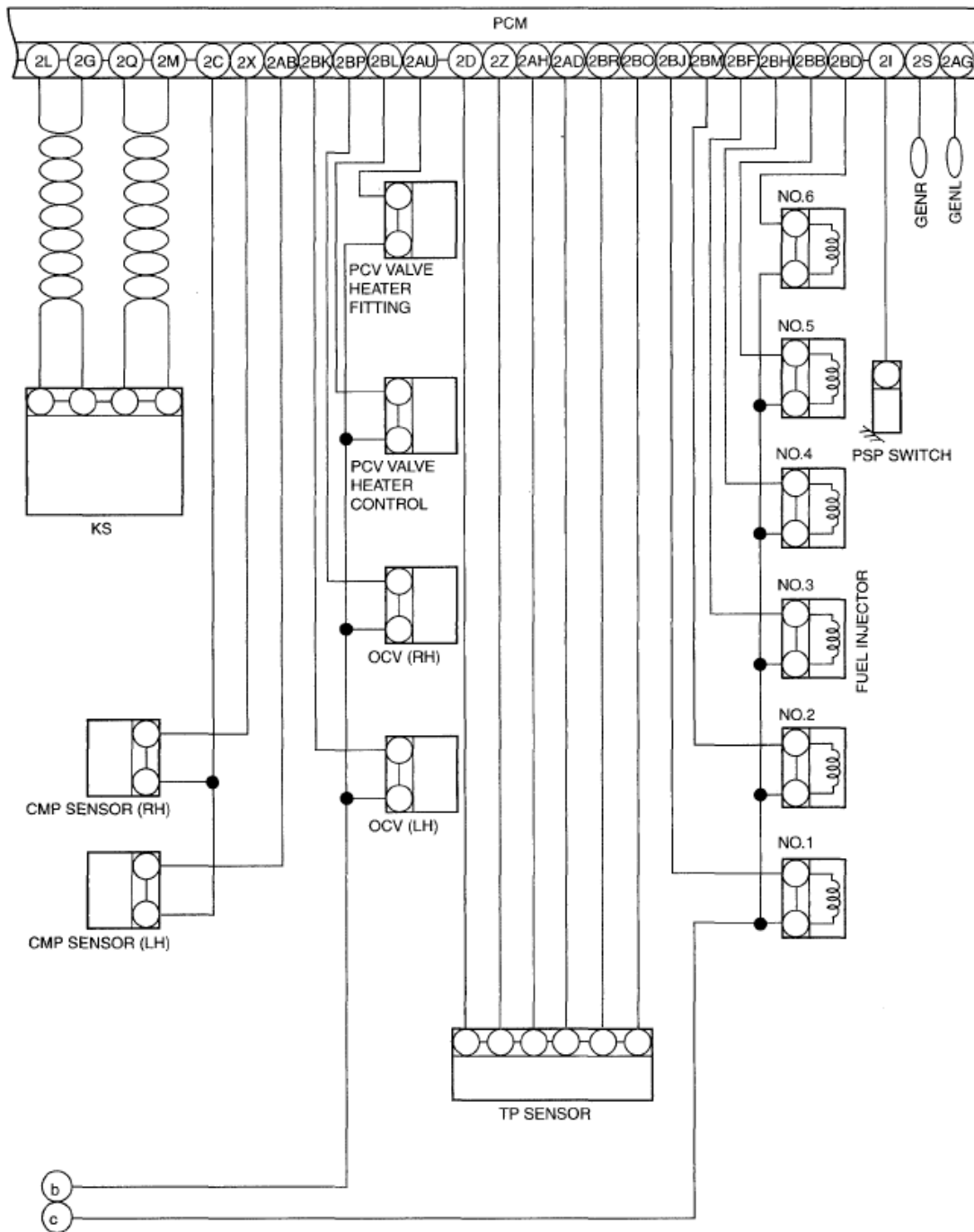


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Fig. 2: Symptom Troubleshooting Wiring Diagram (2 Of 3)
Courtesy of MAZDA MOTORS CORP.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9



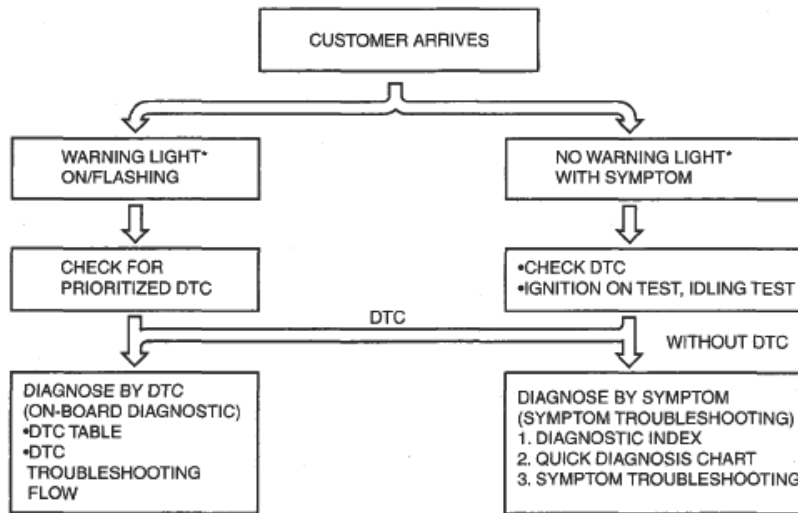
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Fig. 3: Symptom Troubleshooting Wiring Diagram (3 Of 3)
Courtesy of MAZDA MOTORS CORP.

FOREWORD [MZI-3.7]

- When the customer reports a vehicle malfunction, check the malfunction indicator lamp (MIL) indication and diagnostic trouble code (DTC), then diagnose the malfunction according to the following flowchart:

- If a DTC exists, diagnose the applicable DTC inspection. (See **DTC TABLE [MZI-3.7]** .)
- If no DTC exists and the MIL does not illuminate or flash, diagnose the applicable symptom troubleshooting. (See **QUICK DIAGNOSTIC CHART [MZI-3.7]**.)



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*: Malfunction Indicator Lamp (MIL), Generator Warning Light, Security Light

Fig. 4: Symptom Troubleshooting Flow Chart
Courtesy of MAZDA MOTORS CORP.

SYMPTOM DIAGNOSTIC INDEX [MZI-3.7]

- Confirm trouble symptom using the following diagnostic index, then go to appropriate troubleshooting chart.

Diagnostic Index

DIAGNOSTIC INDEX

No.	TROUBLESHOOTING ITEM	DESCRIPTION	PAGE
1	Melting of main or other fuses	-	(<u>NO.1 MELTING OF MAIN OR OTHER FUSES [MZI-3.7].</u>)
2	MIL illuminates	The MIL is illuminated incorrectly.	(See <u>NO.2 MIL ILLUMINATES [MZI-3.7].</u>)
3	Will not crank	The starter does not work.	(See <u>NO.3 WILL NOT CRANK [MZI-3.7].</u>)
4	Hard to start/long crank/erratic start/erratic crank	The starter cranks the engine at normal speed but the engine requires excessive	(See <u>NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK</u>)

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

			cranking time before starting.	[MZI-3.7].)
5	Engine stalls.	After start/at idle	The engine stops unexpectedly at idle and/or after start or both.	(See <u>NO.5 ENGINE STALLS-AFTER START/AT IDLE [MZI-3.7].</u>)
6	Crank normally but will not start		The starter cranks engine at normal speed but the engine will not run.	(See <u>NO.6 CRANKS NORMALLY BUT WILL NOT START [MZI-3.7].</u>)
7	Slow return to idle		The engine takes more time than normal to return to idle speed.	(See <u>NO.7 SLOW RETURN TO IDLE [MZI-3.7].</u>)
8	Engine runs rough/rolling idle.		The engine speed fluctuates between the specified idle speed and lower speed and the engine shakes excessively.	(See <u>NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [MZI-3.7].</u>)
9	Fast idle/runs on		The engine speed continues at fast idle after warm-up. The engine runs after the ignition switch is turned off.	(See <u>NO.9 FAST IDLE/RUNS ON [MZI-3.7].</u>)
10	Low idle/stalls during deceleration		The engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.	(See <u>NO.10 LOW IDLE/STALLS DURING DECELERATION [MZI-3.7].</u>)
11	Engine stalls/quits.	Acceleration/cruise	The engine stops unexpectedly at the beginning of acceleration or during acceleration. The engine stops unexpectedly while cruising.	(See <u>NO.11 ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE,</u>)
	Engine runs rough.	Acceleration/cruise	The engine speed fluctuates during acceleration or cruising.	
	Misses	Acceleration/cruise	The engine misses during acceleration or cruising.	

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	Buck/jerk	Acceleration/cruise/deceleration	The vehicle bucks/jerks during acceleration, cruising, or deceleration.	<u>SURGES [MZI-3.7].)</u>
	Hesitation/stumble	Acceleration	A momentary pause at the beginning of acceleration or during acceleration.	
	Surges	Acceleration/cruise	A momentary minor irregularity in engine output.	
12	Lack/loss of power	Acceleration/cruise	The performance is poor under load (such as power down when climbing hills).	<u>(See NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE [MZI-3.7].)</u>
13	Knocking/pinging	Acceleration/cruise	Sound is produced when the air/fuel mixture is ignited by something other than the spark plug (such as hot spot in combustion chamber).	<u>(See NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [MZI-3.7].)</u>
14	Poor fuel economy		The fuel economy is unsatisfactory.	<u>(See NO.14 POOR FUEL ECONOMY [MZI-3.7].)</u>
15	Emission compliance		Fails emissions test.	<u>(See NO.15 EMISSION COMPLIANCE [MZI-3.7].)</u>
16	High oil consumption/leakage		The oil consumption is excessive.	<u>(See NO.16 HIGH OIL CONSUMPTION/LEAKAGE [MZI-3.7].)</u>
17	Cooling system concerns	Overheating	The engine runs at higher than normal temperature/overheats.	<u>(See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [MZI-3.7].)</u>
18	Cooling system concerns	Runs cold	The engine does not reach normal operating temperature.	<u>(See NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [MZI-3.7].)</u>
19	Exhaust smoke		Blue, black, or white smoke from exhaust system	<u>(See NO.19 EXHAUST SMOKE [MZI-3.7].)</u>
20	Fuel odor (in engine compartment)		Gasoline fuel smell or visible leakage	<u>(See NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) [MZI-3.7].)</u>
21	Engine noise		Engine noise from under hood	<u>(See NO.21 ENGINE NOISE [MZI-3.7].)</u>
22	Vibration concerns (engine)		Vibration from under hood or driveline	<u>(See NO.22 VIBRATION CONCERNS (ENGINE)</u>

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

			[MZI-3.7].)
23	A/C does not work sufficiently.		The A/C compressor magnetic clutch does not engage when A/C is turned on. (See <u>NO.23 A/C DOES NOT WORK SUFFICIENTLY</u> [MZI-3.7].)
24	A/C is always on or A/C compressor runs continuously.		The A/C compressor magnetic clutch does not disengage. (See <u>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY</u> [MZI-3.7].)
25	A/C does not cut off under wide open throttle conditions.		The A/C compressor magnetic clutch does not disengage under wide open throttle. (See <u>NO.25 A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS</u> [MZI-3.7].)
26	Exhaust sulphur smell		Rotten egg smell (sulphur) from exhaust (See <u>NO.26 EXHAUST SULPHUR SMELL</u> [MZI-3.7].)
27	Fuel refill concerns		The fuel tank does not fill smoothly. (See <u>NO.27 FUEL REFILL CONCERNS</u> [MZI-3.7].)
28	Fuel filling shut off concerns		The fuel does not shut off properly. (See <u>NO.28 FUEL FILLING SHUT OFF CONCERNS</u> [MZI-3.7].)
29	Spark plug condition		An incorrect spark plug condition. (See <u>NO.29 SPARK PLUG CONDITION</u> [MZI-3.7].)
30	AT concerns	Upshift/downshift engagement	AT concerns not related to engine performance. (See <u>SYMPTOM TROUBLESHOOTING ITEM TABLE</u> [AW6A-EL, AW6AX-EL] .)

QUICK DIAGNOSTIC CHART [MZI-3.7]

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

X: Applicable

Troubleshooting item		Possible factor																					
		Starter motor malfunction (Mechanical or electrical)	Starter circuit including ignition switch is open.	Improper engine oil level	Low or dead battery	Charging system malfunction	Improper engine compression	Improper valve timing	Hydrolocked engine	Improper engine oil viscosity	Improper dipstick	Base engine malfunction	Drive plate or flywheel are seized.	Improper tension or damaged drive belts	Improper engine coolant level	Water and anti-freeze mixture is improper.	Cooling system malfunction (Radiator, hoses, overflow system, thermostat, etc.)	Cooling fan system malfunction	Engine or transaxle mounts are improperly installed.	Cooling fan seal is improper.	Cruise control system operation improperly	Fuel quality	
1	Melting of main or other fuses																						
2	MIL illuminates																						
3	Will not crank	x	x		x	x			x				x										
4	Hard to start/long crank/erratic start/erratic crank	x																					x
5	Engine stalls. After start/at idle						x	x															x
6	Cranks normally but will not start						x	x															x
7	Slow return to idle																x						
8	Engine runs rough/rolling idle						x	x															x
9	Fast idle/runs on																						x
10	Low idle/stalls during deceleration																						x
11	Engine stalls/quits. Acceleration/cruise						x	x															x
	Engine runs rough. Acceleration/cruise						x	x															x
	Misses. Acceleration/cruise						x	x															x
	Buck/jerk. Acceleration/cruise/ deceleration						x	x															x
	Hesitation/stumble. Acceleration						x	x															x
Surges. Acceleration/cruise						x	x															x	
12	Lack/loss of power. Acceleration/cruise						x	x															x
13	Knocking/pinging. Acceleration/cruise						x										x						
14	Poor fuel economy						x	x									x	x					x
15	Emission compliance						x	x				x					x						
16	High oil consumption/leakage								x	x	x												
17	Cooling system concerns. Overheating													x	x	x	x	x					
18	Cooling system concerns. Runs cold																x	x					
19	Exhaust smoke						x					x					x						
20	Fuel odor (in engine compartment)																						
21	Engine noise			x							x		x										
22	Vibration concerns (engine)												x						x	x			
23	A/C does not work sufficiently.																						
24	A/C is always on or A/C compressor runs continuously.																						
25	A/C does not cut off under WOT conditions.																						x
26	Exhaust sulphur smell																						x
27	Fuel refill concerns																						
28	Fuel filling shut off concerns																						
29	Spark plug condition						x																
30	AT concerns. Upshift/downshift engagement	See Section 05-03 TROUBLESHOOTING																					

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Fig. 5: Quick Diagnostic Chart (1 Of 4)
 Courtesy of MAZDA MOTORS CORP.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

X: Applicable

Possible factor		Troubleshooting Item																		
Troubleshooting Item		Variable valve timing system malfunction	Engine overheating	Air cleaner element clogging or restriction	Air leakage from intake-air system (Loose tubes, cracks, gaskets breakage)	Intake air temperature is too hot	Idle learning of electronic throttle control system is not completed	Electronic throttle control improper operation	Throttle body malfunction	Vacuum leakage (Vacuum hose damage, misrouting)	Ignition coil malfunction (e.g. open, short or cracks)	Initial ignition timing misadjustment (CKP sensor & crankshaft pulley misadjustment)	Spark plug malfunction	Erratic signal to ignition coil	CKP sensor is damaged. (e.g. open or short circuits)	Crankshaft pulley is damaged	Improper gap between CKP sensor and crankshaft	Fuel pump malfunction (Mechanically or electrically)	Pressure regulator malfunction	Fuel hoses restriction or clogging
1	Melting of main or other fuses																			
2	MIL illuminates	x						x							x					
3	Will not crank																			
4	Hard to start/long crank/erratic start/erratic crank			x	x			x	x				x	x	x	x	x	x	x	x
5	Engine stalls. After start/at idle	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x
6	Cranks normally but will not start	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x
7	Slow return to idle							x												
8	Engine runs rough/rolling idle	x	x	x	x		x	x	x		x		x	x	x	x	x	x	x	x
9	Fast idle/runs on				x			x	x											
10	Low idle/stalls during deceleration				x			x	x											
11	Engine stalls/quits. Acceleration/cruise	x	x	x				x	x	x			x	x	x	x	x	x	x	x
	Engine runs rough. Acceleration/cruise	x	x	x				x	x	x			x	x	x	x	x	x	x	x
	Misses. Acceleration/cruise	x	x	x				x	x	x			x	x	x	x	x	x	x	x
	Buck/jerk. Acceleration/cruise/ deceleration	x	x	x				x	x	x			x	x	x	x	x	x	x	x
	Hesitation/stumble. Acceleration	x	x	x				x	x	x			x	x	x	x	x	x	x	x
	Surges. Acceleration/cruise	x	x	x				x	x	x			x	x	x	x	x	x	x	x
12	Lack/loss of power. Acceleration/cruise	x	x	x	x	x		x	x	x			x	x	x	x	x	x	x	x
13	Knocking/pinging. Acceleration/cruise		x															x	x	
14	Poor fuel economy	x		x										x	x					x
15	Emission compliance			x	x				x	x			x	x				x	x	x
16	High oil consumption/leakage																			
17	Cooling system concerns. Overheating																			
18	Cooling system concerns. Runs cold																			
19	Exhaust smoke			x						x			x	x				x	x	x
20	Fuel odor (in engine compartment)																			x
21	Engine noise				x					x										
22	Vibration concerns (engine)																			
23	A/C does not work sufficiently.																			
24	A/C is always on or A/C compressor runs continuously.																			
25	A/C does not cut off under WOT conditions.																			
26	Exhaust sulphur smell								x									x	x	x
27	Fuel refill concerns																			
28	Fuel filling shut off concerns																			
29	Spark plug condition			x									x	x				x	x	x
30	AT concerns. Upshift/downshift engagement																			See Section 05-03 TROUBLESHOOTING

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Fig. 6: Quick Diagnostic Chart (2 Of 4)
 Courtesy of MAZDA MOTORS CORP.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

X: Applicable

Troubleshooting item		Possible factor																					
		Injectors malfunction (Leakage or clogging, inoperative)	Fuel leakage from fuel system (including insulator, injector O-ring)	Fuel filters restriction or clogging	CMP sensor is damaged. (e.g. open or short circuit)	Camsshaft is damaged	Improper air/fuel mixture ratio control	Exhaust system restriction or clogging	Catalytic converter malfunction	EVAP control system malfunction	Fuel-filler cap malfunction	Fuel into evaporative purge hose	Check valve (two-way) malfunction	PCV valve malfunction	Constant voltage supply circuit malfunction	Main relay malfunction (Mechanically or electrically)	PCM or sensor GND circuit open or short	CHT sensor malfunction	TR switch misadjustment	TR switch malfunction	Brake switch and related circuit malfunction	HO2S and related circuit malfunction	
1	Melting of main or other fuses																						
2	MIL illuminates				x		x											x	x		x	x	
3	Will not crank																		x	x			
4	Hard to start/long crank/erratic start/erratic crank			x	x	x	x	x	x				x			x							x
5	Engine stalls. After start/at idle	x	x		x	x	x	x	x	x			x		x								x
6	Cranks normally but will not start	x	x				x	x	x				x	x	x								x
7	Slow return to idle																	x					
8	Engine runs rough/rolling idle	x		x	x	x	x	x	x	x			x				x						x
9	Fast idle/runs on																	x					
10	Low idle/stalls during deceleration						x			x										x	x	x	
11	Engine stalls/quits. Acceleration/cruise	x		x	x	x	x	x	x	x		x	x	x	x	x							x
	Engine runs rough. Acceleration/cruise	x		x	x	x	x	x	x	x		x	x	x	x	x							x
	Misses. Acceleration/cruise	x		x	x	x	x	x	x	x		x	x	x	x	x							x
	Buck/jerk. Acceleration/cruise/ deceleration	x		x	x	x	x	x	x	x		x	x	x	x	x							x
	Hesitation/stumble. Acceleration	x		x	x	x	x	x	x	x		x	x	x	x	x							x
Surges. Acceleration/cruise	x		x	x	x	x	x	x	x		x	x	x	x	x							x	
12	Lack/loss of power. Acceleration/cruise	x			x	x	x	x	x				x										
13	Knocking/pinging. Acceleration/cruise				x													x					
14	Poor fuel economy			x	x	x	x	x	x				x										
15	Emission compliance			x	x	x	x	x	x	x	x		x										x
16	High oil consumption/leakage												x										
17	Cooling system concerns. Overheating																						
18	Cooling system concerns. Runs cold																						
19	Exhaust smoke	x		x									x										
20	Fuel odor (in engine compartment)	x								x													
21	Engine noise																						
22	Vibration concerns (engine)																						
23	A/C does not work sufficiently.																						
24	A/C is always on or A/C compressor runs continuously.																						
25	A/C does not cut off under WOT condition																						
26	Exhaust sulphur smell			x						x													
27	Fuel refill concerns									x													
28	Fuel filling shut off concerns									x													
29	Spark plug condition	x	x				x	x		x								x					x
30	AT concerns. Upshift/downshift engagement																						
See Section 05-03 TROUBLESHOOTING																							

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Fig. 7: Quick Diagnostic Chart (3 Of 4)
 Courtesy of MAZDA MOTORS CORP.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

X: Applicable

Possible factor		IAT sensor and related circuit malfunction	MAF sensor and related circuit malfunction	Knock sensor and related circuit malfunction	TP sensor and related circuit malfunction	Accelerator pedal position sensor and related circuit malfunction	Improper refrigerant charging amount	A/C relay (A/C control signal circuit malfunction)	A/C compressor magnetic clutch malfunction	Condenser fan system malfunction	Improper load signal input	AT related parts malfunction	VSS and related circuit malfunction	Improper ATF level	Brake dragging	Loose parts	Improper balance of wheels and tires	Drive line malfunction	Suspension malfunction	Immobilizer system operating (if equipped)	Immobilizer system or related circuit malfunction (if equipped)
Troubleshooting item																					
1	Melting of main or other fuses																				
2	MIL illuminates	x	x	x	x								x								
3	Will not crank																			x	x
4	Hard to start/long crank/erratic start/erratic crank		x																		
5	Engine stalls.]After start/at idle						x	x												x	x
6	Cranks normally but will not start																			x	x
7	Slow return to idle																				
8	Engine runs rough/rolling idle						x			x	x	x									
9	Fast idle/runs on										x										
10	Low idle/stalls during deceleration		x	x	x			x	x												
11	Engine stalls/quits.		x	x	x	x	x					x	x								
	Engine runs rough.		x	x	x	x	x					x	x								
	Misses		x	x	x	x	x					x	x								
	Buck/jerk		x	x	x	x	x					x	x								
	Hesitation/stumble		x	x	x	x	x					x	x								
12	Surges		x	x	x	x	x					x	x								
13	Lack/loss of power		x	x	x	x	x					x	x								
14	Knocking/pinging	x	x	x																	
15	Poor fuel economy		x												x	x					
16	Emission compliance																				
17	High oil consumption/leakage																				
17	Cooling system concerns																				
	Overheating						x	x		x											
18	Cooling system concerns																				
	Runs cold										x										
19	Exhaust smoke																				
20	Fuel odor (in engine compartment)																				
21	Engine noise																			x	
22	Vibration concerns (engine)																			x	x
23	A/C does not work sufficiently.							x	x	x											
24	A/C is always on or A/C compressor runs continuously.								x	x											
25	A/C does not cut off under WOT conditions.						x														
26	Exhaust sulphur smell																				
27	Fuel refill concerns																				
28	Fuel filling shut off concerns																				
29	Spark plug condition		x																		
30	AT concerns																				
	Upshift/downshift engagement																				
		See Section 05-03 TROUBLESHOOTING																			

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Fig. 8: Quick Diagnostic Chart (4 Of 4)
 Courtesy of MAZDA MOTORS CORP.

NO.1 MELTING OF MAIN OR OTHER FUSES [MZI-3.7]

TROUBLESHOOTING HINTS - NO.1 MELTING OF MAIN OR OTHER FUSES

1	MELTING OF MAIN OR OTHER FUSES
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2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

[TROUBLESHOOTING HINTS]

Inspect condition of fuse



(ILSAC)

TROUBLESHOOTING HINTS FOR FUSES

Damaged fuse	Related wiring harness
MAIN	<p>MAIN fuse</p> <ul style="list-style-type: none"> • IGKEY2 fuse • Ignition switch • Generator • FUEL PUMP fuse • FAN1 fuse <ul style="list-style-type: none"> ○ Cooling fan relay (Single fan control module) ○ Fan control module (Single fan control module) ○ Cooling fan relay No.1 (Dual fan control module) ○ Fan control module No.1 (Dual fan control module) • FAN2 fuse <ul style="list-style-type: none"> ○ Cooling fan relay (Single fan control module) ○ Fan control module (Single fan control module) ○ Cooling fan relay No.2 (Dual fan control module) ○ Fan control module No.2 (Dual fan control module)

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

IGKEY1	<p>IGKEY1 fuse</p> <ul style="list-style-type: none"> • Ignition switch • ENG. IGA fuse
IG KEY2	<p>IGKEY2 fuse</p> <ul style="list-style-type: none"> • Ignition switch • STA fuse • Starter relay <ul style="list-style-type: none"> ○ Starter ○ PCM
ENG.IGA	<p>ENG.IGA fuse</p> <ul style="list-style-type: none"> • Fuel pump relay • PCM • Diode • Fan relay (Single fan control module) • Cooling fan relay No.1 (Dual fan control module) • Cooling fan relay No.2 (Dual fan control module)
FUEL PUMP	<p>FUEL PUMP fuse</p> <ul style="list-style-type: none"> • Fuel pump relay <ul style="list-style-type: none"> ○ Fuel pump ○ PCM • INJ fuse <ul style="list-style-type: none"> ○ PCM ○ Fuel injector No.1 ○ Fuel injector No.2 ○ Fuel injector No.3 ○ Fuel injector No.4 ○ Fuel injector No.5 ○ Fuel injector No.6
FAN1	<p>FAN 1 fuse</p> <ul style="list-style-type: none"> • Fan relay <ul style="list-style-type: none"> ○ Fan control module (Single fan control module) • Cooling fan relay No.1 (Dual fan control module) <ul style="list-style-type: none"> ○ Fan control module No.1 (Dual fan control module)
	<p>FAN 2 fuse</p>

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

FAN 2	<ul style="list-style-type: none"> • Fan relay <ul style="list-style-type: none"> ○ Fan control module (Single fan control module) • Cooling fan relay No.2 (Dual fan control module) <ul style="list-style-type: none"> ○ Fan control module No.2 (Dual fan control module)
ENG+B	<p>ENG+B fuse</p> <ul style="list-style-type: none"> • Generator • CV solenoid valve • PCM
STA	<p>STA fuse</p> <ul style="list-style-type: none"> • Starter relay <ul style="list-style-type: none"> ○ PCM
ENG BAR	<p>ENG BAR fuse</p> <ul style="list-style-type: none"> • Front HO2S (RH) • Front HO2S (LH) • Rear HO2S (RH) • Rear HO2S (LH) • Oil control valve (RH) • Oil control valve (LH) • Mass air flow/intake air temperature sensor • Purge solenoid valve • Brake switch No.2
ENG BAR2	<p>ENG BAR2 fuse</p> <ul style="list-style-type: none"> • A/C relay • PCV valve heater fitting • PCV valve heater control
ENG INJ	<p>ENG INJ fuse</p> <ul style="list-style-type: none"> • PCM
INJ	<p>INJ fuse</p> <ul style="list-style-type: none"> • PCM • Fuel injector No.1 • Fuel injector No.2 • Fuel injector No.3 • Fuel injector No.4 • Fuel injector No.5

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	<ul style="list-style-type: none"> • Fuel injector No.6
IG COIL	<p>IG COIL fuse</p> <ul style="list-style-type: none"> • Condenser • Ignition coil No.1 • Ignition coil No.2 • Ignition coil No.3 • Ignition coil No.4 • Ignition coil No.5 • Ignition coil No.6

NO.2 MIL ILLUMINATES [MZI-3.7]

NO.2 MIL ILLUMINATES (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

2	MIL ILLUMINATES
DESCRIPTION	The MIL is illuminated incorrectly.
POSSIBLE CAUSE	<ul style="list-style-type: none"> • The PCM illuminates for emission-related concern (DTC is stored in PCM) • Instrument cluster malfunction <p>NOTE:</p> <ul style="list-style-type: none"> • If the MIL blinks at steady rate, misfire condition could possibly exist.

DIAGNOSTIC PROCEDURE

NO.2 MIL ILLUMINATES (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	<p>DTC is displayed:</p> <ul style="list-style-type: none"> • Go to appropriate the DTC inspection. <p>(See <u>DTC TABLE [MZI-3.7]</u> .)</p>
		No	<p>No DTC is displayed:</p> <ul style="list-style-type: none"> • Inspect instrument cluster operation. <p>(See <u>INSTRUMENT CLUSTER INSPECTION</u> .)</p>

- Verify test results.
 - If normal, return to diagnostic index to service any additional symptoms.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

(See **SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].**)

- 2
- 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, replace the PCM.

(See **PCM INSPECTION [MZI-3.7]** .)

NO.3 WILL NOT CRANK [MZI-3.7]

NO.3 WILL NOT CRANK (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

3	WILL NOT CRANK
DESCRIPTION	The starter does not work.
POSSIBLE CAUSE	<ul style="list-style-type: none"> ● Open starter circuit between ignition switch and starter ● TR switch malfunction ● TR switch misadjustment ● Low or dead battery ● Charging system malfunction. ● Starter malfunction ● Seized/hydrolocked engine, drive plate ● Immobilizer system and/or circuit malfunction ● Immobilizer system operating properly. (Ignition key is not registered) ● Advanced keyless entry system malfunction

DIAGNOSTIC PROCEDURE

NO.3 WILL NOT CRANK (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	NOTE: <ul style="list-style-type: none"> ● The following test should be performed on the advanced keyless entry system. If not equipped, go to the next step. Start the engine using the mechanical ignition key. Does the engine start?	Yes	Inspect advanced keyless entry system and repair or replace according to inspection result. (See <u>SYMPTOM TROUBLESHOOTING CHART [KEYLESS ENTRY SYSTEM]</u> .)
		No	Go to the next step.
2	Connect the M-MDS to the DLC-2. Do the following conditions appear? <ul style="list-style-type: none"> ● The engine is not completely 	Yes	Both conditions appear: Go to Step 4.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	started. • DTC P1260 is displayed.	No	Either or other condition appears: Go to the next step.
3	Is the coil antenna connector securely connected to the coil antenna?	Yes	Go to the next step.
		No	Connect the coil antenna connector securely. Return to Step 1.
4	Does the security light flush?	Yes	Go to the next step.
		No	Inspect and repair or replace the following: <ul style="list-style-type: none"> • Wiring harnesses and connectors from keyless control module terminal 3W and instrument cluster terminal 1W • Wiring harness and connectors from keyless control module terminal 3X and instrument cluster terminal 1X <ul style="list-style-type: none"> • Instrument cluster (See <u>INSTRUMENT CLUSTER INSPECTION</u> .)
5	Connect the M-MDS to the DLC-2 and retrieve DTC for PCM, instrument cluster and keyless control module. DTC PCM: B1342, U0073, U0155 Instrument cluster: B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2431, U0100, U0214 Keyless control module (with advanced keyless entry system): B1681, B2103, B1213	Yes	Go to appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	Go to the next step.
6	Inspect for the following wiring harnesses and connectors: With advanced keyless entry system <ul style="list-style-type: none"> • Between coil terminal A and keyless control module terminal 3V • Between coil terminal B and keyless control module terminal 3U Without advanced keyless entry system <ul style="list-style-type: none"> • Between coil terminal A and instrument cluster terminal 1E 	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step, (with advanced keyless entry system) Go to the Step 8. (without advanced keyless

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	<ul style="list-style-type: none"> Between coil terminal B and instrument cluster terminal 1G 		entry system)
	Is there any malfunction?		
7	Inspect the following wiring harnesses and connectors for an open or short circuit: <ul style="list-style-type: none"> Between keyless control module terminal 3W and instrument cluster terminal 1W Between keyless control module terminal 3X and instrument cluster terminal 1X 	Yes	Repair or replace wiring harness and connectors.
		No	Go to the next step.
	Is there any malfunction?		
8	Inspect for the following wiring harnesses and connectors: <ul style="list-style-type: none"> Between PCM terminal 1BG and instrument cluster terminal 1W Between PCM terminal 1BL and instrument cluster terminal 1X 	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step.
	Is there any malfunction?		
9	Inspect the following: <ul style="list-style-type: none"> Battery connection Battery condition (See: 01-17-2 BATTERY INSPECTION [MZI-3.7]) <ul style="list-style-type: none"> Fuses (See: 01-03-12 NO.1 MELTING OF MAIN OR OTHER FUSES [MZI-3.7]) <ul style="list-style-type: none"> Transmission in Park or Neutral (AT) 	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 9.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	Are all items normal?		
10	Connect the M-MDS to the DLC-2. Turn ignition switch to the ON position. (Engine off) Access TR PID. Is TR PID indicated P/N when selecting P or N position	Yes	Go to the next step.
		No	Inspect TR switch is adjusted properly, inspect for open or short circuit between TR switch and TCM. Repair or replace components as required. Then go to the next step.
11	Is clicking sound heard from starter relay when the ignition switch is turned to START?	Yes	Go to step 14.
		No	Go to the next step.
12	Inspect the starter relay and following harnesses. Between starter relay and PCM Between starter relay and ignition switch (See: 09-21-6 RELAY INSPECTION) Are they normal?	Yes	Go to the next step.
		No	Repair or replace components as required. Then go to step 11.
13	Inspect IGNITION switch and related harnesses. (See: 09-21-2 IGNITION SWITCH INSPECTION) Are they normal?	Yes	Go to the next step.
		No	Repair or replace components as required. Then go to step 11.
14	Inspect the following harnesses. Between starter relay and Battery Between starter relay and Starter Are they normal?	Yes	Go to the next step.
		No	Repair or replace as required. Then go to next step.
15	Inspect the starting system. (See: 01-19-2 STARTER INSPECTION [MZI-3.7]) Is starting system normal?	Yes	Go to the next step.
		No	Repair or replace components as required.
16	Inspect for seized/hydro locked engine or flywheel. Is ENGINE seized or hydro locked?	Yes	Repair or replace components as required.
		No	Go to the next step.
17	Connect the M-MDS to the DLC-2. Retrieve any continuous memory DTCs. Are there any continuous memory DTCs	Yes	<p>DTC is displayed: Go to appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)</p> <p>Communication error message is displayed: Inspect for the following:</p> <ul style="list-style-type: none"> • Open circuit in wiring harness between main relay and PCM terminal 1BO or 1BJ • Open circuit in wiring harness between main relay terminal E and PCM terminal 1BM

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	displayed?		<ul style="list-style-type: none"> • Main relay is stuck open. • Open or short circuit in wiring harness between the DLC-2 and PCM terminals 1BL or 1BG • Open or poor GND circuit (PCM terminal 1D, 1J, 1BP, 1BK) • Poor connection of vehicle body GND
		No	No DTC is displayed: Go to the next step.
18	Retrieve any KOEO DTCs using M-MDS. Are there DTCs displayed during KOEO inspection?	Yes	DTC is displayed: Go to appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	No DTC is displayed: Go to the next step.
19	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7]</u>.)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p>		

NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [MZI-3.7]

NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

4	HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK
DESCRIPTION	<ul style="list-style-type: none"> • The starter cranks engine at normal speed but engine requires excessive cranking time before starting. • The battery is in normal condition.
	<ul style="list-style-type: none"> • Erratic signal to ignition coil • Vacuum leakage • Poor fuel quality • Starting system malfunction

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE

- Spark plug malfunction
- Air leakage from intake-air system
- Erratic signal from CKP sensor
- Erratic signal from CMP sensor
- Improper air/fuel mixture ratio control
- Air cleaner restriction
- Improper operation of electronic throttle control system
- PCV valve malfunction
- Inadequate fuel pressure
- Purge solenoid valve malfunction
- MAF sensor contamination
- Incorrect MAF sensor GND voltage
- Restriction in exhaust system
- Pressure regulator malfunction (built-in fuel pump unit)

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] .)

(See AFTER SERVICE PRECAUTION [MZI-3.7] .)

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

NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK (MZI-3.7) DIAGNOSTIC PROCEDURE

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2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: <ul style="list-style-type: none"> • 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.) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	No DTC is displayed: Go to the next step.
3	Is engine overheating?	Yes	Go to symptom troubleshooting "No. 17 Cooling system concerns-Overheating". (See <u>NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [MZI-3.7].</u>)
		No	Go to the next step.
4	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 the wiring harnesses.
5	Inspect the spark plug conditions. 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.
		No	Install the spark plugs on original cylinders. Go to the next step.
6	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are the CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
7	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
			Inspect the electronic throttle control system

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

8	Attempt to start engine at part throttle. Does engine run smoothly at part throttle?	Yes	operation. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>)
		No	Go to the next step.
9	Install the fuel pressure gauge between the fuel pipe and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch ON? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7] .</u>)	Yes	Go to the next step.
		No	<p>Zero or low: Inspect the fuel pump relay and the fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .</u>)</p> <p>High: Replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .</u>)</p>
10	Is the fuel line pressure held after ignition switch is turned off? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7] .</u>)	Yes	Go to the next step.
		No	<p>Inspect the fuel injector. (See <u>FUEL INJECTOR INSPECTION [MZI-3.7] .</u>)</p> <p>If the fuel injector is normal, replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .</u>)</p>
11	Disconnect a vacuum hose from purge solenoid valve and plug opening end of vacuum hose. Start engine. Is starting condition improved?	Yes	Inspect if the purge solenoid valve is stuck open.
		No	Go to the next step.
12	Inspect the MAF sensor for following: <ul style="list-style-type: none"> • Contamination • MAF sensor terminal B voltage (GND circuit) Is there any contamination?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
13	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
	Inspect the starting system.	Yes	Inspect for loose connectors or poor

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

14	(See STARTER INSPECTION [MZI-3.7] .) Is starting system normal?	No	terminal contact. Repair or replace components as required.
15	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, Replace the PCM. <p style="text-align: center;">(See PCM REMOVAL/INSTALLATION [MZI-3.7] .)</p>		

NO.5 ENGINE STALLS-AFTER START/AT IDLE [MZI-3.7]

NO.5 ENGINE STALLS-AFTER START/AT IDLE (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

5	ENGINE STALLS-AFTER START/AT IDLE
DESCRIPTION	<ul style="list-style-type: none"> • Engine stops unexpectedly.
	<ul style="list-style-type: none"> • A/C system operation is improper • Air leakage from intake-air system parts • Purge solenoid valve malfunction • Improper operation of electronic throttle control system • No signal from CKP sensor due to sensor, related wire or wrong installation • Vacuum leakage • Engine overheating • Low engine compression • Erratic signal to ignition coil • Poor fuel quality • PCV valve malfunction • Air cleaner restriction • Restriction in exhaust system • Electrical connector disconnection • Open or short circuit in fuel pump body and related wiring harness • No battery power supply to PCM or poor GND • Inadequate fuel pressure • Fuel pump body mechanical malfunction

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE

- Fuel leakage from fuel injector
- Fuel injector clogging
- Ignition coil malfunction
- Improper air/fuel mixture ratio control
- Improper valve timing
- Improper operation variable valve timing control system
- Immobilizer system and/or circuit malfunction
- Immobilizer system operating property. (Ignition key is not registered.)
- Pressure regulator malfunction (built-in fuel pump unit)

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] .)

(See AFTER SERVICE PRECAUTION [MZI-3.7] .)

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

NO.5 ENGINE STALLS-AFTER START/AT IDLE (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Do the following conditions appear? • The engine is not completely started. • DTC P1260 is displayed.	Yes	Both conditions appear: Go to Step 3.
		No	Either or other condition appears: Go to the next step.
		Yes	Go to the next step.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

2	Does the engine stall after approx. 2 s since the engine is started?	No	Immobilizer system is normal. Go to Step 9.
3	Is coil connector securely connected to coil?	Yes	Go to the next step.
		No	Connect the coil connector securely. Return to Step 2.
4	Does the security light flush?	Yes	Go to the next step.
		No	Inspect and repair or replace the following: <ul style="list-style-type: none"> • Wiring harnesses and connectors from keyless control module terminal 3W and instrument cluster terminal 1W • Wiring harness and connectors from keyless control module terminal 3X and instrument cluster terminal 1X <ul style="list-style-type: none"> • Instrument cluster <p style="text-align: center;">(See <u>INSTRUMENT CLUSTER INSPECTION</u> .)</p>
5	Connect the M-MDS to the DLC-2 and retrieve DTC for PCM, instrument cluster and keyless control module (with advanced keyless entry system). Are any of the following DTCs displayed? DTC PCM: B1342, U0073, U0155 Instrument cluster: B1213, B1600, B1601, B1602, B1681, B2103, 2139, B2431, U0110, U0214 Keyless control module (with advanced keyless entry system): B1681, B2103, B1213	Yes	Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	Go to the next step.
6	Inspect for the following wiring harnesses and connectors: With advanced keyless entry system: <ul style="list-style-type: none"> • Between coil terminal A and keyless control module terminal 3V • Between coil terminal B and keyless control module terminal 3U Without advanced keyless entry system:	Yes	Repair or replace the suspected wiring harness and connector.
			Go to the next step, (with advanced

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	<ul style="list-style-type: none"> • Between coil terminal A and instrument cluster terminal 1G • Between coil terminal B and instrument cluster terminal 1E 	No	keyless entry system.) Go to Step 8. (without advanced keyless entry system.)
	Is there any malfunction?		
7	Inspect the following wiring harnesses and connectors for an open or short circuit:	Yes	Repair or replace wiring harness and connectors.
	<ul style="list-style-type: none"> • Between keyless control module terminal 3W and instrument cluster terminal 1W • Between keyless control module terminal 3X and instrument cluster terminal 1X 	No	Go to the next step.
	Is there any malfunction?		
8	Inspect for the following wiring harnesses and connectors:	Yes	Repair or replace the suspected wiring harness and connector.
	<ul style="list-style-type: none"> • Between PCM terminal 1BG and instrument cluster terminal 1W • Between PCM terminal 1BL and instrument cluster terminal 1X 	No	Go to the next step.
	Is there any malfunction?		
9	Verify the following:	Yes	Go to the next step.
	<ul style="list-style-type: none"> • Vacuum connection • Air cleaner element • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold • Ignition wiring • Fuel quality: proper octane, contamination, winter/summer blend • Electrical connections 	No	Service if necessary. Repeat Step 9.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	<ul style="list-style-type: none"> • Smooth operation of throttle valve 		
	Are all items normal?	Yes	Go to the next step.
10	<p>Connect the M-MDS to the DLC-2. Access the APP1 and APP2, APP3 PIDs. Crank the engine with accelerator pedal released. Are the APP1 and APP2, APP3 PIDs indicating that the accelerator pedal is in the released position?</p>	No	<p>Inspect for the following:</p> <ul style="list-style-type: none"> • APP sensor • Wiring harnesses and connectors for following: <ul style="list-style-type: none"> ○ PCM terminal 1AC-APP sensor terminal B ○ PCM terminal 1 AH-APP sensor terminal C ○ PCM terminal 1Y-APP sensor terminal D ○ PCM terminal 1AK-APP sensor terminal E ○ PCM terminal 1BA-APP sensor terminal F ○ PCM terminal 1 AD-APP sensor terminal G ○ PCM terminal 1AG-APP sensor terminal H
11	<p>Connect the M-MDS to the DLC-2. Access the TP1, TP2 PID. Crank the engine with accelerator pedal released. Are the TP1, TP2 PID indicates the closed throttle position?</p>	No	<p>Inspect for the following:</p> <ul style="list-style-type: none"> • TP sensor • Wiring harnesses and connectors for following: <ul style="list-style-type: none"> ○ PCM terminal 2BO-TP sensor terminal A ○ PCM terminal 2BR-TP sensor terminal B ○ PCM terminal 2AD-TP sensor terminal C ○ PCM terminal 2D-TP sensor terminal D ○ PCM terminal 2AH-TP sensor terminal E ○ PCM terminal 2Z-TP sensor terminal F

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

12	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	<p>DTC is displayed: Go to appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)</p> <p>Communication error message is displayed: Inspect for the following:</p> <ul style="list-style-type: none"> • Open circuit in wiring harness between main relay and PCM terminal 1 BO or 1BJ • Open main relay GND circuit • Main relay is stuck open. • Open or short circuit in wiring harness between the DLC-2 and PCM terminals 1BL or 1BG • Open or poor GND circuit (PCM terminal 1D, 1J, 1BP, 1BK) • Poor connection of vehicle body GND
		No	<p>No DTC is displayed: Go to the next step.</p>
13	Attempt to start engine at part throttle. Does engine run smoothly at part throttle?	Yes	Inspect electronic throttle control system operation. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>)
		No	Go to the next step.
14	Connect the M-MDS to the DLC-2. Access RPM PID. Is RPM PID indicating engine speed during engine cranking?	Yes	Go to the next step.
		No	<p style="text-align: center;">Inspect for the following:</p> <ul style="list-style-type: none"> • Open or short circuit in CKP sensor • Open or short circuit in wiring harness between CKP sensor terminal A and PCM terminal 2P • Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2T • Open or short circuit in CKP sensor wiring harnesses <p style="text-align: center;">If CKP sensor and wiring harness are normal, go to the next step.</p>
	Visually inspect CKP sensor and teeth of		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

15	crankshaft pulley. Are CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
16	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 the wiring harnesses.
17	Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].) Is strong blue spark visible at each cylinder?	Yes	Go to the next step. If symptoms occurs with the A/C on, go to Step 23.
		No	Repair or replace the malfunctioning part according to spark test result.
18	Inspect the spark plug condition. Is spark plug wet, covered with carbon or grayish white?	Yes	Spark plug is wet or covered with carbon: Inspect for fuel leakage from injector. Spark plug is grayish white: Inspect the fuel injector for clogging.
		No	Install spark plugs on original cylinders. Go to the next step.
19	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
20	visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
21	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch ON? (See FUEL LINE PRESSURE INSPECTION [MZI-3.7] .)	Yes	Go to the next step.
		No	Zero or low: Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .) High: Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .)
22	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. Is fuel line pressure held after ignition switch is turned off? (See FUEL LINE PRESSURE	Yes	Go to the next step.
		No	Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	INSPECTION [MZI-3.7] .)		3.7] .)
23	<p>NOTE:</p> <ul style="list-style-type: none"> • The following test is for stall concerns with the A/C on. If other symptoms exist, go to the next step. <p>Connect pressure gauges to A/C low and high pressure side lines. Turn A/C on and measure low side and high side pressures. Are pressures within specifications? (See <u>REFRIGERANT PRESSURE CHECK</u> .)</p>	Yes	Go to the next step.
		No	<p>If A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See <u>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MZI-3.7].</u>)</p> <p>For other symptoms, inspect the following:</p> <ul style="list-style-type: none"> • Refrigerant charging amount • Condenser fan operation
24	<p>Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid side. Plug opening end of vacuum hose. Start the engine. Is the engine stall now eliminated?</p>	Yes	<p>Inspect if purge solenoid valve is stuck open. Inspect evaporative emission control system.</p>
		No	Go to the next step.
25	<p>Is air leakage felt or heard at intake-air system components while racing the engine to higher speed?</p>	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
26	<p>Inspect variable valve timing control system operation. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>) Does variable valve timing control function properly?</p>	Yes	Go to the next step.
		No	Repair or replace the malfunctioning parts according to variable valve timing control system operation inspection results.
27	<p>Is the engine compression correct?</p>	Yes	Inspect the valve timing.
		No	Inspect for cause.
28	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].</u>)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7] .</u>)</p>		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

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

NO.6 CRANKS NORMALLY BUT WILL NOT START (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

6	CRANKS NORMALLY BUT WILL NOT START
DESCRIPTION	<ul style="list-style-type: none">• The starter cranks engine at normal speed but the engine will not run.• Refer to symptom troubleshooting "<u>NO.5 ENGINE STALLS</u>" if this symptom appears after engine stall.• Fuel is in tank.• Battery is in normal condition.
POSSIBLE CAUSE	<ul style="list-style-type: none">• No battery power supply to PCM• Air leakage from intake-air system• Open PCM GND or vehicle body GND• Improper operation of electronic throttle 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• Low engine compression• Engine overheating• Vacuum leakage• Erratic signal to ignition coil• Improper air/fuel mixture ratio control• Poor fuel quality• PCV valve malfunction• Restriction in intake-air system• Restriction in exhaust system• Disconnected electrical connector• Open or short circuit in fuel pump body and related wiring harness• Inadequate fuel pressure• Fuel pump mechanical malfunction• Fuel leakage from injector• Fuel injector is clogged.• Purge solenoid valve malfunction• Spark plug malfunction• Ignition coil malfunction• Improper variable valve timing control system operation• Improper valve timing• Immobilizer system and/or circuit malfunction• Immobilizer system operating properly. (Ignition key is not registered.)

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

- Pressure regulator malfunction (built-in fuel pump unit)

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] .)

(See AFTER SERVICE PRECAUTION [MZI-3.7] .)

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

NO.6 CRANKS NORMALLY BUT WILL NOT START (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Do any of the following conditions appear? • Engine does not completely start. • DTC P1260 is displayed.	Yes	Both conditions appear: Go to Step 3.
		No	Either or other condition appears: Go to the next step.
2	Does engine stall after approx. 2 s from when it is started?	Yes	Go to the next step.
		No	Immobilizer system is normal. Go to Step 9.
3	Is the coil connector securely connected to the coil?	Yes	Go to the next step.
		No	Connect the coil connector securely. Return to Step 2.
		Yes	Go to the next step.
			Inspect and repair or replace the following:

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

4	Does the security light flush?	No	<ul style="list-style-type: none"> • Wiring harnesses and connectors from keyless control module terminal 3W and instrument cluster terminal 1W • Wiring harness and connectors from keyless control module terminal 3X and instrument cluster terminal 1X <ul style="list-style-type: none"> • Instrument cluster <p>(See <u>INSTRUMENT CLUSTER INSPECTION</u> .)</p>
5	Connect the M-MDS to the DLC-2 and retrieve the DTC for PCM, instrument cluster and keyless control module (with advanced keyless entry system). Are any of the following DTCs displayed? DTC PCM: B1342, U0073, U0155 Instrument cluster: B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2431, U0100, U0214 Keyless control module (with advanced keyless entry system): B1681, B2103, B1213	Yes	Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	Go to the next step.
6	Inspect the following wiring harnesses and connectors: With advanced keyless entry system: <ul style="list-style-type: none"> • Between coil terminal A and keyless control module terminal 3V • Between coil terminal B and keyless control module terminal 3U Without advanced keyless entry system: <ul style="list-style-type: none"> • Between coil terminal A and instrument cluster terminal 1G • Between coil terminal B and instrument cluster terminal 1E 	Yes	Repair or replace the suspected wiring harness and connector.
		No	Go to the next step, (with advanced keyless entry system.) Go to Step 8. (without advanced keyless entry system.)

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	Is there any malfunction?		
7	<p>Inspect the following wiring harnesses and connectors for an open or short circuit:</p> <ul style="list-style-type: none"> • Between keyless control module terminal 3W and instrument cluster terminal 1W • Between keyless control module terminal 3X and instrument cluster terminal 1X 	Yes	Repair or replace wiring harness and connectors.
		No	Go to the next step.
	Is there any malfunction?		
8	<p>Inspect the following wiring harnesses and connectors:</p> <ul style="list-style-type: none"> • Between PCM terminal 1BG and instrument cluster terminal 1W • Between PCM terminal 1BL and instrument cluster terminal 1X 	Yes	Repair or replace the suspected wiring harness and connector.
		No	Go to the next step.
	Is there any malfunction?		
9	<p>Verify the following:</p> <ul style="list-style-type: none"> • 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 • Electrical connections • Fuses • Smooth operation of throttle valve 	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 9.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	Are all items normal?		
10	<p>Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?</p>	Yes	<p>DTC is displayed:</p> <ul style="list-style-type: none"> • Go to the appropriate DTC inspection. <p>(See <u>DTC TABLE [MZI-3.7]</u> .)</p> <p>Communication error message is displayed: Inspect for the following:</p> <ul style="list-style-type: none"> • Open circuit in wiring harness between main relay and PCM terminal 1 BO or 1BJ • Open main relay GND circuit • Open or short circuit in wiring harness between the DLC-2 and PCM terminal 1BL or 1BG • Main relay is stuck open. • Open or poor GND circuit (PCM terminal 1D, 1J, 1BP, 1BK) • Poor connection of vehicle body GND
		No	<p>No DTC is displayed: Go to the next step.</p>
11	<p>Connect the M-MDS to the DLC-2. Access the APP1 and APP2, APP3 PIDs. Crank the engine with accelerator pedal released. Are the APP1 and APP2, APP3 PIDs indicating that the accelerator pedal is in the released position?</p>	Yes	Go to the next step.
		No	<p style="text-align: center;">Inspect for the following:</p> <ul style="list-style-type: none"> • APP sensor • Wiring harnesses and connectors for following: <ul style="list-style-type: none"> ○ PCM terminal 1 AC-APP sensor terminal B ○ PCM terminal 1 AH-APP sensor terminal C ○ PCM terminal 1Y-APP sensor terminal D ○ PCM terminal 1AK-APP sensor terminal E ○ PCM terminal 1BA-APP sensor terminal F

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

			<ul style="list-style-type: none"> ○ PCM terminal 1AD-APP sensor terminal G ○ PCM terminal 1AG-APP sensor terminal H
12	Connect the M-MDS to the DLC-2. Access the TP1, TP2 PID. Crank the engine with accelerator pedal released. Are the TP1, TP2 PID indicates the closed throttle position?	Yes	Go to the next step.
		No	<p>Inspect for the following:</p> <ul style="list-style-type: none"> ● TP sensor ● Wiring harnesses and connectors for following: <ul style="list-style-type: none"> ○ PCM terminal 2BO-TP sensor terminal A ○ PCM terminal 2BR-TP sensor terminal B ○ PCM terminal 2AD-TP sensor terminal C ○ PCM terminal 2D-TP sensor terminal D ○ PCM terminal 2AH-TP sensor terminal E ○ PCM terminal 2Z-TP sensor terminal F
13	Does the engine start with the throttle valve closed?	Yes	Go to Step 28.
		No	Go to the next step.
14	Will the engine start and run smoothly at part throttle?	Yes	Inspect the electronic throttle control system operation. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>)
		No	Go to the next step.
15	Connect the M-MDS to the DLC-2. Access RPM PID. Is RPM PID indicating the engine speed when cranking the engine?	Yes	Go to the next step.
		No	<p>Inspect for the following:</p> <ul style="list-style-type: none"> ● Open or short circuit in CKP sensor ● Open or short circuit in wiring harness between CKP sensor terminal A and PCM terminal 2P ● Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2T ● Open or short circuit in CKP sensor wiring harnesses

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

			If CKP sensor and wiring harness are normal, go to the next step.
16	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
17	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 the wiring harnesses.
18	Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to spark test result.
19	Inspect the spark plug conditions. Is spark plug wet, covered with carbon or grayish white?	Yes	Spark plug is wet or covered with carbon: Inspect for fuel leakage from injector. Spark plug is grayish white: Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
20	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
21	visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
22	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct when ignition switch is turned on/off five times? (See FUEL LINE PRESSURE INSPECTION [MZI-3.7] .)	Yes	Go to the next step.
		No	Zero or low: Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .) High: Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .)
	Visually inspect the fuel injector O-ring and fuel line for fuel leakage.	Yes	Go to the next step.
			Inspect the fuel injector.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

23	Service if necessary. Is the fuel line pressure held after the ignition switch is turned off? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7]</u> .)	No	If the fuel injector is normal, replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7]</u> .)
24	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Start the engine. Is starting condition improved?	Yes	Inspect if the purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system.
		No	Go to the next step.
25	Is air leakage felt or heard at intake-air system components while racing engine to higher speed?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
26	Inspect the variable valve timing control system operation. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7]</u> .) Does variable valve timing control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
27	Is the engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for causes.
28	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7]</u>.)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p>		

NO.7 SLOW RETURN TO IDLE [MZI-3.7]

NO.7 SLOW RETURN TO IDLE (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

7	SLOW RETURN TO IDLE
DESCRIPTION	Engine takes more time than normal to return to idle speed.
	<ul style="list-style-type: none"> • CHT sensor malfunction

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE

- Thermostat is stuck open.
- Throttle body malfunction
- Air leakage from intake-air system

DIAGNOSTIC PROCEDURE

NO.7 SLOW RETURN TO IDLE (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See DTC TABLE [MZI-3.7] .)
		No	No DTC is displayed: Go to the next step.
2	Remove thermostat and inspect operation. (See THERMOSTAT REMOVAL/INSTALLATION [MZI-3.7] .) (See THERMOSTAT INSPECTION [MZI-3.7] .) Is thermostat normal?	Yes	ECT and thermostat are normal. Go to the next step.
		No	Access ECT PID on the M-MDS. Inspect for both ECT PID and temperature gauge on instrument cluster readings. If temperature gauge on instrument cluster indicates normal range but ECT PID is not same as temperature gauge reading, inspect CHT sensor. If temperature gauge on instrument cluster indicates cold range but ECT PID is normal, inspect temperature gauge and heat gauge unit.
3	Is throttle body free of contamination?	Yes	Inspect for air leakage from the intake-air system components while racing the engine to higher speed.
		No	Clean or replace throttle body.
4	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See PCM REMOVAL/INSTALLATION [MZI-3.7] .)</p>		

NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [MZI-3.7]

NO.8 ENGINE RUNS ROUGH/ROLLING IDLE (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

8	ENGINE RUNS ROUGH/ROLLING IDLE
DESCRIPTION	<ul style="list-style-type: none"> • Engine speed fluctuates between specified idle speed and lower speed and engine shakes excessively. • Idle speed is too slow and engine shakes excessively.
POSSIBLE CAUSE	<ul style="list-style-type: none"> • Air leakage from intake-air system parts • A/C system operation is improper • Erratic signal to ignition coil • Spark plug malfunction • Purge solenoid valve malfunction • Improper operation of electronic throttle control system • Idle learning of electronic throttle control system is not completed • Erratic or no signal from CMP sensor • Low engine compression • Improper valve timing • Improper variable valve timing control system operation • Erratic signal from CKP sensor • Improper air / fuel mixture ratio control operation (abnormal signal from MAF sensor or HO2S) • Open or short circuit in PCM GND circuit • Poor fuel quality • PCV valve malfunction • Air cleaner restriction • Restriction in exhaust system • Disconnected electrical connectors • Inadequate fuel pressure • Fuel pump body mechanical malfunction • Improper load signal input • Fuel line restriction or clogging • Improper fuel injection control operation • Fuel leakage from fuel injector • Fuel injector clogging • Engine overheating • Vacuum leakage • Pressure regulator malfunction (built-in fuel pump unit)

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

WARNING:

The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read 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] .)

(See AFTER SERVICE PRECAUTION [MZI-3.7] .)

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

NO.8 ENGINE RUNS ROUGH/ROLLING IDLE (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Warm up the engine. Idle the engine for 5 min. Is the symptom disappeared?	Yes	Troubleshooting completed. (Cause of this symptom is that the idle learning of electronic throttle control system is not completed.)
		No	Go to the next step.
2	Verify the following: <ul style="list-style-type: none"> • External fuel shut off or accessory (such as kill switch, alarm) • Fuel quality (such as proper octane, contamination, winter/summer blend) • No air leakage from intake-air system • Proper sealing of intake manifold and components attached to intake manifold 	Yes	Go to the next step.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	<ul style="list-style-type: none"> • Ignition wiring • Electrical connections • Fuses • Smooth operation of throttle valve • PCM GND circuit (1D, U, 1BP, 1BK) 	No	Service if necessary. Repeat Step 2.
	Are all items normal?		
3	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	No DTC is displayed: Go to the next step.
4	Is the engine overheating?	Yes	Go to symptom troubleshooting "No.17 Cooling system concerns - Overheating". (See <u>NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [MZI-3.7].</u>)
		No	Go to the next step.
5	Connect the M-MDS to the DLC-2. Access MAF PID. Drive vehicle with monitoring PID. Is MAF PID within specification?	Yes	Go to the next step.
		No	Inspect for open or short circuit of MAF sensor and related wiring harness.
6	NOTE: <ul style="list-style-type: none"> • The following test is for engine running at rough idle with A/C on. If other symptoms exist, go to the next step. Connect pressure gauge to A/C low and high pressure side lines.Start engine and idle it.Turn the A/C switch on.Measure low side and high side pressures.Are pressures within specifications?(See <u>REFRIGERANT PRESSURE CHECK</u> .)	Yes	Go to the next step.
		No	If the A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See <u>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MZI-3.7].</u>) For other symptoms, inspect the following: <ul style="list-style-type: none"> • Refrigerant charging amount • Condenser fan operation
7	NOTE: <ul style="list-style-type: none"> • The following test is for engine running rough with P/S on. If other symptoms exist, go to the next step. Connect the M-MDS to the DLC-2.Start	Yes	Go to the next step.
		No	Inspect power steering pressure switch operation and wiring harness between P/S pressure switch and PCM terminal 21.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	the engine and idle it. Access PSP PID. Is PSP PID within specification?		
8	Visually inspect the CKP sensor and teeth of crankshaft pulley.	Yes	Go to the next step.
	Are the CKP sensor and teeth of crankshaft pulley normal?	No	Replace the malfunctioning part.
9	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 the wiring harnesses.
10	Inspect the spark plug condition. Is the spark plug wet, covered with carbon or grayish white?	Yes	Spark plug is wet or covered with carbon: Inspect for fuel leakage from injector. Spark plug is grayish white: Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
11	Perform the electronic throttle control system operation inspection. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>) Does the electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle control system operation inspection results.
12	Install fuel pressure gauge between fuel pipe and fuel distributor. Start the engine and run it at idle. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7] .</u>)	Yes	Go to the next step.
		No	Low: Inspect the fuel line for clogging. If there is no malfunction, replace fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .</u>) High: Replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .</u>)
13	Visually inspect for fuel leakage at fuel injector, O-ring, and fuel line. Service if necessary. Does fuel line pressure hold after ignition switch is turned off? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7] .</u>)	Yes	Go to the next step.
		No	Inspect fuel injector. If fuel injector is normal, replace fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .</u>)
		Yes	Go to the next step.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

14	<p>Connect the M-MDS to the DLC-2. Start the engine and idle it. Access LONG FT1 PID, LONG FT2 PID. Measure LONG FT1 PID, LONG FT2 PID at idle. Is PID value normal?</p>	No	<p>LONG FT1 PID, LONG FT2 PID is out of specification. Less than specification (too rich):</p> <ul style="list-style-type: none"> • Inspect EVAP control system. <p>Greater than specification (too lean):</p> <ul style="list-style-type: none"> • Inspect for air leakage at intake-air system components. <ul style="list-style-type: none"> ○ If system is normal, go to the next step.
15	<p>Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Start the engine. Does the engine condition improve?</p>	Yes	<p>Check if purge solenoid valve is stuck open mechanically. Inspect EVAP control system.</p>
		No	Go to the next step.
16	<p>Remove and shake the PCV valve. Does the PCV valve rattle?</p>	Yes	Go to the next step.
		No	Replace the PCV valve.
17	<p>Visually inspect the exhaust system part. Is there any deformed exhaust system part?</p>	Yes	Replace the suspected part.
		No	Go to the next step.
18	<p>Visually inspect the CMP sensor and teeth of camshaft. Are the CMP sensor and teeth of camshaft normal?</p>	Yes	Go to the next step.
		No	Replace the malfunctioning part.
19	<p>Inspect variable valve timing control system operation. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].) Does variable valve timing control system function properly?</p>	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
20	<p>Is engine compression correct?</p>	Yes	Inspect the valve timing.
		No	Inspect for causes.
21	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p>(See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. 		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

- If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.

(See **PCM REMOVAL/INSTALLATION [MZI-3.7]** .)

NO.9 FAST IDLE/RUNS ON [MZI-3.7]

NO.9 FAST IDLE/RUNS ON (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

9	FAST IDLE/RUNS ON
DESCRIPTION	<ul style="list-style-type: none"> • The engine speed continues at fast idle after warm-up. • The engine runs after the ignition switch is turned off.
POSSIBLE CAUSE	<ul style="list-style-type: none"> • CHT sensor malfunction • Air leakage from intake-air system • Throttle body malfunction • Accelerator pedal position sensor misadjustment • Cruise control system operation improperly • Improper load signal input • Improper operation of electronic throttle control system

DIAGNOSTIC PROCEDURE

NO.9 FAST IDLE/RUNS ON (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Access ECT PID. Start and warm up engine to normal operating temperature. Is ECT PID between 82-112°C {180-234°F} ?	Yes	Go to the next step.
		No	<p>ECT PID is higher than 112°C {234°F}: Go to symptom troubleshooting "No.17 Cooling system concerns - Overheating".</p> <p>ECT PID is less than 82°C {180°F}: Go to symptom troubleshooting "No.18 Cooling system concerns - Runs cold".</p>
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	<p>DTC is displayed: Go to the appropriate DTC inspection. (See DTC TABLE [MZI-3.7] .)</p>
		No	<p>No DTC is displayed: Go to the next step.</p>
		Yes	Go to the next step.
			<p>If the AC_REQ PID is not normal:</p> <ul style="list-style-type: none"> • Inspect A/C switch, refrigerant pressure switch, and fan switch, and related wiring harness for vibration or intermittent open/short circuit.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

3	<p>Access and monitor PSP and TR PIDs. Are PIDs values normal? (See PCM INSPECTION [MZI-3.7] .)</p>	No	<p>If the TR PID is not normal:</p> <ul style="list-style-type: none"> • Inspect TR switch and related wiring harness for vibration or intermittent open/short circuit. <p>If the PSP PID is not normal:</p> <ul style="list-style-type: none"> • Inspect power steering switch and related wiring harness for vibration or intermittent open/short circuit.
4	<p>Is there air leakage felt or heard at intake-air system components while racing engine to higher speed?</p>	Yes	<p>Repair or replace parts if necessary.</p>
		No	<p style="text-align: center;">Inspect the following:</p> <ul style="list-style-type: none"> • Electronic throttle control system operation • Accelerator pedal position sensor
5	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See PCM REMOVAL/INSTALLATION [MZI-3.7] .)</p>		

NO.10 LOW IDLE/STALLS DURING DECELERATION [MZI-3.7]

NO.10 LOW IDLE/STALLS DURING DECELERATION (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

10	LOW IDLE/STALLS DURING DECELERATION
DESCRIPTION	<ul style="list-style-type: none"> • Engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.
	<ul style="list-style-type: none"> • Vacuum leakage • Improper operation of electronic throttle control system • Air leakage from intake-air system

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE

- Improper air/fuel mixture ratio control
- Evaporative emission control system malfunction
- Accelerator pedal position sensor or related circuit malfunction
- Accelerator pedal position sensor misadjustment
- TP sensor or related circuit malfunction
- MAF sensor or related circuit malfunction
- Brake switch or related circuit malfunction
- TR switch or related circuit malfunction
- Improper A/C magnetic clutch operation

DIAGNOSTIC PROCEDURE

NO.10 LOW IDLE/STALLS DURING DECELERATION (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Does the engine idle roughly?	Yes	Go to symptom troubleshooting "No.8 Engine runs rough/rolling idle". (See NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [MZI-3.7].)
		No	Go to the next step.
2	Turn off the A/C switch and fan switch. Does the A/C magnetic clutch engage?	Yes	Go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously." (See NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MZI-3.7].)
		No	Go to the next step.
3	Verify the following: <ul style="list-style-type: none"> • Proper routing of and no damage to vacuum lines • No air leakage from intake-air system <p>Are all items normal?</p>	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 3.
4	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See DTC TABLE [MZI-3.7] .)
		No	No DTC is displayed: Go to the next step.
	Perform the electronic throttle control system operation inspection. (See ENGINE CONTROL SYSTEM	Yes	Go to the next step.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

5	<p><u>OPERATION INSPECTION [MZI-3.7].)</u> Does the electronic throttle control system function properly?</p>	No	Repair or replace the malfunctioning part according to electronic throttle control system operation inspection results.
6	<p>Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?</p>	Yes	Inspect the evaporative emission control system.
		No	Go to the next step.
7	<p>Connect the M-MDS to the DLC-2. Access APP1, APP2, APP3, TP1, TP2, MAF and VSS PIDs. Monitor each PID while driving vehicle. (See <u>PCM INSPECTION [MZI-3.7]</u> .) Are PIDs normal?</p>	Yes	Go to the next step.
		No	<p style="text-align: center;">APP1, APP2, APP3 PIDs: Inspect the accelerator pedal position sensor. TP1, TP2 PID: Inspect TP sensor. MAF PID: Inspect MAF sensor. VSS PID: Inspect VSS.</p>
8	<p>Access and monitor BOO, TR PIDs. Are PIDs values normal? (See <u>PCM INSPECTION [MZI-3.7]</u> .)</p>	Yes	Go to the next step.
		No	<p style="text-align: center;">If the BOO PID is not normal:</p> <ul style="list-style-type: none"> • Inspect brake switch, and related wiring harness for vibration or intermittent open/short circuit. <p style="text-align: center;">If the TR PID is not normal:</p> <ul style="list-style-type: none"> • Inspect TR switch and related wiring harness for vibration or intermittent open/short circuit.
9	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)</u>)</p> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p> 		

NO.11 ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES [MZI-3.7]

NO.11 ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

<p>11</p>	<p>ENGINE STALLS/QUITS-ACCELERATION/CRUISE ENGINE RUNS ROUGH-ACCELERATION/CRUISE MISSES-ACCELERATION/CRUISE BUCK/JERK-ACCELERATION/CRUISE/DECELERATION HESITATION/STUMBLE-ACCELERATION SURGES-ACCELERATION/CRUISE</p>
<p>DESCRIPTION</p>	<ul style="list-style-type: none"> • Engine stops unexpectedly at the beginning of acceleration or during acceleration. • Engine stops unexpectedly while cruising. • Engine speed fluctuates during acceleration or cruising. • Engine misses during acceleration or cruising. • Vehicle bucks/jerks during acceleration, cruising, or deceleration. • Momentary pause at beginning of acceleration or during acceleration • Momentary minor irregularity in engine output
	<ul style="list-style-type: none"> • Improper A/C system operation • Erratic signal or no signal from CMP sensor • Air leakage from intake-air system parts • Purge solenoid valve malfunction • Improper operation of electronic throttle control system • Erratic signal from CKP sensor • Low engine compression • Vacuum leakage • Poor fuel quality • Main relay intermittent malfunction • Throttle body malfunction • Engine overheating • Spark plug malfunction • Improper air/fuel mixture ratio control operation • Erratic signal to ignition coil • Air cleaner restriction • PCV valve malfunction • Fuel flow into evaporative purge hose • Improper valve timing due to jumping out timing chain

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE

- Restriction in exhaust system
- Intermittent open or short circuit in fuel body pump circuit
- Inadequate fuel pressure
- Fuel pump mechanical malfunction
- Check valve (two-way) malfunction integrated with fuel tank
- Fuel leakage from fuel injector
- Fuel injector clogging
- Fuel line restriction or clogging
- Pressure regulator malfunction (built-in fuel pump unit)
- Erratic signal from APP sensor
- Erratic signal from TP sensor
- Intermittent open or short circuit of MAF sensor, TP sensor, APP sensor and VSS
- ATX malfunction
- Loose attaching bolts or worn engine mounts

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] .)

(See AFTER SERVICE PRECAUTION [MZI-3.7] .)

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

NO.11 ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE. SURGES (MZI-3.7) DIAGNOSTIC PROCEDURE

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

STEP	INSPECTION	RESULTS	ACTION
1	Verify the following: <ul style="list-style-type: none"> • Vacuum connection • Air cleaner element • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold • Ignition wiring • Fuel quality (such as proper octane, contamination, winter/summer blend) • Electrical connections • Smooth operation of throttle valve Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	No DTC is displayed: Go to the next step.
3	Is engine overheating?	Yes	Go to symptom troubleshooting "No.17 Cooling system concerns - Overheating".
		No	Go to the next step.
4	Connect the M-MDS to the DLC-2. Access APP1, APP2, APP3, RPM, VPWR, MAF, TP1, TP2 and VSS PIDs. Drive the vehicle with monitoring PIDs. Are PIDs within specifications? (See <u>PCM INSPECTION [MZI-3.7]</u> .)	Yes	Go to the next step.
		No	<p style="text-align: center;">APP1, APP2, APP3 PIDs:</p> Inspect if output signal from APP sensor changes smoothly. <p style="text-align: center;">RPM PID:</p> Inspect the CKP sensor and related wiring harness for vibration or intermittent open/short circuit. <p style="text-align: center;">VPWR PID:</p> Inspect for open circuit intermittently. <p style="text-align: center;">MAF PID:</p> Inspect for open circuit of the MAF sensor and related wiring harness intermittently. <p style="text-align: center;">TP1, TP2 PID:</p> Inspect if output signal from TP sensor changes smoothly.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

			VSS PID: Inspect for open circuit of VSS and related wiring harness intermittently.
5	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
6	Inspect the spark plug conditions. 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.
		No	Install the spark plugs on original cylinders. Go to the next step.
7	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
8	Perform the electronic throttle control system operation inspection. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>) Does the electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle system operation inspection results.
9	Visually inspect deformed exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
10	Install fuel pressure gauge between the fuel pipe and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch to ON position? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7].</u>)	Yes	Go to the next step.
		No	Zero or low: Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7].</u>) High: Replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7].</u>)
11	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. Is fuel line pressure held after ignition	Yes	Go to the next step.
			Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	switch is turned off? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7]</u> .)	No	(See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7]</u> .)
12	NOTE: <ul style="list-style-type: none"> • The following test is for engine stall with the A/C on. If other symptom exists, go to the next step. Connect a pressure gauge to A/C low and high pressure side lines. Turn the A/C on and measure low side and high side pressure. Are pressures within specifications? (See <u>REFRIGERANT PRESSURE CHECK</u> .)	Yes	Go to the next step.
		No	If the A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See <u>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MZI-3.7]</u> .) For other symptoms, inspect the following: <ul style="list-style-type: none"> • Refrigerant charging amount • Condenser fan operation
13	NOTE: <ul style="list-style-type: none"> • The following test should be performed for symptom with cruise control ON. If other symptoms exist, go to the next step. Inspect cruise control system. Is cruise control system normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
14	Inspect the front HO2S. (See <u>FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [MZI-3.7]</u> .) Is the front HO2S normal?	Yes	Go to the next step.
		No	Replace the front HO2S. (See <u>REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [MZI-3.7]</u> .)
15	Inspect the evaporative purge hose between the fuel tank and the purge valve. Does fuel flow into evaporative purge hose?	Yes	Inspect the check valve (two-way). (See <u>FUEL TANK INSPECTION [MZI-3.7]</u> .)
		No	Go to the next step.
16	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from the purge solenoid valve side. Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	Yes	Go to the next step. Inspect if the purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system.
		No	Go to the next step.
17	Visually inspect the CMP sensor and projections of camshaft pulley. Are CMP sensor and projections of camshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

18	Is the engine compression correct?	Yes	Inspect the following: <ul style="list-style-type: none"> • Valve timing • Internal transaxle part • Engine mounts • Check valve (two-way)
		No	Inspect for cause.
19	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="margin-left: 40px;">(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].</u>)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="margin-left: 40px;">(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7].</u> .)</p>		

NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE [MZI-3.7]

NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

12	LACK/LOSS OF POWER-ACCELERATION/CRUISE
DESCRIPTION	Performance is poor under load (such as power down when climbing hills).
	<ul style="list-style-type: none"> • Improper A/C system operation • Erratic signal or no signal from CMP sensor • Air leakage from intake-air system parts • Restriction in intake-air system • Intake air temperature too hot • Improper operation of electronic throttle control system • Purge control solenoid malfunction • Brake dragging • Erratic signal from CKP sensor • Low engine compression • Vacuum leakage • Poor fuel quality • Erratic signal to ignition coil • Engine overheating

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE

- Throttle body malfunction
- Spark plug malfunction
- PCV valve malfunction
- Improper valve timing due to jumping out of timing chain
- Improper variable valve timing control operation
- Restriction in exhaust system
- Intermittent open or short in fuel pump related circuit
- Inadequate fuel pressure
- Fuel pump mechanical malfunction
- Fuel line restriction or clogging
- Fuel leakage from fuel injector
- Fuel injector clogging
- Erratic signal from accelerator pedal position sensor
- Erratic signal from TP sensor
- Intermittent open or short circuit in MAF sensor, Accelerator pedal position sensor, TP sensor, IAT sensor and VSS
- ATX 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 [MZI-3.7] .)

(See AFTER SERVICE PRECAUTION [MZI-3.7] .)

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.**

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Verify the following: <ul style="list-style-type: none"> • Vacuum connection • Restriction in intake-air system (such as air cleaner element, fresh air duct) • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold • Fuel quality (such as proper octane, contamination, winter/summer blend) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	No DTC is displayed: Go to the next step.
3	Is the engine overheating?	Yes	Go to symptom troubleshooting "No. 17 Cooling system concerns-Overheating".
		No	Go to the next step.
4	Connect the M-MDS to the DLC-2. Access APP1, APP2, APP3, RPM, MAF, TP1, TP2, IAT and VSS PIDs. Drive vehicle while monitoring PIDs. Are PIDs within specifications? (See <u>PCM INSPECTION [MZI-3.7]</u> .)	Yes	Go to the next step.
		No	APP1, APP2, APP3 PIDs: Inspect if output signal accelerator pedal position sensor changes smoothly. RPM PID: Inspect CKP sensor and related wiring harness for vibration or intermittent open/short circuit or both. MAF PID: Inspect for intermittent open circuit of MAF sensor and related wiring harness. TP1, TP2 PID: Inspect if output signal TP sensor changes smoothly. IAT PID: Inspect for air suction in intake-air system. If normal, inspect intermittent short circuit of IAT sensor and related wiring harnesses.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

			VSS PID: Inspect for intermittent open circuit of VSS and related wiring harness.
5	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are the CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
6	Inspect the spark plug condition. Is spark plug wet, covered with carbon or grayish white?	Yes	Spark plug is wet or covered with carbon: Inspect the fuel injector for fuel leakage. Inspect spark plug and high-tension lead. Spark plug is grayish white: Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
7	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace PCV valve.
8	Perform electronic throttle control system operation inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7] .) Does electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle control system operation inspection results.
9	visually inspect deformed exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
10	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch to ON position? (See FUEL LINE PRESSURE INSPECTION [MZI-3.7] .)	Yes	Go to the next step.
		No	Zero or low: Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .) High: Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .)
	NOTE: ● The following test is for engine stalling with the A/C on concern. If	Yes	Go to the next step.
			If A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously".

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

11	<p>other symptoms exist, go to the next step.</p> <p>Connect pressure gauge to the A/C low and high side pressure lines. Turn the A/C on and measure low side and high side pressures. Are pressures within specifications? (See <u>REFRIGERANT PRESSURE CHECK</u> .)</p>	No	<p>(See <u>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MZI-3.7].</u>)</p> <p>For other symptoms, inspect the following:</p> <ul style="list-style-type: none"> • Refrigerant charging amount • Condenser fan operation
12	<p>Inspect for A/C cut-off operation. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>)</p> <p>Does the A/C cut-off function properly?</p>	Yes	Go to the next step.
		No	Inspect A/C cut-off system components.
13	<p>Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?</p>	Yes	<p>Inspect if purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>)</p>
		No	Go to the next step.
14	<p>Visually inspect the CMP sensor and projections of camshaft pulley. Are the CMP sensor and projections of camshaft pulley normal?</p>	Yes	Go to the next step.
		No	Replace the malfunctioning part.
15	<p>Inspect the variable valve timing control system operation. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>)</p> <p>Does the variable valve timing control system function properly?</p>	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to variable valve timing control system inspection results.
16	<p>Is the engine compression correct?</p>	Yes	<p>Inspect the following:</p> <ul style="list-style-type: none"> • Valve timing • Internal transaxle components • Brake system for dragging
		No	Inspect for cause.
17	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p>(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].</u>)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. 		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

- If vehicle is repaired, troubleshooting completed.
- If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.

(See **PCM REMOVAL/INSTALLATION [MZI-3.7]** .)

NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [MZI-3.7]

NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

13	KNOCKING/PINGING - ACCELERATION/CRUISE
DESCRIPTION	Sound is heard when air/fuel mixture is ignited by something other than spark plug (such as hot spot in combustion chamber).
POSSIBLE CAUSE	<ul style="list-style-type: none">• Engine overheating due to cooling system malfunction• CHT sensor malfunction• IAT sensor malfunction• MAF sensor malfunction• Knock sensor malfunction• Erratic signal from CMP sensor• Inadequate engine compression• Inadequate fuel pressure <p>WARNING: The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:</p> <ul style="list-style-type: none">• 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. <p>(See BEFORE SERVICE PRECAUTION [MZI-3.7] .)</p> <p>(See AFTER SERVICE PRECAUTION [MZI-3.7] .)</p> <p>CAUTION:</p> <ul style="list-style-type: none">• 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

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

material.

DIAGNOSTIC PROCEDURE

NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Access ECT PID. Verify ECT PID is less than 116°C {241°F} during driving. Is ECT PID less than specification?	Yes	Go to the next step.
		No	Inspect the cooling system for cause of overheating.
2	Connect the M-MDS to the DLC-2. Access IAT and MAF PIDs. Monitor each PID. (See PCM INSPECTION [MZI-3.7] .) Are PIDs normal?	Yes	Go to the next step.
		No	IAT PID: Inspect IAT sensor MAF PID: Inspect MAF sensor
3	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (engine off). Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See DTC TABLE [MZI-3.7] .)
		No	No DTC is displayed: Go to the next step.
4	Is engine compression correct?	Yes	Go to the next step.
		No	Inspect for cause.
5	Install fuel pressure gauge between fuel pipe and fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See FUEL LINE PRESSURE INSPECTION [MZI-3.7] .)	Yes	Inspect the ignition timing.
		No	Low: Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .) High: Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .)
6	Inspect the knock sensor. Is the knock sensor normal?	Yes	Inspect ignition timing.
		No	Replace the knock sensor.
7	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair 		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

Information and perform repair or diagnosis.

- If vehicle is repaired, troubleshooting completed.
- If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.

(See **PCM REMOVAL/INSTALLATION [MZI-3.7]** .)

NO.14 POOR FUEL ECONOMY [MZI-3.7]

NO.14 POOR FUEL ECONOMY (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

14	POOR FUEL ECONOMY
DESCRIPTION	Fuel economy is unsatisfactory.
POSSIBLE CAUSE	<ul style="list-style-type: none">• Contaminated air cleaner element• Engine cooling system malfunction• Improper ATF level• Weak spark• Poor fuel quality• Erratic or no signal from CMP sensor• Improper variable valve timing control system operation• Improper coolant level• Inadequate fuel pressure• Spark plug malfunction• PCV valve malfunction• Brake dragging• Improper valve timing due to jumping out of timing chain• Contaminated MAF sensor• Improper engine compression• Exhaust system clogging <p>WARNING: The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:</p> <ul style="list-style-type: none">• 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.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

(See **BEFORE SERVICE PRECAUTION [MZI-3.7]** .)

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

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

NO.14 POOR FUEL ECONOMY (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: <ul style="list-style-type: none"> • Air cleaner element for contamination • ATF level • Fuel quality • Coolant level • Brake dragging Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See DTC TABLE [MZI-3.7] .)
		No	No DTC is displayed: Go to the next step.
3	Access ECT PID. Drive vehicle while monitoring PID. (See PCM INSPECTION [MZI-3.7] .) Is PID within specification?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan and condenser fan operations or thermostat operation.
4	Perform the spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7] .) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to spark test result.
	Install the fuel pressure gauge	Yes	Go to the next step.
			Low:

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

5	<p>between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle.</p> <p>Is fuel line pressure correct during idle? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7]</u> .)</p>	No	<p>Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7]</u> .) High: Replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p>
6	<p>Inspect for variable valve timing control system operation. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7]</u>.)</p> <p>Does the variable valve timing control system function properly?</p>	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
7	<p>Remove and shake the PCV valve. Does the PCV valve rattle?</p>	Yes	Go to the next step.
		No	Replace the PCV valve.
8	<p>Visually inspect the exhaust system part. Is there any deformed exhaust system?</p>	Yes	Replace the suspected part.
		No	Go to the next step.
9	<p>Inspect for contaminated MAF sensor. Is there any contamination?</p>	Yes	Go to the next step.
		No	Inspect for cause.
10	<p>Inspect the MAF sensor for contamination. Is there any contamination?</p>	Yes	Replace MAF sensor.
		No	Go to the next step.
11	<p>Is engine compression correct?</p>	Yes	Inspect the valve timing.
		No	Inspect for cause.
12	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. (See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7]</u>.) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p>		

NO.15 EMISSION COMPLIANCE [MZI-3.7]

NO.15 EMISSION COMPLIANCE (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

15	EMISSION COMPLIANCE
DESCRIPTION	Fails emissions test.
POSSIBLE CAUSE	<ul style="list-style-type: none"> • Vacuum lines leakage or blockage • Cooling system malfunction • Spark plug malfunction • Leakage from intake manifold • Erratic or no signal from CMP sensor • Inadequate fuel pressure • PCV valve malfunction or incorrect valve installation • Exhaust system clogging • Fuel tank ventilation system malfunction • Fuel-filler cap malfunction • Charcoal canister damage • Air cleaner element clogging or restriction • Throttle body malfunction • Erratic signal to ignition coil • Improper air/fuel mixture ratio control operation • Bend or open circuit HO2S wiring harness • Catalyst converter malfunction • Engine internal parts malfunction • Excessive carbon is built up in combustion chamber • Improper engine compression • Improper valve timing <p>WARNING: The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:</p> <ul style="list-style-type: none"> • 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. <p>(See <u>BEFORE SERVICE PRECAUTION [MZI-3.7]</u> .)</p>

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

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

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

NO.15 EMISSION COMPLIANCE (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: <ul style="list-style-type: none"> • Vacuum lines for leakage or blockage • Electrical connections • Proper maintenance schedule followed • Intake-air system and air cleaner element concerns: obstructions, leakage or dirtiness Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to appropriate DTC inspection. (See DTC TABLE [MZI-3.7] .)
		No	No DTC is displayed: Go to the next step.
3	Is any other driveability concern present?	Yes	Go to appropriate symptom troubleshooting.
		No	Go to the next step.
4	Connect the M-MDS to the DLC-2. Access ECT PID. Warm up the engine and idle it. Verify ECT PID is correct. (See PCM INSPECTION [MZI-3.7] .) Is ECT PID correct?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan and condenser fan operation or thermostat operation.
5	Inspect fuel-filler cap. (See FUEL-FILLER CAP INSPECTION [MZI-3.7] .)	Yes	Replace the fuel-filler cap.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	Is there any leakage at fuel-filler cap?	No	Go to the next step.
6	Inspect the front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [MZI-3.7] .) Is front HO2S normal?	Yes	Go to the next step.
		No	Replace the front HO2S. (See FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [MZI-3.7] .)
7	Perform spark test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7] .) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to spark test result.
8	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See FUEL LINE PRESSURE INSPECTION [MZI-3.7] .)	Yes	Go to the next step.
		No	Low: Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .) High: Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .)
9	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
10	Inspect for fuel saturation inside charcoal canister. Is excess amount of liquid fuel present in canister?	Yes	Replace the charcoal canister.
		No	Inspect the fuel tank vent system. Then, go to the next step. (See FUEL TANK INSPECTION [MZI-3.7] .)
11	visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the part.
		No	Go to the next step.
12	Inspect the three-way catalytic converter. (See EXHAUST SYSTEM INSPECTION [MZI-3.7] .) Is the three-way catalytic converter normal?	Yes	Go to the next step.
		No	Replace the three-way catalytic converter.

- Verify test results.
 - If normal, return to diagnostic index to service any additional symptoms.

(See **SYMPTOM DIAGNOSTIC INDEX [MZI-3.7]**.)

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

13

- 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, replace the PCM.

(See **PCM REMOVAL/INSTALLATION [MZI-3.7]** .)

NO.16 HIGH OIL CONSUMPTION/LEAKAGE [MZI-3.7]

NO.16 HIGH OIL CONSUMPTION/LEAKAGE (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

16	HIGH OIL CONSUMPTION/LEAKAGE
DESCRIPTION	Oil consumption is excessive.
POSSIBLE CAUSE	<ul style="list-style-type: none"> ● PCV valve malfunction ● Improper dipstick ● Improper engine oil viscosity ● Engine internal parts malfunction

DIAGNOSTIC PROCEDURE

NO.16 HIGH OIL CONSUMPTION/LEAKAGE (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Remove and shake the PCV valve.	Yes	Go to the next step.
	Does the PCV valve rattle?	No	Replace the PCV valve.
2	Inspect for the following: <ul style="list-style-type: none"> ● External leakage ● Proper dipstick ● Proper engine oil viscosity 	Yes	Inspect the internal engine parts such as valves, valve guides, valve stem seals, cylinder head drain passage, and piston rings.
	Are all items normal?	No	Service if necessary. Repeat Step 2.

- Verify test results.
 - If normal, return to diagnostic index to service any additional symptoms.

(See **SYMPTOM DIAGNOSTIC INDEX [MZI-3.7]**.)

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

3	<ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> ● If vehicle is repaired, troubleshooting completed. ● If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See PCM REMOVAL/INSTALLATION [MZI-3.7] .)</p>
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NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [MZI-3.7]

NO.17 COOLING SYSTEM CONCERNS-OVERHEATING (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

17	COOLING SYSTEM CONCERNS-OVERHEATING
DESCRIPTION	Engine runs at higher than normal temperature/overheats.
POSSIBLE CAUSE	<ul style="list-style-type: none"> ● Improper coolant level ● Blown fuses ● Coolant leakage ● Excessive A/C system pressure ● A/C system operation is improper ● Improper water/anti-freeze mixture ● Fans reverse rotation ● Poor radiator condition ● Thermostat malfunction ● Radiator hoses damage ● Improper or damaged radiator cap ● Cooling fan is inoperative. ● Coolant overflow system malfunction ● Improper tension of drive belt ● Drive belt damage

DIAGNOSTIC PROCEDURE

NO.17 COOLING SYSTEM CONCERNS-OVERHEATING (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
	Inspect the following: <ul style="list-style-type: none"> ● Engine coolant level ● Coolant leakage ● Water and anti-freeze mixture ● Radiator condition 	Yes	Go to the next step.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

1	<ul style="list-style-type: none"> • Collapsed or restricted radiator hoses • Radiator pressure cap • Overflow system • Fan rotational direction • Fuses <p>Are all items normal?</p>	No	<p>Service if necessary. Repeat Step 1.</p>
2	<p>Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?</p>	Yes	<p>DTC is displayed: Go to the appropriate DTC inspection. (See DTC TABLE [MZI-3.7] .)</p>
		No	<p>No DTC is displayed: Go to the next step.</p>
3	<p>Start the engine and idle it. Turn the A/C switch on and set blower fan to any speed. Does the A/C compressor engage?</p>	Yes	<p>Go to Step 5.</p>
		No	<p>Inspect for the following and repair or replace if necessary:</p> <ul style="list-style-type: none"> • Refrigerant charging amount • Open circuit in wiring harness between A/C relay and PCM terminal 1N • Seized A/C magnetic clutch • A/C magnetic clutch malfunction <p>If all items are normal, go to the next step.</p>
4	<p>Connect the M-MDS to the DLC-2. Access AC_REQ PID. Start the engine and idle it. Turn the A/C switch and fan switch on. Does AC_REQ PID read on?</p>	Yes	<p>Go to the next step.</p>
		No	<p>Inspect the following:</p> <ul style="list-style-type: none"> • Refrigerant pressure switch operation • The A/C switch is stuck open. • Open or short circuit between refrigerant pressure switch and PCM terminal 1R • Open circuit of blower motor fan switch and resistor (if blower motor does not operate) • The evaporator temperature sensor and A/C amplifier
	<p>Inspect cooling fan control system operation.</p>		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

5	(See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].) Does the cooling fan control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
6	Is the drive belt normal?	Yes	Go to the next step.
		No	Replace the drive belt.
7	Is there leakage around the heater unit in passenger compartment?	Yes	Inspect and service heater for leakage.
		No	Go to the next step.
8	Is there leakage at the coolant hoses and/or radiator?	Yes	Replace the malfunctioning part.
		No	Go to the next step.
9	Cool down the engine. Remove thermostat and inspect operation. (See THERMOSTAT REMOVAL/INSTALLATION [MZI-3.7].) (See THERMOSTAT INSPECTION [MZI-3.7].) Is thermostat normal?	Yes	The engine coolant temperature and thermostat are normal, inspect engine block for leakage or blockage.
		No	Access ECT PID. Inspect for both ECT PID and temperature gauge readings. If temperature gauge on instrument cluster indicates normal range but ECT PID is not same as temperature gauge reading, inspect CHT sensor. If temperature gauge on instrument cluster indicates overheating but ECT PID is normal, inspect temperature gauge and heat gauge unit.
10	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See PCM REMOVAL/INSTALLATION [MZI-3.7].)</p>		

NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [MZI-3.7]

NO.18 COOLING SYSTEM CONCERNS-RUNS COLD (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

18	COOLING SYSTEM CONCERNS-RUNS COLD
DESCRIPTION	Engine takes excessive time to reach normal operating temperature.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE

- Thermostat malfunction
- Cooling fan system malfunction

DIAGNOSTIC PROCEDURE

NO.18 COOLING SYSTEM CONCERNS-RUNS COLD (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Is customer complaint "Lack of passenger compartment heat" only?	Yes	Inspect A/C and heater system.
		No	Go to the next step.
2	Does the engine speed continue at fast idle?	Yes	Go to symptom troubleshooting "No.9 Fast idle/runs on". (See <u>NO.9 FAST IDLE/RUNS ON [MZI-3.7].</u>)
		No	Go to the next step.
3	Remove the thermostat and inspect operation. (See <u>THERMOSTAT REMOVAL/INSTALLATION [MZI-3.7].</u>) (See <u>THERMOSTAT INSPECTION [MZI-3.7].</u>) Is thermostat normal?	Yes	Go to the next step.
		No	Replace the thermostat.
4	Inspect cooling fan control system operation. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].</u>) Does the cooling fan control system function properly?	Yes	Access ECT PID. Inspect for both ECT PID and temperature gauge on instrument cluster readings. If the temperature gauge on the instrument cluster indicates normal range but ECT PID is not the same as temperature gauge reading, inspect the CHT sensor. If the temperature gauge on the instrument cluster indicates cold range but ECT PID is normal, inspect the temperature gauge and heat gauge unit.
		No	Repair or replace the malfunctioning part.
5	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].</u>)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace PCM. 		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

(See [PCM REMOVAL/INSTALLATION \[MZI-3.7\]](#) .)

NO.19 EXHAUST SMOKE [MZI-3.7]

NO.19 EXHAUST SMOKE (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

19	EXHAUST SMOKE
DESCRIPTION	Blue, black, or white smoke from exhaust system
POSSIBLE CAUSE	<p>Blue smoke (Burning oil):</p> <ul style="list-style-type: none">• PCV valve malfunction• Engine internal oil leakage <p>White smoke (Water in combustion):</p> <ul style="list-style-type: none">• Cooling system malfunction (coolant loss)• Engine internal coolant leakage <p>Black smoke (Rich fuel mixture):</p> <ul style="list-style-type: none">• Air cleaner restriction• Intake-air system is collapsed or restricted.• Fuel return line is restricted.• Excessive fuel pressure• Improper engine compression• Injector fuel leakage• Ignition system malfunction <p>WARNING: The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:</p> <ul style="list-style-type: none">• 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. <p>(See BEFORE SERVICE PRECAUTION [MZI-3.7] .)</p> <p>(See AFTER SERVICE PRECAUTION [MZI-3.7] .)</p>

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

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

NO.19 EXHAUST SMOKE (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	What color is smoke coming from the exhaust system?	Blue	Burning oil is indicated. Go to the next step.
		White	Water in combustion is indicated. Go to Step 3.
		Black	Rich fuel mixture is indicated. Go to Step 4.
2	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Inspect for the following: <ul style="list-style-type: none"> • Damaged valve guide, stems or valve seals • Blocked oil drain passage in cylinder head • Piston ring is not seated, seized or worn. • Damaged cylinder bore If other driveability symptoms are present, return to diagnostic index to service any additional symptoms.
		No	Replace the PCV valve.
3	Does the cooling system hold pressure?	Yes	Inspect for the following: <ul style="list-style-type: none"> • Cylinder head gasket leakage • Intake manifold gasket leakage • Cracked or porous engine block If other driveability symptoms are present, return to diagnostic index to service any additional symptoms.
		No	Inspect for cause.
	Inspect for the following: <ul style="list-style-type: none"> • Air cleaner restriction 	Yes	Go to the next step.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

4	<ul style="list-style-type: none"> • Collapsed or restricted intake-air system • Restricted fuel return line <p>Are all items normal?</p>	No	Service if necessary. Repeat Step 4.
5	<p>Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?</p>	Yes	<p>DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)</p>
		No	<p>No DTC is displayed: Go to the next step.</p>
6	<p>Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7]</u> .)</p>	Yes	Go to the next step.
		No	<p>Low: Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p> <p>High: Replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p>
7	<p>Perform the spark test. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7]</u>.) Is strong blue spark visible at each cylinder?</p>	Yes	<p>Inspect the CMP sensor. (See <u>CAMSHAFT POSITION (CMP) SENSOR INSPECTION [MZI-3.7]</u> .)</p>
		No	<p>Repair or replace the malfunctioning part according to spark test result.</p>
8	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p>(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7]</u>.)</p> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p>(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p> 		

NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) [MZI-3.7]

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

20	FUEL ODOR (IN ENGINE COMPARTMENT)
DESCRIPTION	Gasoline fuel smell or visible leakage
POSSIBLE CAUSE	<ul style="list-style-type: none"> • Excessive fuel pressure • Purge solenoid valve malfunction • Fuel tank vent system blockage • Charcoal canister malfunction • Fuel leakage from fuel system <p>WARNING: The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:</p> <ul style="list-style-type: none"> • 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. <p style="text-align: center;">(See <u>BEFORE SERVICE PRECAUTION [MZI-3.7]</u> .)</p> <p style="text-align: center;">(See <u>AFTER SERVICE PRECAUTION [MZI-3.7]</u> .)</p> <p>CAUTION:</p> <ul style="list-style-type: none"> • 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

NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary.	Yes	Go to the next step.
	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle?	No	Replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7]</u> .)

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	(See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7]</u> .)		
2	Inspect for blockage/restriction or open circuit in wiring harness between the engine vacuum port and the charcoal canister.	Yes	Replace vacuum hose.
	Inspect for blockage in fuel tank vent system. Is malfunction indicated?	No	Go to the next step.
3	Inspect the purge solenoid valve. (See <u>PURGE SOLENOID VALVE INSPECTION [MZI-3.7]</u> .)	Yes	Go to the next step.
	Is the solenoid operating properly?	No	Replace the purge solenoid valve. (See <u>PURGE SOLENOID VALVE REMOVAL/INSTALLATION [MZI-3.7]</u> .)
4	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs.	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
	Are there any DTCs displayed?	No	No DTC is displayed: Inspect charcoal canister for fuel saturation. If excess amount of liquid fuel is present, replace the charcoal canister.
5	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7]</u>.)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p>		

NO.21 ENGINE NOISE [MZI-3.7]

NO.21 ENGINE NOISE (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

21	ENGINE NOISE
DESCRIPTION	Engine noise from under hood
	Squeal, click or chirp noise: <ul style="list-style-type: none"> • Improper engine oil level • Improper drive belt tension

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE	<ul style="list-style-type: none"> • Generator installation (alignment) • Splash shield or under cover looseness (splashed water to drive belts) <p>Rattle sound noise:</p> <ul style="list-style-type: none"> • Loose parts <p>Hiss sound noise:</p> <ul style="list-style-type: none"> • vacuum leakage • Loose spark plug • Air leakage from intake-air system <p>Rumble or grind noise:</p> <ul style="list-style-type: none"> • Improper drive belt tension • Improper P/S fluid level <p>Rap or roar noise:</p> <ul style="list-style-type: none"> • Dynamic dumper looseness • Exhaust system looseness • Intake-air system looseness <p>Other noise:</p> <ul style="list-style-type: none"> • Camshaft friction gear noise or MLA noise • Timing chain noise
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DIAGNOSTIC PROCEDURE

NO.21 ENGINE NOISE (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Is a squealing, click or chirping sound present?	Yes	Inspect for the followings: <ul style="list-style-type: none"> • Engine oil level • Drive belt tension • Splash shield or under cover looseness

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

			<ul style="list-style-type: none"> • Generator installation (alignment)
		No	Go to the next step.
2	Is a rumbling or grinding noise present?	Yes	Inspect for the followings: <ul style="list-style-type: none"> • Drive belt tension • P/S fluid level
		No	Go to the next step.
3	Is a rattling noise present?	Yes	Inspect rattling location for loose parts.
		No	Go to the next step.
4	Is a hissing noise present?	Yes	Inspect for the following: <ul style="list-style-type: none"> • Vacuum leakage • Spark plug looseness • Intake-air system leakage
		No	Go to the next step.
5	Is a rapping or roar noise present?	Yes	Inspect looseness for followings: <ul style="list-style-type: none"> • Dynamic dumper • Intake-air system • Exhaust system
		No	Go to the next step.
6	Is a knocking noise present?	Yes	Go to symptom troubleshooting "No. 13 Knocking/pinging". (See <u>NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [MZI-3.7].</u>)
		No	If the noise comes from the engine internal, inspect for friction gear, timing chain or MLA noise.
7	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. (See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].</u>) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See <u>PCM REMOVAL/INSTALLATION [MZI-3.7] .</u>) 		

NO.22 VIBRATION CONCERNS (ENGINE) [MZI-3.7]

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

NO.22 VIBRATION CONCERNS (ENGINE) (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

22	VIBRATION CONCERNS (ENGINE)
DESCRIPTION	<ul style="list-style-type: none"> • Vibration from under hood or driveline
POSSIBLE CAUSE	<ul style="list-style-type: none"> • Loose attaching bolts or worn parts • Components malfunction such as worn parts

DIAGNOSTIC PROCEDURE

NO.22 VIBRATION CONCERNS (ENGINE) (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Inspect the following components for loose attaching bolts or worn parts: <ul style="list-style-type: none"> • Cooling fan • Drive belt and pulleys • Generator • Engine mounts • Exhaust system mounts 	Yes	Inspect the following systems: <ul style="list-style-type: none"> • Wheels • ATX • Driveline • Suspension
		No	Readjust or retighten engine mount installation position. Service if necessary for other parts.
2	All items normal? <ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. (See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].</u>) <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See <u>PCM REMOVAL/INSTALLATION [MZI-3.7]</u> .)		

NO.23 A/C DOES NOT WORK SUFFICIENTLY [MZI-3.7]

NO.23 A/C DOES NOT WORK SUFFICIENTLY (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

23	A/C DOES NOT WORK SUFFICIENTLY.
DESCRIPTION	A/C compressor magnetic clutch does not engage when the A/C switch is turned on.
	<ul style="list-style-type: none"> • Improper refrigerant charging amount

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE	<ul style="list-style-type: none"> • Open the A/C magnetic clutch • Open circuit in wiring harness between A/C relay and A/C magnetic clutch • Poor GND of A/C magnetic clutch • Refrigerant pressure switch is stuck open. • A/C relay is stuck open. • Seized A/C compressor • Open circuit in wiring harness between A/C switch and PCM through both refrigerant pressure switch and A/C amplifier
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DIAGNOSTIC PROCEDURE

NO.23 A/C DOES NOT WORK SUFFICIENTLY (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See DTC TABLE [MZI-3.7] .)
		No	No DTC is displayed: Go to the next step.
2	Disconnect A/C compressor connector. Start engine and turn A/C switch on. Is there correct voltage at A/C compressor magnetic clutch terminal? Specification 10.5 V or more	Yes	Inspect for GND condition of magnetic clutch on A/C compressor. If GND condition is normal, inspect for open circuit magnetic clutch coil.
		No	Go to the next step.
3	Disconnect refrigerant pressure switch connector. Connect jumper wiring between A/C high pressure switch terminal. Connect jumper wiring between refrigerant pressure switch terminal. Turn the ignition switch to the ON position. Turn A/C switch on and set blower fan to any speed. Does A/C work?	Yes	Inspect refrigerant pressure switch operation. If switch is normal, go to the next step.
		No	Inspect for the following: <ul style="list-style-type: none"> • A/C switch is stuck open. • Open circuit in wiring harness between refrigerant pressure switch and PCM terminal 1R • Open circuit in wiring harness between blower motor fan switch and resistor (if blower motor does not operate) • Evaporator temperature sensor and A/C amplifier
	Remove jumper wiring from the switch connector.	Yes	Inspect whether A/C relay is stuck open. Replace if necessary.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

4	Reconnect connector to refrigerant pressure switch. Start the engine and turn the A/C switch on. Does the fan operate?	No	Inspect the following and repair or replace if necessary: <ul style="list-style-type: none"> • Refrigerant charging amount • A/C compressor for seizure
5	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].</u>)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p>		

NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MZI-3.7]

NO.24 A/C ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

24	A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY.
DESCRIPTION	A/C compressor magnetic clutch does not disengage.
POSSIBLE CAUSE	<ul style="list-style-type: none"> • A/C compressor magnetic clutch engagement is stuck. • A/C relay is stuck closed. • Short to GND in wiring harness between A/C switch and PCM • Short to GND in wiring harness between A/C relay and PCM • Short circuit to battery power in A/C relay to magnetic clutch

DIAGNOSTIC PROCEDURE

NO.24 A/C ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	No DTC is displayed: Go to the next step.
			Inspect for the following:

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

2	<p>Start the engine and idle it. Turn the A/C switch on. Remove the A/C relay. Does the A/C magnetic clutch disengage?</p>	Yes	<ul style="list-style-type: none"> • A/C relay is stuck closed. • Short to GND in wiring harness between A/C relay and PCM terminal 1N. <p>If both items normal, go to the next step.</p>
		No	<p>Inspect if circuit between the A/C relay and magnetic clutch shorts to battery power circuit. If the circuit is normal, inspect the magnetic clutch for stuck engagement or clearance.</p>
3	<p>Disconnect refrigerant pressure switch connector. Start the engine and turn A/C switch on.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • A/C should not work when disconnecting connector. If A/C remains working, short to GND circuit may be present. <p>Does the A/C remain working?</p>	Yes	<p>Inspect for short to GND in wiring harness between refrigerant pressure switch and PCM terminal 1R.</p>
		No	<p>Go to the next step.</p>
4	<p>Reconnect refrigerant pressure switch connector. Turn off A/C switch.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • A/C should not work when turning A/C switch off. If A/C remains working, short to GND circuit may be present. <p>Does A/C remain working?</p>	Yes	<p>Inspect following:</p> <ul style="list-style-type: none"> • Short to GND in wiring harness between A/C switch and A/C amplifier • Short to GND circuit between A/C amplifier and refrigerant pressure switch
		No	<p>Inspect whether A/C switch is stuck closed.</p>
5	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)</p> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. 		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

- If vehicle is repaired, troubleshooting completed.
- If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.

(See **PCM REMOVAL/INSTALLATION [MZI-3.7]** .)

NO.25 A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS [MZI-3.7]

NO.25 A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

25	A/C DOES NOT CUT OFF UNDER WOT CONDITIONS.
DESCRIPTION	A/C compressor magnetic clutch does not disengage under WOT.
POSSIBLE CAUSE	<ul style="list-style-type: none"> • Accelerator pedal position sensor malfunction • Accelerator pedal position sensor misadjustment • Loosely installed accelerator pedal position sensor

DIAGNOSTIC PROCEDURE

NO.25 A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

STEP	INSPECTION	RESULTS	ACTION
1	Does A/C compressor disengage when the A/C switch is turned off?	Yes	Go to the next step.
		No	Go to symptom troubleshooting "<u>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY</u>".
2	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	No DTC is displayed: Inspect accelerator pedal position sensor.
3	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7]</u>.)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. 		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

(See PCM REMOVAL/INSTALLATION [MZI-3.7] .)

NO.26 EXHAUST SULPHUR SMELL [MZI-3.7]S

NO.26 EXHAUST SULPHUR SMELL (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

26	EXHAUST SULPHUR SMELL
DESCRIPTION	Rotten egg smell (sulphur) from exhaust
POSSIBLE CAUSE	<ul style="list-style-type: none"> • Electrical connectors are disconnected or connected poorly • Charcoal canister malfunction • Vacuum lines are disconnected or connected improperly. • Improper fuel pressure • Poor fuel quality <p>WARNING: The following troubleshooting flow chart contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:</p> <ul style="list-style-type: none"> • 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. <p style="text-align: center;">(See <u>BEFORE SERVICE PRECAUTION [MZI-3.7]</u> .)</p> <p style="text-align: center;">(See <u>AFTER SERVICE PRECAUTION [MZI-3.7]</u> .)</p> <p>CAUTION:</p> <ul style="list-style-type: none"> • 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

NO.26 EXHAUST SULPHUR SMELL (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Are any driveability or exhaust smoke concerns present?	Yes	Go to the appropriate flow chart.
		No	Go to the next step.
	Inspect the following:		

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

2	<ul style="list-style-type: none"> • Electrical connections • Vacuum lines • Fuel quality <p>Are all items normal?</p>	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 2.
3	<p>Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?</p>	Yes	<p>DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)</p>
		No	<p>No DTC is displayed: Go to the next step.</p>
4	<p>Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start engine and idle it. Is fuel line pressure correct at idle? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7]</u> .)</p>	Yes	Go to the next step.
		No	<p>Low: Inspect fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p> <p>High: Replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p>
5	<p>Inspect the charcoal canister for fuel saturation. Is excess amount of liquid fuel present in canister?</p>	Yes	Replace the charcoal canister.
		No	<p>Inspect the fuel tank vent system. If the fuel tank vent system is normal, suggest trying a different brand since sulphur content can vary in different fuels. If the fuel tank vent system is not normal, repair or replace the malfunctioning part.</p>
6	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p>(See <u>SYMPTOM DIAGNOSTIC INDEX [MZI-3.7]</u>.)</p> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p>(See <u>PCM REMOVAL/INSTALLATION [MZI-3.7]</u> .)</p> 		

NO.27 FUEL REFILL CONCERNS [MZI-3.7]

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

NO.27 FUEL REFILL CONCERNS (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

27	FUEL REFILL CONCERNS
DESCRIPTION	<ul style="list-style-type: none"> • Fuel tank is not filled smoothly.
POSSIBLE CAUSE	<ul style="list-style-type: none"> • Clogged EVAP pipes • Nonreturn valve malfunction • Improper use of fuel nozzle • Inadequate fuel filling speed <p>WARNING:</p> <ul style="list-style-type: none"> • The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system: <ul style="list-style-type: none"> ○ 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. <p style="text-align: center;">(See BEFORE SERVICE PRECAUTION [MZI-3.7] .)</p> <p style="text-align: center;">(See AFTER SERVICE PRECAUTION [MZI-3.7] .)</p> <p>CAUTION:</p> <ul style="list-style-type: none"> • 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

NO.27 FUEL REFILL CONCERNS (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See DTC TABLE [MZI-3.7] .)
		No	No DTC is displayed: Go to the next step.
		Yes	Inspect for the following: <ul style="list-style-type: none"> • Improper use of fuel nozzle

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

2	Remove the fuel-filler pipe. Make sure the nonreturn valve is installed properly. Inspect nonreturn valve operation. Is the nonreturn valve normal?	No	<ul style="list-style-type: none"> • Inadequate fuel filling speed <p>Nonreturn valve is installed improperly:</p> <ul style="list-style-type: none"> • Reinstall nonreturn valve to proper position. <p>Nonreturn valve does not operate properly:</p> <ul style="list-style-type: none"> • Replace nonreturn valve.
3	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p>(See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)</p> <ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p>(See PCM REMOVAL/INSTALLATION [MZI-3.7] .)</p>		

NO.28 FUEL FILLING SHUT OFF CONCERNS [MZI-3.7]

NO.28 FUEL FILLING SHUT OFF CONCERNS (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

28	FUEL FILLING SHUT OFF CONCERNS
DESCRIPTION	<ul style="list-style-type: none"> • Fuel does not shut off properly.
	<ul style="list-style-type: none"> • Clogged EVAP pipes • Nonreturn valve malfunction • Fuel shut-off valve malfunction • Fuel nozzle malfunction • Fuel nozzle is not inserted correctly. <p>WARNING:</p> <ul style="list-style-type: none"> • The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system: <ul style="list-style-type: none"> ○ Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

POSSIBLE CAUSE	<p style="margin-left: 40px;">fuel.</p> <ul style="list-style-type: none"> ○ 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. <p style="margin-left: 40px;">(See <u>BEFORE SERVICE PRECAUTION [MZI-3.7]</u> .)</p> <p style="margin-left: 40px;">(See <u>AFTER SERVICE PRECAUTION [MZI-3.7]</u> .)</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● 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.
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DIAGNOSTIC PROCEDURE

NO.28 FUEL FILLING SHUT OFF CONCERNS (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	Connect the M-MDS to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	DTC is displayed: Go to the appropriate DTC inspection. (See <u>DTC TABLE [MZI-3.7]</u> .)
		No	No DTC is displayed: Go to the next step.
2	Remove the fuel-filler pipe. Make sure the nonreturn valve is installed properly. Inspect nonreturn valve operation. Is the nonreturn valve normal?	Yes	Inspect for the following: <ul style="list-style-type: none"> ● Improper use of fuel nozzle ● Fuel is not inserted correctly. ● Inspect fuel shut-off valve.
		No	Nonreturn valve is installed improperly: <ul style="list-style-type: none"> ● Reinstall the nonreturn valve to proper position. Nonreturn valve does not operate properly: <ul style="list-style-type: none"> ● Replace the nonreturn valve.

- Verify test results.
 - If normal, return to diagnostic index to service any additional symptoms.

(See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

3	<ul style="list-style-type: none"> ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> ● If vehicle is repaired, troubleshooting completed. ● If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. <p style="text-align: center;">(See PCM REMOVAL/INSTALLATION [MZI-3.7] .)</p>
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NO.29 SPARK PLUG CONDITION [MZI-3.7]

NO.29 SPARK PLUG CONDITION (MZI-3.7) DETECTION CONDITIONS AND POSSIBLE CAUSES

29	SPARK PLUG CONDITION
DESCRIPTION	Incorrect spark plug condition
POSSIBLE CAUSE	<p>NOTE:</p> <ul style="list-style-type: none"> ● Inspecting spark plugs condition can determine whether problem is related to a specific cylinder or possibly all cylinders. <p>Wet/carbon stuck on specific plug:</p> <ul style="list-style-type: none"> ● Spark-Weak, not visible ● Air/fuel mixture-Excessive fuel injection volume ● Compression-No compression, low compression ● Malfunction spark plug <p>Grayish white with specific plug:</p> <ul style="list-style-type: none"> ● Air/fuel mixture-Insufficient fuel injection volume ● Malfunction spark plug <p>Wet/carbon is stuck on all plugs:</p> <ul style="list-style-type: none"> ● Spark-Spark weak ● Air/fuel mixture-Too rich ● Compression-Low compression ● Clogging in intake/exhaust system <p>Grayish white with all plugs:</p> <ul style="list-style-type: none"> ● Air/fuel mixture-Too lean <p style="text-align: center;">WARNING: The following troubleshooting flow chart contains the fuel system diagnosis</p>

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

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]** .)

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

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

NO.29 SPARK PLUG CONDITION (MZI-3.7) DIAGNOSTIC PROCEDURE

STEP	INSPECTION	RESULTS	ACTION
1	Remove all the spark plugs. Inspect spark plug condition. Is spark plug condition normal?	Yes	Troubleshooting completed.
		No	<p>Specific plug is wet or covered with carbon: Go to the next step.</p> <p>Specific plug looks grayish white: Go to Step 7.</p> <p>All plugs are wet or covered with carbon: Go to Step 9.</p> <p>All plugs look grayish white: Go to Step 15.</p>
2	Are the spark plug wet/covered with carbon by the engine oil?	Yes	Inspect all areas related to oil, working up and down.
		No	Go to the next step.
3	Inspect the spark plug for the following: <ul style="list-style-type: none"> • Cracked insulator • Heat range • Air gap • Worn electrode 	Yes	Go to the next step.
		No	<p>Replace the spark plug. (See SPARK PLUG REMOVAL/INSTALLATION [MZI-3.7] .)</p>

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	Is the spark plug normal?		
4	Inspect compression pressure at suspected malfunctioning cylinder.	Yes	Go to the next step.
	Is compression pressure correct? (See COMPRESSION INSPECTION [MZI-3.7] .)	No	Repair or replace the malfunctioning part.
5	Install all spark plugs. Perform the spark test at suspected malfunctioning cylinder.	Yes	Go to the next step.
	Is strong blue spark visible? (Compare with normal cylinder.)	No	Repair or replace the malfunctioning part.
6	Install the fuel pressure gauge between fuel filter and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position (Engine off). Is the fuel line pressure correct with the ignition switch at ON? (See FUEL LINE PRESSURE INSPECTION [MZI-3.7] .)	Yes	Inspect fuel injector for the following: <ul style="list-style-type: none"> • Open or short circuit in injector • Leakage • Injection volume
		No	Zero or low: Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .) High: Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .)
7	Inspect the spark plug for the following. <ul style="list-style-type: none"> • Heat range • Air gap 	Yes	Go to the next step.
	Is the spark plug normal?	No	Replace the spark plug. (See SPARK PLUG REMOVAL/INSTALLATION [MZI-3.7] .)
8	Remove the suspected fuel injector. Inspect the following: <ul style="list-style-type: none"> • Resistance • Fuel injection volume (See FUEL INJECTOR	Yes	Inspect for open circuit in wiring harness between fuel injector connector terminal A and PCM at the following terminals: <ul style="list-style-type: none"> • For No.1 cylinder: 2BJ • For No.2 cylinder: 2BM • For No.3 cylinder: 2BF

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

	<u>INSPECTION [MZI-3.7] .)</u>		<ul style="list-style-type: none"> • For No.4 cylinder: 2BH • For No.5 cylinder: 2BB • For No.6 cylinder: 2BD
	Are all above items normal?	No	Replace the fuel injector.
9	Is the air cleaner element free of clogging?	Yes	Go to the next step.
		No	Replace the air cleaner element.
10	Perform the spark test. (See <u>ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].)</u> Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
11	Install the fuel pressure gauge between the fuel filter and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position (Engine off). Is the fuel line pressure correct with ignition switch at ON? (See <u>FUEL LINE PRESSURE INSPECTION [MZI-3.7] .)</u>)	Yes	Go to the next step.
		No	<p style="text-align: center;">Zero or low:</p> <p style="text-align: center;">Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .)</u>)</p> <p style="text-align: center;">High:</p> <p style="text-align: center;">Replace the fuel pump unit. (See <u>FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7] .)</u>)</p>
12	Inspect the following PIDs: <ul style="list-style-type: none"> • ECT • O2S11 (When engine can be started.) • O2S12 (When engine can be started.) • O2S21 (When engine can be started.) • O2S22 (When engine can be started.) • MAF (See <u>PCM INSPECTION [MZI-3.7] .)</u> Are PIDs normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
	Perform the purge control inspection. (When engine can be started.)	Yes	Go to the next step.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

13	(See ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7].) Is the purge control correct?	No	Repair or replace the malfunctioning part.
14	Perform compression inspection. (See COMPRESSION INSPECTION [MZI-3.7].) Is compression correct?	Yes	Visually inspect for deformed exhaust system part.
		No	Repair or replace the malfunctioning part.
15	When the engine cannot be started, inspect the intake-air system for air leakage. When the engine can be started, perform intake manifold vacuum inspection. Is air sucked in from intake-air system?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
16	Install the fuel pressure gauge Between the fuel filter and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position (Engine off). Is fuel line pressure correct with the ignition switch at ON? (See FUEL LINE PRESSURE INSPECTION [MZI-3.7].)	Yes	Inspect the following PIDs: <ul style="list-style-type: none"> • ECT • O2S11 • O2S12 • O2S21 • O2S22 • MAF <p style="text-align: center;">(See PCM INSPECTION [MZI-3.7].)</p>
		No	Inspect PCM GND condition. <p style="text-align: center;">Zero or low:</p> Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7].) <p style="text-align: center;">High:</p> Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [MZI-3.7].)
<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> ○ If normal, return to diagnostic index to service any additional symptoms. <p style="text-align: center;">(See SYMPTOM DIAGNOSTIC INDEX [MZI-3.7].)</p>			

17

- 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, replace the PCM.

(See **PCM REMOVAL/INSTALLATION [MZI-3.7]** .)

INTERMITTENT CONCERN TROUBLESHOOTING [MZI-3.7]

VIBRATION METHOD

- If malfunction occurs or becomes worse while driving on a rough road or when the engine is vibrating, perform the steps below.

NOTE:

- **There are several reasons vehicle or engine vibration could cause an electrical malfunction. Inspect the following:**
 - **Connectors not fully seated**
 - **Wiring harnesses not having full play**
 - **Wiring harnesses laying across brackets or moving parts**
 - **Wiring harnesses routed too close to hot parts**
- **An improperly routed, improperly clamped, or loose wiring harness can cause wiring to become pinched between parts.**
- **The connector joints, points of vibration, and places where wiring harnesses pass such as through the firewall and body panels are the major areas to be checked.**

Inspection Method for Switch Connectors or Wiring Harnesses

1. Connect the M-MDS to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

NOTE:

- **If the engine starts and runs, perform the following steps during idle.**

3. Access PIDs for the switch you are inspecting.
4. Turn the switch on manually.
5. Slightly shake each connector or wiring harness vertically and horizontally while monitoring the PID.
 - If PID value is unstable, inspect for poor connection.

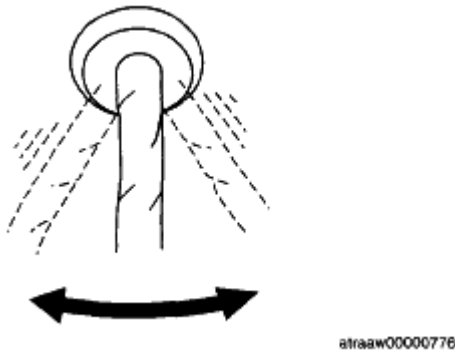


Fig. 9: Inspection Method For Wiring Harnesses
Courtesy of MAZDA MOTORS CORP.

Inspection Method for Sensor Connectors or Wiring Harnesses

1. Connect the M-MDS to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

NOTE:

- If the engine starts and runs, perform the following steps during idle.

3. Access PIDs for the switch you are inspecting.
4. Slightly shake each connector or wiring harness vertically and horizontally while monitoring the PID.
 - If PID value is unstable, inspect for poor connection.

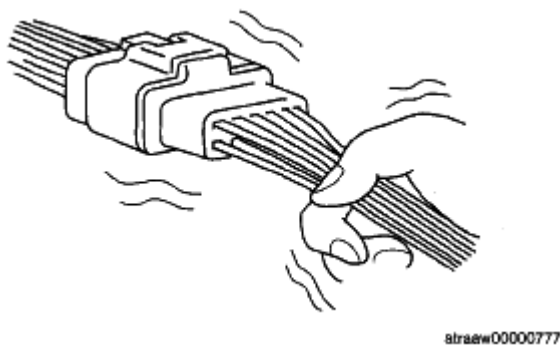


Fig. 10: Inspection Method For Sensor Connectors
Courtesy of MAZDA MOTORS CORP.

Inspection Method for Sensors

1. Connect the M-MDS to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

NOTE:

- If the engine starts and runs, perform the following steps during idle.

3. Access PIDs for the switch you are inspecting.
4. Vibrate the sensor slightly with your finger.
 - If PID value is unstable or malfunction occurs, check for poor connection or poorly mounted sensor or both.

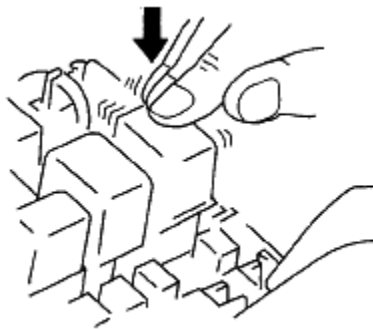
Inspection Method for Actuators or Relays

1. Connect the M-MDS to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

NOTE: • If the engine starts and runs, perform the following steps during idle.

3. Prepare the output state control function for actuators or relays that you are inspecting.
4. Vibrate the actuator or relay with your finger for 3 s after output state control function is activated.
 - If variable click sound is heard, check for poor connection or poorly mounted actuator or both, or the relay.

NOTE: • Vibrating relays too strongly may result in open relays.



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Fig. 11: Inspection Method For Relays
Courtesy of MAZDA MOTORS CORP.

WATER SPRINKLING METHOD

If malfunction occurs only under high humidity or rainy/snowy weather, perform the following steps:

- CAUTION:**
- Indirectly change the temperature and humidity by spraying water onto the front of the radiator.
 - If a vehicle is subject to water leakage, the leakage may damage the control module. When testing a vehicle with a water leakage problem, special caution must be used.

1. Connect the M-MDS to the DLC-2 if you are inspecting sensors or switches

2. Turn the ignition switch to the ON position (Engine off).

NOTE:

- If the engine starts and runs, perform the following steps at idle.

3. Access PIDs for sensor or switch if you are inspecting sensors or switches.
4. If you are inspecting the switch, turn it on manually.
5. Spray water onto the vehicle or run it through a car wash.
 - If PID value is unstable or malfunction occurs, repair or replace part if necessary.



absqpw00000793

Fig. 12: Water Sprinkling Method
Courtesy of MAZDA MOTORS CORP.

ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZI-3.7]

INPUT SIGNAL SYSTEM INSPECTION PROCEDURE

1. Find an irregular signal. (See **FINDING IRREGULAR SIGNALS.**)
2. Locate source. (See **LOCATING THE SOURCE OF UNUSUAL SIGNALS.**)
3. Repair or replace the malfunctioning part.
4. Confirm that the irregular signal is no longer detected.

Finding irregular signals

While referring to, use the PID/DATA monitor and record function to inspect the input signal system relating to the problem.

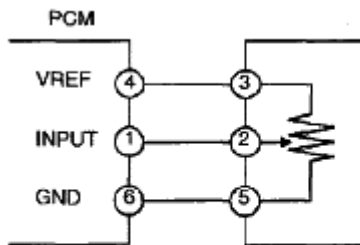
1. Start the engine and idle the vehicle. You can assume that any signals that are out of specification by a wide margin are irregular.
2. When recreating the problem, any sudden change in monitor input signals that is not intentionally created by the driver can be determined as irregular.

Locating the source of unusual signals

CAUTION:

- Compare the M-MDS monitor voltage with the measurement voltage using the digital measurement system function. If you use another tester, misreading may occur.
- When measuring voltage, attach the tester GND to the GND of the PCM that is being tested, or to the engine itself. If this is not performed, the measured voltage and actual voltage may differ.
- After connecting the pin to a waterproof coupler, confirming continuity and measuring the voltage, inspect the waterproof connector for cracks. If there are any, use sealant to fix them. Failure to do this may result in deterioration of the wiring harness or terminal from water damage, leading to problems with the vehicle.

Variable resistance type 1 (TP sensor)



ac9uuw00001080

Fig. 13: Variable Resistance Type 1 (TP Sensor)
 Courtesy of MAZDA MOTORS CORP.

Input signal system inspection for variable resistance type 1

1. When an irregular signal is detected, measure the #1 PCM terminal voltage.
 - If the #1 terminal voltage and the M-MDS monitor voltage are the same, proceed to the next step.
 - If there is a difference of **0.5 V or more**, inspect for the following points concerning the PCM connector:
 - Female terminal opening is loose.
 - Coupler (pin holder) damage
 - Pin discoloration (blackness)
 - Harness/pin crimp is loose or disconnected.
2. Measure the #2 sensor terminal voltage.
 - If there is a **0.5 V or more** difference between the sensor and the M-MDS voltages, inspect the wiring harness for open or short circuits.
 - If the sensor and the M-MDS voltages are the same, inspect for the following points concerning the sensor connector:
 - Female terminal opening is loose.
 - Coupler (pin holder) damage

- Pin discoloration (blackness)
- If there are no problems, proceed to next investigation below.

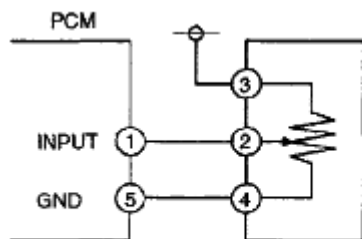
Standard power supply system inspection for variable resistance type 1

- Confirm that the #3 terminal is at **5 V**.
 - If the measured voltage on the #3 terminal is **5 V** , inspect the following points on the sensor connector.
 - If there is no problem, inspect for the following:
 - Female terminal opening is loose.
 - Coupler (pin holder) damage
 - Pin discoloration (blackness)
 - If the #3 terminal measures other than **5 V** , inspect for the following:
 - Open or short circuit in wiring harness
 - Harness/pin crimp is loose or disconnected.

GND system inspection for variable resistance type 1

- Confirm that terminal sensor #5 is at **0 V**.
 - If it is at **0 V** , inspect the sensor.
 - If necessary, replace the sensor.
 - If not, inspect for the following:
 - Open or short circuit in wiring harness
 - Female terminal opening is loose causing an open or short circuit in wiring harness
 - Coupler (pin holder) damage
 - Pin discoloration (blackness)
 - Harness/pin crimp is loose or disconnected.

Variable resistance type 2 (mass air flow (MAF) sensor & VSS)



ac9uuw00001081

Fig. 14: Variable Resistance Type 2 (Mass Air Flow Sensor & VSS)
 Courtesy of MAZDA MOTORS CORP.

GND system inspection for variable resistance type 2

- Confirm that terminal sensor #4 is at **0 V**.
 - If it is at **0 V** , inspect the sensor.
 - If necessary, replace the sensor.
 - If not at **0 V** , inspect for the following:
 - Open circuit in wiring harness
 - Female terminal opening is loose.
 - Coupler (pin holder) damage
 - Pin discoloration (blackness)
 - Harness/pin crimp is loose or disconnected.

Input signal system inspection for variable resistance type 2

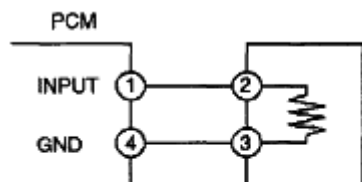
1. When an irregular signal is detected, measure the #1 PCM terminal voltage.
 - If the #1 terminal voltage and the M-MDS monitor voltage are the same, proceed to the next step.
 - If there is a difference of **0.5 V or more** , inspect for the following points concerning the PCM connector:
 - Female terminal opening is loose.
 - Coupler (pin holder) damage
 - Pin discoloration (blackness)
 - Harness/pin crimp is loose or disconnected.
2. Measure the #2 sensor terminal voltage.
 - If there is a **0.5 V or more** difference between the sensor and the M-MDS voltages, inspect the wiring harness for open or short circuits.
 - If the sensor and the M-MDS voltages are the same, inspect the following points concerning the sensor connector:
 - Female terminal opening is loose.
 - Coupler (pin holder) damage
 - Pin discoloration (blackness)
 - Harness/pin crimp is loose or disconnected.
 - If there are no problems, proceed to next investigation below.

Electrical supply system inspection for variable resistance type 2

- Confirm that the sensor #3 terminal is **B+**.
 - If the measured voltage on the #3 terminal is **B+** , inspect the following points on the sensor connector.
 - If there is no problem, inspect for the following:
 - Female terminal opening is loose.
 - Coupler (pin holder) damage

- Pin discoloration (blackness)
- If the #3 terminal measures other than **B+** , inspect the following:
 - Open or short circuit in wiring harness
 - Harness/pin crimp is loose or disconnected.

Thermistor type (IAT sensor & CHT sensor)



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Fig. 15: Thermistor Resistance Type (IAT Sensor & CHT Sensor)
 Courtesy of MAZDA MOTORS CORP.

Input signal system inspection for thermistor type

1. When an irregular signal is detected, measure the #1 PCM terminal voltage.
 - If the #1 terminal voltage and the M-MDS monitor voltage are the same, proceed to the next step.
 - If there is a difference of **0.5 V or more** , inspect the following points concerning the PCM connector:
 - Female terminal opening loose
 - Coupler (pin holder) damage
 - Pin discoloration (blackness)
 - Harness/pin crimp is loose or disconnected.
2. Measure the #2 sensor terminal voltage.
 - If there is a **0.5 V or more** difference between the sensor and the M-MDS voltages, inspect the wiring harness for open or short circuits.
 - If the sensor and the M-MDS voltages are the same, inspect the following points concerning the sensor connector:
 - Female terminal opening is loose.
 - Coupler (pin holder) damage
 - Pin discoloration (blackness)
 - Harness/pin crimp is loose or disconnected.
 - If there are no problems, proceed to next investigation below.

GND system inspection for thermistor type

- Confirm that terminal sensor #3 is at **0 V**.

- If it is at **0 V** , inspect the sensor. If necessary, replace the sensor.
- If not, inspect for the following:
 - Open circuit in wiring harness
 - Female terminal opening is loose.
 - Coupler (pin holder) damage
 - Pin discoloration (blackness)
 - Harness/pin crimp is loose or disconnected.

MAIN RELAY OPERATION INSPECTION

1. Verify that the main relay clicks when the ignition switch is turned to ON position and off.
 - If there is no operation sound, inspect the following:
 - Main relay (See **RELAY INSPECTION** .)
 - Harness and connector between battery and main relay terminal A.
 - Harness and connector between PCM terminal 1Q and main relay terminal E.

ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION

Engine coolant temperature compensation inspection

1. Connect the M-MDS to the DLC-2.
2. Access the following PIDs:
 - ECT
 - IAT
 - RPM
3. Verify that the engine is cold, then start the engine.
4. Verify that the engine speed decreases as the engine warms up.
 - If the engine speed does not decrease or decreases slowly, inspect the following:
 - CHT sensor and related wiring harness

(See **CYLINDER HEAD TEMPERATURE (CHT) SENSOR INSPECTION [MZI-3.7]** .)
 - Electronic throttle body and related wiring harness

(See **THROTTLE BODY INSPECTION [MZI-3.7]** .)

Load compensation inspection

1. Start the engine and idle it.
2. Connect the M-MDS to the DLC-2.
3. Verify that P0506 P0507 is not displayed

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

- If P0506, P0507 are displayed, perform DTC inspection.

(See **DTC TABLE [MZI-3.7]** .)

4. Access the RPM PID.

NOTE:

- **Excludes temporary idle speed drop just after the loads are turned on.**

5. Verify that the engine speed is within the specification under each load condition.

- If load condition is not as specified, inspect the following:
 - A/C switch and related wiring harness

(See **FRONT CLIMATE CONTROL UNIT INSPECTION** .)

- Fan switch and related wiring harness

(See **FRONT CLIMATE CONTROL UNIT INSPECTION** .)

Throttle position (TP) sweep inspection

1. Connect the M-MDS to the DLC-2.
2. Turn the ignition switch to the ON position.
3. Verify that none of the following DTC are displayed:
 - P0122, P0123, P0222, P0223, P2101, P2107, P2112, P2122, P2123, P2127, P2128, P2135
 - If any one DTC is displayed, perform DTC inspection.
4. Access TP1, TP2 PID.
5. Verify that the PID reading is within the CTP value. (See **PCM INSPECTION [MZI-3.7]** .)
 - If the PID reading is out of range, perform the following:
 - Remove the air duct from the throttle valve body.
 - Verify that the throttle valve opens when the accelerator pedal is depressed.
 - If the throttle valve opens, inspect the throttle position sensor and related wiring harness.
 - If the throttle valve does not open, inspect the throttle actuator control motor and related wiring harness.
6. Gradually depress the throttle pedal and verify that the PID reading increases accordingly.
 - If the PID reading drops momentarily, inspect the following:
 - Throttle position sensor
7. Fully depress the throttle pedal and verify that the PID reading is within WOT value. (See **PCM INSPECTION [MZI-3.7]** .)
 - If the PID reading is out of range, perform the followings:

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

- Remove the air duct from throttle valve body.
- Verify that the throttle valve opens when throttle pedal is depressed.
 - If the throttle valve opens, inspect the throttle position sensor and related wiring harness.
 - If the throttle valve does not open, inspect the throttle actuator control motor and related wiring harness.

FUEL INJECTOR OPERATION INSPECTION

FUEL INJECTOR OPERATION INSPECTION CHART

STEP	INSPECTION	RESULTS	ACTION
1	While cranking the engine, inspect for fuel injector operation sound at each cylinder using a soundscope. Is operation sound heard?	Yes	Fuel injector operation is normal.
		No	All cylinders not heard: Go to the next step. Some cylinders not heard: Go to Step 3.
2	Perform main relay operation inspection. Is main relay operation normal?	Yes	Inspect the following: <ul style="list-style-type: none"> ● Fuel injector power system related wiring harness and connectors ● PCM connectors ● Fuel injector GND and related wiring harness and connectors
		No	Repair or replace malfunctioning parts.
3	Switch fuel injector connector of not operating fuel injector with operating fuel injector. Is operation sound heard?	Yes	Go to the next step.
		No	Replace the fuel injector.
4	Are wiring harness and connectors of not operation fuel injector normal? (Open or short)	Yes	Inspect PCM terminal voltage of fuel injector signal.
		No	Repair or replace malfunctioning parts.

FUEL CUT CONTROL SYSTEM INSPECTION

NOTE: ● This inspection has to perform after the Fuel Injector Operation Inspection.

If simulation function of the M-MDS is used:

1. Warm up the engine and idle it.
2. Connect the M-MDS to the DLC-2.
3. Select the RPM and FUELSYS1 PIDs.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

4. Monitor the both PIDs while performing the following steps.
 1. Depress the accelerator pedal and increase the RPM PID to **4,000 rpm**.
 2. Quickly release the accelerator pedal (brake pedal is not depressed) and verify that the FUELSYS1 PID is OL, and CL. when the RPM PID drops **below 1,200 rpm**.
 - If not as specified, inspect the following.

- CHT sensor and related harness

(See **CYLINDER HEAD TEMPERATURE (CHT) SENSOR INSPECTION [MZI-3.7]** .)

- TR switch and related wiring harness

(See **TRANSAXLE RANGE (TR) SWITCH INSPECTION [AW6A-EL, AW6AX-EL]** .)

If simulation function of the M-MDS is not used:

1. Warm up the engine and idle it.
2. Measure the fuel injector control signal wave profile using the oscilloscope while performing the following steps.
 1. Depress the accelerator pedal and increase the engine speed to **4,000 rpm**.
 2. Quickly release the accelerator pedal (brake pedal is not depressed) and verify that the wave profile constant **B+** , and appears wave, when the engine speed drops **below 2,200 rpm**.
 - If not as specified, inspect the following.

- CHT sensor and related harness

(See **CYLINDER HEAD TEMPERATURE (CHT) SENSOR INSPECTION [MZI-3.7]** .)

- TR switch and related wiring harness

(See **TRANSAXLE RANGE (TR) SWITCH INSPECTION [AW6A-EL, AW6AX-EL]** .)

FUEL PUMP OPERATION INSPECTION

1. Remove the fuel-filler cap.
2. Turn the ignition switch to the ON position.
3. Turn the fuel pump relay from off to on using the FP PID and inspect if the operation sound is heard.
 - If no operation sounds is heard, proceed to next step.
4. Measure voltage at wiring harness side fuel pump connector terminal B.

Specification

B+ (Ignition switch at on)

- If the voltage is as specified, inspect the following:
 - Fuel pump continuity
 - Fuel pump GND
 - Wiring harness between fuel pump relay and PCM terminal 1V
- If not as specified, inspect the following:
 - Fuel pump relay
 - Wiring harness connector (Main relay-fuel pump relay-fuel pump)

FUEL PUMP CONTROL SYSTEM INSPECTION

1. Crank the engine and verify that fuel pump relay operation sound is heard.
2. If operation sound is not heard, inspect the following:
 - Fuel pump relay

(See **RELAY INSPECTION** .)

 - Wiring harness and connectors (Main relay-fuel pump relay-PCM terminal 1V)

SPARK TEST

1. Disconnect the fuel pump relay.
2. Verify that each ignition coil and connector is connected properly.
3. Inspect the ignition system in the following procedure.

WARNING: • **High voltage in the ignition system can cause strong electrical shock which can result in serious injury. Avoid direct contact to the vehicle body during the following spark test.**

FUEL PUMP CONTROL SYSTEM INSPECTION CHART

STEP	INSPECTION	ACTION
1	• Disconnect the ignition coil from the spark plugs.	Yes Go to the next step.
	• Remove the spark plugs. <ul style="list-style-type: none"> ○ Ensure that the spark plugs don't have carbon deposits. • Are the spark plugs OK?	No Perform 2 times of no-load racing at 4000 rpm for 2 min to burn off the carbon deposits. Then repeat this step.
2	• Inspect the spark plugs for damage, wear, and proper plug gap.	Yes Go to the next step.
	• Are the spark plugs normal?	No Replace spark plugs, then go to the next step.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

3	<ul style="list-style-type: none"> • Reconnect the spark plugs to the ignition coil. • Ground the spark plugs to the engine. • Is a strong blue spark visible at each cylinder while cranking? 	Yes	Ignition system is normal.
		No	<p style="text-align: center;">Some cylinders do not spark:</p> <ul style="list-style-type: none"> • Go to the next step. <p style="text-align: center;">All cylinders do not spark:</p> <ul style="list-style-type: none"> • Go to Step 5.
4	<ul style="list-style-type: none"> • Inspect the following wiring harnesses for open or short: <ul style="list-style-type: none"> ○ Ignition coil No.1 terminal C-PCM terminal 2A ○ Ignition coil No.2 terminal C-PCM terminal 2F ○ Ignition coil No.3 terminal C-PCM terminal 2K ○ Ignition coil No.4 terminal C-PCM terminal 2W ○ Ignition coil No.5 terminal C-PCM terminal 2AA ○ Ignition coil No.6 terminal C-PCM terminal 2AE • Are the wiring harnesses normal? 	Yes	Inspect and replace the ignition coil. (See <u>IGNITION COIL INSPECTION [MZI-3.7]</u> .)
		No	Repair or replace the malfunctioning part, then go to Step 1.
5	<ul style="list-style-type: none"> • Measure the voltage at terminal A in each ignition coils. • Is the voltage B+? 	Yes	Go to the next step.
		No	Inspect power supply circuit of ignition coils.
6	Verify continuity between each ignition coils terminal B and battery negative post. Is there any continuity?	Yes	Go to the next step.
		No	Inspect GND circuit of ignition coils.
7	<ul style="list-style-type: none"> • Does the PCM connector or ignition coil connectors have poor connection? 	Yes	Repair or replace the connector, then go to Step 1.
		No	Go to the next step.
8	<ul style="list-style-type: none"> • Are the following parts normal? <ul style="list-style-type: none"> ○ CKP sensor and crankshaft pulley 	Yes	Inspect for open or short circuit in wiring harness and connector of CKP sensor.
		No	Repair or replace the malfunctioning part, then go to Step 1.

PURGE CONTROL SYSTEM INSPECTION

If simulation function of the M-MDS is used:

1. Start the engine.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

2. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
3. Put the finger to the purge solenoid valve and verify that there is no vacuum applied when the engine is cold.
 - If there is a vacuum, inspect the following:
 - Wiring harness and connectors (Purge solenoid valve-PCM terminal 1BC)
 - Purge solenoid valve (stuck open)
4. Connect the M-MDS to the DLC-2 and verify that the DTC P0443 is shown. Perform the DTC inspection. (See **DTC TABLE [MZI-3.7]** .)
5. Select EVAPCP PID.
6. Increase the duty value of the purge valve to **50 %** and inspect if the operation sound of the valve is heard.
 - If the operation sound is heard, inspect for the loose or damaged vacuum hose. (Intake manifold-purge solenoid valve-charcoal canister)
 - If the operation sound is not heard, perform the purge solenoid valve inspection.

(See **PURGE SOLENOID VALVE INSPECTION [MZI-3.7]** .)

7. Warm up the engine to normal operating temperature.
8. Monitor the EVAPCP PID using the M-MDS, and drive the vehicle **approx. 2,000 rpm for 30 sec.** or more.
 - If the EVAPCP PID is **0 %** , inspect the following.
 - MAF, APP1, APP2, APP3, TP_REL and LOAD PIDs.

If simulation function of the M-MDS is not used:

1. Start the engine.
2. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
3. Put the finger to the purge solenoid valve and verify that there is no vacuum applied when the engine is cold.
 - If there is a vacuum, inspect the following:
 - Wiring harness and connectors (Purge solenoid valve-PCM terminal 1BC)
 - Purge solenoid valve (stuck open)
4. Connect the M-MDS to the DLC-2 and verify that the DTC P0443 is shown. Perform the DTC inspection.

(See **DTC TABLE [MZI-3.7]** .)

5. Access EVAPCP and ECT PIDs.
6. Verify that the ECT PID is **more than 78°C {173°F}**.
 - If the ECT PID reading indicates **less than 78°C {173°F}** , perform the ECT inspection.
7. Set the vehicle on the dynamometer or chassis roller.

- WARNING:**
- **When the dynamometer or chassis roller is operating, there is a possibility that the operator may come into contact with or be caught up in the rotating parts, leading to serious injuries or death. When performing work while the dynamometer or chassis roller is operating, be careful not to come into contact with or caught up in any of the rotating parts.**

8. Drive the vehicle **approx. 2,000 rpm for 30 sec.** or more.
 - If there is no vacuum, inspect the following:
 - Wiring harness and connector (Main relay-purge solenoid valve-PCM terminal 1BC)
 - Purge solenoid valve
 - MAF, APP1, APP2, APP3, TP_REL and LOAD PISs
 - If there is vacuum, inspect the following:
 - Vacuum hose (Purge solenoid valve-charcoal canister)

A/C CUT-OFF CONTROL SYSTEM INSPECTION

1. Start the engine.
2. Turn the A/C switch and the fan switch on.
3. Verify that the A/C compressor magnetic clutch actuates.
 - If it does not actuate, go to symptom troubleshooting "No.23 A/C does not work sufficiently".
4. Fully open the throttle valve and verify that the A/C compressor magnetic clutch does not actuate for **2-5 s.**
 - If it actuates, inspect as follows:
 - A/C relay
 - Open or short to GND circuit in wiring harness and connectors (Ignition switch-A/C relay-PCM terminal 1N)
 - A/C related parts
 - APP1, APP2, APP3 PIDs

COOLING FAN CONTROL SYSTEM INSPECTION

1. Connect the M-MDS to the DLC-2.
2. Start the engine and warm it up to normal operating temperature.
3. Perform the KOER self-test. (See **KOEO/KOER SELF TEST [MZI-3.7]** .)
4. Verify that the DTC P0480 is not shown and the cooling fan operates during the KOER self-test.
 - If DTC P0480 is shown, perform the DTC troubleshooting procedure.

(See **DTC TABLE [MZI-3.7]** .)

- If the cooling fans do not operate, proceed to the following:

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

1. Verify the clicking sound of the cooling fan relay when the ignition switch is turned from the off to the ON position.
2. If there is no the clicking sound, inspect the cooling fan relay for an open circuit between the ignition switch and the cooling fan relay.
 - If there is a clicking sound, go to the next step.
 - Inspect the following parts in the indicated order in accordance with fan operation conditions.

Cooling fans do not operate

- Open circuit between the fan control module and the cooling fan relay
- Open circuit between fan control module and ground
- Poor connection of the fan control module connector
- Fan control module (See **FAN CONTROL MODULE INSPECTION [MZI-3.7]** .)

Cooling fan motor No.1 does not operate

- Open or short to ground circuit between the fan control module and cooling fan motor No.1
- Poor connection of the fan control module connector or cooling fan motor No.1 connector
- Cooling fan motor No.1 (See **FAN MOTOR INSPECTION [MZI-3.7]** .)
- Fan control module (See **FAN CONTROL MODULE INSPECTION [MZI-3.7]** .)

Cooling fan motor No.2 does not operate

- Open or short to ground circuit between the fan control module and the cooling fan motor No.2
- Poor connection of the fan control module connector or the cooling fan motor No.1 connector
- Cooling fan motor No.2 (See **FAN MOTOR INSPECTION [MZI-3.7]** .)
- Fan control module (See **FAN CONTROL MODULE INSPECTION [MZI-3.7]** .)

VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION

When idling cannot be continued

NOTE:

- **Inspect for each bank**

1. Remove the OCV and verify that the spool valve is at maximum retard position.
 - If the spool valve is stuck in advance direction, replace the OCV. (See **OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [MZI-3.7]** .)
2. Connect the OCV.
3. Turn the ignition switch to ON position.
4. Verify that the spool valve is at max. retard position.
 - If the spool valve is stuck in advance direction, inspect the following:
 - Short circuit in harnesses or connectors between the OCV and the PCM.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

5. Inspect the variable valve timing actuator.

When idling can be continued

For right bank

1. Disconnect OCV (RH) connector.
2. Warm up the engine and it at idle.
3. Apply the battery voltage to the OCV and verify that the engine idles roughly or stalls.
 - If the engine idles roughly or stalls, inspect the timing belt component (valve timing deviation).
 - If the engine does not idle roughly or stall, go to the next step.
4. Remove the OCV (RH) and perform spool valve operation inspection. (See **OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [MZI-3.7]** .)
 - If not as specified, inspect the following:
 - OCV (RH)
 - Harnesses and connectors between OCV (RH) and PCM have an open or short circuit.
 - If as specified, inspect the following right bank hydraulic passages for clogging or leakage, or both.
 - Oil pressure switch - OCV
 - OCV - camshaft
 - Camshaft internal passage
5. If they are normal, replace the right bank camshaft pulley (with built-in variable valve timing actuator).

For left bank

1. Disconnect OCV (LH) connector.
2. Warm up the engine to idle.
3. Apply the battery voltage to the OCV and verify that the engine idles roughly or stalls.
 - If the engine idles roughly or stalls, inspect the timing belt component (valve timing deviation).
 - If the engine does not idle roughly or stall, go to the next step.
4. Remove the OCV (LH) and perform spool valve operation inspection. (See **OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [MZI-3.7]** .)
 - If not as specified, inspect the following:
 - OCV (LH)
 - Harnesses and connectors between OCV (LH) and PCM have an open or short circuit.
 - If as specified, inspect the following left bank hydraulic passages for clogging or leakage or both.
 - Oil pressure switch - OCV
 - OCV - camshaft
 - Camshaft internal passage
5. If they are normal, replace the left bank camshaft pulley (with built-in variable valve timing actuator).

EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK INSPECTION

- To verify that the problem has been fixed properly after repairs, the run drive cycle or EVAP system leak inspection must be performed.

EVAP system leak inspection using the M-MDS

- NOTE:**
- **Use the IDS (laptop PC) because the PDS (Pocket PC) does not support the EVAP system test.**

EVAP system test out line

- The EVAP system test, which can substituted for the run drive cycle as an EVAP control system repair confirmation method, can detect the small / large leak or blockage without run-drive cycle.

- NOTE:**
- **M-MDS can not detect "VERY SMALL LEAK". To identify the leak point, please use the leak tester or ultrasonic leak detector.**

EVAP system test description

- The EVAP system test finds gas leaks or blockage of EVAP system using the changes of the fuel tank pressure.
 - This test starts after sending an on-demand test signal from the M-MDS to the PCM.
 - This test consists of three stages, and each stage is performed automatically as follows:

Stage 1 test. (Test for large leak or blockage)

- M-MDS send the stage 1 test start signal to the PCM.
- PCM controls the CV solenoid valve and purge solenoid valve to control the tank pressure to the targeted value.
- M-MDS detect the large leak or the purge line blockage if the tank pressure does not arrive at the target vacuum in specified period.

Stage 2 test. (Test for small leak)

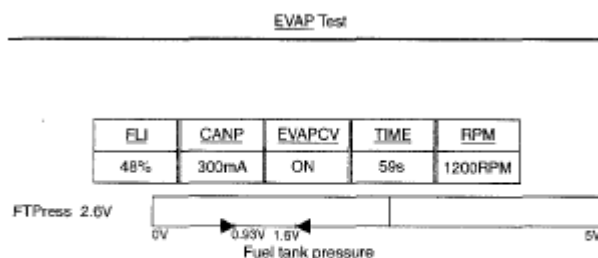


Fig. 16: Stage 1 Test For Large Leak Or Blockage
 Courtesy of MAZDA MOTORS CORP.

- When fuel tank pressure arrived at the targeted pressure at stage 1 test, M-MDS send the stage 2 test signal to the PCM to turn off the purge solenoid to keep the tank pressure.
- M-MDS detect the small leak if the tank pressure can not keep within the target in specified period.

Stage 3 test. (Test for blockage)

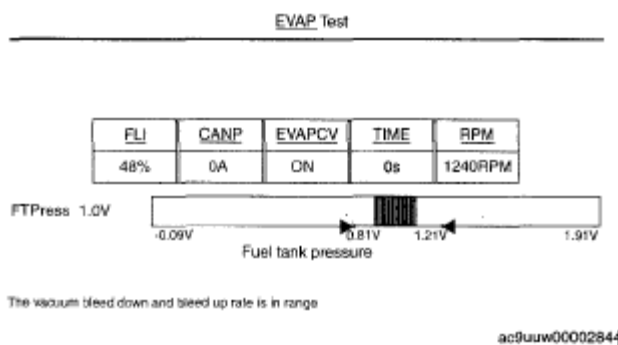


Fig. 17: Stage 2 Test For Small Leak
 Courtesy of MAZDA MOTORS CORP.

- M-MDS send the stage 3 test signal to the PCM to turn off the CV solenoid for check the blockage of EVAP system.
- M-MDS detect blockage of the CV solenoid valve or air filter if the tank pressure does not arrive at the target (atmosphere).

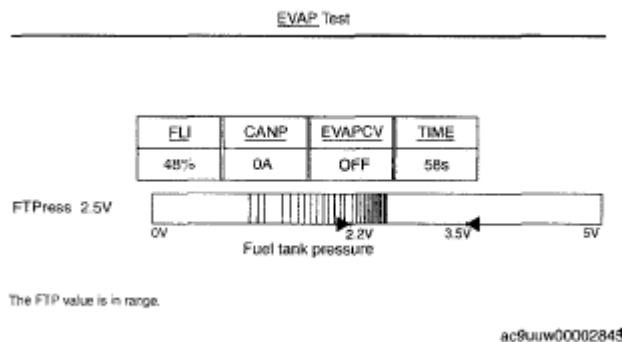


Fig. 18: Stage 3 Test For Blockage
 Courtesy of MAZDA MOTORS CORP.

EVAP system malfunction judgment

- M-MDS detect the small / large leak or blockage based on fuel tank pressure at the end of EVAP Test.

The EVAP Test could not obtain the target vacuum. A large leak or blockage is suspect.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

- This judgment means tank pressure could not arrive at target pressure at stage 1 test.
 - Check for the large leakage or inspect the purge solenoid valve operation and related hoses.
 - Repair or replace any malfunctioning parts.

The EVAP Test could not maintain the target vacuum. A small leak is suspect.

- This judgment means tank pressure could not stay in target pressure at stage 2 test.
 - Run the EVAP Test again after Re-tighten the fuel filler cap.
 - If small leak is suspected again, use the leak tester or ultrasonic leak detector for identify the leak point.
 - Repair or replace any malfunctioning parts.

Blockage in EVAP system.

- This judgment means tank pressure could not return to atmosphere at stage 3 test.
 - Inspect the CV solenoid, Air filter, Charcoal canister and related hoses for blockage.

No large leaks or blockage have been detected in the EVAP system at this time.

- M-MDS can not detect "VERY SMALL LEAK".
 - To identify the leak point, please use the leak tester or ultrasonic leak detector.

Evaporative system test procedure

1. Verify that all PIDs within the following specifications.

NOTE:

- **To successfully perform this procedure, all PIDs must be within the specifications before proceeding to the next step.**

2. Select the following items from the initialization screen of the M-MDS.

1. Select the "Powertrain".
2. Select the "Fuel".
3. Select the "EVAP Test".

- Verify that ECT and IAT are within the specifications at the confirmation screen. To successfully perform this procedure, ECT and IAT must be within the spec before proceeding to the next step.
- Fuel Level must be maintained within **15%-85%**. PCM will cancel the EVAP Test If the Fuel Level is **lower than 15%** or **higher than 85%**.

2008 Mazda CX-9 Grand Touring

2008 ENGINE Symptom Troubleshooting (MZI-3.7) - Mazda CX-9

Specification

PID	PID Range
BARO	74.9 kPa {562 mmHg, 22.1 inHg} or more
FLI	15—85 %
ECT	ECT minus IAT -10—25 °C {-5.6—13.9 °F}
IAT	

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Fig. 19: Evaporative System Test Procedure
Courtesy of MAZDA MOTORS CORP.

3. Verify the test results described on the M-MDS and follow the instructions.

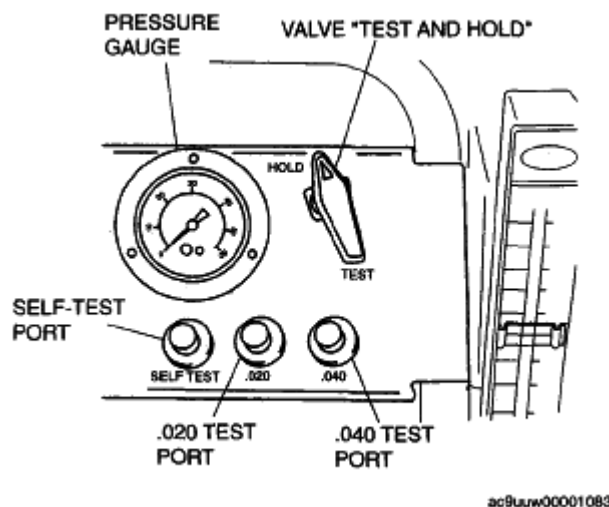
EVAP system leak inspection using leak tester

1. Perform the following SST (EVAP System Tester 134-01049) self-test:

NOTE:

- If the tester does not work correctly during the self-test, refer to the tester operators manual for a more detailed self-test procedure.

1. Verify that the control valve on the panel is in the HOLD position then open the nitrogen bottle valve.
2. Connect the vehicle interface hose (part of the **SST**) to the SELF-TEST port located on the control panel. Hand tighten the fitting. (Do not overtighten.)
3. Turn the control valve to the TEST position.
4. The gauge should read **331-381 mm {13-15 in}** of water.
 - If the gauge is not reading in this range, adjust the pressure by turning the black knob on the low pressure regulator at the nitrogen bottle.
5. Turn the control valve to the HOLD position.
6. Verify that the gauge holds pressure and that the flow meter reads no flow.
 - If there is no drop in pressure and no flow, the tester passes the self-test.
 - If the gauge leaks down, refer to the tester operators manual.



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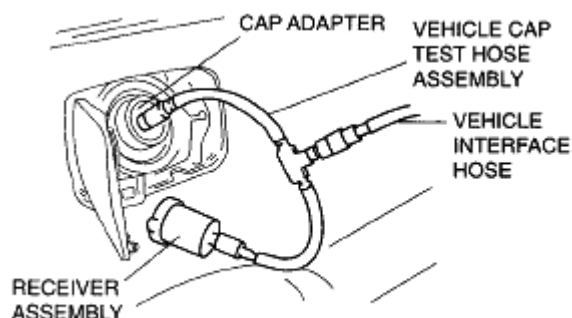
Fig. 20: EVAP System Leak Inspection Using Leak Tester
 Courtesy of MAZDA MOTORS CORP.

2. Connect the SST to the vehicle.
 1. Verify that the control valve on the panel is in the HOLD position then open the nitrogen bottle valve.
 2. Remove the fuel-filler cap from the vehicle.
 - If the fuel-filler cap is not a MAZDA part or equivalent, replace it.

NOTE:

- **INSPECT FUEL FILLER CAP AND FILLER NECK**
 - **Visually inspect for damage, insufficient sealing, rust, cracks or warps for filler cap and filler neck.**
 - **Repair or replace if necessary.**

3. Connect the receiver assembly (SST: 134-01059) to the vehicle cap test hose assembly (part of the SST) and the fuel-filler cap from the vehicle.
4. Connect the cap adaptor (SST: 134-01058) to the vehicle cap test hose assembly (part of the SST) and to the fuel-filler neck.
5. Connect the vehicle interface hose (part of the SST) to the center fitting of the vehicle cap test hose assembly (part of the SST).
3. Connect the M-MDS to the DLC-2.
4. Turn the ignition switch to the ON position (Engine off).
5. Request the PCM on-board device control (Mode 08) using the M-MDS to close the canister vent valve.



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Fig. 21: Inspecting Fuel Filler Cap & Filler Neck
 Courtesy of MAZDA MOTORS CORP.

NOTE:

- **The canister vent valve is closed for 10 min unless the following any actions are done:**
 - **The engine is started.**
 - **The ignition switch is turned off position.**

6. Make sure the control valve on the 134-01049 is in the HOLD position and that the valve on the cylinder of nitrogen gas is open.
7. Turn the control valve to the open position and let the system fill. You should note a drop in the gauge pressure along with the flow meter being pegged at maximum flow for several minutes depending on how full or empty the fuel tank is, and how long it takes to completely fill and pressurize the evaporative emissions system hoses.
8. If the gauge and the flow meter do not settle to a measurable level after **2-3 min**, then refer to the Mazda Workshop Manual to verify that the canister vent valve is properly closed. If canister vent valve is properly closed. The EVAP system has large leakage. Check for leakage and repair as necessary.
9. Verify the pressure gauge and flow meter reading to determine if there is an evaporative emissions leak:

NO EVAPORATIVE LEAK:

- The flow meter registers "zero flow" and the pressure gauge returns to the pre-set pressure of **356 mm {14 in}** of water (H₂O).

EVAPORATIVE LEAK:

- The pressure does not return to the preset level of **356 mm {14 in}** of water (H₂O) when measuring the flow. See "SETTING LEAK STANDARD FOR TESTING" (.020 to .040 inch H₂O) of the Evaporative Emissions Tester operators manual (134-01067).

NOTE:

- **Turn the control valve to the HOLD position then disconnect the SST.**