

**2007 Mazda MX-5 Miata Sport**

2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

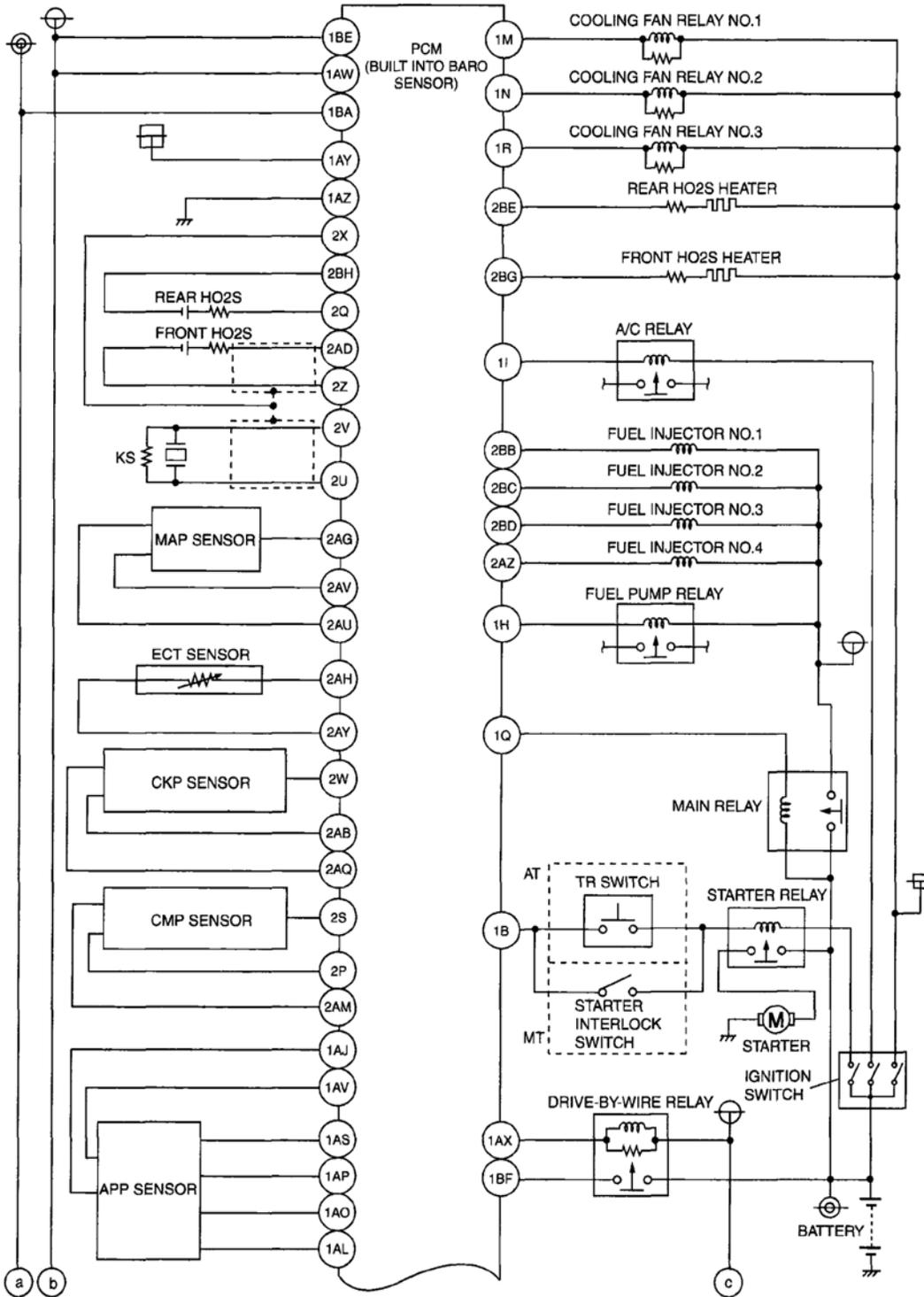
**2007 ENGINE PERFORMANCE**

**Symptom Troubleshooting - MX-5 Miata**

**SYMPTOM TROUBLESHOOTING WIRING DIAGRAM [LF]**

# 2007 Mazda MX-5 Miata Sport

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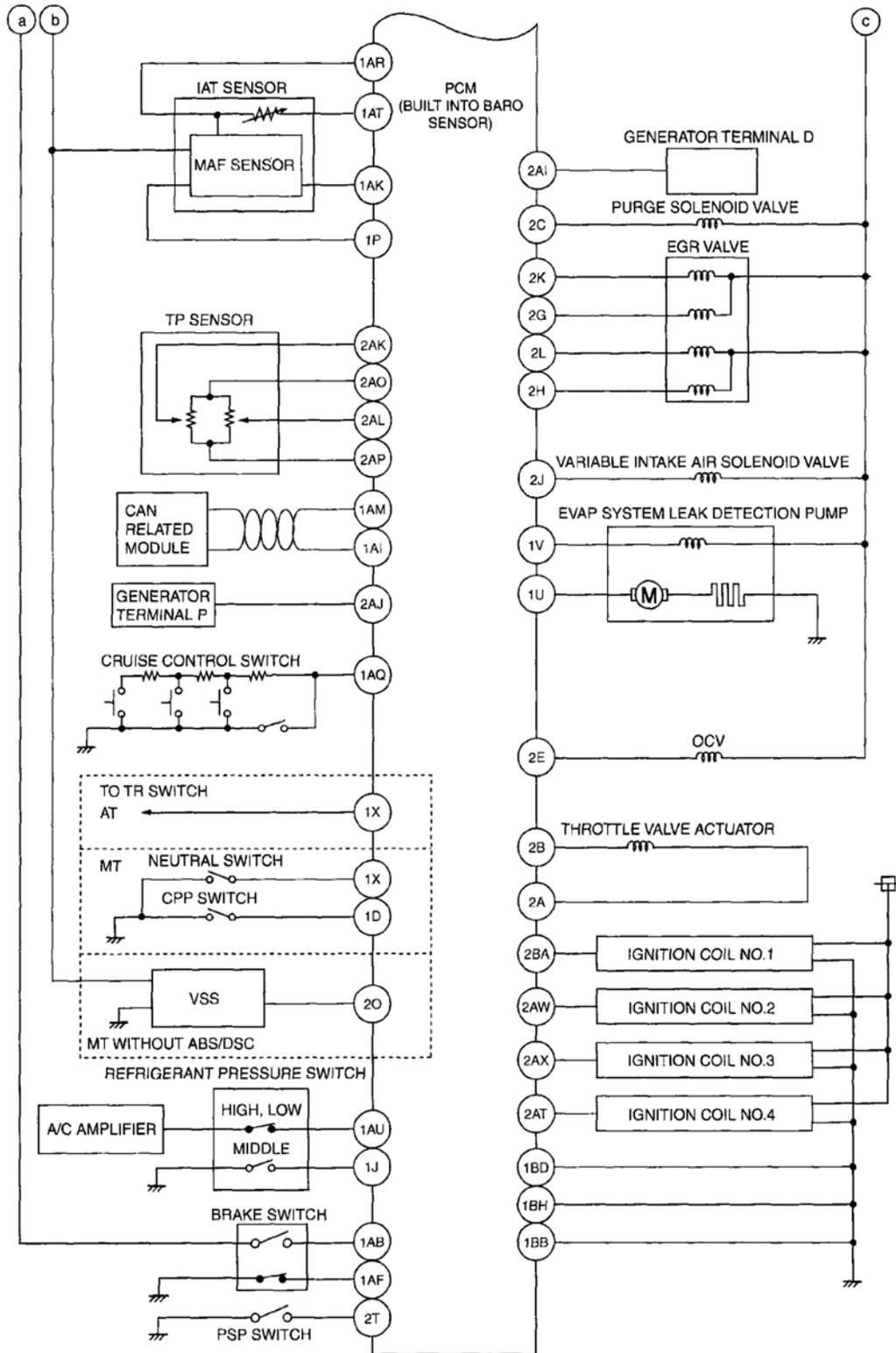


ESU1022W4917

**Fig. 1: Symptom Troubleshooting - Wiring Diagram [LF] (1 Of 2)**  
 Courtesy of MAZDA MOTORS CORP.

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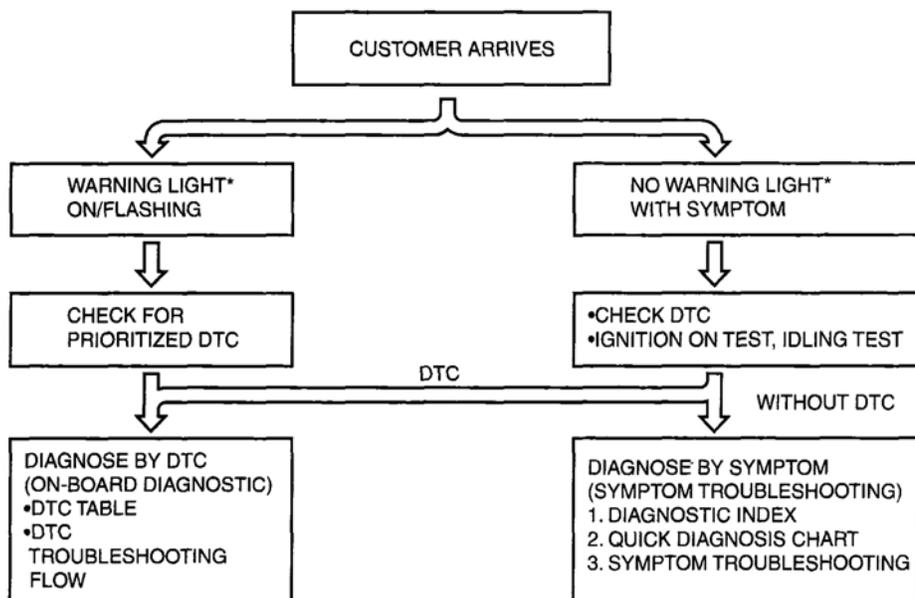
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Fig. 2: Symptom Troubleshooting - Wiring Diagram [LF] (2 Of 2)

Courtesy of MAZDA MOTORS CORP.

## FOREWORD [LF]

- 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 **Fig. 3** :
  - If a DTC exists, diagnose the applicable DTC inspection. (See **DTC TABLE [LF]** .)
  - If no DTC exists and the MIL does not illuminate or flash, diagnose the applicable symptom troubleshooting. (See **QUICK DIAGNOSTIC TABLE [LF]** .)



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

C3U0103W001

**Fig. 3: Malfunction Flow Diagram**  
Courtesy of MAZDA MOTORS CORP.

## ENGINE SYMPTOM TROUBLESHOOTING [LF]

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

### DIAGNOSTIC INDEX

#### DIAGNOSTIC INDEX

| No. | TROUBLESHOOTING ITEM           | DESCRIPTION | REFERENC                                       |
|-----|--------------------------------|-------------|--|
| 1   | Melting of main or other fuses | -           | (See <b>NO.1 MELTING MAIN OR OTHER [LF]</b> .) |

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|    |  |                     |   |  |
|----|--|---------------------|---|--|
| 2  | MIL illuminates                                      |                     | The MIL is illuminated incorrectly.   | (See <b><u>NO.2 MIL ILLUMINATES [LF]</u></b> .)                                      |
| 3  | Will not crank                                       |                     | The starter does not work.  | (See <b><u>NO.3 WILL NOT CRANK [LF]</u></b> .)                                       |
| 4  | Hard to start/long crank/erratic start/erratic crank |                     | The starter cranks the engine at normal speed but the engine requires excessive cranking time before starting.  | (See <b><u>NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [LF]</u></b> .) |
| 5  | Engine stalls.                                       | After start/at idle | The engine stops unexpectedly at idle and/or after start or both.   | (See <b><u>NO.5 ENGINE AFTER START/AT IDLE [LF]</u></b> .)                           |
| 6  | Cranks normally but will not start                   |                     | The starter cranks engine at normal speed but the engine will not run.  | (See <b><u>NO.6 CRANKS NORMALLY BUT WILL NOT START [LF]</u></b> .)                   |
| 7  | Slow return to idle                                  |                     | The engine takes more time than normal to return to idle speed.   | (See <b><u>NO.7 SLOW RETURN TO IDLE [LF]</u></b> .)                                  |
| 8  | Engine runs rough/rolling idle                       |                     | The engine speed fluctuates between the specified idle speed and lower speed and the engine shakes excessively. | (See <b><u>NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [LF]</u></b> .)                       |
| 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 <b><u>NO.9 FAST IDLE/RUNS ON [LF]</u></b> .)                                    |
| 10 | Low idle/stalls during deceleration                  |                     | The engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.                   | (See <b><u>NO.10 LOW IDLE/STALLS DURING DECELERATION [LF]</u></b> .)                 |
|    | Engine stalls/quits.                                 | Acceleration/cruise | The engine stops unexpectedly at the beginning of acceleration or during acceleration. The engine stops         |  |

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### 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

|    |                              |                                  |   |   |
|----|------------------------------|----------------------------------|---|---|
|    |                              |                                  | unexpectedly while cruising.  |   |
|    | Engine runs rough.           | Acceleration/cruise              | The engine speed fluctuates during acceleration or cruising.  |   |
| 11 | Misses                       | Acceleration/cruise              | The engine misses during acceleration or cruising.  | (See <b><u>NO.11 ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISS BUCK/JERK, HESITATION/STUTTER SURGES [LF] .</u></b> ) |
|    | Buck/jerk                    | Acceleration/cruise/deceleration | The vehicle bucks/jerks during acceleration, cruising, or deceleration.   |   |
|    | 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).  | (See <b><u>NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE [LF] .</u></b> )  |
| 13 | Knocking/pinging/detonation  | 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). | (See <b><u>NO.13 KNOCKING/PINGING/DETONATION-ACCELERATION/CRUISE [LF] .</u></b> )                                   |
| 14 | Poor fuel economy            |                                  | The fuel economy is unsatisfactory.   | (See <b><u>NO.14 POOR FUEL ECONOMY [LF] .</u></b> )   |
| 15 | Emission compliance          |                                  | Fails emissions test.   | (See <b><u>NO.15 EMISSION COMPLIANCE [LF] .</u></b> )   |
| 16 | High oil consumption/leakage |                                  | The oil consumption is excessive.   | (See <b><u>NO.16 HIGH OIL CONSUMPTION/LEAKAGE [LF] .</u></b> )  |
| 17 | Cooling system concerns      | Overheating                      | The engine runs at higher than normal temperature/overheats.  | (See <b><u>NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF] .</u></b> )   |
| 18 | Cooling system concerns      | Runs cold                        | The engine does not reach normal operating temperature.   | (See <b><u>NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [LF] .</u></b> )   |
| 19 | Exhaust smoke                |                                  | Blue, black, or white   | (See <b><u>NO.19 EXHAUST SMOKE [LF] .</u></b> )   |

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### 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

|    |   |   |   |
|----|---|---|---|
|    |   | smoke from exhaust system   | <b>SMOKE [LF] .)</b>  |
| 20 | Fuel odor (in engine compartment)                         | Gasoline fuel smell or visible leakage  | (See <b>NO.20 FUEL O ENGINE COMPAR [LF] .)</b>                          |
| 21 | Engine noise  | Engine noise from under hood  | (See <b>NO.21 ENGINE [LF] .)</b>  |
| 22 | Vibration concerns (engine)                               | Vibration from under hood or driveline  | (See <b>NO.22 VIBRAT CONCERNS (ENGI [LF] .)</b>                         |
| 23 | A/C does not work sufficiently.                           | The A/C compressor magnetic clutch does not engage when A/C is turned on.       | (See <b>NO.23 A/C DOI WORK SUFFICIEN [LF] .)</b>                        |
| 24 | A/C is always on or A/C compressor runs continuously.     | The A/C compressor magnetic clutch does not disengage.                          | (See <b>NO.24 A/C IS A ON OR A/C COMPI RUNS CONTINUOI [LF] .)</b>       |
| 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 <b>NO.25 A/C DOI CUT OFF UNDER \ OPEN THROTTLE CONDITIONS [LF]</b> |
| 26 | Exhaust sulphur smell                                     | Rotten egg smell (sulphur) from exhaust   | (See <b>NO.26 EXHAUS SULPHUR SMELL</b>                                  |
| 27 | Fuel refill concerns                                      | The fuel tank does not fill smoothly.   | (See <b>NO.27 FUEL R CONCERNS [LF] .)</b>                               |
| 28 | Fuel filling shut off issues                              | The fuel does not shut off properly.  | (See <b>NO.28 FUEL FI SHUT OFF CONCE [LF] .)</b>                        |
| 29 | Spark plug condition                                      | An incorrect spark plug condition.  | (See <b>NO.29 SPARK \ CONDITION [LF] .)</b>                             |
| 30 | AT concerns   | Upshift/downshift engagement  | (See <b>SYMPTOM TROUBLESHOOTI ITEM TABLE [SJ6/</b>                      |
|    |   | AT concerns not related to engine performance.                                  |   |

## QUICK DIAGNOSTIC TABLE [LF]

# 2007 Mazda MX-5 Miata Sport

## 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

X: Applicable

| Troubleshooting Item |   | Possible factor | Starter motor malfunction (Mechanical or electrical) | Starter circuit including ignition switch is open. | Starter interlock switch malfunction (MT) | 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 seat 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                  |                               |                   |                         | 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   |                                |  |                               |  |              |
| 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   |                                |  |                               |  |              |
| 20                   | Fuel odor (in engine compartment)                     |                 |  |  |   |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                     |   |                               |  |   |                                |  |                               |  |              |
| 21                   | Engine noise  |                 |  |  |   | x                         |                     |                             |                             |                       |                    |                               |                   |                         |                                     |   |                               |  |   |                                |  |                               |  |              |
| 22                   | Vibration concerns (engine)                           |                 |  |  |   |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                     | x                                       |                               |  |   |                                |  |                               |  |              |
| 23                   | A/C does not work sufficiently.                       |                 |  |  |   |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                     |   |                               |  |   |                                |  | x                             | x  |              |
| 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 sulfur smell                                  |                 |  |  |   |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                     |   |                               |  |   |                                |  |                               |  | x            |
| 27                   | Fuel refill concerns                                  |                 |  |  |   |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                     |   |                               |  |   |                                |  |                               |  |              |
| 28                   | Fuel filling shut off issues                          |                 |  |  |   |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                     |   |                               |  |   |                                |  |                               |  |              |
| 29                   | Spark plug condition                                  |                 |  |  |   |                           |                     |                             | x                           |                       |                    |                               |                   |                         |                                     |   |                               |  |   |                                |  |                               |  |              |
| 30                   | AT concerns. Upshift/downshift engagement             |                 |  |  |   |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                     |   |                               |  |   |                                |  |                               |  |              |

See TROUBLESHOOTING

ESU103ZW4001

**Fig. 4: Quick Diagnostic Table (1 Of 4)**  
 Courtesy of MAZDA MOTORS CORP.

# 2007 Mazda MX-5 Miata Sport

## 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

X: Applicable

| Possible factor             |   | 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 | Variable intake air system 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 |
|-----------------------------|---|--|--------------------|---|--|-----------------------------------|--|--|---------------------------|--|---|--|--|------------------------|---------------------------------|--|------------------------------|--|--|--------------------------------|------------------------------------|
| <b>Troubleshooting Item</b> |   |  |                    |   |  |                                   |  |  |                           |  |   |  |  |                        |                                 |  |                              |  |  |                                |                                    |
| 1                           | Melting of main or other fuses                        |  |                    |   |  |                                   |  |  |                           |  |   |  |  |                        |                                 |  |                              |  |  |                                |                                    |
| 2                           | MIL illuminates                                       | x  |                    |   |  |                                   |  | 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                                  |
| 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                              | 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                                  |
| 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 sulfur smell                                  |  |                    |   |  |                                   |  |  |                           | x                                      |   |  |  |                        |                                 |  |                              |  | x  | x                              | x                                  |
| 27                          | Fuel refill concerns                                  |  |                    |   |  |                                   |  |  |                           |  |   |  |  |                        |                                 |  |                              |  |  |                                |                                    |
| 28                          | Fuel filling shut off issues                          |  |                    |   |  |                                   |  |  |                           |  |   |  |  |                        |                                 |  |                              |  |  |                                |                                    |
| 29                          | Spark plug condition                                  |  |                    | x   |  |                                   |  |  |                           |  |   |  |  | x                      | x                               |  |                              |  | x  | x                              | x                                  |
| 30                          | AT concerns. Upshift/downshift engagement             |  |                    |   |  |                                   |  |  |                           |  |   |  |  |                        |                                 |  |                              |  |  |                                |                                    |

See TROUBLESHOOTING

E5U103ZW4002

**Fig. 5: Quick Diagnostic Table (2 Of 4)**  
 Courtesy of MAZDA MOTORS CORP.

# 2007 Mazda MX-5 Miata Sport

## 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

X: Applicable

| Troubleshooting item |   | Injectors malfunction (Leakage or clogging, inoperative) | Fuel leakage from fuel system (including insulator, injector O-rings) | Fuel filters restriction or clogging | CMP sensor is damaged, (e.g. open or short circuit) | Camshaft is damaged | Improper air/fuel mixture ratio control | Exhaust system restriction or clogging | Catalytic converter malfunction | EGR system 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 | ECT sensor malfunction | TR switch misadjustment (AT) | TR switch malfunction (AT) | Brake switch and related circuit malfunction | Manifold absolute pressure sensor 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   | 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                                 |                       |   |   |   |                        |                              |                            |  |   | 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   |   |   |                        |                              |                            |  |   | 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                     | x   |   |   |                        |                              |                            |  | x   | x                                    |
|                      | Engine runs rough. Acceleration/cruise                | x  | x   | x                                    | 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                     | x   |   |   |                        |                              |                            |  | x   | x                                    |
|                      | Buck/jerk. Acceleration/cruise/ deceleration          | x  | x   | 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   |   |   |                        |                              |                            |  | x   | x                                    |
|                      | Surges. Acceleration/cruise                           | x  | x   | 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                            |                            |  |   |                                      |
| 14                   | Poor fuel economy                                     |  |   | x                                    | x   | x                   | x                                       | x                                      |                                 |                        |                                 |                             |                                  | x                                 |                       |   |   |   |                        |                              |                            |  |   |                                      |
| 15                   | Emission compliance                                   |  |   | x                                    | 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                                    |   |                     |   |  |                                 |                        |                                 |                             |                                  |                                   |                       |   |   |   |                        |                              |                            |  |   |                                      |
| 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                        |  |   |                                      |   |                     |   |  |                                 |                        |                                 |                             |                                  |                                   |                       |   |   |   |                        |                              |                            |  |   |                                      |
| 26                   | Exhaust sulfur smell                                  |  |   | x                                    |   |                     |   |  |                                 |                        |                                 | x                           |                                  |                                   |                       |   |   |   |                        |                              |                            |  |   |                                      |
| 27                   | Fuel refill concerns                                  |  |   |                                      |   |                     |   |  |                                 |                        |                                 |                             |                                  |                                   |                       |   |   |   |                        |                              |                            |  |   |                                      |
| 28                   | Fuel filling shut off issues                          |  |   |                                      |   |                     |   |  |                                 |                        |                                 |                             |                                  |                                   |                       |   |   |   |                        |                              |                            |  |   |                                      |
| 29                   | Spark plug condition                                  | x  | x   |                                      |   |                     | x                                       | x                                      |                                 |                        | x                               |                             |                                  |                                   |                       |   |   |   |                        |                              |                            |  |   | x                                    |
| 30                   | AT concerns. Upshift/downshift engagement             |  |   |                                      |   |                     |   |  |                                 |                        |                                 |                             |                                  |                                   |                       |   |   |   |                        |                              |                            |  |   |                                      |

See TROUBLESHOOTING

ESU103ZW4003

**Fig. 6: Quick Diagnostic Table (3 Of 4)**  
 Courtesy of MAZDA MOTORS CORP.

# 2007 Mazda MX-5 Miata Sport

## 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

X: Applicable

| Possible factor             |   | IAT sensor and related circuit malfunction | Barometric pressure sensor malfunction | Neutral or clutch pedal position switch and related circuit malfunction (MTX) | 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 | EHPAS 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 | Clutch slippage (MT) | AT related parts malfunction (AT) | VSS and related circuit malfunction | Improper ATF level (AT) | 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) |
|-----------------------------|---|--|--|---|--|--|---|---|---------------------------------------|--------------------------------------|--|--|----------------------------------|----------------------------|----------------------|-----------------------------------|-------------------------------------|-------------------------|----------------|-------------|--------------------------------------|------------------------|------------------------|--|---|
| <b>Troubleshooting Item</b> |   |  |  |   |  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 1                           | Melting of main or other fuses                        |  |  |   |  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 2                           | MIL illuminates                                       | x  | x                                      | 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  | 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  |                                  | x                          | x                    |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 9                           | Fast idle/runs on                                     |  |  |   |  |  |   |   |                                       |                                      |  |  |                                  |                            | x                    |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 10                          | Low idle/stalls during deceleration                   |  |  | x   | x  |  | x   | x   |                                       |                                      |  | x  | x                                |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 11                          | Engine stalls/quits. Acceleration/cruise              | 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                                   |                         |                |             |                                      |                        |                        |  |   |
|                             | Misses. Acceleration/cruise                           |  |  | 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                                   |                         |                |             |                                      |                        |                        |  |   |
|                             | Hesitation/stumble. Acceleration                      | x  |  | x   | x  | x  | x   | x   | x                                     | x                                    |  |  |                                  |                            | x                    | x                                 | x                                   |                         |                |             |                                      |                        |                        |  |   |
|                             | Surges. Acceleration/cruise                           |  |  | 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                                    |                        |                        |  |   |
| 13                          | Knocking/pinging. Acceleration/cruise                 | x  |  | x   | x  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 14                          | Poor fuel economy                                     |  |  | x   |  |  |   |   |                                       |                                      |  |  |                                  |                            | x                    |                                   |                                     | x                       | x              |             |                                      |                        |                        |  |   |
| 15                          | Emission compliance                                   |  |  |   |  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 16                          | 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  | 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 sulfur smell                                  |  |  |   |  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 27                          | Fuel refill concerns                                  |  |  |   |  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 28                          | Fuel filling shut off issues                          |  |  |   |  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 29                          | Spark plug condition                                  |  |  |   | x  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
| 30                          | AT concerns. Upshift/downshift engagement             |  |  |   |  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |
|                             |   | See TROUBLESHOOTING                        |  |   |  |  |   |   |                                       |                                      |  |  |                                  |                            |                      |                                   |                                     |                         |                |             |                                      |                        |                        |  |   |

ESU103Z4004

**Fig. 7: Quick Diagnostic Table (4 Of 4)**  
 Courtesy of MAZDA MOTORS CORP.

### NO.1 MELTING OF MAIN OR OTHER FUSES [LF]

#### MELTING OF MAIN OR OTHER FUSES POSSIBLE CAUSE

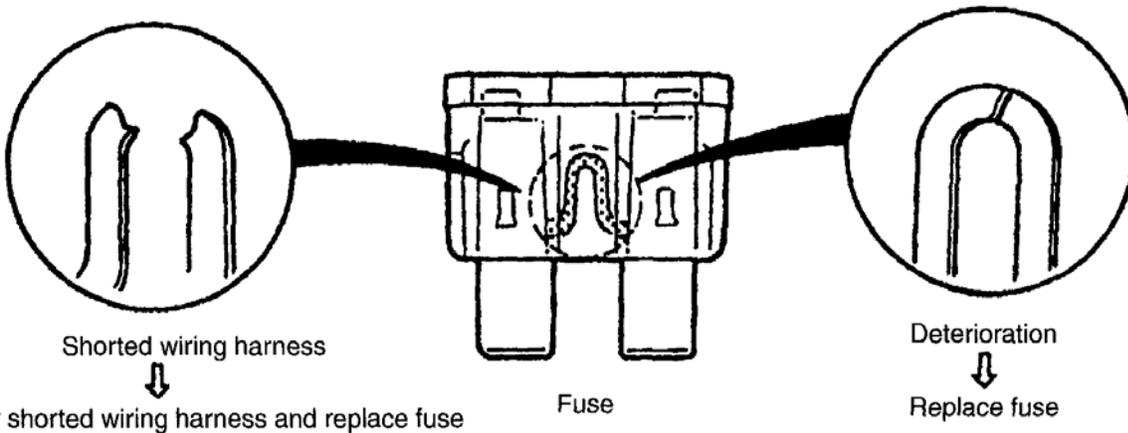
|   |                        |
|---|------------------------|
| 1 | Related wiring harness |
|---|------------------------|

## 2007 Mazda MX-5 Miata Sport

2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

### [TROUBLESHOOTING HINTS]

Inspect condition of fuse.



### DAMAGED FUSE & RELATED WIRING HARNESS

| Damaged fuse       | Related wiring harness   |
|--------------------|--|
| MAIN               | <b>MAIN fuse</b> <ul style="list-style-type: none"> <li>• ROOM fuse</li> <li>• IG KEY2 fuse</li> <li>• ST fuse</li> <li>• FAN fuse <sup>(1)</sup></li> <li>• Generator</li> </ul>  |
| ROOM               | <b>ROOM fuse</b> <ul style="list-style-type: none"> <li>• DLC-2</li> <li>• PCM</li> </ul>  |
| IG KEY2            | <b>IG KEY2 fuse</b> <ul style="list-style-type: none"> <li>• Ignition switch</li> </ul>  |
| ST                 | <b>ST fuse</b> <ul style="list-style-type: none"> <li>• Starter relay</li> </ul>   |
| FAN <sup>(1)</sup> | <b>FAN fuse</b> <ul style="list-style-type: none"> <li>• Cooling fan relay No.1                             <ul style="list-style-type: none"> <li>○ Cooling fan motor</li> </ul> </li> <li>• Cooling fan relay No.2                             <ul style="list-style-type: none"> <li>○ Cooling fan motor</li> </ul> </li> </ul> |
|                    |  |

## 2007 Mazda MX-5 Miata Sport

### 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

|                    |   |
|--------------------|---|
| FAN <sup>(1)</sup> | <b>FAN fuse</b> <ul style="list-style-type: none"><li>• Cooling fan relay No.1<ul style="list-style-type: none"><li>○ PCM</li></ul></li><li>• Cooling fan relay No.2<ul style="list-style-type: none"><li>○ PCM</li></ul></li><li>• Cooling fan relay No.3<ul style="list-style-type: none"><li>○ PCM</li></ul></li></ul> |
| FUEL PUMP          | <b>FUEL PUMP fuse</b> <ul style="list-style-type: none"><li>• Fuel pump relay<ul style="list-style-type: none"><li>○ Fuel pump</li></ul></li></ul>  |
| IG KEY1            | <b>IG KEY1 fuse</b> <ul style="list-style-type: none"><li>• Ignition switch<ul style="list-style-type: none"><li>○ METER fuse</li></ul></li></ul>   |
| METER              | <b>METER fuse</b> <ul style="list-style-type: none"><li>• Ignition relay</li></ul>  |
| ETV                | <b>ETV fuse</b> <ul style="list-style-type: none"><li>• Drive-by-wire relay<ul style="list-style-type: none"><li>○ PCM</li></ul></li></ul>  |
| EGI COMP1          | <b>EGI COMP1 fuse</b> <ul style="list-style-type: none"><li>• Oil control valve</li><li>• Purge solenoid valve</li><li>• Variable intake air control solenoid valve</li><li>• EGR valve</li></ul>   |
| EGI COMP2          | <b>EGI COMP2 fuse</b> <ul style="list-style-type: none"><li>• Drive-by-wire relay<ul style="list-style-type: none"><li>○ PCM</li></ul></li><li>• Evaporative leak detection pump</li><li>• MAF sensor</li><li>• VSS (MT without ABS/DSC)</li></ul>  |
| EGI INJ            | <b>EGI INJ fuse</b> <ul style="list-style-type: none"><li>• Fuel injector No.1</li><li>• Fuel injector No.2</li><li>• Fuel injector No.3</li></ul>  |

## 2007 Mazda MX-5 Miata Sport

### 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

- Fuel injector No.4

(1) Two FAN fuses differs in a current valve.

## NO.2 MIL ILLUMINATES [LF]

### POSSIBLE CAUSE & DESCRIPTION (MIL ILLUMINATES [LF])

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

### DIAGNOSTIC PROCEDURE

#### MIL ILLUMINATES DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION  |
|------|---|---------|---|
| 1    | Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?  | Yes     | <p><b>DTC is displayed:</b></p> <ul style="list-style-type: none"> <li>• Go to appropriate the DTC inspection.</li> </ul> <p>(See <b><u>DTC TABLE [LF]</u></b> .)</p>                   |
|      |   | No      | <p><b>No DTC is displayed:</b></p> <ul style="list-style-type: none"> <li>• Inspect instrument cluster operation.</li> </ul> <p>(See <b><u>INSTRUMENT CLUSTER INSPECTION</u></b> .)</p> |
| 2    | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> |         |   |

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(See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .)

- 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 [LF]** .)

### NO.3 WILL NOT CRANK [LF]

#### POSSIBLE CAUSE & DESCRIPTION (WILL NOT CRANK [LF])

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

#### DIAGNOSTIC PROCEDURE

#### WILL NOT CRANK DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION   | RESULTS | ACTION                                 |
|------|--|---------|--|
| 1    | Inspect the following: <ul style="list-style-type: none"> <li>• Battery connection</li> <li>• Battery condition</li> <li>• Transaxle is in Park or Neutral.</li> </ul> | Yes     | Go to the next step.                   |
|      |  | No      | Service if necessary<br>Repeat Step 1. |

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|   |   |     |  |
|---|---|-----|--|
|   | <p>(AT)</p> <ul style="list-style-type: none"> <li>• Clutch is fully depressed. (MT)</li> <li>• Fuses</li> </ul> <p>Are all items normal</p>  |     |  |
| 2 | <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• <b>The following test should be performed on the advanced keyless entry system. If not equipped, go to the next step.</b></li> </ul> <p>Start the engine using the mechanical ignition key. Does the engine start?</p> | Yes | <p>Inspect advanced keyless entry system and repair or replace according to inspection result. (See <b><u>SYMPTOM TROUBLESHOOTING TABLE [KEYLESS ENTRY SYSTEM]</u></b> .)</p>                                      |
|   |   | No  | Go to the next step.   |
| 3 | <p>Connect the M-MDS or equivalent to the DLC-2. Do the following conditions appear?</p> <ul style="list-style-type: none"> <li>• The engine is not completely started.</li> <li>• DTC P1260 is displayed.</li> </ul>   | Yes | <p><b>Both conditions appear:</b><br/>Go to Step 4.</p>  |
|   |   | No  | <p><b>Either or other condition appears:</b><br/>Go to the next step.</p>  |
| 4 | <p>Turn the ignition switch to the ON position. Is the coil connector securely connected to the coil?</p>   | Yes | Go to the next step.   |
|   |   | No  | <p>Connect the coil connector securely.<br/>Return to Step 1.</p>  |
| 5 | <p>Does the security light flush?</p>   | Yes | Go to the next step.   |
|   |   | No  | <p>Inspect and repair or replace the following:</p> <ul style="list-style-type: none"> <li>• Wiring harnesses and connectors from keyless control module terminal 3F and instrument cluster terminal 2F</li> </ul> |

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|   |  |     |   |
|---|--|-----|---|
|   |  |     | <ul style="list-style-type: none"> <li>• Instrument cluster</li> </ul> <p>(See <b><u>INSTRUMENT CLUSTER INSPECTION</u></b> .)</p> |
| 6 | <p>Connect the M-MDS or equivalent to the DLC-2 and retrieve DTC for PCM, instrument cluster and keyless control module.</p> <p><b>DTC</b><br/> <b>PCM: B1342, U0073, U0155</b><br/> <b>Instrument cluster: B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2431, U0100, U0214</b><br/> <b>Keyless control module (with advanced keyless entry system): B1681, B2103, B1213</b></p>  | Yes | Go to appropriate DTC inspection.<br>(See <b><u>DTC TABLE [LF]</u></b> .)   |
|   |  | No  | Go to the next step.  |
| 7 | <p>Inspect for the following wiring harnesses and connectors:<br/> <b>With advanced keyless entry system</b></p> <ul style="list-style-type: none"> <li>• Between coil terminal A and keyless control module terminal 2S</li> <li>• Between coil terminal B and keyless control module terminal 2Q</li> </ul> <p><b>Without advanced keyless entry system</b></p> <ul style="list-style-type: none"> <li>• Between coil</li> </ul> | Yes | Repair or replace suspected wiring harness and connector.   |
|   |  | No  | Go to the next step, (with advanced keyless entry system)<br>Go to the Step 8. (without advanced keyless entry system)            |

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|    |   |     |   |
|----|---|-----|---|
|    | <p>terminal A and instrument cluster terminal 3AA</p> <ul style="list-style-type: none"> <li>• Between coil terminal B and instrument cluster terminal 3Y</li> </ul>  |     |   |
|    | Is there any malfunction?   |     |   |
| 8  | <p>Inspect the following wiring harnesses and connectors for an open or short circuit:</p> <ul style="list-style-type: none"> <li>• Between keyless control module terminal 4A and instrument cluster terminal 2Q</li> <li>• Between keyless control module terminal 4C and instrument cluster terminal 2S</li> </ul> | Yes | Repair or replace wiring harness and connectors.  |
|    |   | No  | Go to the next step.  |
|    | Is there any malfunction?   |     |   |
| 9  | <p>Is there continuity between PCM terminal 1B and starter relay with clutch pedal depressed (MT with starter interlock system), P or N position (AT)?</p>  | Yes | Go to the next step.  |
|    |   | No  | Repair or replace wiring harness.   |
| 10 | <p>Is clicking sound heard from starter when the ignition switch is turned to START?</p>  | Yes | Go to the next step.  |
|    |   | No  | Go to Step 13.  |
| 11 | <p>Inspect the starting system.<br/>(See <b>STARTER INSPECTION [LF]</b> .)</p> <p>Is starting system normal?</p>  | Yes | Inspect for seized/hydrolocked engine, flywheel or drive plate.<br>(See <b>FLYWHEEL INSPECTION</b> .) |
|    |   | No  | Repair or replace components if required.   |

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### 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

|    |   |     |  |
|----|---|-----|--|
| 12 | Do any other electrical accessories function?   | Yes | Go to the next step.   |
|    |   | No  | Inspect the charging system.<br>(See <b>BATTERY INSPECTION [LF]</b> .)<br>(See <b>GENERATOR INSPECTION [LF]</b> .)   |
| 13 | <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• <b>The following test should be performed on AT only. For MT, go to the next step.</b></li> </ul> <p>Connect the M-MDS or equivalent to the DLC-2. Access TR PID. Turn the ignition switch to the ON position. Is TR PID indicated P/N when selecting P or N position?</p> | Yes | Go to the next step.   |
|    |   | No  | Inspect adjustment of TR switch.<br>If TR switch is adjusted properly, inspect for open circuit between TR switch and PCM terminal 1B or starter.  |
| 14 | Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?  | Yes | <p><b>DTC is displayed:</b><br/>Go to appropriate DTC inspection.<br/>(See <b>DTC TABLE [LF]</b> .)</p> <p><b>Communication error message is displayed:</b><br/>Inspect for the following:</p> <ul style="list-style-type: none"> <li>• Open circuit in wiring harness between main relay and PCM terminal 1AW or 1BE</li> <li>• Open circuit in wiring harness between main relay terminal E and PCM terminal 1Q</li> <li>• Main relay is stuck open.</li> <li>• Open or short circuit in wiring harness between</li> </ul> |

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### 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

|    |  |    |   |
|----|--|----|---|
|    |  |    | <p>DLC and PCM terminals 1AM or 1AI</p> <ul style="list-style-type: none"> <li>• Open or poor GND circuit (PCM terminal 1AZ, 1BH, 1BD, 1BB)</li> <li>• Poor connection of vehicle body GND</li> </ul>   |
|    |  | No | <p><b>No DTC is displayed:</b><br/>Inspect the following:</p> <ul style="list-style-type: none"> <li>• START circuit in ignition switch</li> <li>• Open circuit in wiring harness between ignition switch and starter</li> <li>• Starter interlock switch (MT)</li> </ul> |
| 15 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> <p style="margin-left: 40px;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> <p style="margin-left: 40px;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> </li> </li></ul> |    |   |

## NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [LF]

### POSSIBLE CAUSE & DESCRIPTION (HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [LF])

|                    |   |
|--------------------|---|
| 4                  | <b>HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK</b>   |
| <b>DESCRIPTION</b> | <ul style="list-style-type: none"> <li>• The starter cranks engine at normal speed but engine requires excessive cranking time</li> </ul> |

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### POSSIBLE CAUSE

- before starting.
- The battery is in normal condition.
  - Erratic signal to ignition coil
  - Vacuum leakage
  - Poor fuel quality
  - Starting system malfunction
  - 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
  - EGR valve malfunction
  - Pressure regulator malfunction (built-in fuel pump unit)

#### **WARNING:**

**The following DIAGNOSTIC PROCEDURE TABLE 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 article.**



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### 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

|   |   |     |  |
|---|---|-----|--|
|   | 2.<br>Turn the ignition switch to the ON position (Engine off).<br>Retrieve any DTCs.<br>Are there any DTCs displayed?                                      |     | inspection.<br>(See <b>DTC TABLE [LF]</b> .)   |
|   |   | No  | <b>No DTC is displayed:</b><br>Go to the next step.  |
| 3 | Is engine overheating?  | Yes | Go to symptom troubleshooting "No.17 Cooling system concerns-Overheating".<br>(See <b>NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]</b> .)  |
|   |   | No  | Go to the next step.   |
| 4 | Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders.<br>Are wiring harness conditions normal? | Yes | Go to the next step.   |
|   |   | No  | Repair the wiring harnesses.   |
| 5 | Inspect the spark plug conditions.<br>Is spark plug wet, covered with carbon or grayish white?  | Yes | <b>Spark plug is wet or covered with carbon:</b><br>Inspect for fuel leakage from fuel injector.<br><b>Spark plug is grayish white:</b><br>Inspect the fuel injector for clogging. |
|   |   | No  | Install the spark plugs on original cylinders.<br>Go to the next step.   |
| 6 | Visually inspect the CKP sensor and teeth of crankshaft pulley.<br>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.<br>Does the PCV valve rattle?   | Yes | Go to the next step.   |
|   |   | No  | Replace the PCV valve.   |
| 8 | Attempt to start engine at part throttle.<br>Does engine run smoothly at part throttle?   | Yes | Inspect the electronic throttle control system operation.<br>(See <b>ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION</b> .)  |

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|    |   |     |   |
|----|---|-----|---|
|    |   | No  | Go to the next step.  |
| 9  | Install the fuel pressure gauge between the fuel pipe and fuel distributor.<br>Short check connector terminal F/P to body GND using a jumper wiring.<br>Turn the ignition switch to the ON position.<br>Is fuel line pressure correct with ignition switch ON?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .) | Yes | Go to the next step.  |
|    |   | No  | <b>Zero or low:</b><br>Inspect the fuel pump relay and the fuel pump circuit. Inspect the fuel line for clogging.<br>If there is no malfunction, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)<br><b>High:</b><br>Replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .) |
| 10 | Is the fuel line pressure held after ignition switch is turned off?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .)  | Yes | Go to the next step.  |
|    |   | No  | Inspect the fuel injector.<br>(See <b>FUEL INJECTOR INSPECTION [LF]</b> .)<br>If the fuel injector is normal, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)  |
| 11 | Disconnect a vacuum hose from purge solenoid valve and plug opening end of vacuum hose.<br>Start engine.<br>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"> <li>• Contamination</li> <li>• MAF sensor terminal B voltage (GND circuit)</li> </ul> Is there any contamination?  | Yes | Repair or replace the malfunctioning part.  |
|    |   | No  | Go to the next step.  |

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|    |  |     |   |
|----|--|-----|---|
| 13 | Visually inspect the exhaust system part.<br>Is there any deformed exhaust system part?  | Yes | Replace the suspected part.   |
|    |  | No  | Go to the next step.  |
| 14 | Inspect engine condition while tapping EGR valve housing.<br>Does engine condition improve?  | Yes | Replace the EGR valve.<br>(See <b>EGR VALVE REMOVAL/INSTALLATION [LF]</b> .)  |
|    |  | No  | Go to the next step.  |
| 15 | Inspect the starting system.<br>(See <b>STARTER INSPECTION [LF]</b> .)<br>Is starting system normal?   | Yes | Inspect for loose connectors or poor terminal contact.<br>If there is no malfunction, remove EGR valve and visually inspect for mechanically stuck EGR valve. |
|    |  | No  | Repair or replace components as required.   |
| 16 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> <li style="margin-left: 40px;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</li> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, Replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |     |   |

## NO.5 ENGINE STALLS-AFTER START/AT IDLE [LF]

### POSSIBLE CAUSE & DESCRIPTION (ENGINE STALLS-AFTER START/AT IDLE [LF])

| 5                  | ENGINE STALLS-AFTER START/AT IDLE   |
|--------------------|---|
| <b>DESCRIPTION</b> | <ul style="list-style-type: none"> <li>• Engine stops unexpectedly.</li> </ul>  |
|                    | <ul style="list-style-type: none"> <li>• A/C system operation is improper</li> <li>• Air leakage from intake-air system parts</li> <li>• Purge solenoid valve malfunction</li> <li>• Improper operation of electronic throttle control system</li> <li>• EGR valve malfunction</li> </ul> |

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### POSSIBLE CAUSE

- 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
- 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 DIAGNOSTIC PROCEDURE TABLE 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.**

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- 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 article.

(See BEFORE SERVICE PRECAUTION [LF] .)

(See AFTER SERVICE PRECAUTION [LF] .)

**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

#### ENGINE STALLS-AFTER START/AT IDLE DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION  |
|------|---|---------|---|
| 1    | Connect the M-MDS or equivalent to the DLC-2.<br>Do the following conditions appear? <ul style="list-style-type: none"> <li>• The engine is not completely started.</li> <li>• DTC P1260 is displayed.</li> </ul> | Yes     | <b>Both conditions appear:</b><br>Go to Step 3.                   |
|      |   | No      | <b>Either or other condition appears:</b><br>Go to the next step. |
| 2    | Does the engine stall after <b>approx. 2s</b> since the engine is started?  | Yes     | Go to the next step.  |
|      |   | No      | Immobilizer system is normal.<br>Go to Step 8.                    |
| 3    | Is coil connector securely connected to coil?   | Yes     | Go to the next step.  |
|      |   | No      | Connect the coil connector securely.                              |

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|   |  |     |  |
|---|--|-----|--|
|   |  |     | 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"> <li>• Wiring harnesses and connectors from keyless control module terminal 3F and instrument cluster terminal 2F</li> <li>• Instrument Cluster (See <b><u>INSTRUMENT CLUSTER INSPECTION</u></b> )</li> </ul> |
| 5 | Connect the M-MDS or equivalent to the DLC-2 and retrieve DTC for PCM, instrument cluster and keyless control module (with advanced keyless entry system).<br>Are any of the following DTCs displayed?<br><b>DTC</b><br><b>PCM: B1342, U0073, U0155</b><br><b>Instrument cluster: B1213, B1600, B1601, B1602, B1681, B2103, 2139, B2431, U0110, U0214</b><br><b>Keyless control module (with advanced keyless entry system): B1681, B2103, B1213</b> | Yes | Go to the appropriate DTC inspection.<br>(See <b><u>DTC TABLE [LF]</u></b> .)  |
|   |  | No  | Go to the next step.   |
| 6 | Inspect for the following wiring harnesses and connectors:<br><b>With advanced keyless entry system:</b> <ul style="list-style-type: none"> <li>• Between coil</li> </ul>  | Yes | Repair or replace the suspected wiring harness and connector.  |

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|   |   |     |   |
|---|---|-----|---|
|   | <p>terminal A and keyless control module terminal 3Y</p> <ul style="list-style-type: none"> <li>• Between coil terminal B and keyless control module terminal 3AA</li> <li>• Between keyless control module terminal 4A and instrument cluster terminal 2Q</li> <li>• Between keyless control module terminal 4C and instrument cluster terminal 2S</li> </ul> <p><b>Without advanced keyless entry system:</b></p> <ul style="list-style-type: none"> <li>• Between coil terminal A and instrument cluster terminal 2S</li> <li>• Between coil terminal B and instrument cluster terminal 2Q</li> </ul> <p>Is there any malfunction?</p> | No  | Go to the next step   |
| 7 | <p>Inspect for the following wiring harnesses and connectors:</p> <ul style="list-style-type: none"> <li>• Between PCM terminal 1AM and instrument cluster terminal 1J</li> </ul>   | Yes | Repair or replace the suspected wiring harness and connector. |

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|   |   |     |  |
|---|---|-----|--|
|   | <ul style="list-style-type: none"> <li>Between PCM terminal 1AI and instrument cluster terminal 1L</li> </ul> <p>Is there any malfunction?</p>  | No  | Go to the next step.   |
| 8 | <p>Verify the following:</p> <ul style="list-style-type: none"> <li>Vacuum connection</li> <li>Air cleaner element</li> <li>No air leakage from intake-air system</li> <li>No restriction of intake-air system</li> <li>Proper sealing of intake manifold and components attached to intake manifold: EGR valve</li> <li>Ignition wiring</li> <li>Fuel quality: proper octane, contamination, winter/summer blend</li> <li>Electrical connections</li> <li>Smooth operation of throttle valve</li> </ul> <p>Are all items normal?</p> | Yes | Go to the next step.   |
|   |   | No  | Service if necessary. Repeat Step 9.   |
| 9 | Connect the M-MDS or equivalent to the DLC-2. Access the APP1 and APP2 PIDs. Crank the engine with accelerator pedal released.  | Yes | Go to the next step.   |
|   |   | No  | <p>Inspect for the following:</p> <ul style="list-style-type: none"> <li>APP sensor</li> <li>Wiring harnesses and connectors for following:</li> </ul> |

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|    |   |     |  |
|----|---|-----|--|
|    | Are the APP1 and APP2 PIDs indicating that the accelerator pedal is in the released position?   |     | <ul style="list-style-type: none"> <li>○ PCM terminal 1AJ-APP sensor terminal A</li> <li>○ PCM terminal 1AV-APP sensor terminal B</li> <li>○ PCM terminal 1AP-APP sensor terminal C</li> <li>○ PCM terminal 1AL-APP sensor terminal D</li> <li>○ PCM terminal 1AS-APP sensor terminal E</li> <li>○ PCM terminal 1AO-APP sensor terminal F</li> </ul>   |
| 10 | Connect the M-MDS or equivalent to the DLC-2. Access the TP PID. Crank the engine with accelerator pedal released. Are the TP PID indicates the closed throttle position? | Yes | Go to the next step.   |
|    |   | No  | Inspect for the following: <ul style="list-style-type: none"> <li>● TP sensor</li> <li>● Wiring harnesses and connectors for following:               <ul style="list-style-type: none"> <li>○ PCM terminal 2AK-TP sensor terminal F</li> <li>○ PCM terminal 2AO-TP sensor terminal E</li> <li>○ PCM terminal 2AP-TP sensor terminal C</li> <li>○ PCM terminal 2AL-TP sensor terminal D</li> </ul> </li> </ul> |
| 11 | Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?                  | Yes | <b>DTC is displayed:</b><br>Go to appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .)<br><b>Communication error message is displayed:</b><br>Inspect for the following:   |

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|    |  |     |   |
|----|--|-----|---|
|    |  |     | <ul style="list-style-type: none"> <li>• Open circuit in wiring harness between main relay and PCM terminal 1AW or 1BE</li> <li>• Open main relay GND circuit</li> <li>• Main relay is stuck open.</li> <li>• Open or short circuit in wiring harness between DLC and PCM terminals 1AM or 1AI</li> <li>• Open or poor GND circuit (PCM terminal 1AZ, 1BB, 1BD, 1BH)</li> <li>• Poor connection of vehicle body GND</li> </ul>  |
|    |  | No  | <b>No DTC is displayed:</b><br>Go to the next step.   |
| 12 | Attempt to start engine at part throttle. Does engine run smoothly at part throttle?                                     | Yes | Inspect electronic throttle control system operation. (See <b><u>ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION</u></b> .)   |
|    |  | No  | Go to the next step.  |
| 13 | Connect the M-MDS or equivalent to the DLC-2. Access RPM PID. Is RPM PID indicating engine speed during engine cranking? | Yes | Go to the next step.  |
|    |  | No  | Inspect for the following: <ul style="list-style-type: none"> <li>• Open or short circuit in CKP sensor</li> <li>• Open or short circuit in wiring harness between CKP sensor terminal A and PCM terminal 2AB</li> <li>• Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2W</li> <li>• Open or short circuit in wiring harness between CKP sensor terminal C and PCM terminal 2AQ</li> <li>• Open or short circuit in CKP sensor wiring harnesses</li> </ul> |

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|    |  |     |   |
|----|--|-----|---|
|    |  |     | If CKP sensor and wiring harness are normal, go to the next step.   |
| 14 | Visually inspect CKP sensor and teeth of crankshaft pulley.<br>Are CKP sensor and teeth of crankshaft pulley normal?                                     | Yes | Go to the next step.  |
|    |  | No  | Replace the malfunctioning part.  |
| 15 | 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.  |
| 16 | Perform the spark test. (See <b>SPARK TEST</b> .)<br>Is strong blue spark visible at each cylinder?  | Yes | Go to the next step.<br>If symptoms occurs with the A/C on, go to Step 24.  |
|    |  | No  | Repair or replace the malfunctioning part according to spark test result.   |
| 17 | Inspect the spark plug condition.<br>Is spark plug wet, covered with carbon or grayish white?  | Yes | <b>Spark plug is wet or covered with carbon:</b><br>Inspect for fuel leakage from injector.<br><b>Spark plug is grayish white:</b><br>Inspect the fuel injector for clogging. |
|    |  | No  | Install spark plugs on original cylinders.<br>Go to the next step.  |
| 18 | Remove and shake the PCV valve.<br>Does the PCV valve rattle?  | Yes | Go to the next step.  |
|    |  | No  | Replace the PCV valve.  |
| 19 | Visually inspect the exhaust system part.<br>Is there any deformed exhaust system part?  | Yes | Replace the suspected part.   |
|    |  | No  | Go to the next step.  |
| 20 | Install the fuel pressure gauge between the fuel pipe and the fuel distributor.  | Yes | Go to the next step.  |
|    |  | No  | <b>Zero or low:</b><br>Inspect the fuel pump relay and fuel pump circuit.   |

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|    |   |     |   |
|----|---|-----|---|
|    | <p>Short check connector terminal F/P to body GND using a jumper wiring.</p> <p>Turn the ignition switch to the ON position.</p> <p>Is fuel line pressure correct with ignition switch ON?<br/>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .)</p>  |     | <p>Inspect the fuel line for clogging.</p> <p>If there is no malfunction, replace the fuel pump unit.<br/>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)</p> <p><b>High:</b><br/>Replace the fuel pump unit.<br/>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)</p>   |
| 21 | <p>Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary.</p> <p>Is fuel line pressure held after ignition switch is turned off?<br/>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .)</p>  | Yes | Go to the next step.  |
|    |   | No  | <p>Inspect the fuel injector.</p> <p>If the fuel injector is normal, replace the fuel pump unit.<br/>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)</p>  |
| 22 | <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• <b>The following test is for stall concerns with the A/C on. If other symptoms exist, go to the next step.</b></li> </ul> <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 <b>REFRIGERANT PRESSURE CHECK</b> .)</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".<br/>(See <b>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]</b> .)</p> <p>For other symptoms, inspect the following:</p> <ul style="list-style-type: none"> <li>• Refrigerant charging amount</li> <li>• Condenser fan operation</li> </ul> |
| 23 | <p>Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid side.</p>  | Yes | <p>Inspect if purge solenoid valve is stuck open.</p> <p>Inspect evaporative emission control system.</p>   |

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|    |  |     |  |
|----|--|-----|--|
|    | Plug opening end of vacuum hose.<br>Start the engine.<br>Is the engine stall now eliminated?   | No  | Go to the next step.   |
| 24 | Is air leakage felt or heard at intake-air system components while racing the engine to higher speed?  | Yes | Repair or replace the malfunctioning part.   |
|    |  | No  | Go to the next step.   |
| 25 | Inspect the engine condition while tapping EGR valve housing.<br>Does the engine condition improve?  | Yes | Replace the EGR valve.   |
|    |  | No  | Go to the next step.   |
| 26 | Inspect variable valve timing control system operation.<br>(See <b>VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION</b> .)<br>Does variable valve timing control function properly?   | Yes | Go to the next step.   |
|    |  | No  | Repair or replace the malfunctioning parts according to variable valve timing control system operation inspection results. |
| 27 | Is the engine compression correct?   | Yes | Inspect the valve timing.  |
|    |  | No  | Inspect for cause.   |
| 28 | <ul style="list-style-type: none"> <li>• Verify test results. <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |     |  |

## NO.6 CRANKS NORMALLY BUT WILL NOT START [LF]

### POSSIBLE CAUSE & DESCRIPTION (CRANKS NORMALLY BUT WILL NOT START [LF])

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| 6                  | <b>CRANKS NORMALLY BUT WILL NOT START</b>   |
|--------------------|---|
| <b>DESCRIPTION</b> | <ul style="list-style-type: none"><li>• The starter cranks engine at normal speed but the engine will not run.</li><li>• Refer to symptom troubleshooting <b><u>NO.5 ENGINE STALLS-AFTER START/AT IDLE [LF]</u></b> if this symptom appears after engine stall.</li><li>• Fuel is in tank.</li><li>• Battery is in normal condition.</li></ul>  |
|                    | <ul style="list-style-type: none"><li>• No battery power supply to PCM</li><li>• Air leakage from intake-air system</li><li>• Open PCM GND or vehicle body GND</li><li>• Improper operation of electronic throttle control system</li><li>• EGR valve malfunction</li><li>• No signal from CKP sensor due to sensor, related wire or incorrect installation</li><li>• No signal from CMP sensor due to sensor, related wire or incorrect installation</li><li>• Low engine compression</li><li>• Engine overheating</li><li>• Vacuum leakage</li><li>• Erratic signal to ignition coil</li><li>• Improper air/fuel mixture ratio control</li><li>• Poor fuel quality</li><li>• PCV valve malfunction</li><li>• Restriction in intake-air system</li><li>• Restriction in exhaust system</li><li>• Disconnected electrical connector</li><li>• Open or short circuit in fuel pump body and related wiring harness</li><li>• Inadequate fuel pressure</li><li>• Fuel pump mechanical malfunction</li><li>• Fuel leakage from injector</li><li>• Fuel injector is clogged.</li><li>• Purge solenoid valve malfunction</li><li>• Spark plug malfunction</li><li>• Ignition coil malfunction</li></ul> |

**POSSIBLE CAUSE**

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

**WARNING:**

The following **DIAGNOSTIC PROCEDURE TABLE** 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 article.

(See **BEFORE SERVICE PRECAUTION [LF]** .)

(See **AFTER SERVICE PRECAUTION [LF]** .)

**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.

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### CRANKS NORMALLY BUT WILL NOT START DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION   |
|------|---|---------|--|
| 1    | Connect the M-MDS or equivalent to the DLC-2.<br>Do any of the following conditions appear? <ul style="list-style-type: none"> <li>• Engine does not completely start.</li> <li>• DTC P1260 is displayed.</li> </ul>              | Yes     | <b>Both conditions appear:</b><br>Go to Step 3.  |
|      |   | No      | <b>Either or other condition appears:</b><br>Go to the next step.  |
| 2    | Does engine stall after <b>approx. 2 s</b> from when it is started?   | Yes     | Go to the next step.   |
|      |   | No      | Immobilizer system is normal.<br>Go to Step 8.   |
| 3    | Is the coil connector securely connected to the coil?   | Yes     | Go to the next step.   |
|      |   | No      | Connect the coil connector securely.<br>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"> <li>• Wiring harnesses and connectors from keyless control module terminal 3F and instrument cluster terminal 2F</li> <li>• Instrument cluster</li> </ul> (See <b>INSTRUMENT CLUSTER INSPECTION</b> .) |
| 5    | Connect the M-MDS equivalent to the DLC-2 and retrieve the DTC for PCM, instrument cluster and keyless control module (with advanced keyless entry system).<br>Are any of the following DTCs displayed?<br><b>DTC PCM: B1342,</b> | Yes     | Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .)   |

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|   |   |     |   |
|---|---|-----|---|
|   | <p><b>U0073, U0155</b><br/> <b>Instrument cluster:</b><br/> <b>B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2431, U0100, U0214</b><br/> <b>Keyless control module (with advanced keyless entry system): B1681, B2103, B1213</b></p>  | No  | Go to the next step.  |
| 6 | <p>Inspect the following wiring harnesses and connectors:<br/> <b>With advanced keyless entry system:</b></p> <ul style="list-style-type: none"> <li>• Between coil terminal A and keyless control module terminal 3Y</li> <li>• Between coil terminal B and keyless control module terminal 3AA</li> <li>• Between keyless control module terminal 4A and instrument cluster terminal 2Q</li> <li>• Between keyless control module terminal 4C and instrument cluster terminal 2S</li> </ul> | Yes | Repair or replace the suspected wiring harness and connector. |
|   | <p><b>Without advanced keyless entry system:</b></p> <ul style="list-style-type: none"> <li>• Between coil terminal A and instrument cluster terminal 2S</li> </ul>   | No  | Go to the next step.  |

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|   |   |     |   |
|---|---|-----|---|
|   | <ul style="list-style-type: none"> <li>Between coil terminal B and instrument cluster terminal 2Q</li> </ul>  |     |   |
|   | Is there any malfunction?   |     |   |
| 7 | <p>Inspect the following wiring harnesses and connectors:</p> <ul style="list-style-type: none"> <li>Between PCM terminal 1AM and instrument cluster terminal 1J</li> <li>Between PCM terminal 1AI and instrument cluster terminal 1L</li> </ul>  | Yes | Repair or replace the suspected wiring harness and connector. |
|   | Is there any malfunction?   | No  | Go to the next step.  |
| 8 | <p>Verify the following:</p> <ul style="list-style-type: none"> <li>Vacuum connection</li> <li>External fuel shut off or accessory (such as kill switch, alarm)</li> <li>Fuel quality: proper octane, contamination, winter/summer blend</li> <li>No air leakage from intake-air system</li> <li>Intake-air system restriction (such as air cleaner element, fresh air</li> </ul> | Yes | Go to the next step.  |
|   |   | No  | Service if necessary. Repeat Step 9.                          |

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|    |   |     |   |
|----|---|-----|---|
|    | <p>duct)</p> <ul style="list-style-type: none"> <li>• Proper sealing of intake manifold and components attached to intake manifold: EGR valve</li> <li>• Ignition wiring</li> <li>• Electrical connections</li> <li>• Fuses</li> <li>• Smooth operation of throttle valve</li> </ul> <p>Are all items normal?</p> |     |   |
| 9  | <p>Connect the M-MDS or equivalent to the DLC-2.</p> <p>Turn the ignition switch to the ON position (Engine off).</p> <p>Retrieve any DTCs.</p> <p>Are there any DTCs displayed?</p>  | Yes | <p><b>DTC is displayed:</b></p> <p>Go to the appropriate DTC inspection.</p> <p>(See <b>DTC TABLE [LF]</b> .)</p> <p><b>Communication error message is displayed:</b></p> <p>Inspect for the following:</p> <ul style="list-style-type: none"> <li>• Open circuit in wiring harness between main relay and PCM terminal 1AW or 1BE</li> <li>• Open main relay GND circuit</li> <li>• Open or short circuit in wiring harness between DLC and PCM terminal 1AM or 1AI</li> <li>• Main relay is stuck open.</li> <li>• Open or poor GND circuit (PCM terminal 1AZ, 1BB, 1BD, 1BH)</li> <li>• Poor connection of vehicle body GND</li> </ul> |
|    |   | No  | <p><b>No DTC is displayed:</b></p> <p>Go to the next step.</p>  |
| 10 | <p>Connect the M-MDS or equivalent to the DLC-</p>  | Yes | Go to the next step.  |
|    |   | No  | Inspect for the following:  |

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|    |  |     |  |
|----|--|-----|--|
|    | <p>2.<br/>Access the APP1 and APP2 PIDs. Crank the engine with accelerator pedal released.<br/>Are the APP1 and APP2 PIDs indicating that the accelerator pedal is in the released position?</p> |     | <ul style="list-style-type: none"> <li>• APP sensor</li> <li>• Wiring harnesses and connectors for following: <ul style="list-style-type: none"> <li>○ PCM terminal 1AJ-APP sensor terminal A</li> <li>○ PCM terminal 1AV-APP sensor terminal B</li> <li>○ PCM terminal 1AP-APP sensor terminal C</li> <li>○ PCM terminal 1AL-APP sensor terminal D</li> <li>○ PCM terminal 1AS-APP sensor terminal E</li> <li>○ PCM terminal 1AO-APP sensor terminal F</li> </ul> </li> </ul> |
| 11 | <p>Connect the M-MDS or equivalent to the DLC-2.<br/>Access the TP PID.<br/>Crank the engine with accelerator pedal released.<br/>Are the TP PID indicates the closed throttle position?</p>     | Yes | Go to the next step.   |
|    |  | No  | <p>Inspect for the following:</p> <ul style="list-style-type: none"> <li>• TP sensor</li> <li>• Wiring harnesses and connectors for following: <ul style="list-style-type: none"> <li>○ PCM terminal 2AK-TP sensor terminal F</li> <li>○ PCM terminal 2AO-TP sensor terminal E</li> <li>○ PCM terminal 2AP-TP sensor terminal C</li> <li>○ PCM terminal 2AL-TP sensor terminal D</li> </ul> </li> </ul>  |
| 12 | <p>Does the engine start with the throttle valve closed?</p>   | Yes | Go to Step 29.   |
|    |  | No  | Go to the next step.   |
| 13 | <p>Will the engine start</p>   | Yes | Inspect the electronic throttle  |

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|    |  |     |  |
|----|--|-----|--|
|    | and run smoothly at part throttle?   |     | control system operation.<br>(See <b>ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION</b> .)  |
|    |  | No  | Go to the next step.   |
| 14 | Connect the M-MDS or equivalent to the DLC-2.<br>Access RPM PID.<br>Is RPM PID indicating the engine speed when cranking the engine?                     | Yes | Go to the next step.   |
|    |  | No  | Inspect for the following: <ul style="list-style-type: none"> <li>• Open or short circuit in CKP sensor</li> <li>• Open or short circuit in wiring harness between CKP sensor terminal A and PCM terminal 2AB</li> <li>• Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2W</li> <li>• Open or short circuit in wiring harness between CKP sensor terminal C and PCM terminal 2AQ</li> <li>• Open or short circuit in CKP sensor wiring harnesses</li> </ul> <p>If CKP sensor and wiring harness are normal, go to the next step.</p> |
| 15 | Visually inspect the CKP sensor and teeth of crankshaft pulley.<br>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.<br>(See <b>SPARK TEST</b> .)   | Yes | Go to the next step.   |
|    |  | No  | Repair or replace the  |

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|    |   |     |  |
|----|---|-----|--|
|    | Is strong blue spark visible at each cylinder?  |     | malfunctioning part according to spark test result.  |
| 18 | Inspect the spark plug conditions.<br>Is spark plug wet, covered with carbon or grayish white?  | Yes | <b>Spark plug is wet or covered with carbon:</b><br>Inspect for fuel leakage from injector.<br><b>Spark plug is grayish white:</b><br>Inspect the fuel injector for clogging.  |
|    |   | No  | Install the spark plugs on original cylinders.<br>Go to the next step.   |
| 19 | Remove and shake the PCV valve.<br>Does the PCV valve rattle?   | Yes | Go to the next step.   |
|    |   | No  | Replace the PCV valve.   |
| 20 | Visually inspect the exhaust system part.<br>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.<br>Short check connector terminal F/P to body GND using a jumper wiring.<br>Turn the ignition switch to the ON position.<br>Is fuel line pressure correct when ignition switch is turned on/off <b>five times?</b><br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .) | Yes | Go to the next step.   |
|    |   | No  | <b>Zero or low:</b><br>Inspect the fuel pump relay and fuel pump circuit.<br>Inspect the fuel line for clogging.<br>If there is no malfunction, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)<br><b>High:</b><br>Replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .) |
| 22 | Visually inspect the fuel injector O-ring and fuel line for fuel leakage.<br>Service if necessary.<br>Is the fuel line pressure held after the ignition switch is turned off?<br>(See <b>FUEL LINE PRESSURE</b>   | Yes | Go to the next step.   |
|    |   | No  | Inspect the fuel injector.<br>If the fuel injector is normal, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)   |

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|    | <b>INSPECTION [LF] .)</b>  |     |   |
|----|--|-----|---|
| 23 | Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side.<br>Plug opening end of vacuum hose.<br>Start the engine.<br>Is starting condition improved?  | Yes | Inspect if the purge solenoid valve is stuck open mechanically.<br>Inspect the evaporative emission control system. |
|    |  | No  | Go to the next step.  |
| 24 | 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.  |
| 25 | Inspect the engine condition while tapping EGR valve housing.<br>Is engine condition improved?   | Yes | Replace the EGR valve.  |
|    |  | No  | Go to the next step.  |
| 26 | Inspect the variable valve timing control system operation.<br>(See <b>VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION .)</b><br>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"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> <li>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF] .)</b></li> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information</li> </ul> </li> </ul> |     |   |

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is not available, replace the PCM.

(See **PCM REMOVAL/INSTALLATION [LF]** .)

### NO.7 SLOW RETURN TO IDLE [LF]

#### POSSIBLE CAUSE & DESCRIPTION (SLOW RETURN TO IDLE [LF])

| 7                     | SLOW RETURN TO IDLE   |
|-----------------------|---|
| <b>DESCRIPTION</b>    | Engine takes more time than normal to return to idle speed.   |
| <b>POSSIBLE CAUSE</b> | <ul style="list-style-type: none"><li>• ECT sensor malfunction</li><li>• Thermostat is stuck open.</li><li>• Throttle body malfunction</li><li>• Air leakage from intake-air system</li></ul> |

#### DIAGNOSTIC PROCEDURE

#### SLOW RETURN TO IDLE DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION  |
|------|---|---------|---|
| 1    | Connect the M-MDS or equivalent to the DLC-2.<br>Turn the ignition switch to the ON position (Engine off).<br>Retrieve any DTCs.<br>Are there any DTCs displayed?     | Yes     | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .)  |
|      |   | No      | <b>No DTC is displayed:</b><br>Go to the next step.   |
| 2    | Remove thermostat and inspect operation.<br>(See <b>THERMOSTAT REMOVAL/INSTALLATION [LF]</b> .)<br>(See <b>THERMOSTAT INSPECTION [LF]</b> .)<br>Is thermostat normal? | Yes     | ECT and thermostat are normal.<br>Go to the next step.  |
|      |   | No      | Access ECT PID on the M-MDS or equivalent.<br>Inspect for both ECT PID and temperature gauge on instrument cluster readings.<br>If temperature gauge on instrument cluster indicates normal range but ECT PID is not same as temperature gauge reading, inspect ECT sensor.<br>If temperature gauge on instrument cluster |

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|   |   |     |  |
|---|---|-----|--|
|   |   |     | 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"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> <li>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</li> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |     |  |

## NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [LF]

### POSSIBLE CAUSE & DESCRIPTION (ENGINE RUNS ROUGH/ROLLING IDLE [LF])

| 8                  | ENGINE RUNS ROUGH/ROLLING IDLE  |
|--------------------|---|
| <b>DESCRIPTION</b> | <ul style="list-style-type: none"> <li>• Engine speed fluctuates between specified idle speed and lower speed and engine shakes excessively.</li> <li>• Idle speed is too slow and engine shakes excessively.</li> </ul>  |
|                    | <ul style="list-style-type: none"> <li>• Air leakage from intake-air system parts</li> <li>• A/C system operation is improper</li> <li>• Erratic signal to ignition coil</li> <li>• Spark plug malfunction</li> <li>• Purge solenoid valve malfunction</li> <li>• Improper operation of electronic throttle control system</li> </ul> |

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### POSSIBLE CAUSE

- Idle learning of electronic throttle control system is not completed
- EGR valve malfunction
- 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)

### WARNING:

The following **DIAGNOSTIC PROCEDURE TABLE** 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.

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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 article.

(See **BEFORE SERVICE PRECAUTION [LF]** .)

(See **AFTER SERVICE PRECAUTION [LF]** .)

**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

#### ENGINE RUNS ROUGH/ROLLING IDLE DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION   | RESULTS | ACTION  |
|------|--|---------|---|
| 1    | Warm up the engine. Idle the engine for <b>5 min.</b><br>Is the symptom disappeared?   | Yes     | Troubleshooting completed.<br>(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"> <li>• External fuel shut off or accessory (such as kill switch, alarm)</li> <li>• Fuel quality (such as proper octane, contamination, winter/summer blend)</li> <li>• No air leakage from intake-air system</li> <li>• Proper sealing of</li> </ul> | Yes     | Go to the next step.  |
|      |  | No      | Service if necessary.<br>Repeat Step 2.   |

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|   |  |     |  |
|---|--|-----|--|
|   | <p>intake manifold and components attached to intake manifold: EGR valve</p> <ul style="list-style-type: none"> <li>• Ignition wiring</li> <li>• Electrical connections</li> <li>• Fuses</li> <li>• Smooth operation of throttle valve</li> <li>• PCM GND circuit (1AZ, 1BB, 1BD, 1BH)</li> </ul> <p>Are all items normal?</p> |     |  |
| 3 | <p>Connect the M-MDS or equivalent to the DLC-2.<br/>Turn the ignition switch to the ON position (Engine off).<br/>Retrieve any DTCs.<br/>Are there any DTCs displayed?</p>  | Yes | <p><b>DTC is displayed:</b><br/>Go to the appropriate DTC inspection.<br/>(See <b>DTC TABLE [LF]</b> .)</p>          |
|   |  | No  | <p><b>No DTC is displayed:</b><br/>Go to the next step.</p>  |
| 4 | <p>Is the engine overheating?</p>  | Yes | <p>Go to symptom troubleshooting <b><u>NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]</u></b> .</p>                  |
|   |  | No  | <p>Go to the next step.</p>  |
| 5 | <p>Connect the M-MDS or equivalent to the DLC-2.<br/>Access MAF PID.<br/>Drive vehicle with monitoring PID. Is MAF PID within specification?</p>   | Yes | <p>Go to the next step.</p>  |
|   |  | No  | <p>Inspect for open or short circuit of MAF sensor and related wiring harness.</p>                                   |
| 6 | <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• <b>The following test is for engine running at rough idle with A/C on. If</b></li> </ul>  | Yes | <p>Go to the next step.</p>  |
|   |  | No  | <p>If the A/C is always on, go to symptom troubleshooting <b><u>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR</u></b></p> |

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|    |  |     |  |
|----|--|-----|--|
|    | <p><b>other symptoms exist, go to the next step.</b></p> <p>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 <b><u>REFRIGERANT PRESSURE CHECK</u></b> .)</p>                      |     | <p><b><u>RUNS CONTINUOUSLY [LF]</u></b> .</p> <p>For other symptoms, inspect the following:</p> <ul style="list-style-type: none"> <li>• Refrigerant charging amount</li> <li>• Condenser fan operation</li> </ul> |
| 7  | <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• <b>The following test is for engine running rough with P/S on. If other symptoms exist, go to the next step.</b></li> </ul> <p>Connect the M-MDS or equivalent to the DLC-2. Start the engine and idle it. Retrieve any DTCs for EPS. Is there any EPS DTC displayed?</p> | Yes | Go to appropriate the DTC inspection. (See <b><u>DTC TABLE [LF]</u></b> .)   |
|    |  | No  | Go to the next step.   |
| 8  | 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.   |
| 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   | Yes | <b>Spark plug is wet or covered</b>  |

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|    |  |     |  |
|----|--|-----|--|
|    | condition.<br>Is the spark plug wet, covered with carbon or grayish white?   |     | <b>with carbon:</b><br>Inspect for fuel leakage from injector.<br><b>Spark plug is grayish white:</b><br>Inspect the fuel injector for clogging.   |
|    |  | No  | Install the spark plugs on original cylinders.<br>Go to the next step.   |
| 11 | Perform the electronic throttle control system operation inspection.<br>(See <b><u>ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION</u></b> .)<br>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.<br>Start the engine and run it at idle.<br>Measure fuel line pressure during idle.<br>Is fuel line pressure correct during idle?<br>(See <b><u>FUEL LINE PRESSURE INSPECTION [LF]</u></b> .) | Yes | Go to the next step.   |
|    |  | No  | <b>Low:</b><br>Inspect the fuel line for clogging.<br>If there is no malfunction, replace fuel pump unit.<br>(See <b><u>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</u></b> .)<br><b>High:</b><br>Replace the fuel pump unit.<br>(See <b><u>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</u></b> .) |
| 13 | Visually inspect for fuel leakage at fuel injector, O-ring, and fuel line.<br>Service if necessary.<br>Does fuel line pressure hold after ignition switch is turned off?<br>(See <b><u>FUEL LINE PRESSURE INSPECTION [LF]</u></b> .)                             | Yes | Go to the next step.   |
|    |  | No  | Inspect fuel injector.<br>If fuel injector is normal, replace fuel pump unit.  |
| 14 | Connect the M-MDS or equivalent to the DLC-2.  | Yes | Go to the next step.   |
|    |  | No  | LONG FT1 PID is out of specification.  |

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|    |  |     |  |
|----|--|-----|--|
|    | <p>Start the engine and idle it.<br/>Access LONG FT1 PID.<br/>Measure LONG FT1 PID at idle.<br/>Is PID value normal?<br/>(See <b>PCM INSPECTION [LF]</b> .)</p>  |     | <p>Less than specification (too rich):</p> <ul style="list-style-type: none"> <li>• Inspect EVAP control system. <ul style="list-style-type: none"> <li>○ If system is normal, go to Step 14.</li> </ul> </li> </ul> <p>Greater than specification (too lean):</p> <ul style="list-style-type: none"> <li>• Inspect for air leakage at intake-air system components. <ul style="list-style-type: none"> <li>○ If system is normal, go to the next step.</li> </ul> </li> </ul> |
| 15 | <p>Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side.<br/>Plug opening end of vacuum hose.<br/>Start the engine.<br/>Does the engine condition improve?</p> | Yes | <p>Check if purge solenoid valve is stuck open mechanically.<br/>Inspect EVAP control system.</p>  |
|    |  | No  | <p>Go to the next step.</p>  |
| 16 | <p>Remove and shake the PCV valve.<br/>Does the PCV valve rattle?</p>  | Yes | <p>Go to the next step.</p>  |
|    |  | No  | <p>Replace the PCV valve.</p>  |
| 17 | <p>Visually inspect the exhaust system part.<br/>Is there any deformed exhaust system part?</p>  | Yes | <p>Replace the suspected part.</p>   |
|    |  | No  | <p>Go to the next step.</p>  |
| 18 | <p>Visually inspect the CMP sensor and teeth of camshaft.<br/>Are the CMP sensor and teeth of camshaft normal?</p>   | Yes | <p>Go to the next step.</p>  |
|    |  | No  | <p>Replace the malfunctioning part.</p>  |
| 19 | <p>Inspect the engine condition while tapping EGR valve housing.<br/>Does the engine condition improve?</p>  | Yes | <p>Replace the EGR valve.</p>  |
|    |  | No  | <p>Go to the next step.</p>  |

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|    |   |     |  |
|----|---|-----|--|
| 20 | Inspect variable valve timing control system operation.<br>(See <b>VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION</b> .)<br>Does variable valve timing control system function properly?   | Yes | Go to the next step.   |
|    |   | No  | Repair or replace the malfunctioning part.   |
| 21 | Is engine compression correct?  | Yes | Inspect the valve timing.<br>(See <b>VARIABLE VALVE TIMING ACTUATOR INSPECTION [LF]</b> .) |
|    |   | No  | Inspect for causes.  |
| 22 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> <li>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</li> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |     |  |

## NO.9 FAST IDLE/RUNS ON [LF]

### POSSIBLE CAUSE & DESCRIPTION (FAST IDLE/RUNS ON [LF])

| 9                     | FAST IDLE/RUNS ON  |
|-----------------------|--|
| <b>DESCRIPTION</b>    | <ul style="list-style-type: none"> <li>• The engine speed continues at fast idle after warm-up.</li> <li>• The engine runs after the ignition switch is turned off.</li> </ul>   |
| <b>POSSIBLE CAUSE</b> | <ul style="list-style-type: none"> <li>• ECT sensor malfunction</li> <li>• Air leakage from intake-air system</li> <li>• Throttle body malfunction</li> <li>• Accelerator pedal position sensor misadjustment</li> </ul> |

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- Cruise control system operation improperly
- Improper load signal input
- Improper operation of electronic throttle control system

## DIAGNOSTIC PROCEDURE

### FAST IDLE/RUNS ON DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION   | RESULTS | ACTION  |
|------|--|---------|---|
| 1    | Connect the M-MDS or equivalent to the DLC-2. Access ECT PID. Start and warm up engine to normal operating temperature. Is ECT PID between <b>82-112°C {180-234°F}</b> ? | Yes     | Go to the next step.  |
|      |  | No      | <b>ECT PID is higher than 112°C {234°F}:</b><br>Go to symptom troubleshooting <b><u>NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]</u></b> .<br><b>ECT PID is less than 82°C {180°F}:</b><br>Go to symptom troubleshooting <b><u>NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [LF]</u></b> . |
| 2    | Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?                 | Yes     | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection. (See <b><u>DTC TABLE [LF]</u></b> .)  |
|      |  | No      | <b>No DTC is displayed:</b><br>Go to the next step.   |
| 3    | Access and monitor AC_REQ, CPP (MT), CPP/PNP (MT), and TR (AT) PIDs. Are PIDs values normal? (See <b><u>PCM INSPECTION [LF]</u></b> .)                                   | Yes     | Go to the next step.  |
|      |  | No      | <b>If the AC_REQ PID is not normal:</b><br><br><ul style="list-style-type: none"> <li>• Inspect A/C switch, refrigerant pressure switch, and fan switch, and related wiring harness for vibration or intermittent open/short circuit.</li> </ul>  |

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|   |  |     |  |
|---|--|-----|--|
|   |  |     | <p><b>If the CPP PID is not normal:</b></p> <ul style="list-style-type: none"> <li>Inspect clutch position switch and related wiring harness for vibration or intermittent open/short circuit.</li> </ul> <p><b>If the CPP/PNP PID is not normal:</b></p> <ul style="list-style-type: none"> <li>Inspect neutral position switch and related wiring harness for vibration or intermittent open/short circuit.</li> </ul> <p><b>If the TR PID is not normal:</b></p> <ul style="list-style-type: none"> <li>Inspect TR switch and related wiring harness for vibration or intermittent open/short circuit.</li> </ul> |
| 4 | Connect the M-MDS or equivalent to the DLC-2. Start the engine and idle it. Retrieve any DTCs for EHPAS. Is there any EHPAS DTC displayed? | Yes | <p><b>DTC is displayed:</b><br/>Go to appropriate DTC inspection.</p>  |
|   |  | No  | <p><b>No DTC is displayed:</b><br/>Go to the next step.</p>  |
| 5 | Is there air leakage felt or heard at intake-air system components while racing engine to higher speed?                                    | Yes | Repair or replace parts if necessary.  |
|   |  | No  | Inspect the following:   |

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|   |  |  |   |
|---|--|--|---|
|   |  |  | <ul style="list-style-type: none"> <li>• Electronic throttle control system operation</li> <li>• Accelerator pedal position sensor</li> </ul> |
| 6 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |  |   |

## NO.10 LOW IDLE/STALLS DURING DECELERATION [LF]

### POSSIBLE CAUSE & DESCRIPTION (LOW IDLE/STALLS DURING DECELERATION [LF])

| 10                    | LOW IDLE/STALLS DURING DECELERATION  |
|-----------------------|--|
| <b>DESCRIPTION</b>    | <ul style="list-style-type: none"> <li>• Engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.</li> </ul>  |
| <b>POSSIBLE CAUSE</b> | <ul style="list-style-type: none"> <li>• Vacuum leakage</li> <li>• Improper operation of electronic throttle control system</li> <li>• Air leakage from intake-air system</li> <li>• Improper air/fuel mixture ratio control</li> <li>• Evaporative emission control system malfunction</li> <li>• Accelerator pedal position sensor or related circuit malfunction</li> <li>• Accelerator pedal position sensor misadjustment</li> <li>• TP sensor or related circuit malfunction</li> <li>• MAF sensor or related circuit malfunction</li> <li>• Brake switch or related circuit malfunction</li> <li>• Neutral/clutch pedal position switch or related</li> </ul> |

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circuit malfunction (MT)

- TR switch or related circuit malfunction (AT)
- Improper A/C magnetic clutch operation

### DIAGNOSTIC PROCEDURE

#### LOW IDLE/STALLS DURING DECELERATION DIAGNOSTIC PROCEDURE TABLE

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

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|   |   |     |   |
|---|---|-----|---|
|   | Are there any DTCs displayed?   | No  | <b>No DTC is displayed:</b><br>Go to the next step.   |
| 5 | Perform the electronic throttle control system operation inspection.<br>(See <b><u>ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION</u></b> .)<br>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.   |
| 6 | Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side.<br>Plug opening end of vacuum hose.<br>Drive the vehicle.<br>Does the engine condition improve? | Yes | Inspect the evaporative emission control system.  |
|   |   | No  | Go to the next step.  |
| 7 | Connect the M-MDS or equivalent to the DLC-2.<br>Access APP1, APP2, TP, MAF and VSS PIDs.<br>Monitor each PID while driving vehicle.<br>(See <b><u>PCM INSPECTION [LF]</u></b> .)<br>Are PIDs normal?               | Yes | Go to the next step.  |
|   |   | No  | <b>APP1, APP2 PIDs:</b><br>Inspect the accelerator pedal position sensor.<br><b>TP PID:</b> Inspect TP sensor.<br><b>MAF PID:</b> Inspect MAF sensor.<br><b>VSS PID:</b> Inspect VSS.                                 |
| 8 | Access and monitor BOO, CPP (MT), CPP/PNP (MT), and TR (AT) PIDs.<br>Are PIDs values normal?<br>(See <b><u>PCM INSPECTION [LF]</u></b> .)   | Yes | Go to the next step.  |
|   |   | No  | If the BOO PID is not normal: <ul style="list-style-type: none"> <li>• Inspect brake switch, and related wiring harness for vibration or intermittent open/short circuit.</li> </ul><br>If the CPP PID is not normal: |

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|   |   |  |  |
|---|---|--|--|
|   |   |  | <ul style="list-style-type: none"><li>• Inspect clutch position switch and related wiring harness for vibration or intermittent open/short circuit.</li></ul> <p>If the CPP/PNP PID is not normal:</p> <ul style="list-style-type: none"><li>• Inspect neutral position switch and related wiring harness for vibration or intermittent open/short circuit.</li></ul> <p>If the TR PID is not normal:</p> <ul style="list-style-type: none"><li>• Inspect TR switch and related wiring harness for vibration or intermittent open/short circuit.</li></ul> |
| 9 | <ul style="list-style-type: none"><li>• Verify test results.<ul style="list-style-type: none"><li>○ If normal, return to diagnostic index to service any additional symptoms.</li></ul></li></ul> <p>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"><li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.<ul style="list-style-type: none"><li>• If vehicle is repaired, troubleshooting completed.</li><li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li></ul></li></ul> <p>(See <b>PCM INSPECTION [LF]</b> .)</p> |  |  |

**BUCK/JERK, HESITATION/STUMBLE, SURGES [LF]**

**POSSIBLE CAUSE & DESCRIPTION (ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES)**

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

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### POSSIBLE CAUSE

- 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 belt
- 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 form Accelerator pedal position sensor
- Erratic signal form TP sensor
- Intermittent open or short circuit of MAF sensor, TP sensor, Accelerator pedal position sensor and VSS
- AT malfunction (AT)
- Clutch slippage (MT)
- Improper variable intake air control operation
- Loose attaching bolts or worn engine mounts

### WARNING:

The following **DIAGNOSTIC PROCEDURE TABLE** 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**

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skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.

(See **BEFORE SERVICE PRECAUTION [LF]** .)

(See **AFTER SERVICE PRECAUTION [LF]** .)

### 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

### ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION                                  |
|------|---|---------|---|
| 1    | Verify the following: <ul style="list-style-type: none"><li>• Vacuum connection</li><li>• Air cleaner element</li><li>• No air leakage from intake-air system</li><li>• No restriction of intake-air system</li><li>• Proper sealing of intake manifold and components attached to intake manifold: such as EGR valve</li><li>• Ignition wiring</li><li>• Fuel quality (such as proper octane, contamination, winter/summer</li></ul> | Yes     | Go to the next step.                    |
|      |   | No      | Service if necessary.<br>Repeat Step 1. |

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|   |  |     |  |
|---|--|-----|--|
|   | blend) <ul style="list-style-type: none"> <li>• Electrical connections</li> <li>• Smooth operation of throttle valve</li> </ul>  |     |  |
|   | Are all items normal?  |     |  |
| 2 | Connect the M-MDS or equivalent to the DLC-2.<br>Turn the ignition switch to the ON position (Engine off).<br>Retrieve any DTCs.<br>Are there any DTCs displayed?  | Yes | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .)   |
|   |  | No  | <b>No DTC is displayed:</b><br>Go to the next step.  |
| 3 | Is engine overheating?   | Yes | Go to symptom troubleshooting <b><u>NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]</u></b> .   |
|   |  | No  | Go to the next step.   |
| 4 | Connect the M-MDS or equivalent to the DLC-2.<br>Access APP1, APP2, RPM, VPWR, MAF, TP and VSS PIDs.<br>Drive the vehicle with monitoring PIDs.<br>Are PIDs within specifications?<br>(See <b>PCM INSPECTION [LF]</b> .) | Yes | Go to the next step.   |
|   |  | No  | <b>APP1, APP2 PIDs:</b><br>Inspect if output signal from accelerator pedal position sensor changes smoothly.<br><b>RPM PID:</b><br>Inspect the CKP sensor and related wiring harness for vibration or intermittent open/short circuit.<br><b>VPWR PID:</b><br>Inspect for open circuit intermittently.<br><b>MAF PID:</b><br>Inspect for open circuit of the MAF sensor and related wiring harness intermittently.<br><b>TP PID:</b><br>Inspect if output signal from TP sensor changes smoothly.<br><b>VSS PID:</b><br>Inspect for open circuit of VSS and related wiring harness intermittently. |

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|    |   |     |   |
|----|---|-----|---|
| 5  | Visually inspect the CKP sensor and teeth of crankshaft pulley.<br>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.<br>Is spark plug wet, covered with carbon or grayish white?  | Yes | <b>Spark plug is wet or covered with carbon:</b><br>Inspect for fuel leakage from fuel injector.<br><b>Spark plug is grayish white:</b><br>Inspect the fuel injector for clogging.  |
|    |   | No  | Install the spark plugs on original cylinders.<br>Go to the next step.  |
| 7  | Remove and shake the PCV valve.<br>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.<br>(See <b><u>ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION</u></b> .)<br>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.<br>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.<br>Short check connector terminal F/P to body GND using a jumper wiring.<br>Turn the ignition switch to the ON position.<br>Is fuel line pressure | Yes | Go to the next step.  |
|    |   | No  | <b>Zero or low:</b><br>Inspect the fuel pump relay and fuel pump circuit.<br>Inspect the fuel line for clogging.<br>If there is no malfunction, replace the fuel pump unit.<br>(See <b><u>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</u></b> .) |

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|    |   |     |   |
|----|---|-----|---|
|    | correct with ignition switch to ON position?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .)   |     | <b>High:</b><br>Replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)  |
| 11 | 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?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .)   | Yes | Go to the next step.  |
|    |   | No  | Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)   |
| 12 | <b>NOTE:</b><br><br><ul style="list-style-type: none"> <li>• <b>The following test is for engine stall with the A/C on. If other symptom exists, go to the next step.</b></li> </ul> <p>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?<br/>(See <b>REFRIGERANT PRESSURE CHECK</b> .)</p> | 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".<br>(See <b>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]</b> .)<br>For other symptoms, inspect the following: <ul style="list-style-type: none"> <li>• Refrigerant charging amount</li> <li>• Condenser fan operation</li> </ul> |
| 13 | <b>NOTE:</b><br><br><ul style="list-style-type: none"> <li>• <b>The following test should be performed for symptom with cruise control ON. If other symptoms exist, go to the next step.</b></li> </ul> <p>Inspect cruise control</p>   | Yes | Go to the next step.  |
|    |   | No  | Repair or replace the malfunctioning part.  |

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|    |  |     |  |
|----|--|-----|--|
|    | system. Is cruise control system normal?   |     |  |
| 14 | Inspect the front HO2S. (See <b>FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF]</b> .) Is the front HO2S normal?   | Yes | Go to the next step.   |
|    |  | No  | Replace the front HO2S. (See <b>FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]</b> .)   |
| 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 <b>FUEL TANK INSPECTION [LF]</b> .)  |
|    |  | 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.   |
| 18 | Inspect the EGR system. (See <b>EGR CONTROL SYSTEM INSPECTION</b> .) Is the EGR system normal?   | Yes | Go to the next step.   |
|    |  | No  | Replace the malfunctioning part.   |
| 19 | Is the engine compression correct?   | Yes | Inspect the following: <ul style="list-style-type: none"> <li>• Valve timing</li> <li>• Internal transaxle part (AT)</li> <li>• Clutch (MT)</li> </ul> |

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|    |  |    |  |
|----|--|----|--|
|    |  |    | <ul style="list-style-type: none"> <li>• EGR valve (mechanical stuck)</li> <li>• Engine mounts</li> <li>• Check valve (two-way)</li> </ul> |
|    |  | No | Inspect for cause.   |
| 20 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |    |  |

## NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE [LF]

### POSSIBLE CAUSE & DESCRIPTION (LACK/LOSS OF POWER-ACCELERATION/CRUISE)

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

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### POSSIBLE CAUSE

- Poor fuel quality
- Erratic signal to ignition coil
- Engine overheating
- Throttle body malfunction
- Spark plug malfunction
- PCV valve malfunction
- Improper valve timing due to jumping out of timing belt
- 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
- AT malfunction (AT)
- Clutch slippage (MT)

#### **WARNING:**

**The following DIAGNOSTIC PROCEDURE TABLE 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**

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complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE MANUAL" described in this article.

(See BEFORE SERVICE PRECAUTION [LF] .)

(See AFTER SERVICE PRECAUTION [LF] .)

**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

#### LACK/LOSS OF POWER-ACCELERATION/CRUISE DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION   | RESULTS | ACTION                               |
|------|--|---------|--------------------------------------|
| 1    | Verify the following: <ul style="list-style-type: none"> <li>• Vacuum connection</li> <li>• Restriction in intake-air system (such as air cleaner element, fresh air duct)</li> <li>• No air leakage from intake-air system</li> <li>• No restriction of intake-air system</li> <li>• Proper sealing of intake manifold and components attached to intake manifold; such as EGR valve</li> <li>• Fuel quality (such as proper octane,</li> </ul> | Yes     | Go to the next step.                 |
|      |  | No      | Service if necessary. Repeat Step 1. |

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|   |  |     |   |
|---|--|-----|---|
|   | contamination, winter/summer blend) Are all items normal?  |     |   |
| 2 | Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?   | Yes | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .)  |
|   |  | No  | <b>DTC is displayed:</b><br>Go to the next step.  |
| 3 | Is the engine overheating?   | Yes | Go to symptom troubleshooting <b><u>NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]</u></b> .  |
|   |  | No  | Go to the next step.  |
| 4 | Connect the M-MDS or equivalent to the DLC-2.<br>Access APP1, APP2, RPM, MAF, TP, IAT and VSS PIDs.<br>Drive vehicle while monitoring PIDs.<br>Are PIDs within specifications?<br>(See <b>PCM INSPECTION [LF]</b> .) | Yes | Go to the next step.  |
|   |  | No  | <b>APP1, APP2 PIDs:</b><br>Inspect if output signal accelerator pedal position sensor changes smoothly.<br><b>RPM PID:</b><br>Inspect CKP sensor and related wiring harness for vibration or intermittent open/short circuit or both.<br><b>MAF PID:</b><br>Inspect for intermittent open circuit of MAF sensor and related wiring harness.<br><b>TP PID:</b><br>Inspect if output signal TP sensor changes smoothly.<br><b>IAT PID:</b><br>Inspect for air suction in intake-air system.<br>If normal, inspect intermittent short circuit of IAT sensor and related wiring harnesses.<br><b>VSS PID:</b><br>Inspect for intermittent open circuit of VSS and related wiring harness. |
| 5 | Visually inspect the CKP sensor and teeth of   | Yes | Go to the next step.  |

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|    |   |     |   |
|----|---|-----|---|
|    | crankshaft pulley.<br>Are the CKP sensor and teeth of crankshaft pulley normal?   | No  | Replace the malfunctioning part.  |
| 6  | Inspect the spark plug condition.<br>Is spark plug wet, covered with carbon or grayish white?   | Yes | <b>Spark plug is wet or covered with carbon:</b><br>Inspect the fuel injector for fuel leakage.<br>Inspect spark plug and high-tension lead.<br><b>Spark plug is grayish white:</b><br>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.<br>Does the PCV valve rattle?   | Yes | Go to the next step.  |
|    |   | No  | Replace PCV valve.  |
| 8  | Perform electronic throttle control system operation inspection.<br>(See <b>ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION</b> .)<br>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.<br>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.<br>Short check connector terminal F/P to body GND using a jumper wiring.<br>Turn the ignition switch to the ON position.<br>Is fuel line pressure | Yes | Go to the next step.  |
|    |   | No  | <b>Zero or low:</b><br>Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging.<br>If there is no malfunction, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)<br><b>High:</b> |

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|    |   |     |   |
|----|---|-----|---|
|    | correct with ignition switch to ON position?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .)   |     | Replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)  |
| 11 | Inspect variable intake air control operation.<br>(See <b>VARIABLE INTAKE AIR CONTROL OPERATION INSPECTION</b> .)<br>Does VIS function properly?  | Yes | Go to the next step.  |
|    |   | No  | Repair or replace the malfunctioning part.  |
| 12 | <b>NOTE:</b> <ul style="list-style-type: none"> <li>• The following test is for engine stalling with the A/C on concern. If other symptoms exist, go to the next step.</li> </ul> <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?<br/>(See <b>REFRIGERANT PRESSURE CHECK</b> .)</p> | Yes | Go to the next step.  |
|    |   | No  | If A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously".<br>(See <b>NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]</b> .)<br>For other symptoms, inspect the following: <ul style="list-style-type: none"> <li>• Refrigerant charging amount</li> <li>• Condenser fan operation</li> </ul> |
| 13 | Inspect for A/C cut-off operation.<br>(See <b>A/C Cut-off Control System Inspection</b> .)<br>Does the A/C cut-off function properly?   | Yes | Go to the next step.  |
|    |   | No  | Inspect A/C cut-off system components.  |
| 14 | Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side.   | Yes | Inspect if purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system.<br>(See <b>PURGE CONTROL SYSTEM INSPECTION</b> .)  |

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|    |  |     |   |
|----|--|-----|---|
|    | Plug opening end of vacuum hose.<br>Drive the vehicle.<br>Does the engine condition improve?   | No  | Go to the next step.  |
| 15 | Visually inspect the CMP sensor and projections of camshaft pulley.<br>Are the CMP sensor and projections of camshaft pulley normal?   | Yes | Go to the next step.  |
|    |  | No  | Replace the malfunctioning part.  |
| 16 | Inspect EGR system.<br>(See <b>EGR CONTROL SYSTEM INSPECTION</b> .)<br>Is EGR system normal?   | Yes | Go to the next step.  |
|    |  | No  | Replace the malfunctioning part according to EGR control system operation inspection results.   |
| 17 | Inspect the variable valve timing control system operation.<br>(See <b>VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION</b> .)<br>Does the variable valve timing control system function properly?  | Yes | Go to the next step.  |
|    |  | No  | Repair or replace the malfunctioning part according to variable valve timing control system inspection results.   |
| 18 | Is the engine compression correct?   | Yes | Inspect the following: <ul style="list-style-type: none"> <li>• Valve timing</li> <li>• Internal transaxle components (AT)</li> <li>• Clutch (MT)</li> <li>• Brake system for dragging</li> </ul> |
|    |  | No  | Inspect for cause.  |
| 19 | <ul style="list-style-type: none"> <li>• Verify test results. <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.</li> </ul> |     |   |

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- 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 [LF]** .)

### NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [LF]

#### POSSIBLE CAUSE & DESCRIPTION (KNOCKING/PINGING-ACCELERATION/CRUISE)

| 13                    | KNOCKING/PINGING-ACCELERATION/CRUISE   |
|-----------------------|--|
| <b>DESCRIPTION</b>    | Sound is heard when air/fuel mixture is ignited by something other than spark plug (such as hot spot in combustion chamber).   |
| <b>POSSIBLE CAUSE</b> | <ul style="list-style-type: none"><li>• Engine overheating due to cooling system malfunction</li><li>• ECT sensor malfunction</li><li>• IAT sensor malfunction</li><li>• MAF sensor malfunction</li><li>• Knock sensor malfunction</li><li>• Erratic signal from CMP sensor</li><li>• Inadequate engine compression</li><li>• Inadequate fuel pressure</li></ul> <p><b>WARNING:</b><br/>The following <b>DIAGNOSTIC PROCEDURE TABLE</b> contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:</p> <ul style="list-style-type: none"><li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li><li>• 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 article.</li></ul> <p>(See <b>BEFORE SERVICE</b></p> |

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### PRECAUTION [LF] .)

(See **AFTER SERVICE PRECAUTION [LF] .)**

### 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

### KNOCKING/PINGING-ACCELERATION/CRUISE DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION   |
|------|---|---------|--|
| 1    | Connect the M-MDS or equivalent to the DLC-2.<br>Access ECT PID.<br>Verify ECT PID is <b>less than 116°C {241°F}</b> during driving.<br>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 or equivalent to the DLC-2.<br>Access IAT and MAF PIDs.<br>Monitor each PID.<br>(See <b>PCM INSPECTION [LF] .)</b><br>Are PIDs normal?                    | Yes     | Go to the next step.   |
|      |   | No      | <b>IAT PID</b> : Inspect IAT sensor<br><b>MAF PID</b> : Inspect MAF sensor                         |
| 3    | Connect the M-MDS or equivalent to the DLC-2.<br>Turn the ignition switch to the ON position (engine off).<br>Are there any DTCs displayed?                                 | Yes     | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF] .)</b> |
|      |   | No      | <b>No DTC is displayed:</b><br>Go to the next step.  |
| 4    | Is engine compression   | Yes     | Go to the next step.   |
|      |   |         |  |

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|   |   |     |  |
|---|---|-----|--|
|   | correct?  | No  | Inspect for cause.   |
| 5 | Install fuel pressure gauge between fuel pipe and fuel distributor.<br>Start the engine and idle it.<br>Measure fuel line pressure during idle.<br>Is fuel line pressure correct during idle?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .)  | Yes | Inspect the ignition timing.   |
|   |   | No  | <b>Low:</b><br>Inspect the fuel pump relay and fuel pump circuit.<br>Inspect the fuel line for clogging.<br>If there is no malfunction, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)<br><b>High:</b><br>Replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .) |
| 6 | Inspect the knock sensor.<br>Is the knock sensor normal?  | Yes | Inspect ignition timing.   |
|   |   | No  | Replace the knock sensor.  |
| 7 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> <li>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</li> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |     |  |

## NO.14 POOR FUEL ECONOMY [LF]

### POSSIBLE CAUSE & DESCRIPTION (POOR FUEL ECONOMY)

| 14                 | POOR FUEL ECONOMY  |
|--------------------|--|
| <b>DESCRIPTION</b> | Fuel economy is unsatisfactory.  |
|                    | <ul style="list-style-type: none"> <li>• Contaminated air cleaner element</li> <li>• Variable intake air control malfunction</li> <li>• Engine cooling system malfunction</li> </ul> |

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### POSSIBLE CAUSE

- Improper ATF level (AT)
- Weak spark
- Poor fuel quality
- Erratic or no signal from CMP sensor
- Clutch slippage (MT)
- 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 belt
- Contaminated MAF sensor
- Improper engine compression
- Exhaust system clogging

#### **WARNING:**

**The following DIAGNOSTIC PROCEDURE TABLE contains fuel system diagnosis and repair procedures. Read following warnings before servicing 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 article.**

**(See BEFORE SERVICE PRECAUTION [LF] .)**

**(See AFTER SERVICE PRECAUTION [LF] .)**

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### 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

### POOR FUEL ECONOMY DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION   |
|------|---|---------|--|
| 1    | Inspect for the following: <ul style="list-style-type: none"> <li>• Air cleaner element for contamination</li> <li>• ATF level (AT)</li> <li>• Fuel quality</li> <li>• Coolant level</li> <li>• Brake dragging</li> <li>• Clutch slippage (MT)</li> </ul> Are all items normal? | Yes     | Go to the next step.   |
|      |   | No      | Service if necessary.<br>Repeat Step 1.  |
| 2    | Connect the M-MDS or equivalent to the DLC-2.<br>Turn the ignition switch to the ON position (Engine off).<br>Retrieve any DTCs.<br>Are there any DTCs displayed?   | Yes     | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .) |
|      |   | No      | <b>No DTC is displayed:</b><br>Go to the next step.  |
| 3    | Access ECT PID.<br>Drive vehicle while monitoring PID.<br>(See <b>PCM INSPECTION [LF]</b> .)<br>Is PID within specification?  | Yes     | Go to the next step.   |
|      |   | No      | Inspect for coolant leakage, cooling fan and condenser fan operations or thermostat operation.     |

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|   |  |     |   |
|---|--|-----|---|
| 4 | Perform the spark test.<br>(See <b>SPARK TEST</b> .)<br>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.   |
| 5 | Install the fuel pressure gauge between the fuel pipe and the fuel distributor.<br>Start the engine and idle it.<br>Measure fuel line pressure during idle.<br>Is fuel line pressure correct during idle?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .) | Yes | Go to the next step.  |
|   |  | No  | <b>Low:</b><br>Inspect the fuel pump relay and fuel pump circuit.<br>Inspect the fuel line for clogging.<br>If there is no malfunction, replace the fuel pump unit<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)<br><b>High:</b><br>Replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .) |
| 6 | Inspect for variable valve timing control system operation.<br>(See <b>VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION</b> .)<br>Does the variable valve timing control system function properly?  | Yes | Go to the next step.  |
|   |  | No  | Repair or replace the malfunctioning part.  |
| 7 | Inspect for the variable intake air control operation.<br>(See <b>VARIABLE INTAKE AIR CONTROL OPERATION INSPECTION</b> .)<br>Does variable intake air control function properly?   | Yes | Go to the next step.  |
|   |  | No  | Repair or replace the malfunctioning part.  |
| 8 | Remove and shake the PCV valve.<br>Does the PCV valve rattle?  | Yes | Go to the next step.  |
|   |  | No  | Replace the PCV valve.  |
|   |  |     |   |

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|    |   |     |                             |
|----|---|-----|-----------------------------|
| 9  | Visually inspect the exhaust system part.<br>Is there any deformed exhaust system?  | Yes | Replace the suspected part. |
|    |   | No  | Go to the next step.        |
| 10 | Inspect for contaminated MAF sensor.<br>Is there any contamination?   | Yes | Go to the next step.        |
|    |   | No  | Inspect for cause.          |
| 11 | Inspect the MAF sensor for contamination.<br>Is there any contamination?  | Yes | Replace MAF sensor.         |
|    |   | No  | Go to the next step.        |
| 12 | Is engine compression correct?  | Yes | Inspect the valve timing.   |
|    |   | No  | Inspect for cause.          |
| 13 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> <li>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</li> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |     |                             |

## NO.15 EMISSION COMPLIANCE [LF]

### POSSIBLE CAUSE & DESCRIPTION (EMISSION COMPLIANCE)

| 15                 | EMISSION COMPLIANCE   |
|--------------------|---|
| <b>DESCRIPTION</b> | Fails emissions test. <ul style="list-style-type: none"> <li>• Vacuum lines leakage or blockage</li> <li>• Cooling system malfunction</li> <li>• Spark plug malfunction</li> <li>• Leakage from intake manifold</li> <li>• Erratic or no signal from CMP sensor</li> <li>• Inadequate fuel pressure</li> <li>• PCV valve malfunction or incorrect valve installation</li> </ul> |

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### POSSIBLE CAUSE

- EGR valve malfunction
- 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

#### **WARNING:**

**The following DIAGNOSTIC PROCEDURE TABLE contains fuel system diagnosis and repair procedures. Read following warnings before servicing 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 article.**

**(See BEFORE SERVICE PRECAUTION [LF] .)**

**(See AFTER SERVICE PRECAUTION [LF] .)**

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**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

### EMISSION COMPLIANCE DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION   |
|------|---|---------|--|
| 1    | Inspect for the following: <ul style="list-style-type: none"> <li>• Vacuum lines for leakage or blockage</li> <li>• Electrical connections</li> <li>• Proper maintenance schedule followed</li> <li>• Intake-air system and air cleaner element concerns: obstructions, leakage or dirtiness</li> </ul> | Yes     | Go to the next step.   |
|      |   | No      | Service if necessary.<br>Repeat Step 1.  |
| 2    | Are all items normal?<br><br>Connect the M-MDS or equivalent to the DLC-2.<br>Turn the ignition switch to the ON position (Engine off).<br>Retrieve any DTCs.<br>Are there any DTCs displayed?  | Yes     | <b>DTC is displayed:</b><br>Go to appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .) |
|      |   | No      | <b>No DTC is displayed:</b><br>Go to the next step.  |
| 3    | Is any other driveability   | Yes     | Go to appropriate symptom  |

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|   | concern present?   |     | troubleshooting.   |
|---|--|-----|--|
|   |  | No  | Go to the next step.   |
| 4 | Connect the M-MDS or equivalent to the DLC-2.<br>Access ECT PID.<br>Warm up the engine and idle it.<br>Verify ECT PID is correct.<br>(See <b>PCM INSPECTION [LF]</b> .)<br>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.<br>(See <b>FUEL-FILLER CAP INSPECTION [LF]</b> .)<br>Is there any leakage at fuel-filler cap?   | Yes | Replace the fuel-filler cap.   |
|   |  | No  | Go to the next step.   |
| 6 | Inspect the front HO2S.<br>(See <b>FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF]</b> .)<br>Is front HO2S normal?   | Yes | Go to the next step.   |
|   |  | No  | Replace the front HO2S.<br>(See <b>FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]</b> .)  |
| 7 | Perform spark test.<br>(See <b>SPARK TEST</b> .)<br>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.<br>Start the engine and idle it.<br>Measure fuel line pressure during idle.<br>Is fuel line pressure correct during idle?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .) | Yes | Go to the next step.   |
|   |  | No  | <b>Low:</b><br>Inspect the fuel line for clogging.<br>If there is no malfunction, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)<br><b>High:</b><br>Replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .) |
| 9 | Remove and shake the PCV valve.<br>Does the PCV valve  | Yes | Go to the next step.   |
|   |  | No  | Replace the PCV valve.   |

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|    |   |     |  |
|----|---|-----|--|
|    | rattle?   |     |  |
| 10 | Inspect for fuel saturation inside charcoal canister.<br>Is excess amount of liquid fuel present in canister?   | Yes | Replace the charcoal canister.   |
|    |   | No  | Inspect the fuel tank vent system.<br>Then, go to the next step.<br>(See <b>FUEL TANK INSPECTION [LF]</b> .) |
| 11 | Visually inspect the exhaust system part.<br>Is there any deformed exhaust system part?   | Yes | Replace the part.  |
|    |   | No  | Go to the next step.   |
| 12 | Inspect the three-way catalytic converter.<br>(See <b>EXHAUST SYSTEM INSPECTION [LF]</b> .)<br>Is the three-way catalytic converter normal?   | Yes | Inspect the EGR system.<br>(See <b>EGR CONTROL SYSTEM INSPECTION</b> .)                                      |
|    |   | No  | Replace the three-way catalytic converter.   |
| 13 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> <li>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</li> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |     |  |

## NO.16 HIGH OIL CONSUMPTION/LEAKAGE [LF]

### POSSIBLE CAUSE & DESCRIPTION (HIGH OIL CONSUMPTION/LEAKAGE)

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

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### DIAGNOSTIC PROCEDURE

#### HIGH OIL CONSUMPTION/LEAKAGE DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION   | RESULTS | ACTION   |
|------|--|---------|--|
| 1    | Remove and shake the PCV valve.<br>Does the PCV valve rattle?  | Yes     | Go to the next step.   |
|      |  | No      | Replace the PCV valve.   |
| 2    | Inspect for the following: <ul style="list-style-type: none"> <li>• External leakage</li> <li>• Proper dipstick</li> <li>• Proper engine oil viscosity</li> </ul> Are all items normal?  | Yes     | Inspect the internal engine parts such as valves, valve guides, valve stem seals, cylinder head drain passage, and piston rings. |
|      |  | No      | Service if necessary.<br>Repeat Step 2.  |
| 3    | <ul style="list-style-type: none"> <li>• Verify test results.               <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.               <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |         |  |

### NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]

#### POSSIBLE CAUSE & DESCRIPTION (COOLING SYSTEM CONCERNS-OVERHEATING)

| 17                 | COOLING SYSTEM CONCERNS-OVERHEATING   |
|--------------------|---|
| <b>DESCRIPTION</b> | Engine runs at higher than normal temperature/overheats.  |
|                    | <ul style="list-style-type: none"> <li>• Improper coolant level</li> <li>• Blown fuses</li> <li>• Coolant leakage</li> <li>• Excessive A/C system pressure</li> </ul> |

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### 2007 ENGINE PERFORMANCE Symptom Troubleshooting - MX-5 Miata

#### POSSIBLE CAUSE

- 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

#### COOLING SYSTEM CONCERNS-OVERHEATING DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION   | RESULTS | ACTION   |
|------|--|---------|--|
| 1    | Inspect the following: <ul style="list-style-type: none"> <li>• Engine coolant level</li> <li>• Coolant leakage</li> <li>• Water and anti-freeze mixture</li> <li>• Radiator condition</li> <li>• Collapsed or restricted radiator hoses</li> <li>• Radiator pressure cap</li> <li>• Overflow system</li> <li>• Fan rotational direction</li> <li>• Fuses</li> </ul> | Yes     | Go to the next step.   |
|      |  | No      | Service if necessary.<br>Repeat Step 1.  |
| 2    | Are all items normal?<br><br>Connect the M-MDS or equivalent to the DLC-2.<br>Turn the ignition switch to the ON position (Engine off).<br>Retrieve any DTCs.<br>Are there any DTCs displayed?   | Yes     | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .) |
|      |  | No      | <b>No DTC is displayed:</b><br>Go to the next step.  |
| 3    | Start the engine and idle it.<br>Turn the A/C switch on and set  | Yes     | Go to Step 5.  |
|      |  | No      | Inspect for the  |

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|   |  |     |   |
|---|--|-----|---|
|   | blower fan to any speed.<br>Does the A/C compressor engage?  |     | following and repair or replace if necessary: <ul style="list-style-type: none"> <li>• Refrigerant charging amount</li> <li>• Open circuit in wiring harness between A/C relay and PCM terminal 11</li> <li>• Seized A/C magnetic clutch</li> <li>• A/C magnetic clutch malfunction</li> </ul> <p>If all items are normal, go to the next step.</p>   |
| 4 | Connect the M-MDS or equivalent to DLC-2.<br>Access AC_REQ PID.<br>Start the engine and idle it.<br>Turn the A/C switch and fan switch on.<br>Does AC_REQ PID read on? | Yes | Go to the next step.  |
|   |  | No  | Inspect the following: <ul style="list-style-type: none"> <li>• Refrigerant pressure switch operation</li> <li>• The A/C switch is stuck open.</li> <li>• Open or short circuit between refrigerant pressure switch and PCM terminal 1AU</li> <li>• Open circuit of blower motor fan switch and resistor (if blower motor does not operate)</li> <li>• The evaporator temperature sensor and A/C amplifier</li> </ul> |
| 5 | Inspect cooling fan control system operation.  | Yes | Go to the next step.  |

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|    |   |     |  |
|----|---|-----|--|
|    | (See <b>COOLING FAN CONTROL SYSTEM INSPECTION</b> .)<br>Does the cooling fan control system function properly?  | 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.<br>Remove thermostat and inspect operation.<br>(See <b>THERMOSTAT REMOVAL/INSTALLATION [LF]</b> .)<br>(See <b>THERMOSTAT INSPECTION [LF]</b> .)<br>Is thermostat normal?  | Yes | The engine coolant temperature and thermostat are normal, inspect engine block for leakage or blockage.  |
|    |   | No  | Access ECT PID.<br>Inspect for both ECT PID and temperature gauge readings.<br>If temperature gauge on instrument cluster indicates normal range but ECT PID is not same as temperature gauge reading, inspect ECT sensor.<br>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"> <li>● Verify test results. <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or Online Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> <li>● If vehicle is repaired, troubleshooting completed.</li> </ul> </li> </ul> |     |  |

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

(See **PCM REMOVAL/INSTALLATION [LF]** .)

### NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [LF]

#### POSSIBLE CAUSE & DESCRIPTION (COOLING SYSTEM CONCERNS-RUNS COLD)

|                       |  |
|-----------------------|--|
| <b>18</b>             | <b>COOLING SYSTEM CONCERNS-RUNS COLD</b>   |
| <b>DESCRIPTION</b>    | Engine takes excessive time to reach normal operating temperature.   |
| <b>POSSIBLE CAUSE</b> | <ul style="list-style-type: none"> <li>• Thermostat malfunction</li> <li>• Cooling fan system malfunction</li> </ul> |

#### DIAGNOSTIC PROCEDURE

#### COOLING SYSTEM CONCERNS-RUNS COLD DIAGNOSTIC PROCEDURE TABLE

| 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".<br>(See <b>NO.9 FAST IDLE/RUNS ON [LF]</b> .)                                |
|      |   | No      | Go to the next step.   |
| 3    | Remove the thermostat and inspect operation.<br>(See <b>THERMOSTAT REMOVAL/INSTALLATION [LF]</b> .)<br>(See <b>THERMOSTAT INSPECTION [LF]</b> .)<br>Is thermostat normal? | Yes     | Go to the next step.   |
|      |   | No      | Replace the thermostat.  |
| 4    | Inspect cooling fan control system operation.<br>(See <b>COOLING FAN CONTROL SYSTEM INSPECTION</b> .)<br>Does the cooling fan control system function properly?           | Yes     | Access ECT PID.<br>Inspect for both ECT PID and temperature gauge on instrument cluster readings.<br>If the temperature gauge on the |

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|   |   |    |  |  |
|---|---|----|--|--|
|   |   |    |  | instrument cluster indicates normal range but ECT PID is not the same as temperature gauge reading, inspect the ECT sensor.<br>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"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> <li>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</li> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |    |  |  |

## NO.19 EXHAUST SMOKE [LF]

### POSSIBLE CAUSE & DESCRIPTION (EXHAUST SMOKE)

| 19          | EXHAUST SMOKE  |
|-------------|--|
| DESCRIPTION | Blue, black, or white smoke from exhaust system  |
|             | <b>Blue smoke (Burning oil):</b> <ul style="list-style-type: none"> <li>• PCV valve malfunction</li> <li>• Engine internal oil leakage</li> </ul><br><b>White smoke (Water in combustion):</b> <ul style="list-style-type: none"> <li>• Cooling system malfunction (coolant loss)</li> </ul> |

**POSSIBLE CAUSE**

- Engine internal coolant leakage

**Black smoke (Rich fuel mixture):**

- 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

**WARNING:**

The following **DIAGNOSTIC PROCEDURE TABLE** contains fuel system diagnosis and repair procedures. Read following warnings before servicing 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 article.

(See **BEFORE SERVICE PRECAUTION [LF]** .)

(See **AFTER SERVICE PRECAUTION [LF]** .)

**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

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sure that it is free of foreign material.

### DIAGNOSTIC PROCEDURE

#### EXHAUST SMOKE DIAGNOSTIC PROCEDURE TABLE

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

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|   |  |     |  |
|---|--|-----|--|
|   | <ul style="list-style-type: none"> <li>Collapsed or restricted intake-air system</li> <li>Restricted fuel return line</li> </ul> <p>Are all items normal?</p>  | No  | Service if necessary.<br>Repeat Step 4.  |
| 5 | Connect the M-MDS or equivalent to the DLC-2.<br>Turn the ignition switch to the ON position (Engine off).<br>Retrieve any DTCs.<br>Are there any DTCs displayed?  | Yes | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .)   |
|   |  | No  | <b>No DTC is displayed:</b><br>Go to the next step.  |
| 6 | Install the fuel pressure gauge between the fuel pipe and the fuel distributor.<br>Start the engine and idle it.<br>Measure fuel line pressure during idle.<br>Is fuel line pressure correct during idle?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .) | Yes | Go to the next step.   |
|   |  | No  | <b>Low:</b> <ul style="list-style-type: none"> <li>Inspect the fuel line for clogging.</li> <li>If there is no malfunction, replace the fuel pump unit.</li> </ul> (See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)<br><br><b>High:</b> <ul style="list-style-type: none"> <li>Replace the fuel pump unit.</li> </ul> (See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .) |
| 7 | Perform the spark test.<br>(See <b>SPARK TEST</b> .)<br>Is strong blue spark visible at each cylinder?   | Yes | Inspect the CMP sensor.<br>(See <b>CAMSHAFT POSITION (CMP) SENSOR INSPECTION [LF]</b> .)   |
|   |  | No  | Repair or replace the malfunctioning part according to spark test result.  |
| 8 | <ul style="list-style-type: none"> <li>Verify test results.</li> </ul>   |     |  |

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

(See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .)

- 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 [LF]** .)

### NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) [LF]

#### POSSIBLE CAUSE & DESCRIPTION (FUEL ODOR (IN ENGINE COMPARTMENT))

| 20             | FUEL ODOR (IN ENGINE COMPARTMENT)   |
|----------------|---|
| DESCRIPTION    | Gasoline fuel smell or visible leakage  |
| POSSIBLE CAUSE | <ul style="list-style-type: none"><li>● Excessive fuel pressure</li><li>● Purge solenoid valve malfunction</li><li>● Fuel tank vent system blockage</li><li>● Charcoal canister malfunction</li><li>● Fuel leakage from fuel system</li></ul> <p><b>WARNING:</b><br/>The following <b>DIAGNOSTIC PROCEDURE TABLE</b> contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:</p> <ul style="list-style-type: none"><li>● Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li><li>● 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 article.</li></ul> <p>(See <b>BEFORE SERVICE</b></p> |

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### PRECAUTION [LF] .)

(See **AFTER SERVICE PRECAUTION [LF] .)**

### 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

### FUEL ODOR (IN ENGINE COMPARTMENT) DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION  |
|------|---|---------|---|
| 1    | Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. 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? (See <b>FUEL LINE PRESSURE INSPECTION [LF] .)</b> | Yes     | Go to the next step.  |
|      |   | No      | Replace the fuel pump unit. (See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF] .)</b> |
| 2    | Inspect for blockage/restriction or open circuit in wiring harness between the engine vacuum port and the charcoal canister. Inspect for blockage in fuel tank vent system. Is malfunction indicated?   | Yes     | Replace vacuum hose.  |
|      |   | No      | Go to the next step.  |
| 3    | Inspect the purge   | Yes     | Go to the next step.  |
|      |   |         |   |

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|   |  |     |   |
|---|--|-----|---|
|   | solenoid valve.<br>(See <b>PURGE SOLENOID VALVE INSPECTION [LF]</b> .)   | No  | Replace the purge solenoid valve.<br>(See <b>PURGE SOLENOID VALVE REMOVAL/INSTALLATION [LF]</b> .)  |
| 4 | Connect the M-MDS or equivalent to the DLC-2.<br>Turn the ignition switch to the ON position (Engine off).<br>Retrieve any DTCs.<br>Are there any DTCs displayed?  | Yes | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .)  |
|   |  | No  | <b>No DTC is displayed:</b><br>Inspect charcoal canister for fuel saturation.<br>If excess amount of liquid fuel is present, replace the charcoal canister. |
| 5 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |     |   |

## NO.21 ENGINE NOISE [LF]

### POSSIBLE CAUSE & DESCRIPTION (ENGINE NOISE)

| 21                 | ENGINE NOISE  |
|--------------------|---|
| <b>DESCRIPTION</b> | Engine noise from under hood  |
|                    | <b>Squeal, click or chirp noise:</b> <ul style="list-style-type: none"> <li>• Improper engine oil level</li> <li>• Improper drive belt tension</li> <li>• Generator installation (alignment)</li> <li>• Splash shield or under cover looseness (splashed water to drive belts)</li> </ul> |

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### POSSIBLE CAUSE

#### Rattle sound noise:

- Loose parts

#### Hiss sound noise:

- Vacuum leakage
- Loose spark plug
- Air leakage from intake-air system

#### Rumble or grind noise:

- Improper drive belt tension
- Improper P/S fluid level

#### Rap or roar noise:

- Dynamic dumper looseness
- Exhaust system looseness
- Intake-air system looseness

#### Other noise:

- Camshaft friction gear noise or MLA noise
- Timing chain noise

### DIAGNOSTIC PROCEDURE

#### ENGINE NOISE DIAGNOSTIC PROCEDURE TABLE

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

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|   |  |     |  |
|---|--|-----|--|
|   |  | 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"> <li>• Drive belt tension</li> <li>• P/S fluid level</li> </ul>                                      |
|   |  | 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"> <li>• Vacuum leakage</li> <li>• Spark plug looseness</li> <li>• Intake-air system leakage</li> </ul> |
|   |  | 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"> <li>• Dynamic dumper</li> <li>• Intake-air system</li> <li>• Exhaust system</li> </ul>        |
|   |  | No  | Go to the next step.   |
| 6 | Is a knocking noise present?   | Yes | Go to symptom troubleshooting "No.13 Knocking/pinging".<br>(See <b>NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [LF]</b> .)  |
|   |  | 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"> <li>• Verify test results.               <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.               <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> </ul> </li> </ul> |     |  |

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

(See **PCM REMOVAL/INSTALLATION [LF]** .)

### NO.22 VIBRATION CONCERNS (ENGINE) [LF]

#### POSSIBLE CAUSE & DESCRIPTION (VIBRATION CONCERNS (ENGINE))

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

#### DIAGNOSTIC PROCEDURE

#### VIBRATION CONCERNS (ENGINE) DIAGNOSTIC PROCEDURE TABLE

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

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information is not available, replace the PCM.

(See **PCM REMOVAL/INSTALLATION [LF]** .)

### NO.23 A/C DOES NOT WORK SUFFICIENTLY [LF]

#### POSSIBLE CAUSE & DESCRIPTION (A/C DOES NOT WORK SUFFICIENTLY)

| 23                    | A/C DOES NOT WORK SUFFICIENTLY.  |
|-----------------------|--|
| <b>DESCRIPTION</b>    | A/C compressor magnetic clutch does not engage when the A/C switch is turned on.   |
| <b>POSSIBLE CAUSE</b> | <ul style="list-style-type: none"> <li>• Improper refrigerant charging amount</li> <li>• Open the A/C magnetic clutch</li> <li>• Open circuit in wiring harness between A/C relay and A/C magnetic clutch</li> <li>• Poor GND of A/C magnetic clutch</li> <li>• Refrigerant pressure switch is stuck open.</li> <li>• A/C relay is stuck open.</li> <li>• Seized A/C compressor</li> <li>• Open circuit in wiring harness between A/C switch and PCM through both refrigerant pressure switch and A/C amplifier</li> </ul> |

#### DIAGNOSTIC PROCEDURE

##### A/C DOES NOT WORK SUFFICIENTLY DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION  |
|------|---|---------|---|
| 1    | Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?  | Yes     | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .)  |
|      |   | No      | <b>No DTC is displayed:</b><br>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?<br><b>Specification</b><br><b>10.5 V or more</b> | Yes     | Inspect for GND condition of magnetic clutch on A/C compressor.<br>If GND condition is normal, inspect for open circuit magnetic clutch coil. |
|      |   | No      | Go to the next step.  |

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|   |  |     |   |
|---|--|-----|---|
| 3 | <p>Disconnect refrigerant pressure switch connector.<br/>Connect jumper wiring between A/C high pressure switch terminal.<br/>Connect jumper wiring between refrigerant pressure switch terminal.<br/>Turn the ignition switch to the ON position.<br/>Turn A/C switch on and set blower fan to any speed.<br/>Does A/C work?</p>  | Yes | <p>Inspect refrigerant pressure switch operation.<br/>If switch is normal, go to the next step.</p>   |
|   |  | No  | <p>Inspect for the following:</p> <ul style="list-style-type: none"> <li>• A/C switch is stuck open.</li> <li>• Open circuit in wiring harness between refrigerant pressure switch and PCM terminal 1AU</li> <li>• Open circuit in wiring harness between blower motor fan switch and resistor (if blower motor does not operate)</li> <li>• Evaporator temperature sensor and A/C amplifier</li> </ul> |
| 4 | <p>Remove jumper wiring from the switch connector.<br/>Reconnect connector to refrigerant pressure switch.<br/>Start the engine and turn the A/C switch on.<br/>Does the fan operate?</p>  | Yes | <p>Inspect whether A/C relay is stuck open.<br/>Replace if necessary.</p>   |
|   |  | No  | <p>Inspect the following and repair or replace if necessary:</p> <ul style="list-style-type: none"> <li>• Refrigerant charging amount</li> <li>• A/C compressor for seizure</li> </ul>  |
| 5 | <ul style="list-style-type: none"> <li>• Verify test results. <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> </ul> </li> </li></ul> |     |   |

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

(See **PCM REMOVAL/INSTALLATION [LF]** .)

### NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]

#### POSSIBLE CAUSE & DESCRIPTION (A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY)

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

#### DIAGNOSTIC PROCEDURE

#### A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION   | RESULTS | ACTION  |
|------|--|---------|---|
| 1    | Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed? | Yes     | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection. (See <b>DTC TABLE [LF]</b> .)   |
|      |  | No      | <b>No DTC is displayed:</b><br>Go to the next step.   |
| 2    | Start the engine and idle it. Turn the A/C switch on. Remove the A/C relay. Does the A/C magnetic clutch disengage?                                      | Yes     | Inspect for the following: <ul style="list-style-type: none"> <li>• A/C relay is stuck closed.</li> <li>• Short to GND in wiring harness</li> </ul> |

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|   |   |     |   |
|---|---|-----|---|
|   |   |     | <p>between A/C relay and PCM terminal 11.</p> <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><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• <b>A/C should not work when disconnecting connector. If A/C remains working, short to GND circuit may be present.</b></li> </ul> | Yes | <p>Inspect for short to GND in wiring harness between refrigerant pressure switch and PCM terminal 1AU.</p>   |
|   | Does the A/C remain working?  | No  | <p>Go to the next step.</p>   |
| 4 | <p>Reconnect refrigerant pressure switch connector. Turn off A/C switch.</p> <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• <b>A/C should not work when turning A/C switch off. If A/C remains working, short to GND circuit may be</b></li> </ul>                                | Yes | <p>Inspect following:</p> <ul style="list-style-type: none"> <li>• Short to GND in wiring harness between A/C switch and A/C amplifier</li> <li>• Short to GND circuit between A/C amplifier and refrigerant pressure switch</li> </ul> |

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|   |   |    |   |
|---|---|----|---|
|   | <b>present.</b>   | No | Inspect whether A/C switch is stuck closed. |
|   | Does A/C remain working?  |    |   |
| 5 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> <li>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</li> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> <li>(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</li> </ul> |    |   |

### NO.25 A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS [LF]

**POSSIBLE CAUSE & DESCRIPTION (A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS)**

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

### DIAGNOSTIC PROCEDURE

**A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS DIAGNOSTIC PROCEDURE TABLE**

| 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 <b>NO.24 A/C IS ALWAYS ON</b> |

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|   |  |     |   |
|---|--|-----|---|
|   |  |     | <b>OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF] .</b>   |
| 2 | Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?   | Yes | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection. (See <b>DTC TABLE [LF]</b> .) |
|   |  | No  | <b>No DTC is displayed:</b><br>Inspect accelerator pedal position sensor.                       |
| 3 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |     |   |

## NO.26 EXHAUST SULPHUR SMELL [LF]

### POSSIBLE CAUSE & DESCRIPTION (EXHAUST SULPHUR SMELL)

| 26                 | EXHAUST SULPHUR SMELL  |
|--------------------|--|
| <b>DESCRIPTION</b> | Rotten egg smell (sulphur) from exhaust  |
|                    | <ul style="list-style-type: none"> <li>• Electrical connectors are disconnected or connected poorly</li> <li>• Charcoal canister malfunction</li> <li>• Vacuum lines are disconnected or connected improperly.</li> <li>• Improper fuel pressure</li> <li>• Poor fuel quality</li> </ul> <p style="text-align: center;"><b>WARNING:</b><br/>The following <b>DIAGNOSTIC PROCEDURE TABLE</b> contains fuel system diagnosis and repair procedures. Read following</p> |

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### POSSIBLE CAUSE

#### warnings before servicing 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 article.

(See **BEFORE SERVICE PRECAUTION [LF]** .)

(See **AFTER SERVICE PRECAUTION [LF]** .)

#### 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

#### EXHAUST SULPHUR SMELL DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  | RESULTS | ACTION                               |
|------|---|---------|--------------------------------------|
| 1    | Are any driveability or exhaust smoke concerns present?   | Yes     | Go to the appropriate flow table.    |
|      |   | No      | Go to the next step.                 |
| 2    | Inspect the following: <ul style="list-style-type: none"> <li>• Electrical connections</li> <li>• Vacuum lines</li> <li>• Fuel quality</li> </ul> | Yes     | Go to the next step.                 |
|      |   | No      | Service if necessary. Repeat Step 2. |

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

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- 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 [LF]** .)

### NO.27 FUEL REFILL CONCERNS [LF]

#### POSSIBLE CAUSE & DESCRIPTION (FUEL REFILL CONCERNS)

| 27             | FUEL REFILL CONCERNS   |
|----------------|--|
| DESCRIPTION    |  |
| POSSIBLE CAUSE | <ul style="list-style-type: none"> <li>• Fuel tank is not filled smoothly.</li> <li>• Clogged EVAP pipes</li> <li>• Non-return valve malfunction</li> <li>• Improper use of fuel nozzle</li> <li>• Inadequate fuel filling speed</li> </ul> <p><b>WARNING:</b></p> <ul style="list-style-type: none"> <li>• The following <b>DIAGNOSTIC PROCEDURE TABLE</b> contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:                             <ul style="list-style-type: none"> <li>○ Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>○ 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 article.</li> </ul> </li> </ul> <p style="text-align: right;">(See <b>BEFORE SERVICE PRECAUTION [LF]</b> .)</p> <p style="text-align: right;">(See <b>AFTER SERVICE PRECAUTION [LF]</b> .)</p> |

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**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

#### FUEL REFILL CONCERNS DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION  |     | ACTION   |
|------|---|-----|--|
| 1    | Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?  | Yes | <b>DTC is displayed:</b><br>Go to the appropriate DTC inspection.<br>(See <b>DTC TABLE [LF]</b> .)   |
|      |   | No  | <b>No DTC is displayed:</b><br>Go to the next step.  |
| 2    | Remove the fuel-filler pipe. Make sure the non-return valve is installed properly. Inspect non-return valve operation. Is the non-return valve normal?  | Yes | Inspect for the following: <ul style="list-style-type: none"> <li>• Improper use of fuel nozzle</li> <li>• Inadequate fuel filling speed</li> </ul>  |
|      |   | No  | <b>Non-return valve is installed improperly:</b> <ul style="list-style-type: none"> <li>• Reinstall non-return valve to proper position.</li> </ul> <b>Non-return valve does not operate properly:</b> <ul style="list-style-type: none"> <li>• Replace non-return valve.</li> </ul> |
| 3    | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> |     |  |

(See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .)

- 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 [LF]** .)

## NO.28 FUEL FILLING SHUT OFF CONCERNS [LF]

### POSSIBLE CAUSE & DESCRIPTION (FUEL FILLING SHUT OFF CONCERNS)

| 28             | FUEL FILLING SHUT OFF CONCERNS   |
|----------------|--|
| DESCRIPTION    | <ul style="list-style-type: none"> <li>● Fuel does not shut off properly.</li> </ul>   |
| POSSIBLE CAUSE | <ul style="list-style-type: none"> <li>● Clogged EVAP pipes</li> <li>● Non-return valve malfunction</li> <li>● Fuel shut-off valve malfunction</li> <li>● Fuel nozzle malfunction</li> <li>● Fuel nozzle is not inserted correctly.</li> </ul> <p><b>WARNING:</b></p> <ul style="list-style-type: none"> <li>● The following <b>DIAGNOSTIC PROCEDURE TABLE</b> contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:                             <ul style="list-style-type: none"> <li>○ Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>○ 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 article.</li> </ul> </li> </ul> <p>(See <b>BEFORE SERVICE</b></p> |

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**PRECAUTION [LF] .)**

**(See AFTER SERVICE PRECAUTION [LF] .)**

**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

#### FUEL FILLING SHUT OFF CONCERNS DIAGNOSTIC PROCEDURE TABLE

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

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|   |  |   |
|---|--|---|
|   |  | <ul style="list-style-type: none"> <li>• Replace the non-return valve.</li> </ul> |
| 3 | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>○ If normal, return to diagnostic index to service any additional symptoms.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF]</b> .)</p> <ul style="list-style-type: none"> <li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.                             <ul style="list-style-type: none"> <li>• If vehicle is repaired, troubleshooting completed.</li> <li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li> </ul> </li> </ul> <p style="text-align: center;">(See <b>PCM REMOVAL/INSTALLATION [LF]</b> .)</p> |   |

## NO.29 SPARK PLUG CONDITION [LF]

### POSSIBLE CAUSE & DESCRIPTION (SPARK PLUG CONDITION)

| 29          | SPARK PLUG CONDITION   |
|-------------|--|
| DESCRIPTION | Incorrect spark plug condition   |
|             | <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• <b>Inspecting spark plugs condition can determine whether problem is related to a specific cylinder or possibly all cylinders.</b></li> </ul> <p><b>Wet/carbon stuck on specific plug:</b></p> <ul style="list-style-type: none"> <li>• Spark-Weak, not visible</li> <li>• Air/fuel mixture-Excessive fuel injection volume</li> <li>• Compression-No compression, low compression</li> <li>• Malfunction spark plug</li> </ul> <p><b>Grayish white with specific plug:</b></p> <ul style="list-style-type: none"> <li>• Air/fuel mixture-Insufficient fuel injection volume</li> <li>• Malfunction spark plug</li> </ul> <p><b>Wet/carbon is stuck on all plugs:</b></p> |

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### POSSIBLE CAUSE

- Spark-Spark weak
- Air/fuel mixture-Too rich
- Compression-Low compression
- Clogging in intake/exhaust system

#### Grayish white with all plugs:

- Air/fuel mixture-Too lean

#### WARNING:

The following **DIAGNOSTIC PROCEDURE TABLE** 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 article.

(See **BEFORE SERVICE PRECAUTION [LF]** .)

(See **AFTER SERVICE PRECAUTION [LF]** .)

#### 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

#### SPARK PLUG CONDITION DIAGNOSTIC PROCEDURE TABLE

| STEP | INSPECTION                  | RESULTS | ACTION                     |
|------|-----------------------------|---------|----------------------------|
| 1    | Remove all the spark plugs. | Yes     | Troubleshooting completed. |
|      |                             |         |                            |

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|   |   |     |  |
|---|---|-----|--|
|   | Inspect spark plug condition.<br>Is spark plug condition normal?  | No  | <b>Specific plug is wet or covered with carbon:</b><br>Go to the next step.<br><b>Specific plug looks grayish white:</b><br>Go to Step 7.<br><b>All plugs are wet or covered with carbon:</b><br>Go to Step 9.<br><b>All plugs look grayish white:</b><br>Go to Step 15. |
| 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:<br><br><ul style="list-style-type: none"> <li>• Cracked insulator</li> <li>• Heat range</li> <li>• Air gap</li> <li>• Worn electrode</li> </ul> Is the spark plug normal? | Yes | Go to the next step.   |
|   |   | No  | Replace the spark plug.<br>(See <b>SPARK PLUG REMOVAL/INSTALLATION [LF]</b> .)   |
| 4 | Inspect compression pressure at suspected malfunctioning cylinder.<br>Is compression pressure correct?<br>(See <b>COMPRESSION INSPECTION [LF]</b> .)  | Yes | Go to the next step.   |
|   |   | No  | Repair or replace the malfunctioning part.   |
| 5 | Install all spark plugs.<br>Perform the spark test at suspected malfunctioning cylinder.<br>Is strong blue spark visible?<br>(Compare with normal cylinder.)  | Yes | Go to the next step.   |
|   |   | No  | Repair or replace the malfunctioning part.   |
| 6 | Install the fuel pressure gauge between fuel filter and fuel  | Yes | Inspect fuel injector for the following:   |

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|   |  |     |   |
|---|--|-----|---|
|   | <p>distributor.<br/>Short check connector terminal F/P to body GND using a jumper wiring.</p> <p>Turn the ignition switch to the ON position (Engine off).<br/>Is the fuel line pressure correct with the ignition switch at ON?<br/>(See <b><u>FUEL LINE PRESSURE INSPECTION [LF]</u></b> .)</p>                                    |     | <ul style="list-style-type: none"> <li>• Open or short circuit in injector</li> <li>• Leakage</li> <li>• Injection volume</li> </ul>  |
|   |  | No  | <p><b>Zero or low:</b><br/>Inspect the fuel pump relay and fuel pump circuit.<br/>Inspect the fuel line for clogging.<br/>If there is no malfunction, replace the fuel pump unit.<br/>(See <b><u>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</u></b> .)</p> <p><b>High:</b><br/>Replace the fuel pump unit.<br/>(See <b><u>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</u></b> .)</p> |
| 7 | <p>Inspect the spark plug for the following.</p> <ul style="list-style-type: none"> <li>• Heat range</li> <li>• Air gap</li> </ul> <p>Is the spark plug normal?</p>  | Yes | Go to the next step.  |
|   |  | No  | Replace the spark plug.<br>(See <b><u>SPARK PLUG REMOVAL/INSTALLATION [LF]</u></b> .)   |
| 8 | <p>Remove the suspected fuel injector.<br/>Inspect the following:</p> <ul style="list-style-type: none"> <li>• Resistance</li> </ul> <p>(See <b><u>FUEL INJECTOR INSPECTION [LF]</u></b> .)</p> <ul style="list-style-type: none"> <li>• Fuel injection volume</li> </ul> <p>(See <b><u>FUEL INJECTOR INSPECTION [LF]</u></b> .)</p> | Yes | <p>Inspect for open circuit in wiring harness between fuel injector connector terminal B and PCM at the following terminals:</p> <ul style="list-style-type: none"> <li>• For No.1 cylinder: 2BB</li> <li>• For No.2 cylinder: 2BC</li> <li>• For No.3 cylinder: 2BD</li> <li>• For No.4 cylinder: 2AZ</li> </ul>   |

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|    |   |     |  |
|----|---|-----|--|
|    | 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 <b>SPARK TEST</b> .)<br>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.<br>Short check connector terminal F/P to body GND using a jumper wiring.<br>Turn the ignition switch to the ON position (Engine off).<br>Is the fuel line pressure correct with ignition switch at ON?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .) | Yes | Go to the next step.   |
|    |   | No  | <b>Zero or low:</b><br>Inspect the fuel pump relay and fuel pump circuit.<br>Inspect the fuel line for clogging.<br>If there is no malfunction, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)<br><b>High:</b><br>Replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .) |
| 12 | Inspect the following PIDs:<br><br><ul style="list-style-type: none"> <li>• ECT</li> <li>• O2S11 (When engine can be started.)</li> <li>• O2S12 (When engine can be started.)</li> <li>• MAF</li> </ul><br>(See <b>PCM INSPECTION [LF]</b> .)<br>Are PIDs normal?   | Yes | Go to the next step.   |
|    |   | No  | Repair or replace the malfunctioning part.   |
| 13 | Perform the purge control inspection. (When engine can be   | Yes | Go to the next step.   |

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|    |   |     |  |
|----|---|-----|--|
|    | started.)<br>(See <b>PURGE CONTROL SYSTEM INSPECTION</b> .)<br>Is the purge control correct?  | No  | Repair or replace the malfunctioning part.   |
| 14 | Perform compression inspection.<br>(See <b>COMPRESSION INSPECTION [LF]</b> .)<br>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.<br>When the engine can be started, perform intake manifold vacuum inspection.<br>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.<br>Short check connector terminal F/P to body GND using a jumper wiring.<br>Turn the ignition switch to the ON position (Engine off).<br>Is fuel line pressure correct with the ignition switch at ON?<br>(See <b>FUEL LINE PRESSURE INSPECTION [LF]</b> .) | Yes | Inspect the following PIDs: <ul style="list-style-type: none"> <li>• ECT</li> <li>• O2S11</li> <li>• O2S12</li> <li>• MAF</li> </ul><br>(See <b>PCM INSPECTION [LF]</b> .)<br>Inspect PCM GND condition.   |
|    |   | No  | <b>Zero or low:</b><br>Inspect the fuel pump relay and fuel pump circuit.<br>Inspect the fuel line for clogging.<br>If there is no malfunction, replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]</b> .)<br><b>High:</b><br>Replace the fuel pump unit.<br>(See <b>FUEL PUMP UNIT REMOVAL/INSTALLATION</b> |

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|    | [LF] .)   |
|----|---|
| 17 | <ul style="list-style-type: none"><li>• Verify test results.<ul style="list-style-type: none"><li>○ If normal, return to diagnostic index to service any additional symptoms.</li></ul></li></ul> <p>(See <b>ENGINE SYMPTOM TROUBLESHOOTING [LF] .)</b></p> <ul style="list-style-type: none"><li>○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.<ul style="list-style-type: none"><li>• If vehicle is repaired, troubleshooting completed.</li><li>• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM.</li></ul></li></ul> <p>(See <b>PCM REMOVAL/INSTALLATION [LF] .)</b></p> |

## INTERMITTENT CONCERN TROUBLESHOOTING [LF]

### 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

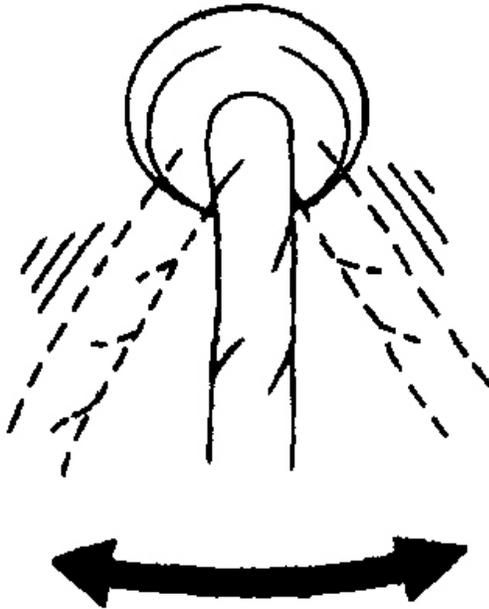
1. Connect the M-MDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

#### 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.



YMU103WC0

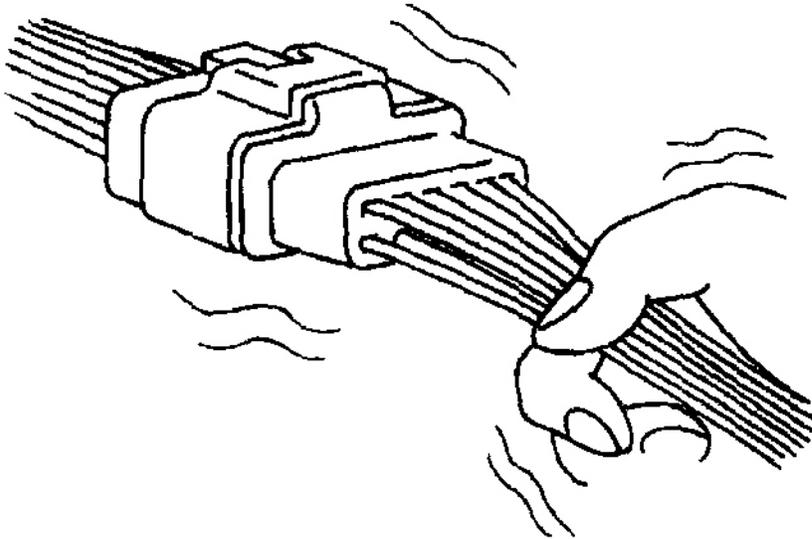
**Fig. 8: Inspecting Wiring Harnesses**  
Courtesy of MAZDA MOTORS CORP.

**Inspection Method for Sensor Connectors or Wiring Harnesses**

1. Connect the M-MDS or equivalent 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.



YMU103WC1

**Fig. 9: Inspecting For Poor Connection**  
Courtesy of MAZDA MOTORS CORP.

#### Inspection Method for Sensors

1. Connect the M-MDS or equivalent 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

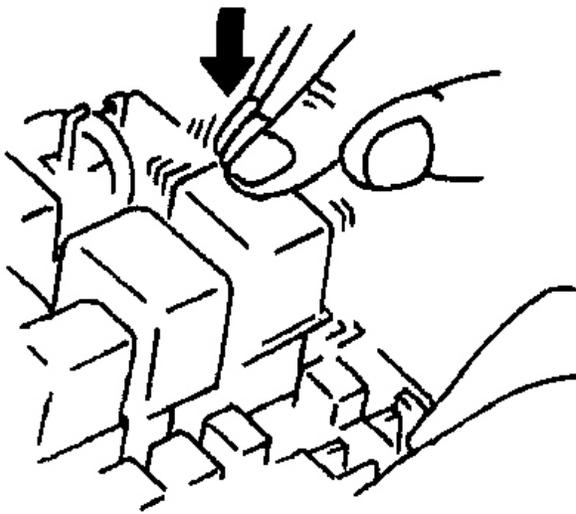
1. Connect the M-MDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

**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 3s 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.**



YMU103WC2

**Fig. 10: Vibrating Actuator Or Relay**  
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 or equivalent 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.



Y5U103WA6

**Fig. 11: Identifying Water Sprinkling Method**  
Courtesy of MAZDA MOTORS CORP.

## **ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF]**

### **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**

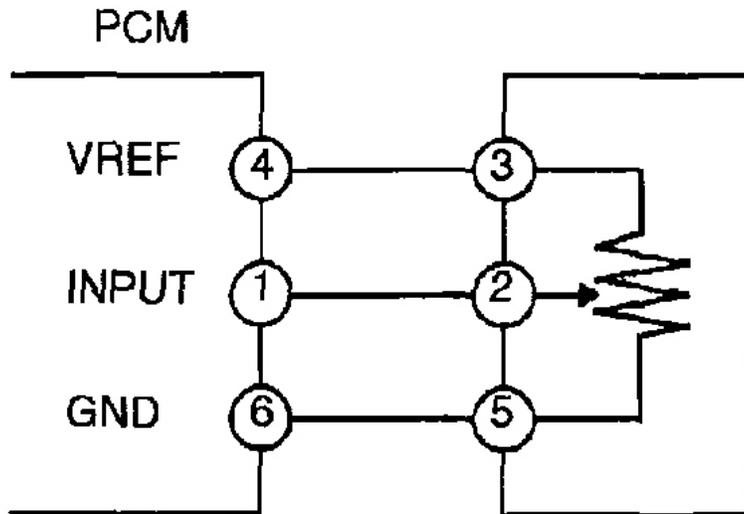
While referring to **ON-BOARD DIAGNOSTIC TEST [LF]** , use the PID/DATA monitor and record function to inspect the input signal system relating to the problem.

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 or equivalent 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 and EGR Boost Sensor)**



YMU103WA5

**Fig. 12: TP Sensor & EGR Boost Sensor - Circuit Diagram**  
 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 or equivalent 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 or equivalent voltages, inspect the wiring harness for open or short circuits.
  - If the sensor and the M-MDS or equivalent voltages are the same, inspect for the following points concerning the sensor connector:
    - Female terminal opening is loose.

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

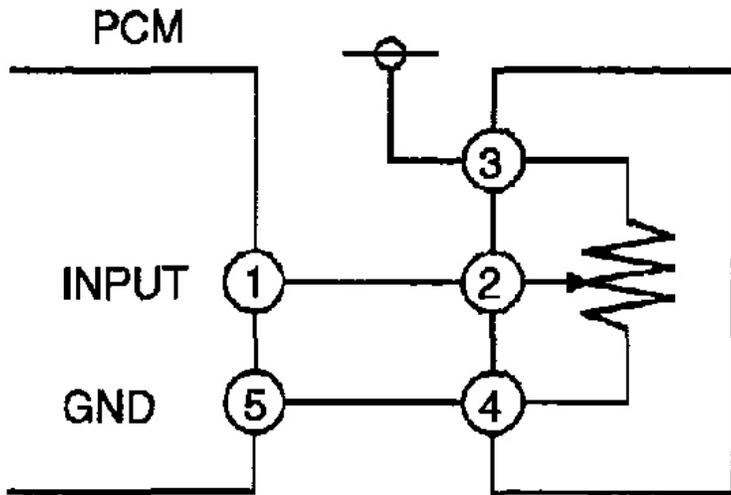
#### Standard Power Supply System Inspection For Variable Resistance Type 1

- 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 and VSS)



YMU103WA6

**Fig. 13: Mass Air Flow (MAF) Sensor & VSS - Circuit Diagram**  
 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 or equivalent 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

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connector:

- Female terminal opening is loose.
- Coupler (pin holder) damage
- Pin discoloration (blackness)
- Harness/pin crimp is loose or disconnected.

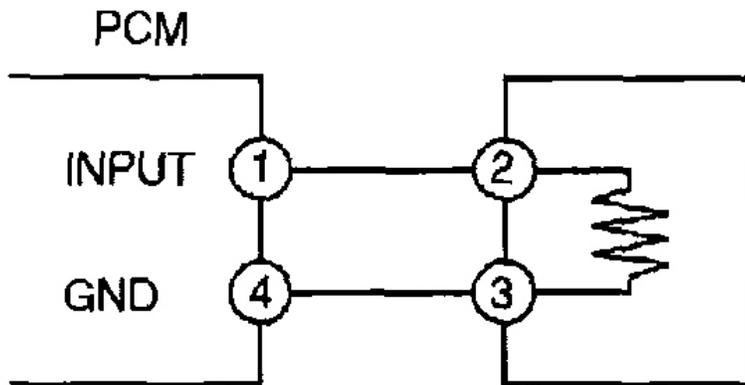
2. Measure the #2 sensor terminal voltage.

- If there is a **0 V or more** difference between the sensor and the M-MDS or equivalent voltages, inspect the wiring harness for open or short circuits.
- If the sensor and the M-MDS or equivalent 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 and ECT Sensor)



ZMU103WA7

**Fig. 14: IAT Sensor & ECT Sensor - Circuit Diagram**  
 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 or equivalent 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 or equivalent voltages, inspect the wiring harness for open or short circuits.
  - If the sensor and the M-MDS or equivalent voltages are the same, inspect the following points concerning the sensor connector:
    - Female terminal opening is loose.
    - Coupler (pin holder) damage

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- 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.

#### INTAKE MANIFOLD VACUUM INSPECTION

1. Verify that the intake air hoses are installed securely.
2. Disconnect the vacuum hose connecting the intake manifold and the purge solenoid valve (purge solenoid valve side) and install the vacuum gauge.
3. Warm up the engine.
4. Measure the intake manifold vacuum while idling (no load) using the vacuum gauge. (See **INTAKE MANIFOLD VACUUM INSPECTION [LF]** .)

- If not within the specification, perform the following inspections.
  - Compression pressure (See **COMPRESSION INSPECTION [LF]** .)
  - Air intake
    - Each hose installation part
    - Throttle body installation part
    - Fuel injector installation part
    - PCV valve installation part
    - Dynamic chamber installation port
    - Intake manifold installation part

## ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION

### Engine Coolant Temperature Compensation Inspection

1. Connect the M-MDS or equivalent 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:
    - ECT sensor and related wiring harness  
  
(See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [LF]** .)
    - Electronic throttle body and related wiring harness  
  
(See **THROTTLE BODY INSPECTION [LF]** .)

### Load Compensation Inspection

1. Start the engine and idle it.
2. Connect the M-MDS or equivalent to the DLC-2.
3. Verify that P0506, P0507, or P0511 is not displayed.
  - If P0506, P0507 or P0511 are displayed, perform DTC inspection.  
  
(See **DTC TABLE [LF]** .)

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. (See **ENGINE TUNE-UP [LF]** .)
  - If load condition is not as specified, inspect the following:
    - A/C switch and related wiring harness  
  
(See **CLIMATE CONTROL UNIT INSPECTION** .)
    - Fan switch and related wiring harness

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

**Throttle Position (TP) Sweep Inspection**

1. Connect the M-MDS or equivalent 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, P0638, P2101, P2107, P2108, P2109, P2112, P2119, P2122, P2123, P2127, P2128, P2135, P2138
    - If any one DTC is displayed, perform DTC inspection.
4. Access TP\_REL PID.
5. Verify that the PID reading is within the CTP value. (See **PCM INSPECTION [LF]** .)
  - 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 [LF]** .)
  - If the PID reading is out of range, perform the followings:
    - 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.

**VARIABLE INTAKE AIR CONTROL OPERATION INSPECTION**

1. Start the engine.
2. Inspect the rod operation. (See **VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [LF]** .)
  - If the rod operation is not as specified, inspect as follows:
    1. Stop the engine.
    2. Connect the M-MDS or equivalent to the DLC-2.

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3. Verify that DTC P0661 or P0662 is not displayed.

- If DTC P0661 or P0662 is shown, perform DTC inspection.

(See **DTC TABLE [LF]** .)

4. Inspect the variable intake air solenoid valve.

(See **VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [LF]** .)

- If the variable intake air solenoid valve is not normal, replace the variable intake air solenoid valve.

(See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)

- If the variable intake air solenoid valve is normal, inspect the following:
  - Vacuum hose and vacuum chamber for looseness or damage
  - Shutter valve actuator

(See **VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [LF]** .)

- Shutter valve stuck open or closed

## FUEL INJECTOR OPERATION INSPECTION

If simulation function of M-MDS is used:

### FUEL INJECTOR OPERATION INSPECTION TABLE

| STEP | INSPECTION   | RESULTS | ACTION  |
|------|--|---------|---|
| 1    | Start the engine and warm it up until normal operating temperature. Connect the M-MDS or equivalent to DLC-2. Select the INJ_1, INJ_2, INJ_3, and INJ_4 PIDs Turn the fuel injector from on to off using the PIDs for each cylinder. Does the engine speed drop? | Yes     | Fuel injector work properly.  |
|      |  | No      | Engine speed does not drop any cylinders:<br>Go to the next step.<br>Engine speed drop some cylinders:<br>Go to Step 3. |
| 2    | Perform main relay operation inspection. (See <b><u>MAIN RELAY</u></b>   | Yes     | Go to the next step.  |
|      |  | No      | Repair or replace   |

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|   |  |     |  |
|---|--|-----|--|
|   | <b>OPERATION INSPECTION .)</b><br>Does the main relay work properly?   |     | malfunctioning parts.  |
| 3 | Inspect the fuel injector for suspected cylinder.<br>(See <b>FUEL INJECTOR INSPECTION [LF] .)</b><br>Is the fuel injector okay?                            | Yes | Inspect the following for suspected cylinder: <ul style="list-style-type: none"> <li>• Fuel injector power and/or GND systems related harness and connectors.</li> </ul>                                     |
|   |  | No  | Replace the fuel injector.<br>(See <b>FUEL INJECTOR REMOVAL/INSTALLATION [LF] .)</b>   |
| 4 | Perform KOER self-test function using M-MDS or equivalent.<br>(See <b>KOEO/KOER SELF TEST [LF] .)</b><br>Are DTC P0201, P0202, P0203 and/or P0204 present? | Yes | Go to appropriate DTC test.<br>(See <b>DTC TABLE [LF] .)</b>   |
|   |  | No  | Go to the next step.   |
| 5 | Inspect the fuel injector for suspected cylinder.<br>(See <b>FUEL INJECTOR INSPECTION [LF] .)</b><br>Is the fuel injector okay?                            | Yes | Inspect the following for suspected cylinder: <ul style="list-style-type: none"> <li>• PCM terminals (pulled-out pins, corrosion)</li> <li>• Fuel injector terminals (pulled-out pins, corrosion)</li> </ul> |
|   |  | No  | Replace the fuel injector.<br>(See <b>FUEL INJECTOR REMOVAL/INSTALLATION [LF] .)</b>   |

If simulation function of M-MDS or equivalent is not used:

#### FUEL INJECTOR OPERATION INSPECTION TABLE

| STEP | INSPECTION   | RESULTS | ACTION  |
|------|--|---------|---|
| 1    | While cranking the engine, inspect for fuel injector operation sound at each cylinder using a soundscope.<br>Is operation sound heard? | Yes     | Fuel injector operation is normal.  |
|      |  | No      | <b>All cylinders not heard:</b><br>Go to the next step.<br><b>Some cylinders not heard:</b> |

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|   |  |     |  |
|---|--|-----|--|
|   |  |     | Go to Step 3.  |
| 2 | Perform main relay operation inspection.<br>Is main relay operation normal?  | Yes | Inspect the following: <ul style="list-style-type: none"> <li>• Fuel injector power system related wiring harness and connectors</li> <li>• PCM connectors</li> <li>• Fuel injector GND and related wiring harness and connectors</li> </ul> |
|   |  | No  | Repair or replace malfunctioning parts.  |
| 3 | Switch fuel injector connector of not operating fuel injector with operating fuel injector.<br>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 M-MDS is used:

1. Warm up the engine and idle it.
2. Connect the M-MDS or equivalent to DLC-2.
3. Select the RPM and FUELPW1 PIDs.
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 FUELPW1 PID is **0 ms.** , and **2-5 ms.** when the RPM PID drops **below 1,200 rpm**.
    - If not as specified, inspect the following.
      - ECT sensor and related harness

(See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION**)

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**[LF]** .)

- Neutral switch and related harness

(See **NEUTRAL SWITCH INSPECTION [LF]** .)

- Clutch switch and related harness

(See **CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF]** .)

**If simulation function of 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**.

(See **PCM INSPECTION [LF]** .)

- If not as specified, inspect the following.

- ECT sensor and related harness

(See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [LF]** .)

- Neutral switch and related harness (MT)

(See **NEUTRAL SWITCH INSPECTION [LF]** .)

- Clutch switch and related harness (MT)

(See **CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF]** .)

- TR switch and related wiring harness (AT)

(See **TRANSMISSION RANGE (TR) SWITCH INSPECTION [SJ6A-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 1H
- 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 1H)

**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.**

**IGNITION SYSTEM INSPECTION TABLE**

| STEP | INSPECTION   | ACTION  |
|------|--|---|
| 1    | <ul style="list-style-type: none"> <li>• Disconnect the ignition coil from the spark plugs.</li> <li>• Remove the spark plugs.                             <ul style="list-style-type: none"> <li>○ Verify that</li> </ul> </li> </ul> | Yes   |
|      |  | No  |
|      |  | Go to the next step.  |
|      |  | Perform no-load racing at 4,000 rpm for 2 min, 2 times to burn off the carbon deposits. |

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|   |  |     |   |
|---|--|-----|---|
|   | <p>the spark plugs do not have carbon deposits.</p> <ul style="list-style-type: none"> <li>• Are the spark plugs normal?</li> </ul>  |     | Repeat Step 1.  |
| 2 | <ul style="list-style-type: none"> <li>• Inspect the spark plugs for damage, wear, carbon deposits and proper plug gap.</li> <li>• Are the spark plugs normal?</li> </ul>  | Yes | Go to the next step.  |
|   |  | No  | Replace spark plugs, then go to Step 1.   |
| 3 | <ul style="list-style-type: none"> <li>• Reconnect the spark plugs to the ignition coil.</li> <li>• Ground the spark plugs to the engine.</li> <li>• Is a strong blue spark visible at each cylinder while cranking the engine?</li> </ul>   | Yes | Ignition system is normal   |
|   |  | No  | <p><b>Some cylinders do not spark:</b></p> <ul style="list-style-type: none"> <li>• Go to the next step.</li> </ul> <p><b>All cylinders do not spark:</b></p> <ul style="list-style-type: none"> <li>• Go to Step 5.</li> </ul> |
| 4 | <ul style="list-style-type: none"> <li>• Inspect the following wiring harnesses for open or short:                             <ul style="list-style-type: none"> <li>○ Ignition coil No.1 terminal C-PCM terminal 2BA</li> <li>○ Ignition coil No.2 terminal C-PCM terminal 2AW</li> <li>○ Ignition coil No.3 terminal C-PCM</li> </ul> </li> </ul> | Yes | Inspect and replace the ignition coil.<br>(See <b><u>IGNITION COIL INSPECTION [LF]</u></b> .)   |
|   |  | No  | Repair or replace the malfunctioning part, then go to Step 1.   |

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|   |   |     |   |
|---|---|-----|---|
|   | terminal<br>2AX<br>○ Ignition coil<br>No.4<br>terminal C-<br>PCM<br>terminal 2AT<br>● Are the wiring<br>harnesses normal? |     |   |
| 5 | ● Measure the<br>voltage at terminal<br>A in each ignition<br>coils.<br>● Is the voltage <b>B+</b> ?                      | Yes | Go to the next step.  |
|   |   | No  | Inspect power supply<br>circuit of ignition coils.  |
| 6 | Verify continuity<br>between each ignition<br>coils terminal B and<br>battery negative post.<br>Is there any continuity?  | Yes | Go to the next step.  |
|   |   | No  | Inspect GND circuit of<br>ignition coils.   |
| 7 | ● Does the PCM<br>connector or<br>ignition coil<br>connectors have<br>poor connection?                                    | Yes | Repair or replace the<br>connector, then go to<br>Step 1.                                 |
|   |   | No  | Go to the next step.  |
| 8 | ● Are the following<br>parts normal?<br>○ CKP sensor<br>and<br>crankshaft<br>pulley                                       | Yes | Inspect for open or short<br>circuit in wiring harness<br>and connector of CKP<br>sensor. |
|   |   | No  | Repair or replace the<br>malfunctioning part, then<br>go to Step 1.                       |

## EGR CONTROL SYSTEM INSPECTION

If simulation function of M-MDS is used:

1. Crank the engine and verify that EGR valve operation (initial operation) sound is heard.
  - If the operation sound is not heard, connect the M-MDS or equivalent to the DLC-2 and verify that the DTC P0403 is shown. Perform the DTC inspection. (See **DTC TABLE [LF]** .)
2. Start the engine run it at idle.
3. Increase the step value of EGR valve **from 0 to 52** using SEGR PID of simulation function.
4. Operate the EGR valve and inspect if the engine speed becomes unstable or the engine stalls.
  - If the engine speed will not change, proceed to following.

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1. Stop the engine.
  2. Remove the EGR valve.
  3. Connect the EGR valve connector.
  4. Turn the ignition switch to the ON position.
  5. Increase the step value of EGR valve **from 0 to 52** using SEGRP PID.
  6. Verify that the EGR valve operates according to SEGRP PID.
    - If the EGR valve is operated, clean the EGR valve and EGR gas passage.
    - If the EGR valve will not operate, replace the EGR valve.
  5. Start the engine and warm it up completely.
  6. Access the following PIDs.
    - ECT, RPM, SEGRP, APP1, APP2, TP, VSS
  7. Idle the vehicle and verify that the SEGRP value is **0**.
  8. Put the vehicle drive.
  9. Depress the accelerator pedal and verify that the SEGRP value is increased.
    - If the SEGRP value will not increase, inspect the VSS, TP and ECT PIDs.
- (See **PCM INSPECTION [LF]** .)
10. Stop the vehicle and verify that the SEGRP value is returned to **0**.

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

1. Crank the engine and verify that EGR valve operation (initial operation) sound is heard.
  - If the operation sound is not heard, connect the M-MDS or equivalent to the DLC-2 and verify that the DTC P0403 is shown. Perform DTC inspection. (See **DTC TABLE [LF]** .)
2. Start the engine and idle it.
3. Warm up the engine to normal operating temperature.
4. Access the following PIDs:
  - ECT, RPM, SEGRP\_DSD, APP1, APP2, VSS
5. Idle the vehicle and verify that the SEGRP value is 0.
6. Put the vehicle in drive.
7. Depress the accelerator pedal and verify that the SEGRP\_DSD value is increased.
  - If the EGR valve increases, inspect the following:
    - EGR valve (stuck open or close)
    - Wiring harness and connectors (Main relay-EGR valve-PCM)
  - If the SEGRP\_DSD value does not increase, inspect the VSS, APP1, APP2, TP and ECT PIDs.  
(See **PCM INSPECTION [LF]** .)
8. Stop the vehicle and verify that the SEGRP value returns to 0.

#### PURGE CONTROL SYSTEM INSPECTION

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#### If simulation function of M-MDS is 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 2C)
    - Purge solenoid valve (stuck open)
4. Connect the M-MDS or equivalent to the DLC-2 and verify that the DTC P0443 is shown. Perform the DTC inspection.

(See **DTC TABLE [LF]** .)

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 [LF]** .)

7. Warm up the engine to normal operating temperature.
8. Monitor the EVAPCP PID using the M-MDS or equivalent, 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, TP\_REL and LOAD PIDs.

#### If simulation function of M-MDS or equivalent 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 2C)
    - Purge solenoid valve (stuck open)
4. Connect the M-MDS or equivalent to the DLC-2 and verify that the DTC P0443 is shown. Perform the DTC inspection.

(See **DTC TABLE [LF]** .)

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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 2C)
    - Purge solenoid valve
    - MAF, APP1, APP2, TP 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 [LF]** .
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 11)
    - A/C related parts
    - APP1, APP2 PIDs

#### **COOLING FAN CONTROL SYSTEM INSPECTION**

**If simulation function of M-MDS is used:**

1. Connect the M-MDS or equivalent to DLC-2.

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2. Start the engine and warm it up to normal operating temperature.
3. Verify that the DTC P0480, P0481 or P0482 is not shown and cooling fan operating while the KOER self-test or the KOER self-test. (See **KOEO/KOER SELF TEST [LF]** .)
4. Verify that the DTC P0480, P0481 or P0482 is not shown and cooling fan while operating the KOER self-test.
  - If the DTC P0480 is shown, perform the DTC troubleshooting procedure. (See **DTC P0480 [LF]** .) (See **DTC P0481 [LF]** .) (See **DTC P0482 [LF]** .)
  - If the cooling fans do not operate while KOER self-test, proceed the followings:
    1. Inspect the cooling fan motor and wiring harness between cooling fan motor and GND.
    2. Select FAN1, FAN2 and FAN3 PIDs.
    3. Turn ignition switch off and disconnect the cooling fan motor connector.
    4. Verify that each cooling fan relay operating sound is heard, when turn each cooling fan relay to on from off using simulation function of FAN1, FAN2 and FAN3 PIDs.
      - If the operation sound is not heard, inspect for suspected cooling fan relay is stuck open or close.
      - If the operation sound is heard, inspect wiring harness and connector between all cooling fan relays and cooling fan motor.

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

1. Connect the M-MDS or equivalent to 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 [LF]** .)
4. Verify that the DTC P0480, P0481 or P0482 is not shown and cooling fan operating while the KOER self-test.
  - If the DTC P0480 is shown, perform the DTC troubleshooting procedure. (See **DTC P0480 [LF]** .) (See **DTC P0481 [LF]** .) (See **DTC P0482 [LF]** .)
  - If the cooling fans do not operate while KOER self-test, proceed the followings:
    1. Inspect the cooling fan motor and wiring harness between cooling fan motor and GND.
    2. Turn the ignition switch to off.
    3. Disconnect ECT sensor connector.
    4. Verify that the operation sound heard from all cooling fan relays (No.1, No.2 and No.3), when the ignition switch to ON position.
      - If the operation sound is not heard, inspect for suspected cooling fan relay is stuck open or close.
      - If the operation sound is heard, inspect wiring harness and connector between all cooling fan relays and cooling fan motor.
    5. Turn the ignition switch off and disconnect the ECT sensor connector.
    6. Reconnect the ECT sensor and clear the DTC from PCM memory using the M-MDS or equivalent.

#### VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION

**If simulation function of M-MDS is used:**

1. Warm up the engine to normal operating temperature.
2. Connect the M-MDS or equivalent to DLC-2.
3. Start the engine and run it at idle.
4. Select VT DUTY1 PID.
5. Increase the oil control valve (OCV) duty value and verify that the engine idles roughly or stalls.
  - If as specified, inspect the timing belt component (valve timing deviation).
  - If not as specified, go to the next step.
6. Remove the oil control valve (OCV) with connector is connected.
7. Turn the ignition switch to the ON position.
8. Select VT DUTY1 PID.
9. Increase the oil control valve (OCV) duty value and verify that the spool valve operates in the advance direction.
  - If as specified, inspect the following hydraulic passage for clogging and/or leakage.
    - Oil pressure switch-oil control valve (OCV)
    - Oil control valve (OCV)-camshaft
    - Camshaft internal passage
  - If not as specified, inspect the following:
    - Oil control valve (OCV) operation
    - Harness and connectors for open or short (Oil control valve (OCV)-PCM terminal 2E)
10. If they are okay, replace the intake camshaft pulley (with a built-in variable valve timing actuator).

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

1. Start the engine and run it at idle.
  - If idling cannot be continued, go to Step 2.
  - If idling can be continued, go to Step 7.
2. Remove the oil control valve (OCV) and verify that the spool valve is at maximum retard position.
3. Connect the oil control valve (OCV).
4. Turn the ignition switch to the ON position.
5. Verify that the spool valve is at maximum retard position.
  - If the spool valve is stuck in the advance direction, inspect for the following:
    - Short circuit in wiring harnesses or connectors between the oil control valve (OCV) and the PCM.
6. Inspect the variable valve timing actuator.

(See **VARIABLE VALVE TIMING ACTUATOR INSPECTION [LF]** .)

7. Disconnect oil control valve (OCV) connector.

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8. Warm up the engine and idle it.
9. Apply battery voltage to the oil control valve (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 stalls, go to the next step.
10. Remove the oil control valve (OCV) and perform spool valve operation inspection.

(See **OIL CONTROL VALVE (OCV) INSPECTION [LF]** .)

- If not as specified, inspect the following:
    - Oil control valve (OCV)
    - Harnesses and connectors between oil control valve (OCV) and PCM open or short.
  - If as specified, inspect the following hydraulic passages for clogging or leakage or both:
    - Oil pressure switch-oil control valve (OCV)
    - Oil control valve (OCV)-camshaft
    - Camshaft internal passage
11. If they are normal, replace the 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 M-MDS or Equivalent

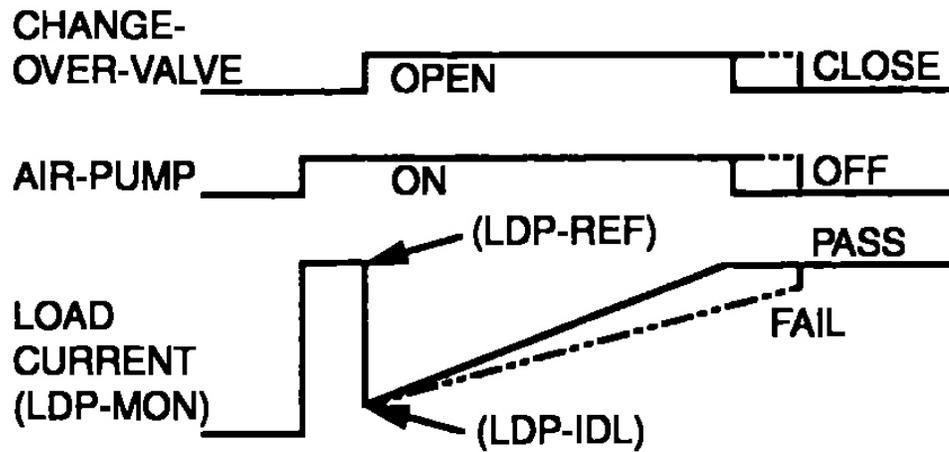
#### **NOTE: EVAP system test outline**

- **The EVAP system test, which can substituted for the run drive cycle as an EVAP control system repair confirmation method, can be done while operating the M-MDS in the KOEO (Key On Engine Off) condition instead of actually driving the vehicle.**

#### EVAP System Test Description

- The EVAP system test finds gas leaks in the system using the PCM to monitor changes in the air pump load current of the EVAP system leak detection pump. This test starts after sending an on-demand test signal from the M-MDS to the PCM. The PCM controls the air pump and change-over-valve operation and also stores the load current of the air pump as follows:
  - i. The PCM commands turn the air pump on and retrieve the air pump load current value (LDP\_MON PID) as a reference current (LDP\_REF PID).
  - ii. After retrieving a reference current value, the PCM commands the change-over-valve to open, then captures the air pump load current value (LDP\_MON PID) as idle current (LDP\_IDL PID). The EVAP system will be pressurized from this phase.
  - iii. The PCM continues to monitor the air pump load current value (LDP\_MON PID) until the end of

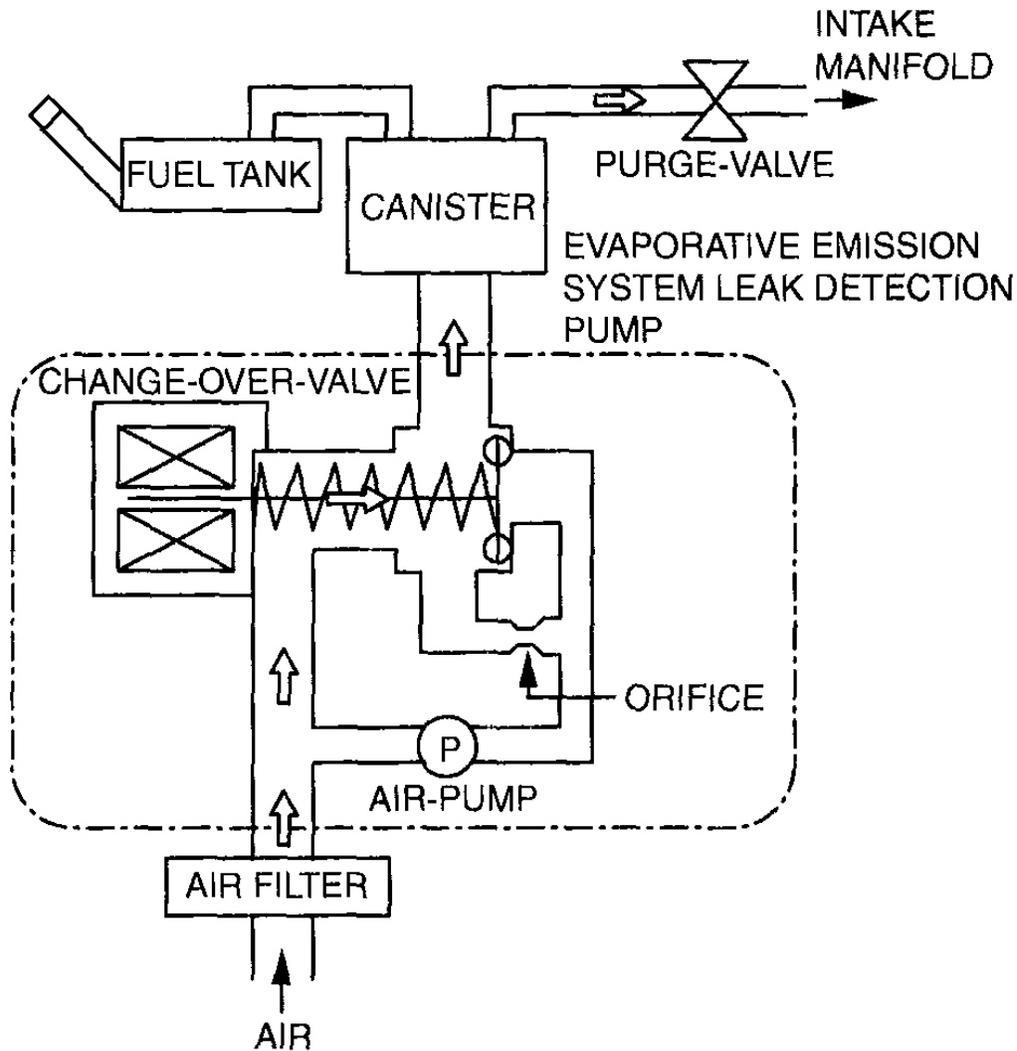
the test.



C5U116AW7001

**Fig. 15: EVAP System PCM Test Description**  
 Courtesy of MAZDA MOTORS CORP.

- You can confirm whether any evaporative gas leak occurred or not by reading the test results.



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**Fig. 16: System Diagram - EVAP System**  
 Courtesy of MAZDA MOTORS CORP.

**EVAP System Malfunction Judgment**

- The PCM calculates the stored air pump load current value and send the results to the M-MDS as DTCs:

**DTC & CONDITION TABLE**

| DTC No. | Condition  |
|---------|--|
| P0442   | Evaporative emission control system leak detected (small leak) |

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|       |  |
|-------|--|
| P0446 | Change over valve (COV) (EVP system leak detection pump) stuck close |
| P0455 | Evaporative emission control system leak detected (gross leak)       |
| P0456 | Evaporative emission system leak detected (very small leak)          |
| P2401 | EVAP system leak detection pump motor circuit low                    |
| P2402 | EVAP system leak detection pump motor circuit high                   |
| P2404 | EVAP system leak detection pump sense circuit problem                |
| P2405 | EVAP system leak detection pump sense circuit low input              |
| P2407 | EVAP system leak detection pump sense circuit intermittent           |

#### Evaporative System Test Procedure

1. Select the EVAP system test from the toolbox on the M-MDS display and follow the instructions.
2. Verify that all of the following PIDs are within the specifications at the pre-test confirmation screen.

#### NOTE:

- To successfully perform this procedure, all PIDs must be within the following specifications before proceeding to the next step.
- The PCM will cancel the EVAP system test if the VPWR PID value falls lower than 11.0 V during the test.

#### PID SPECIFICATION

| PID  | PID Range                              |
|------|--|
| BARO | 72.2 kPa {543 mmHg, 21.3 inHg} or more |
| FLI  | 15-85%                                 |
| IAT  | 5-45°C {41-113°F}                      |
| VPWR | 11.0 V or more                         |

3. Start the engine.
  4. Drive the vehicle or let the engine idle more than **20 min.**
  5. Turn ignition switch off, then turn it to the ON position again (Key On Engine Off).
  6. Press the tick icon to start the test.
  7. Verify that no DTCs present after the completion of the test.
- If any test result is indicated with red, diagnose the problem using the following DTC troubleshooting procedure or component inspection procedure.

- If any DTCs are detected, diagnose the problem using the appropriate DTC troubleshooting procedure.

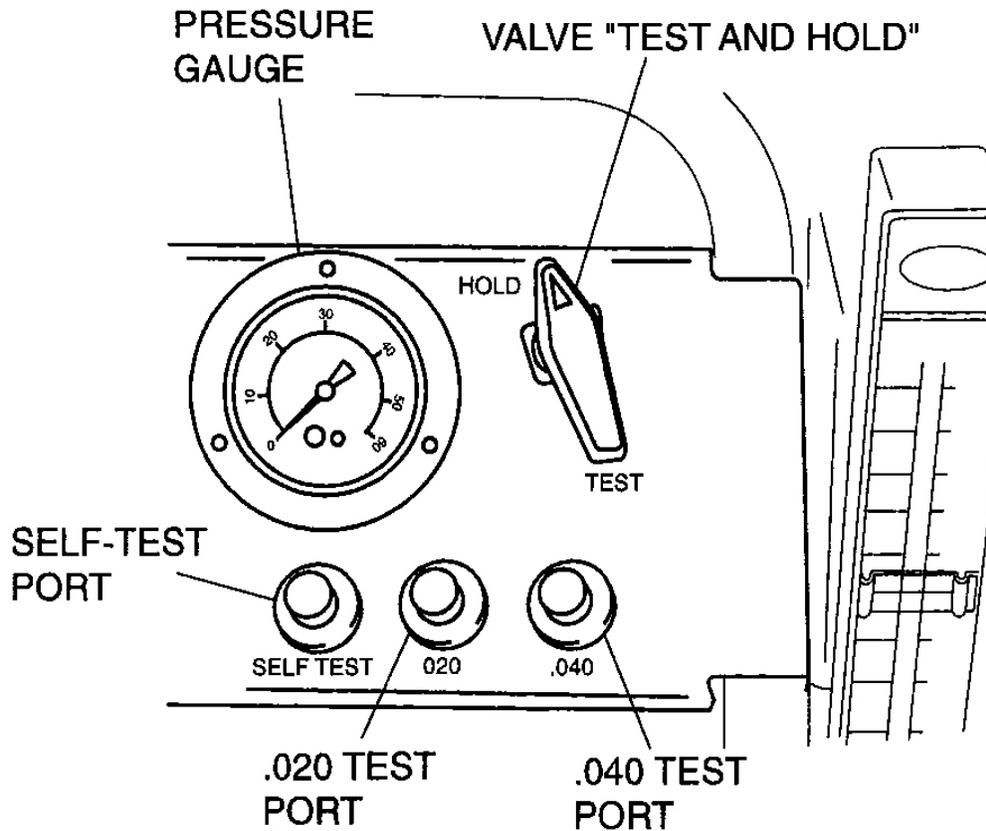
#### **EVAP System Leak Inspection Using Leak Tester**

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.

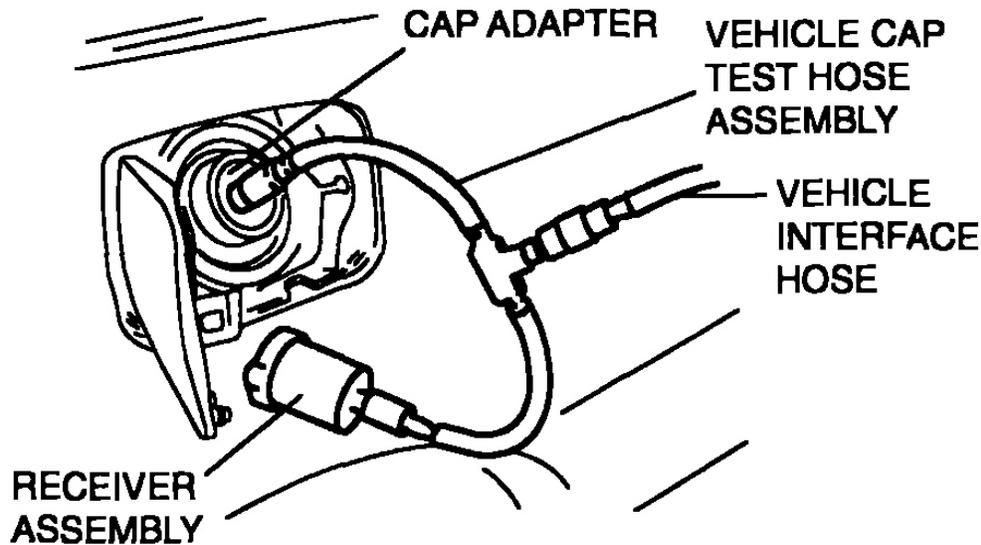


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**Fig. 17: Identifying EVAP Leak Tester Control Panel**  
 Courtesy of MAZDA MOTORS CORP.

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.
  3. Connect the receiver assembly (SST: AKS441130) 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: AKS441131) 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 or equivalent 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 or equivalent to close the change-over valve (COV) in the EVAP system leak detection pump.



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**Fig. 18: Connecting Cap Adaptor To Vehicle Cap Test Hose Assembly**  
Courtesy of MAZDA MOTORS CORP.

**NOTE:**

- The COV 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

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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 appropriate service article to verify that the cut or vent valve is properly closed.
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 (H<sub>2</sub>O).

#### **EVAPORATIVE LEAK:**

- The pressure does not return to the preset level of **356 mm {14 in}** of water (H<sub>2</sub>O) when measuring the flow. See "SETTING LEAK STANDARD FOR TESTING" (.020 to .040 inch H<sub>2</sub>O) of the Evaporative Emissions Tester operators manual (134-01067).

#### **NOTE:**

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