

G - TESTS W/CODES - TESTS

Article Text

2000 Mazda MX-5 Miata

For Yorba Linda Miata

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Monday, May 12, 2003 01:43PM

ARTICLE BEGINNING

2000 ENGINE PERFORMANCE

Self-Diagnostics

Miata

DIAGNOSTIC TESTS

CAUTION: Ensure ignition is off before disconnecting harness connector from any component or control module. If PCM replacement is instructed in following testing, always ensure PCM connectors and ground circuits are okay. If either are suspect, repair and repeat testing to confirm PCM malfunction.

NOTE: For connector terminal identification, see CONNECTOR IDENTIFICATION in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. See appropriate wiring diagram in WIRING DIAGRAMS article. Always perform applicable drive cycle test after repair is performed to verify that DTC does not reset.

NOTE: For following tests, manufacturer recommends use of New Generation Star (NGS) tester. NGS tester is referred to as scan tool. For more information, see SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article.

DTC P0102: MASS AIRFLOW (MAF) SENSOR CIRCUIT LOW INPUT

Condition

DTC is set when input voltage from MAF sensor is less than .86 volt with engine started for 3 seconds. Possible causes are:

- * MAF sensor malfunction.
- * Open or short circuit between main relay and MAF sensor.
- * Open or short circuit between Powertrain Control Module (PCM) and MAF sensor.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Inspect all applicable harness connectors. If problem is found, repair as necessary and go to step 4). If no problem is found, go to next step.

2) Using scan tool, access PID/DATA MONITOR. Record PID data for MAF V. If MAF V is not .86-4.9 volts, check for open circuit on Light Green/Black wire between PCM connector No. 2 terminal "L" and MAF sensor terminal "B". If problem is found, repair as necessary and go to step 4). If no problem is found, go to next step. If MAF V is .86-4.9 volts, go to step 6).

3) Turn ignition off. Disconnect MAF sensor connector. Turn ignition on. Measure voltage between ground and harness connector terminal "C" (White/Red wire). If battery voltage is present, go to

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next step. If battery voltage is not present, check for open or short circuit on White/Red wire between MAF sensor and main relay. If problem is found, repair as necessary and go to step 4).

4) Turn ignition off. Check continuity of Black/Blue wire between MAF harness connector terminal "A" and ground. If continuity exists, go to next step. If continuity does not exist, repair open Black/Blue wire and go to step 4).

5) Disconnect PCM connectors. Check continuity of wire between MAF harness connector terminal "B" and PCM harness connector No. 2 terminal "L". If continuity exists, go to next step. If continuity does not exist, repair open wire and go to step 4).

6) Check continuity between MAF harness connector terminal "B" and ground. Check continuity between MAF harness connector terminals "A" and "B". If continuity does not exist, replace MAF sensor and go to next step. If continuity exists, repair short to ground or between circuits.

7) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for MAF V. If MAF V should be .86-4.9 volts. If same DTC is present, replace PCM. If any other DTC is present, go to appropriate test.

DTC P0103: MASS AIRFLOW (MAF) SENSOR CIRCUIT HIGH INPUT

Condition

DTC is set when input voltage from MAF sensor is more than 4.9 volts with engine started for 3 seconds. Possible causes are:

- * MAF sensor malfunction.
- * Open or short circuit between Powertrain Control Module (PCM) and MAF sensor.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Inspect all applicable harness connectors. If problem is found, repair as needed.

2) Using scan tool, access PID/DATA MONITOR. Record PID data for MAF V. If MAF V is not .86-4.9 volts, go to next step. If MAF V is .86-4.9 volts, problem is intermittent (not current).

3) Turn ignition off. Disconnect MAF connector. Repair any bent or corroded terminals. Turn ignition on. Check voltage between MAF harness connector terminal "B" (Light Green/Black wire) and ground. If voltage is .1 volt or more, repair short to voltage and go to step 4). If voltage is less than .1 volt, go to next step.

4) Turn ignition off. Disconnect PCM connectors. Repair any bent or corroded terminals. Go to next step.

5) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for MAF V. If MAF V should be .86-4.9 volts. If same DTC is present, replace PCM. If any other DTC is present, go to appropriate test.

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DTC P0106: BAROMETRIC PRESSURE CIRCUIT MALFUNCTION

Condition

PCM monitors difference between intake manifold vacuum and atmospheric pressure at idle. Code sets when barometric pressure variation is less than 1.31 in. Hg (4.5 kPa). Possible causes are:

- * EGR boost sensor malfunction.
- * EGR boost sensor valve hose loose, plugged or damaged.
- * EGR boost sensor solenoid valve malfunction.
- * Open or short circuit between EGR boost sensor and PCM.
- * Open or short circuit between EGR boost sensor and main relay.
- * Open or short circuit between EGR boost sensor solenoid valve and PCM.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Turn ignition off. Turn ignition on. If DTC P1487 exists, repair first. If DTC P1487 does not exist, go to next step.

2) Check all EGR boost sensor vacuum lines for looseness, clogging or damage. Check boost sensor filter for clogging. If problem is found, repair as necessary and go to step 5). If no problem is found, go to next step.

3) Disconnect vacuum hose from EGR boost sensor. Disconnect vacuum hose from lower port on EGR sensor solenoid. Connect vacuum pump to lower port on EGR sensor solenoid. Apply vacuum to solenoid. Replace solenoid if vacuum does not hold. Turn ignition on. Using scan tool, activate solenoid (EGRBV). If solenoid operates and vacuum is released, go to next step. If solenoid does not operate as specified, replace EGR boost sensor solenoid.

4) Inspect EGR boost sensor. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. Replace as necessary and go to next step. If EGR boost sensor is okay, go to next step.

5) Reconnect all connectors. Turn ignition on. Clear DTC from memory. Perform drive mode 1, 2 and 3. See SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Recheck for DTCs. If same DTC is still present, replace PCM. If same DTC is not present, go to next step.

6) Clear DTC from memory. Recheck for DTCs. If any DTC is still present, diagnose and repair DTC. If no DTCs are present, test is complete.

DTC P0107: BAROMETRIC PRESSURE CIRCUIT LOW INPUT

Condition

PCM monitors voltage from EGR boost sensor when intake air temperature is more than 50°F (10°C) and EGR boost sensor solenoid is turned off (atmospheric pressure is applied to sensor). Code is set when input voltage from EGR boost sensor is less than .2 volts. Possible causes are:

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- * EGR boost sensor malfunction.
- * Open or short circuit between EGR boost sensor and PCM.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Connect scan tool. Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for BARO V. If voltage is less than .21 volts, go to next step. If voltage is .21 volts or more, problem is intermittent (not current).
- 3) Disconnect EGR boost sensor harness connector. Turn ignition on. Record PID data for BARO V. If voltage is more than 4.8 volts, go to next step. If voltage is 4.8 volts or less, go to step 7).

NOTE: If DTC P0122 and P0452 are present, check reference voltage. See REFERENCE VOLTAGE TEST.

- 4) Turn ignition on. Check voltage at harness connector terminal "C" (Light Green/Red wire). If 4.5-5.5 volts are present, check connector. If connector is okay, replace EGR boost sensor. If connector is bent or corroded, repair connector. After repair, go to step 5). If 4.5-5.5 volts are not present, repair open circuit in Light Green/Red wire between EGR boost sensor and PCM connector No. 2 terminal "I". Go to step 5).
- 5) Turn ignition off. Disconnect PCM connectors. Check continuity between EGR boost sensor harness connector terminal "B" (Gray wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground. Go to step 5).
- 6) Check continuity between harness connector terminals "A" (Black/Red wire) and "B" (Gray wire). If continuity is not present, go to next step. If continuity is present, repair short between circuits. Go to next step.
- 7) Connect all connectors. Turn ignition on. Clear DTC from memory. Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for BARO V and IAT V. IAT V should be more than 50°F (10°C). BARO V should be .21-4.8 volts. Recheck for DTCs. If DTC is still present, replace PCM. If DTC is not present, go to next step.
- 8) Clear DTC from memory. Recheck for DTCs. If any other DTC is still present, diagnose and repair DTC. If no DTCs are present, test is complete.

DTC P0108: BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

Condition

PCM monitors voltage from EGR boost sensor when intake air temperature is more than 50°F (10°C) and EGR boost sensor solenoid is turned off (atmospheric pressure is applied to sensor). Code is set when input voltage from EGR boost sensor is more than 4.8 volts. Possible causes are:

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- * EGR boost sensor malfunction.
- * Open or short circuit between EGR boost sensor and PCM.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Connect scan tool. Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for BARO V. If voltage is more than 4.48 volts, go to next step. If voltage is 4.8 volts or less, problem is intermittent (not current).

3) Disconnect EGR boost sensor harness connector. Check connector for poor contact or corrosion. If problem is present, repair as necessary and go to step 4). If connector is okay, check continuity between EGR boost sensor harness connector terminal No. "A" (Black/Red wire) and ground. If continuity is present, go to next step. If continuity is not present, check continuity of Black/Red wire between EGR boost sensor harness connector terminal No. "A" and PCM harness connector No. 3 terminal "F". If continuity is present, go to next step. If continuity is not present, repair open circuit in Black/Red wire. Go to step 4).

4) Check PCM connector terminals for poor contact or corrosion. If problem is present, repair as necessary and go to step 4). If connector is okay, check continuity between EGR boost sensor harness connector terminals "B" (Gray wire) and "C" (Light Green/Red wire). If continuity is not present, go to next step. If continuity is present, repair short between circuits. After repair, go to step 4).

5) Check continuity of Gray wire between EGR boost sensor harness connector terminal No. "B" and PCM harness connector No. 3 terminal "S". If continuity is present, go to next step. If continuity is not present, repair open circuit in Gray wire. Go to next step.

6) Connect all connectors. Turn ignition on. Clear DTC from memory. Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for BARO V and IAT V. IAT V must be more than 50°F (10°C). BARO V should be .21-4.8 volts. Recheck for DTCs. If DTC is still present, replace PCM. If DTC is not present, go to next step.

7) Clear DTC from memory. Recheck for DTCs. If any other DTC is still present, diagnose and repair DTC. If no DTCs are present, test is complete.

DTC P0111: INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT MALFUNCTION

Condition

DTC is set if input voltage from IAT indicates intake air temperature is 104°F (40°C) greater than engine coolant temperature input from Engine Coolant Temperature (ECT) sensor. Possible causes are:

- * IAT sensor malfunction.
- * Open or short circuit between IAT sensor and Powertrain

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Control Module (PCM).

- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Turn ignition off. Disconnect IAT sensor. Check connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary. Go to step 6).
- 3) Check resistance between IAT sensor terminals. If resistance is more than 76 ohms, go to next step. If resistance is 76 ohms or less, replace IAT sensor. Go to step 6).
- 4) Disconnect PCM connectors. Check connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary. Go to next step.
- 5) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Using scan tool, check freeze frame data. If same DTC is pending, replace PCM. If DTC is not present, go to next step.
- 6) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any other DTCs are present, diagnose and repair as necessary. If no DTCs are present, testing is complete.

DTC P0112: INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT LOW INPUT

Condition

DTC is set if input voltage from IAT is less than .2 volt when engine is started. Possible causes are:

- * IAT sensor malfunction.
- * Open or short circuit between IAT sensor and Powertrain Control Module (PCM).
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Turn ignition on. Using scan tool, access PID/DATA MONITOR. Record PID data for IAT V. If IAT PID is less than .2 volt, go to next step. If IAT PID is .2 volt or more, problem is intermittent (not current).
- 3) Turn ignition off. Inspect all applicable harness connectors. If problem is found, repair as necessary and go to step 8). If no problem is found, go to next step.
- 4) Disconnect IAT sensor harness connector. Turn ignition on. Using scan tool, check IAT PID. If IAT PID is less than .2 volt, go to next step. If IAT PID is .2 volt or more, replace IAT sensor. Go to step 8).
- 5) Turn ignition off. Disconnect PCM connectors. Check

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continuity between IAT sensor harness connector terminal "B" and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground. Go to step 8).

6) Check continuity between IAT sensor harness connector terminals "A" and "B". If continuity is not present, go to next step. If continuity is present, repair short between circuits. Go to next step.

7) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Using scan tool, check freeze frame data. If same DTC is pending, replace PCM. If DTC is not present, go to next step.

8) Clear DTC from memory. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Recheck for DTCs. If DTC is still present, replace PCM. If DTC is not present, testing is complete.

DTC P0113: INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT HIGH INPUT

Condition

DTC is set if input voltage from IAT is more than 4.8 volt when engine is started. Possible causes are:

- * IAT sensor malfunction.
- * Open or short circuit between IAT sensor and Powertrain Control Module (PCM).
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Turn ignition on. Using scan tool, access PID/DATA MONITOR. Record PID data for IAT V. If IAT PID is more than 4.8 volt, go to next step. If IAT PID is 4.8 volts or less, problem is intermittent (not current).

3) Turn ignition off. Inspect IAT sensor harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 6).

4) Disconnect IAT sensor harness connector. Check resistance between IAT sensor terminals "A" and "B". If resistance is 2.59 ohms or less, go to next step. If resistance is 2.59 ohms or more, replace IAT sensor. Go to step 6).

5) Turn ignition on. Check voltage at IAT sensor harness connector terminal "B" (Pink/Blue wire). If battery voltage is not present, go to next step. If battery voltage is present, repair short to power on Pink/Blue wire between IAT sensor and PCM connector No. 2 terminal "B". Go to step 6).

6) Turn ignition off. Inspect PCM harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 6).

7) Check continuity of Pink/Blue wire between IAT sensor

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harness connector terminal "B" and PCM connector No. 2 terminal "B". If continuity is present, go to next step. If continuity is not present, repair open circuit in Pink/Blue wire. Go to step 6).

8) Check continuity of Black/Red wire between IAT sensor harness connector terminal No. "A" and PCM harness connector No. 3 terminal "F". If continuity is present, go to next step. If continuity is not present, repair open circuit in Black/Red wire. Go to step 6).

9) Connect all connectors. Clear DTC from memory. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Recheck for DTCs. If DTC is still present, replace PCM. If DTC is not present, go to next step.

10) Clear DTC from memory. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Recheck for DTCs. If any other DTC is still present, diagnose and repair as necessary. If no DTCs are present, testing is complete.

DTC P0117: ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT LOW INPUT

Condition

DTC is set if input voltage from ECT sensor is less than .2 volt when ignition is turned on. Possible causes are:

- * ECT sensor malfunction.
- * Open or short circuit between ECT sensor and Powertrain Control Module (PCM).
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Start engine. Warm engine to operating temperature. Using scan tool, check ECT V PID. If ECT voltage is less than .2 volt, go to next step. If ECT voltage is .2 volt or more, problem is intermittent (not current).

3) Turn ignition off. Inspect all applicable harness connectors. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 9).

4) Turn ignition on. Using scan tool, access PID/DATA MONITOR. Record PID data for ECT V. If ECT voltage is less than .2 volt, go to next step. If ECT voltage is .2 volt or more, replace ETS sensor. Go to step 9).

5) Turn ignition off. Disconnect PCM connectors. Check continuity between ECT sensor harness connector terminal "A" (Red/Blue wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground on Red/Blue wire. Go to step 9).

6) Check continuity between ECT harness connector terminals "A" (Red/Blue wire) and "B" (Black/Red wire). If continuity is not present, go to next step. If continuity is present, repair short between circuits as necessary and go to next step.

7) Connect all connectors. Erase DTC. See CLEARING CODES in

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SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not present, go to next step. If DTC is present, replace PCM. Go to next step.

8) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any other DTC is present, diagnose and repair as necessary. If no DTC is present, testing is complete.

DTC P0118: ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT HIGH INPUT

Condition

DTC is set if input voltage from ECT sensor is more than 4.9 volts when ignition is turned on. Possible causes are:

- * ECT sensor malfunction.
- * Open circuit between ECT sensor and Powertrain Control Module (PCM).
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Start engine. Using scan tool, check ECT V PID. If ECT voltage is more than 4.8 volt, go to next step. If ECT voltage is .2 volt or more, problem is intermittent (not current).

3) Turn ignition off. Remove air cleaner. Disconnect ECT sensor connector. Inspect all applicable harness connectors. If no problems are found, go to next step. If problem is found, repair as necessary and go to step 8).

4) Connect jumper wire across sensor harness connector terminals. Turn ignition on. Using scan tool, check ECT V PID. If ECT voltage is .2 volt or more, go to next step. If no voltage is present, replace ECT sensor Go to step 8).

5) Turn ignition off. Disconnect jumper wire from ECT sensor connector. Turn ignition on. Measure voltage between terminal "A" (Red/Blue wire) on harness connector and ground. If battery voltage is not present, go to next step. If battery voltage is present, repair short to power on Red/Blue wire. Go to step 8).

6) Disconnect PCM connectors. Check connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary. Go to step 8).

7) Check continuity of Red/Blue wire between terminal "A" on ECT harness connector and PCM harness connector No. 2 terminal "E". If continuity exists, go to next step. If continuity is not present, repair as necessary and go to step 8).

8) Check continuity of Black/Red wire between terminal "B" on ECT harness connector and PCM harness connector No. 3 terminal "F". If continuity exists, go to next step. If continuity is not present, repair open circuit and go to step 8).

9) Inspect ECT sensor. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV & PROTEGE article. If ECT sensor is okay, go to

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next step. If ECT sensor is faulty, replace as necessary and go to step 8).

10) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not present, go to next step. If DTC is present, replace PCM. Go to next step.

11) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any other DTC is present, diagnose and repair as necessary. If no DTC is present, testing is complete.

DTC P0122: THROTTLE POSITION (TP) SENSOR CIRCUIT LOW INPUT

Condition

DTC is set when input voltage from TP sensor is less than .1 volt when ignition is turned on. Possible causes are:

- * TP sensor malfunction.
- * Open or short circuit between Powertrain Control Module (PCM) and TP sensor.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Turn ignition on. Using scan tool, access PID/DATA MONITOR. Record PID data for TP V while slowly depressing accelerator pedal. If TP voltage is less than .1 volt, go to next step. If TP voltage is .1 volt or more, problem is intermittent (not current).

3) Disconnect TP sensor connector. Connect a jumper wire between harness connector terminals "A" (Light Green/Red wire) and "C" (Green/Black wire). Using scan tool, access TP V. If TP voltage is more than 4.8 volts, go to next step. If TP voltage is 4.8 volts or less, go to step 9).

4) Turn ignition off. Check continuity between TP sensor terminals "A" and "C". If continuity is present, check sensor terminal and harness connector terminal "C". Repair as necessary. After repair, go to step 9). If continuity is not present, replace TP sensor. Go to step 9).

NOTE: If DTC P0107 and P0452 are present, check reference voltage. See REFERENCE VOLTAGE TEST.

5) Turn ignition on. Check voltage at harness connector terminal "A" (Light Green/Red wire). If 4.5-5.5 volts are present, go to next step. If 4.5-5.5 volts are not present, repair open circuit in Light Green/Red wire between EGR boost sensor and PCM connector No. 2 terminal "I". Go to step 9).

6) Turn ignition off. Disconnect PCM connectors. Check continuity of Green/Black wire between TP sensor harness connector terminal "C" and PCM connector No. 3 terminal "E". If continuity is present, go to next step. If continuity is not present, repair open

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circuit. Go to step 9).

7) Check continuity between PCM connector No. 3 terminal "E" (Green/Black wire) and ground. If continuity is not present, Repair short between Black/Red wire and Green/Black wire. After repair, go to next step. If continuity is present, repair short to ground. Go to next step.

8) Connect all connectors. Start engine. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If same DTC is present, replace PCM. If same DTC is not present, go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any other DTC is present, diagnose and repair. If no DTC is present, testing is complete.

DTC P0123: THROTTLE POSITION (TP) SENSOR CIRCUIT HIGH INPUT

Condition

DTC is set when input voltage from TP sensor is more than 4.8 volts when ignition is turned on, or when TP sensor voltage is not within normal range when engine is running. Possible causes are:

- * TP sensor malfunction.
- * Open or short circuit between Powertrain Control Module (PCM) and TP sensor.
- * Mass Airflow (MAF) sensor malfunction.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Turn ignition on. Using scan tool, access PID/DATA MONITOR. Record PID data for TP V. Slowly depress accelerator pedal to wide open throttle. Voltage should increase evenly as throttle opening is increased. If voltage is more than 4.8 volts, go to next step. If voltage is 4.8 volts or less, problem is intermittent (not current).

3) Turn ignition off. Disconnect TP connector. Check connector and terminals. If no problem is found, go to next step. If problem is found, repair as needed and go to step 7).

4) Check resistance between TP sensor terminals "A" and "B" Resistance should be 2500-5000 ohms. Check resistance between TP sensor terminals "B" and "C" Resistance should be 200-1100 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace TP sensor. Go to step 7).

5) Check continuity between TP harness connector terminal "B" (Black/Red wire) and ground. If continuity exists, go to next step. If continuity does not exist, repair as needed and go to step 7).

6) Check continuity of Green/Black wire between terminal "C" on TP harness connector and PCM harness connector No. 3 terminal "E". If continuity does not exist, go to next step. If continuity exists, go to step 5).

7) Disconnect PCM connectors. Check connectors and terminals.

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If any problem is found, repair as needed and go to step 7). If no problem is found, go to step 7).

8) Check continuity between TP sensor harness connector terminals "A" (Light Green wire) and "C" (Green/Black wire). If continuity is not present, go to next step. If continuity is present, repair short between circuits and go to next step.

9) Connect all connectors. Start engine. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, access PID/DATA MONITOR. Record PID data for TP V. Voltage should be .1-4.8 volts. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

10) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, diagnose and repair. If no DTC is present, testing is complete.

DTC P0125: EXCESSIVE TIME TO ENTER CLOSED LOOP

Condition

DTC is set when engine coolant temperature has not increased after engine is started and default period of time has passed.

Possible causes are:

- * Engine coolant temperature sensor malfunction.
- * Engine cooling system malfunction.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Warm engine to operating temperature. Using scan tool, check ECT PID. If ECT is less than 140°F (60°C), go to next step. If ECT is 140°F (60°C) or more, problem is intermittent (not current).

3) Inspect ECT sensor terminals. If terminals are okay, go to next step. If terminals are not okay, repair or replace as needed. Go to step 6).

4) Check resistance between ECT sensor terminals. If resistance is about 2000 ohms, go to next step. If resistance is not about 2000 ohms, replace SET sensor and go to step 6).

5) Disconnect PCM connectors. Check connectors and terminals. If no problem is found, go to next step. If any problem is found, repair as needed and go to next step.

6) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, check ECT PID. Ensure ECT PID is less than 68°F (20°C). Start engine. Warm engine to operating temperature. Using scan tool, check for pending DTC P0125. If DTC is not pending, go to next step. If DTC is pending, replace PCM and go to next step.

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7) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, diagnose and repair as necessary. If no DTC is present, test is complete.

DTC P0130: FRONT HEATED OXYGEN SENSOR MALFUNCTION

Condition

DTC is set when PCM checks O2 sensor operation during Test Mode 3. See SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article.

Possible causes are:

- * Front Oxygen Sensor.
- * Oxygen Sensor Harness And/Or Connector.
- * Fuel Injection System Malfunction.
- * Exhaust System Malfunction.
- * EVAP System Malfunction.
- * Engine Malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data and DIAGNOSTIC MONITORING TEST results have been recorded. Check service bulletins. Go to next step.

2) Turn ignition on. Using scan tool, verify stored DTCs. If DTCs P0442, P0443, P0445, P1135, P1136 and/or P1450 are present, repair those DTC(s) first and go to step 6). If DTCs listed are not present, go to next step.

3) Verify if DTC P0130 is present in FREEZE FRAME PID data. If DTC is present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article. After trouble shooting, go to step 6).

4) Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to wide open position and release to race engine. Scan tool should display O2 sensor voltage greater than .45 volt during acceleration (rich condition) and less than .45 volt during deceleration fuel cut (lean condition). If voltage is not as specified, go to next step. If voltage is as specified, go to step 8).

5) Check front oxygen sensor (FHO2S) installation. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 6).

6) Check for exhaust leak upstream of front oxygen sensor. If problem is found, repair as necessary and go to step 6). If no problem is found, replace O2 sensor and go to step 6).

7) Check LONGFT1 PID. Compare to FREEZE FRAME PID data. If fuel trim is shifting to rich condition, go to next step. If fuel trim is shifting to lean condition, go to step 11).

8) Check fuel line pressure. See BASIC DIAGNOSTIC PROCEDURES article. If line pressure is 53-61 psi (3.7-4.3 kg/cm²), go to step 6). If pressure is greater than 53-61 psi (3.7-4.3 kg/cm²), check fuel pump maximum pressure. See BASIC DIAGNOSTIC PROCEDURES article.

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Check return line between fuel filter and tank for clogging or pinching. Repair as necessary. If no problem is found, replace fuel pressure regulator. After repair, go to step 6).

9) Check fuel line pressure. See BASIC DIAGNOSTIC PROCEDURES article. If line pressure is 53-61 psi (3.7-4.3 kg/cm²), go to step 12). If pressure is less than 53-61 psi (3.7-4.3 kg/cm²), go to next step.

10) Check fuel pump maximum pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum pressure is 92 psi (3.7-4.3 kg/cm²), go to next step. If maximum pressure is less than 92 psi (3.7-4.3 kg/cm²), repair wiring and/or replace fuel pump. After repair, go to step 6).

11) Check for leaks in fuel system after fuel pump. If any leaks are found, repair as necessary. If no leaks are found, check for clogging at fuel filter and fuel inlet filter. If clogging is present, check fuel tank for debris. If fuel tank is okay, replace fuel filter and go to step 6). If fuel tank has debris, clean tank, replace fuel inlet filter (sock) and fuel filter. After repair, go to step 6).

12) Check cooling system for combustion gases. If no problem is found, go to next step. If combustion gases are found in cooling system, repair leak and go to step 6).

13) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Conduct drive cycle modes No. 1 and No. 3. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, verify TEST #10:01:11, #10:02:11 or #10:03:11 in DIAGNOSTIC MONITORING TEST RESULTS. If any test exceeds MAX value, replace PCM. After repair, go to next step. If no test exceeds MAX value, go to next step.

14) Clear DTC from memory. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Recheck for DTCs. If DTC is still present, replace PCM. If DTC is not present, testing is complete.

DTC P0134: FRONT HEATED OXYGEN SENSOR - NO ACTIVITY DETECTED

Condition

DTC is set when front oxygen sensor signal voltage does not exceed .55 volt after engine is started, or stays less than .55 volt for 52 seconds after engine has reached normal operating temperature, engine speed is 1150 RPM or greater and TP sensor voltage is more than .62 volt. Possible causes are:

- * Front Oxygen Sensor.
- * Front Oxygen Sensor wiring or connections.
- * Exhaust leak.
- * Internal engine problem.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID DATA have been recorded. Check service bulletins. Go to next step.

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2) Turn ignition on. Using scan tool, verify stored DTCs. If any other DTC is present, repair other DTC first. If no other DTCs are present, go to next step.

3) Verify if DTC P0134 is present in FREEZE FRAME PID data. If DTC is present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.

4) Warm engine to operating temperature. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to wide open position and release to race engine. Scan tool should display O2 sensor voltage greater than .45 volt during acceleration (rich condition) and less than .45 volt during deceleration fuel cut (lean condition). If voltage is as specified, go to step 8). If voltage is not as specified, go to next step.

5) Check front oxygen sensor (FHO2S) installation. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 5).

6) Check for exhaust leak upstream of front oxygen sensor. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 5).

7) Check cooling system for combustion gases. If no problem is found, go to next step. If combustion gases are found in cooling system, repair leak and go to step 5).

8) Check engine compression. If compression is okay, go to next step. If compression is not okay, repair as necessary. Go to next step.

9) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in appropriate SELF-DIAGNOSTICS INTRODUCTION article. Start engine. Conduct drive cycle mode No. 3. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if DTC P0134 is present in PENDING TROUBLE CODE information. If DTC is not present, go to next step. If DTC is present, replace PCM and go to next step.

10) Erase DTC. See CLEARING CODES in appropriate SELF-DIAGNOSTICS INTRODUCTION article. Conduct drive cycle mode No. 3. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if DTCs are stored or are present in PENDING TROUBLE CODE information. If no DTCs are present, testing is complete. If any other DTCs are present, go to applicable test and repair.

DTC P0138: REAR OXYGEN SENSOR CIRCUIT HIGH INPUT

Condition

DTC is set when rear O2 sensor voltage is more than .45 volt for 6 seconds when vehicle is in deceleration (fuel cut) and engine is at normal operating temperature. Possible cause is short circuit in rear O2 sensor wiring harness.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Verify if DTC P0138 is present in FREEZE FRAME PID data.

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If DTC is present, go to next step. If DTC is not present, repair DTC(s) present in FREEZE FRAME PID data.

3) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Referring to FREEZE FRAME PID DATA data, operate vehicle for at least one minute under same conditions as when DTC was set. Verify if DTC P0138 is present in PENDING TROUBLE CODE information. If code is present, go to next step. If code is not present, problem may be intermittent. Ensure all applicable connections are clean and tight.

4) Turn ignition off. Disconnect rear O2 sensor connector. Turn ignition on. Check voltage between harness connector terminal "A" (Red wire) and ground. If voltage is not present, go to next step. If voltage is present, repair short to power on Red wire. After repair, go to step 6).

5) Start engine. Using scan tool, monitor RHO2S PID. Accelerate engine at least 10 times. If PID is always more than .45 volts, replace O2 sensor. If PID is more and less than .45 volts when revving engine, go to next step.

6) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in appropriate SELF-DIAGNOSTICS INTRODUCTION article. Conduct Drive Modes No. 1 and No. 3 . See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if same DTC is stored in PENDING TROUBLE CODE information. If DTC is not present, go to next step. If DTC is present, replace PCM. Go to next step.

7) Erase DTC. See CLEARING CODES in appropriate SELF-DIAGNOSTICS INTRODUCTION article. If no other DTCs are present, testing is complete. If any other DTCs are present, go to applicable test and repair.

DTC P0140: REAR HEATED OXYGEN SENSOR - NO ACTIVITY DETECTED

Condition

DTC is set when rear oxygen sensor signal voltage does not exceed .45 volt for 19 seconds after engine has reached normal operating temperature, TP sensor input is .62 volt and engine speed at 1500 RPM or greater. Possible causes are:

- * Rear oxygen sensor.
- * Exhaust leak.
- * Open or short to ground between O2 sensor and PCM.
- * Internal Engine problem.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID DATA has been recorded. Check service bulletins. Go to next step.

2) Turn ignition off. Turn ignition on. Using scan tool, check for stored an pending DTCs. If any other DTCs are present, go to appropriate test. If no other DTCs are present, go to next step.

3) Verify if DTC P0140 is present in FREEZE FRAME PID data. If DTC is present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.

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4) Start engine. Warm engine to operating temperature. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to wide open position and release to race engine. Scan tool should display O2 sensor voltage greater than .45 volt during acceleration (rich condition) and less than .45 volt during deceleration fuel cut (lean condition). If voltage is as specified, go to step 8). If voltage is not as specified, go to next step.

5) Check rear oxygen sensor (RHO2S) installation. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7).

6) Check for leaks in exhaust system upstream of rear O2 sensor. If problem is found, repair as needed and go to step 7). If no leaks exist, check for open or short to ground on Red wire between PCM and rear O2 sensor. Repair as necessary. If no problem is found, replace rear O2 sensor. After repair, go to step 7).

7) Check cooling system for combustion gases. If no problem is found, go to next step. If combustion gases are found in cooling system, repair leak and go to step 7).

8) Check engine compression. If problem is found, repair as necessary and go to next step. If no problem is found, go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Warm engine to operating temperature. Ensure ECT PID is more than 176°F (80°C). Raise engine speed to more than 1500 RPM for one minute. Verify if DTC P0140 is present in PENDING TROUBLE CODE information. If DTC is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.

10) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are present. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

DTC P0171: FUEL TRIM TOO LEAN

Condition

DTC is set when fuel injection closed loop correction and learning correction are greater than specified value because of system too lean. Deterioration or malfunction of following components and/or systems could contribute to DTC P0171 being set. Possible causes are:

- * Fuel injector malfunction.
- * Fuel pump malfunction.
- * Fuel filter clogged.
- * Fuel lines clogged or leaking.
- * Pressure regulator malfunction.
- * Pulsation damper malfunction.
- * Ignition coil malfunction.
- * Ignition module malfunction.
- * Ignition wire malfunction.
- * Spark plug malfunction.
- * Intake air system leakage.

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- * Exhaust system leak.
- * Low compression.
- * Front oxygen sensor malfunction.
- * Wiring or connector malfunction.
- * Vacuum hose leak.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Using scan tool, check stored and pending DTCs. If no other DTCs are present and no driveability problems are present, go to next step. If a driveability problem is present, go to step 11). If a misfire DTC is present, go to step 11). If any other DTCs are present, go to appropriate test.

3) Verify if DTC P0171 is present in FREEZE FRAME PID data. If DTC is present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.

4) Refer to FREEZE FRAME PID data for RPM, LOAD, ECT and VSS. Compare readings with ignition on and at idle with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If all data is within specification, go to next step. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. Diagnose and repair as necessary, then go to step 7).

5) Referring to FREEZE FRAME PID data, operate vehicle under same conditions as when DTC was set. Record PID data for RPM, LOAD, ECT and VSS. If all data is within specification, go to next step. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. Diagnose and repair as necessary, then go to step 7).

6) Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to wide open position and release to race engine. Scan tool should display O2 sensor voltage greater than .45 volt during acceleration (rich condition) and less than .45 volt during deceleration fuel cut (lean condition). If voltage is as specified, diagnose and repair vacuum leaks as necessary. After repair, go to step 7). If voltage is not as specified, check for exhaust leaks before FO2S. Repair as necessary. If no leak is found, replace front O2 sensor. After repairs, go to step 7).

7) Using scan tool, access PID/DATA MONITOR. Monitor MAF V. Depress accelerator pedal to WOT and release to race engine. Scan tool should display quick voltage changes. If voltage is as specified, go to next step. If voltage is not as specified, replace MAF sensor. After repairs, go to step 7).

8) Inspect air intake system and all vacuum lines for vacuum leaks. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7).

9) Check fuel line pressure. See BASIC DIAGNOSTIC PROCEDURES article. If line pressure is 53-61psi (3.7-4.3 kg/cm²), go to step 15). If fuel pressure is less than specified, go to next step. If pressure is more than specified, check fuel pump maximum pressure. See BASIC DIAGNOSTIC PROCEDURES article. Check fuel system for clogging.

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Repair as necessary. If no problem is found, replace fuel pressure regulator. After repairs, go to step 7).

10) Check fuel pump maximum pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum pressure is 92 psi (6.5 kg/cm²), go to next step. If maximum pressure is less than 92 psi (6.5 kg/cm²), repair fuel pump wiring or replace fuel pump. After repair, go to step 7).

11) Check for fuel system leaks. If any leaks are found, repair leak and go to step 7). If no leaks are found, Check for fuel system clogging. If clogging is present, check fuel tank for debris. If fuel tank is okay, clear clogging and replace fuel filter. After repair, go to step 7). If fuel tank has debris, clean tank, clear clogging, replace fuel inlet filter (sock) and fuel filter. Go to step 7).

12) Using a timing light connected to each spark plug wire in turn, start engine and check for stable and regular flashing of timing light. If all spark plug wires cause timing light to flash properly, go to step 17). If any spark plug wires do not cause timing light to flash properly, go to next step.

13) Check suspect spark plug wire(s) for open circuits and damage. Replace as necessary and go to step 7). If wire(s) are okay, go to next step.

14) Disconnect ignition coil connector. Turn ignition on. Check voltage at coil harness connector terminal "A" (Black/White wire). If battery voltage is present, go to next step. If battery voltage is not present, repair open circuit between coil and ignition switch. After repair, go to step 7).

15) Check ignition coil resistance. See BASIC DIAGNOSTIC PROCEDURES article. If coil is okay, go to next step. If coil is faulty, replace coil and go to step 7).

16) Check engine compression. If compression is okay, go to next step. If compression is not okay, repair as necessary. After repair, go to step 7).

17) Check fuel injector volume at suspect cylinder(s). See applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If no problem is found, go to next step. If problem is found, replace injector(s) as necessary and go to next step.

18) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Conduct Drive Modes No. 1, No. 2 and No. 3. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If DTC is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.

19) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are present. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

DTC P0172: FUEL TRIM TOO RICH

Condition

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DTC is set when fuel injection closed loop correction and learning correction are greater than specified value because of system rich condition. Deterioration or malfunction of following components and/or systems could contribute to DTC P0172 being set. Possible causes are:

- * Fuel injector malfunction.
- * Fuel return hose clogged.
- * Pressure regulator malfunction.
- * Purge solenoid valve malfunction.
- * PRC solenoid malfunction.
- * Mass Airflow (MAF) sensor malfunction.
- * Engine Coolant Temperature (ECT) sensor malfunction.
- * Throttle Position (TP) sensor malfunction.
- * Front oxygen sensor malfunction.
- * Wiring or connector malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Using scan tool, check pending and stored DTCs. If any other DTCs are present, repair those DTC(s) first. If driveability problems are not present, go to next step. If driveability problems are present, go to step 9).

3) Verify if DTC P0172 is present in FREEZE FRAME PID data. If DTC is present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.

4) Refer to FREEZE FRAME PID data for ECT, MAF, TP and VSS. Compare readings with ignition on and at idle with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If all data is within specification, go to next step. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. Diagnose and repair as necessary, then go to step 10).

5) Referring to FREEZE FRAME PID data, operate vehicle under same conditions as when DTC was set. Record PID data for ECT, MAF, TP and VSS. If all data is within specification, go to next step. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. Diagnose and repair as necessary, then go to step 10).

6) Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to wide open position and release to race engine. Scan tool should display O2 sensor voltage greater than .45 volt during acceleration (rich condition) and less than .45 volt during deceleration fuel cut (lean condition). If voltage is as specified, go to next step. If voltage is not as specified, repair wiring or replace O2 sensor as necessary. Go to step 10).

7) Check fuel line pressure. See BASIC DIAGNOSTIC PROCEDURES article. If line pressure is 53-61psi (3.7-4.3 kg/cm²), go to next step. If fuel pressure is not as specified, check fuel pump maximum pressure. See BASIC DIAGNOSTIC PROCEDURES article. Check fuel system for clogging. Repair as necessary. If no problem is found, replace

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fuel pressure regulator. After repairs, go to step 10).

8) Turn ignition off. Disconnect both hoses from purge solenoid valve. Blow air through purge solenoid valve. If air does not flow through valve, go to next step. If air flows through valve, replace purge solenoid valve. After repair, go to step 10).

9) Check PRC solenoid valve. See applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If valve is okay, go to next step. If valve is faulty, replace PRC solenoid valve. After repair, go to step 10).

10) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Conduct Drive Modes No. 1, No. 2 and No. 3. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If DTC is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.

11) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are present. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

DTC P0300: RANDOM MISFIRE DETECTED

Condition

DTC is set when PCM input signal from Crankshaft Position (CKP) sensor signal is irregular. Deterioration or malfunction of following components and/or systems could contribute to DTC P0300 being set. Possible causes are:

- * CKP sensor malfunction.
- * CMP sensor malfunction.
- * Ignition system malfunction.
- * MAF sensor malfunction.
- * Intake air system malfunction.
- * Fuel system malfunction.
- * Purge solenoid malfunction.
- * PCV valve malfunction.
- * EGR system malfunction.
- * Vacuum problem.
- * Wiring problems.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Turn ignition on. Verify stored DTCs. If any other DTCs are present, repair those DTC(s) first. If no other DTCs are present, go to next step.

3) Using scan tool, enter PID/DATA MONITOR AND RECORD. Check PID data with ignition on and at idle for BRK SW, ECT V, IAT V, MAF V, RPM, TP V and VS. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If all data is within specification, go to next step. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV,

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PROTEGE & 626 article. After repair, go to step 10).

4) Check PID data for BRK SW, ECT V, IAT V, MAF V, RPM, TP V and VS while operating vehicle for at least 2 minutes under same conditions as when DTC was set. If all data is within specification, go to next step. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. After repair, go to step 10).

5) Check camshaft position sensor and installation. See BASIC DIAGNOSTIC PROCEDURES article. If sensor and related components are not damaged and installed correctly, go to next step. If problems are present, repair as necessary. Go to step 10).

6) Check crankshaft position sensor installation. See BASIC DIAGNOSTIC PROCEDURES article. If sensor is tight, go to next step. If sensor is loose, repair as necessary. Go to step 10).

7) Using a timing light connected to each spark plug wire in turn, start engine and check for stable and regular flashing of timing light. If any spark plug wires do not cause timing light to flash properly, go to next step. If all spark plug wires cause timing light to flash properly, go to step 15).

8) Check spark plug wires for open circuits and damage. If wires are okay, go to next step. If any spark plug wires are faulty, replace as necessary and go to step 10).

9) Disconnect ignition coil connector. Turn ignition on. Check voltage at coil harness connector terminal "A" (Black/White wire). If battery voltage is present, go to next step. If battery voltage is not present, repair open circuit between ignition switch and ignition coil. After repair, go to step 10).

10) Check ignition coil resistance. See BASIC DIAGNOSTIC PROCEDURES article. If coil is okay, go to step 10). If coil is faulty, replace coil and go to step 10).

11) Start engine. Using scan tool, check MAF V PID while revving engine. If MAF V PID changes quickly, go to next step. If MAF V PID does not change quickly, replace MAF sensor and go to step 10).

12) Check for vacuum leaks from intake system. If no problem is found, go to next step. If any leak is found, repair as necessary. After repair, go to step 10).

13) Check fuel line pressure. See BASIC DIAGNOSTIC PROCEDURES article. If line pressure is 53-61 psi (3.7-4.3 kg/cm²), go to step 20). If line pressure is less than 53-61 psi (3.7-4.3 kg/cm²), go to next step. If fuel pressure is more than 53-61 psi (3.7-4.3 kg/cm²), check fuel return line for clogging. If no problem is found, replace fuel pressure regulator. After repair, go to step 10).

14) Check fuel pump maximum pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum pressure is okay, go to next step. If maximum pressure is not okay, repair wiring or replace fuel pump. After repair, go to step 10).

15) Check for leaks in fuel lines. If any leaks are found, repair as necessary and go to step 10). If no problems are found, check for clogging at fuel filter. If clogging is present, check fuel tank for debris. If fuel tank is okay, replace fuel filter and go to step 10). If fuel tank has debris, clean tank, replace fuel inlet filter (sock) and fuel filter. Go to step 10). If no problems are

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found, replace pressure regulator and go to step 10).

16) Check engine compression. If compression is okay, go to next step. If compression is not okay, repair as necessary. Go to step 10).

17) Turn ignition off. Connect vacuum pump to purge solenoid valve. Apply vacuum. Purge solenoid valve should hold vacuum. Turn ignition on. Using scan tool, select SIMULATION TEST and PRGV PID. Set duty cycle to 100 per cent. Purge solenoid valve should release vacuum. If purge solenoid valve operates as specified, go to next step. If purge solenoid valve does not operate as specified, replace purge solenoid valve. After repair, go to step 10).

18) Turn ignition off. Check PCV system. If PCV system is okay, go to next step. If problem is found, repair as necessary and go to step 10).

19) Check EGR system. See applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If no problems are found, go to next step. If EGR valve is stuck open, replace or repair as necessary. Go to step 10).

20) Check cooling system for combustion gases. If no problem is found, go to next step. If combustion gases are found in cooling system, repair leak and go to next step.

21) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Conduct drive mode No. 1. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If DTC P0300 is not present, go to next step. If DTC P0300 is present in PENDING TROUBLE CODE information, replace PCM. Go to next step.

22) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are stored or are present in PENDING TROUBLE CODE information. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

DTC P0301-P0304: CYLINDERS NO. 1-4 MISFIRE DETECTED

Condition

DTC is set when PCM input signal from Crankshaft Position (CKP) sensor signal is irregular. Deterioration or malfunction of following components and/or systems could contribute to DTC P0301-P0304 being set. Possible causes are:

- * Ignition system malfunction on cylinders No. 1-4.
- * Ignition system malfunction.
- * Fuel system malfunction.
- * Intake air system malfunction.
- * Insufficient compression.
- * Wiring or connector problem.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

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2) Turn ignition off. Turn ignition on. Using scan tool, check for pending or stored DTCs. If any other DTCs are present, repair those DTC(s) first. If no other DTCs are present, go to next step.

3) Using scan tool, access PID/DATA MONITOR AND RECORD. Record PID data for RPM, TPS V, ECT V, IAT V, MAF V, BRK SW and VS with ignition switch on and engine idling. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If all data is within specification, go to next step. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. Repair as necessary and go to step 6).

4) Continue monitoring PIDs while operating vehicle under conditions similar to when DTC was set. If all data is within specification, go to next step. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. Repair as necessary and go to step 6).

5) Turn ignition off. Check suspect spark plug for wetness, wear and damage. If spark plug is okay, go to next step. If plus is wet, go to step 11). If spark plug is worn or damaged, replace as necessary and go to step 6).

6) Check suspect spark plug wire. If spark plug wire is okay, go to next step. If spark plug wire is faulty, replace and go to step 6).

7) Inspect air intake system for vacuum leaks. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 6).

8) Remove air inlet components as necessary to access and disconnect suspect cylinder fuel injector harness connector. Connect Noid light to suspect injector harness connector. Check Noid light while cranking engine. If Noid light illuminates, go to next step. If Noid light does not illuminate, diagnose and repair injector wiring harness. After repair, go to step 6).

9) Check cooling system for combustion gases. If no problem is found, go to next step. If combustion gases are found in cooling system, repair leak and go to step 6).

10) Check engine compression. If compression is okay, go to next step. If compression is not okay, repair as necessary. Go to step 6).

11) Access and remove fuel injector in suspect cylinder with another injector. Recheck while operating vehicle under conditions similar to when DTC was set. If DTC changes to cylinder where suspect injector is installed, replace injector and go to step 6). If DTC does not change, go to next step.

12) Connect all connectors. Start engine. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Conduct drive cycle mode No. 1. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if same DTC is present in PENDING TROUBLE CODE information. If DTC is not present, go to next step. If DTC is present, replace PCM. After repair, go to next step.

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13) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are stored or are present in PENDING TROUBLE CODE information. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

DTC P0325: KNOCK SENSOR CIRCUIT MALFUNCTION

Condition

DTC is set when input voltage from knock sensor is less than 1.25 volts or more than 3.75 volts while engine is running. Possible causes are:

- * Knock sensor malfunction.
- * Improper sensor installation.
- * Open or short in wiring between PCM and sensor.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Turn ignition off. Disconnect knock sensor connector. Turn ignition on. Check voltage between harness connector terminal "A" (White wire) and ground. If about 5 volts is not present, go to next step. If about 5 volts is present, go to step 7).
- 3) Turn ignition off. Disconnect PCM connectors. Check for damaged or corroded terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 9).
- 4) Check continuity between knock sensor harness connector terminal "A" (White wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground on White wire and go to step 9).
- 5) Turn ignition off. Disconnect PCM connectors. Check continuity of White wire between sensor harness connector terminal "A" and PCM connector No. 2 terminal "F". If continuity is present, go to next step. If continuity is not present, repair open circuit in White wire and go to step 9).
- 6) Turn ignition on. Check voltage between harness connector terminal "A" (White wire) and ground. If voltage is not present, go to next step. If voltage is present, repair short to power on White wire. After repair, go to step 9).
- 7) Turn ignition off. Check resistance between knock sensor terminal "A" and sensor body. If resistance is 560 ohms, go to next step. If resistance is not 560 ohms, replace knock sensor and go to next step.
- 8) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Check for DTCs. If DTC is not present, go to next step. If DTC is reset, replace PCM and go to next step.
- 9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

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DTC P0335: CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

Condition

DTC is set when there is no signal input from Crankshaft Position (CKP) sensor while engine is running. Possible causes are:

- * CKP sensor malfunction.
- * Open or short circuit between Powertrain Control Module (PCM) and CKP.
- * Open or short circuit between main relay and CKP.
- * Crankshaft pulley malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Start engine. If DTC is present, go to next step. If DTC is not present, problem is intermittent (not current).
- 3) Turn ignition off. Disconnect CKP sensor connector. Inspect connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7).
- 4) Turn ignition on. Check voltage between harness connector terminal "A" (White/Red wire) and ground. If voltage is not present, go to next step. If voltage is present, repair short to power on White/Red wire. After repair, go to step 7).
- 5) Turn ignition off. Disconnect PCM connectors. Check continuity of Gray/Red wire between CKP sensor harness connector terminal "B" and PCM connector No. 2 terminal "J". If continuity exists, go to next step. If continuity does not exist, repair Gray/Red wire and go to step 7).
- 6) Turn ignition on. Check voltage between PCM harness connector No. 2 terminal "J" (White/Red wire) and ground. If voltage is not present, go to next step. If voltage is present, repair short to power on White/Red wire. After repair, go to step 7).
- 7) Turn ignition off. Check continuity between Gray/Red wire between CKP sensor harness connector terminal "B" and ground. If continuity does not exist, go to next step. If continuity exists, repair short to ground on Gray/Red wire. Go to step 7).
- 8) Check continuity between Black/Blue wire between CKP sensor harness connector terminal "C" and ground. If continuity exists, go to next step. If continuity does not exist, repair open on Black/Blue wire. Go to step 7).
- 9) Using voltmeter connected to PCM harness connector No. 2 terminal "J" (White/Red wire) and ground, check for pulse signal while cranking engine. If signal is present, go to next step. If no signal is present, replace damaged crankshaft pulley. Go to next step.
- 10) Connect all connectors. Start engine. If DTC is not present, go to next step. If DTC is present, replace PCM. After repair, go to next step.
- 11) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are present. If no DTCs are present, testing is complete. If any

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DTCs are present, go to applicable test and repair.

DTC P0339: CRANKSHAFT POSITION SENSOR CIRCUIT INTERMITTENT

Condition

DTC is set when there is less or more than 8 pulses from Crankshaft Position (CKP) sensor when crankshaft rotates twice when engine is running. Possible causes are:

- * CKP sensor malfunction.
- * Open or short circuit between Powertrain Control Module (PCM) and CKP.
- * Open or short circuit between main relay and CKP.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Inspect all applicable harness connectors. If problem is found, repair as necessary and go to step 7). If no problem is found, go to next step.

3) Verify if DTC P0339 is present in FREEZE FRAME PID data. If DTC is present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.

4) Check CKP sensor installation. See BASIC DIAGNOSTIC PROCEDURES article. If installation is okay, go to next step. Adjust as needed and go to step 7).

5) Check CKP sensor surface for damage and metal chips. If sensor is clean and smooth, go to next step. If sensor is damaged or has metal chips clean or replace as necessary. Go to step 7).

6) Disconnect CKP sensor connector. Check connector terminals for damage or corrosion. If no problem is found, go to next step. If any problem is found, clean or replace as necessary. Go to step 7).

7) Using voltmeter connected to PCM harness connector No. 2 terminal "J" (White/Red wire) and ground, check for pulse signal while cranking engine. If signal is present, go to next step. If no signal is present, replace damaged crankshaft pulley. Go to next step.

8) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, select MAF V and RPM PIDs. Start engine. Operate engine so MAF V is 2.0-4.9 volts and engine speed is 500 RPM or more. If DTC P0339 is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are present. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

DTC P0401: INSUFFICIENT EGR FLOW DETECTED

Condition

DTC is set when the difference in intake manifold pressure between open EGR and closed EGR is too small. Possible causes are:

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- * EGR valve malfunction.
- * EGR boost sensor malfunction.
- * EGR boost sensor solenoid valve malfunction.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Turn ignition off. Turn ignition on. If any other DTCs are present, diagnose and repair first. If no other DTCs are present, go to next step.
- 3) Check for vacuum leaks. If no vacuum leaks are present, go to next step. If any vacuum leaks are present, diagnose and repair vacuum leak. Go to step 5).
- 4) Start engine. Warm to operating temperature. Using scan tool in SIMULATION TEST mode, simulate SEGRP PID from zero to 18 steps. If engine speed decreases or stalls, go to next step. If engine speed does not change, replace EGR valve. Go to step 5).
- 5) Turn engine off. Turn ignition on. Disconnect EGR boost sensor vacuum hose. Connect vacuum pump to sensor. Using scan tool, check BARO V PID. Apply vacuum to sensor. If BARO PID voltage decreases, go to next step. If BARO PPID does not change, replace EGR boost sensor. After repair, go to step 5).
- 6) Start engine. Using scan tool in SIMULATION TEST mode, simulate EGRBV OFF. Vacuum should be present for 3 seconds at vacuum hose. If vacuum is not present, go to next step. If vacuum is present, replace sensor. After repair, go to step 5).
- 7) Turn ignition off. Remove EGR valve. If gasket is installed normally, install EGR valve and go to next step. If gasket is not installed correctly, replace gasket, install EGR valve and go to next step.
- 8) Clear DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Perform DRIVE MODE No. 1. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, check RFC FLAG PID. If PID is ON, go to next step. If PID is OFF, clear codes and repeat DRIVE MODE No. 1.
- 9) Perform DRIVE MODE No. 2. Using scan tool, check On-Board Readiness Test. If EGR system has been monitored, go to next step. If EGR system has not been monitored, repeat DRIVE MODE No. 2.
- 10) Reconnect all connectors. Using scan tool, check diagnostic monitoring test results. If test No. 10:41:00 is within specification, go to next step. If test No. 10:41:00 is out of specification, replace PCM and go to next step.
- 11) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Conduct drive cycle mode. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are stored or are present in PENDING TROUBLE CODE, DTC diagnostic monitoring test results. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

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DTC P0402: EXCESSIVE EGR FLOW DETECTED

Condition

DTC is set when the difference in intake manifold pressure between open EGR and closed EGR is too large. Possible causes are:

- * EGR valve gasket problem.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) If any other DTCs are present, diagnose and repair first. If no other DTCs are present, go to next step.
- 3) Turn ignition off. Remove EGR valve. If EGR valve gasket is okay, go to next step. If EGR valve is damaged or missing, replace gasket. Go to next step.
- 4) Clear DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Perform DRIVE MODE No. 1. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, check RFC FLAG PID. If PID is ON, go to next step. If PID is OFF, clear codes and repeat DRIVE MODE No. 1.
- 5) Perform DRIVE MODE No. 2. Using scan tool, check ON-BOARD READINESS TEST. If EGR system has been monitored, go to next step. If EGR system has not been monitored, repeat DRIVE MODE No. 2.
- 6) Reconnect all connectors. Using scan tool, check diagnostic monitoring test results. If test No. 10:41:00 is within specification, go to next step. If test No. 10:41:00 is out of specification, replace PCM and go to next step.
- 7) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Conduct drive cycle mode. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are stored or are present in PENDING TROUBLE CODE, DTC diagnostic monitoring test results. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

DTC P0420: CATALYTIC CONVERTER EFFICIENCY BELOW LIMITDTC

P0421: CATALYTIC CONVERTER EFFICIENCY BELOW LIMIT

NOTE: DTC P0420 applies to Federal emissions vehicles only. DTC P0421 applies to California emissions vehicles only.

Condition

DTC is set when rear oxygen sensor value difference becomes closer to value of front oxygen sensor. This is monitored when engine speed is 1090-3090 RPM, vehicle speed is 16-64 mph and vehicle is under light to medium load. Possible causes are:

- * Three way catalytic converter deterioration.

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- * Exhaust system malfunction.
- * Rear O2 sensor malfunction.
- * Front O2 sensor malfunction.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID DATA have been recorded. Check for service bulletins. Go to next step.

2) Verify stored DTCs. If any other DTCs are present, inspect and repair first. If no other DTCs are present, go to next step.

3) Inspect exhaust system for any leakage. If exhaust system is okay, go to next step. If problem is found, repair as needed. Go to step 8).

4) Ensure both O2 sensors are installed correctly (tight). If no problem is found, go to next step (Federal models) or step 6) (California models). On all models, if problem is found, repair as necessary and go to step 8).

5) Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to wide open position and release to race engine. Scan tool should display O2 sensor voltage greater than .45 volt during acceleration (rich condition) and less than .45 volt during deceleration fuel cut (lean condition). If voltage is as specified, go to next step. If voltage is not as specified, repair wiring or replace O2 sensor as necessary. Go to step 8).

6) Inspect converter. If problem is found, replace converter and go to next step. If converter is okay, replace rear O2 sensor. Go to next step.

7) Connect all connectors. Start engine. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Conduct drive cycle modes No. 1, No. 2 and No. 3. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Check for same DTC in PENDING TROUBLE CODE information. If DTC is not present, go to next step. If DTC is present, replace PCM. After repair, go to next step.

8) Using scan tool, verify PENDING TROUBLE CODE DTC and DIAGNOSTIC MONITORING TEST RESULTS. If any DTCs are present, go to applicable test and repair as needed. If no DTCs are present, testing is complete.

DTC P0442: EVAP SYSTEM MALFUNCTION - LEAK DETECTED

Condition

DTC is set when PCM detects excessive difference in fuel tank pressures measured immediately after purge control is stopped with Canister Drain Cut Valve (CDCV) closed and preset period of time has elapsed. Possible causes are:

- * Purge solenoid valve malfunction.
- * CDCV malfunction.
- * Loose or damaged fuel filler cap.
- * Charcoal canister malfunction.
- * Catch tank malfunction.

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- * Rollover valve malfunction.
- * Cracked fuel tank.
- * Clogs or leakage in system hoses.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME data has been recorded. Check for service bulletins. Go to next step.
- 2) Turn ignition off. Turn ignition on. If DTCs P0443 and/or P1449 are present, diagnose and repair first. If DTCs P0443 and/or P1449 are not present, go to next step.
- 3) Connect scan tool. Perform evaporative emission control system inspection. Follow scan tool manufacturer's instructions. If system fails test, go to next step. If system passes (no leaks), problem is not present. Check purge solenoid valve and CDCV wiring. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. Repair as necessary.
- 4) Inspect fuel filler cap. Ensure filler cap is secure and not leaking. If cap is okay, go to next step. If cap is an after-market brand (non-OEM), replace with factory brand cap. Go to step 16).
- 5) Using scan tool, perform full system inspection. Follow scan tool manufacturer's instructions. If system passes (holds vacuum for 2 minutes), go to step 16). If system fails, and EVAP system tester is not available, go to next step. If system fails, and EVAP system tester is available, go to step 14).
- 6) Connect scan tool. Perform evaporative emission control system inspection for charcoal canister to fuel tank. Follow scan tool manufacturer's instructions. If system leaks, go to next step. If system passes (holds vacuum), go to step 13).
- 7) Remove and inspect fuel tank and sending unit for leakage or damage. If fuel tank and sending unit are okay, go to next step. If problem is found, repair or replace as needed and go to step 16).
- 8) Inspect rollover valve. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If rollover valve is faulty, replace as needed. Go to step 16). If rollover valve is okay, repair lines between charcoal canister and fuel tank. Go to step 16).
- 9) Connect scan tool. Perform evaporative emission control system inspection for charcoal canister to purge solenoid valve. Follow scan tool manufacturer's instructions. If system leaks, go to next step. If system passes (holds vacuum), go to step 16).
- 10) Check catch tank for leaks and plugging. If catch tank is okay, go to next step. If catch tank is plugged or leaking, repair or replace as necessary and go to step 16).
- 11) Check purge solenoid valve for leaks and damage. If purge solenoid valve is okay, go to next step. If purge solenoid valve is damaged or leaking, repair or replace as necessary and go to step 16).
- 12) Remove charcoal canister beside fuel tank. Inspect for damage or leaks. If charcoal canister is okay, go to next step. If charcoal canister is not okay, replace as needed. Go to step 16).
- 13) Inspect Canister Drain Cut Valve (CDCV). See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If CDCV is okay, repair or replace hoses between CDCV and canister and go

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to step 16). If CDCV is faulty, replace CDCV and go to step 16).

14) Using fuel evaporation test equipment, check fuel cap for leaks. If no leak is found, go to next step. If leak is found, replace fuel cap. Go to next step.

15) Turn ignition on. Ensure fuel gauge is between 1/4 and 3/4 full. Using scan tool, monitor PID data for the following:

- * BARO V is 21.3 in. hg or higher.
- * ECT is 14-95°F (-10-35°C).
- * IAT is 14-140°F (-10-60°C).
- * FTL V is .24-2.0 volts.

If any signals are not within specification, go to next step. If all signals are within specification, go to step 19).

16) Connect scan tool. Perform evaporative emission control system inspection. Follow scan tool manufacturer's instructions. If system fails small leak test, go to next step. If system passes test (holds vacuum), system is okay. Go to step 4).

17) Turn ignition on. Ensure fuel gauge is between 1/4 and 3/4 full. Using scan tool, monitor PID data for the following:

- * BARO V is 21.3 in.hg or higher.
- * ECT is 32-95°F (0-35°C).
- * IAT is 50-140°F (0-60°C).
- * FTL V is .24-2.0 volts.

If any signals are not within specification, cool engine as necessary and recheck. If all signals are within specification, go to next step.

18) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Review steps necessary to perform drive cycle mode No. 4. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If mode No. 4 is possible, go to step 21). If mode No. 4 is not possible, go to next step.

19) Perform evaporative emission control system inspection under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If system passes test, go to step 4). If system fails test, replace PCM and go to step 4).

20) Perform drive cycle mode No. 4. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Stop vehicle. Using scan tool, select on board system readiness tests and check drive mode status. If evaporative purge system has been monitored, problem is corrected. Go to next step. If evaporative purge system was not monitored, problem is still present. Go to step 17).

21) Using scan tool, verify TEST #10:21:00 in DIAGNOSTIC MONITORING TEST RESULTS. If test does not exceed MAX value, go to next step. If test exceeds MAX value, replace PCM and go to next step.

22) Using scan tool, verify PENDING TROUBLE CODE DTC and DIAGNOSTIC MONITORING TEST RESULTS. If any DTCs are present, go to applicable test and repair as needed. If no DTCs are present, testing

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is complete.

DTC P0443: EVAP SYSTEM - PURGE CONTROL VALVE CIRCUIT MALFUNCTION

Condition

DTC is set when ignition is turned on and purge solenoid valve voltage is less than 2.7 volts. Possible causes are:

- * Purge solenoid valve malfunction.
- * Open or short circuit between purge solenoid valve and main relay.
- * Open or short circuit between purge solenoid valve Powertrain Control Module (PCM).
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Check for service bulletins. Go to next step.
2) Turn ignition off. Turn ignition on. If DTC is present, go to next step. If DTC is not present, problem is intermittent (not current).

3) With ignition on, disconnect intake manifold vacuum hose from purge solenoid valve. Connect vacuum pump to purge solenoid valve. Apply vacuum to valve. If valve does not hold vacuum, go to next step. If valve holds vacuum, go to step 9).

4) Turn ignition off. Disconnect purge solenoid valve harness connector. Apply vacuum to valve. If valve does not hold vacuum, go to next step. If vacuum holds, repair short to ground on Brown/Red wire between valve and PCM. Go to step 6).

5) Turn ignition off. Inspect all applicable harness connectors. If no problems are found, go to next step. If problems are found, repair as needed and go to step 6).

6) Check resistance between purge solenoid valve terminals. If resistance is 22-26 ohms, go to next step. If resistance is not 22-26 ohms, replace purge solenoid valve and go to step 6).

7) Turn ignition on. Measure voltage between terminal "A" (White/Red wire) and ground. If battery voltage is present, go to next step. If battery voltage is not present, check for open or short circuit between purge solenoid valve and main relay. Repair as needed and go to step 6).

8) Turn ignition off. Disconnect PCM harness connector. Inspect all applicable harness connectors. If no problems are found, go to next step. If problems are found, repair as needed and go to step 6).

9) Connect purge solenoid valve connector. Disconnect PCM connectors. Turn ignition on. Check voltage between PCM harness connector No. 3 terminal "L" and ground. If battery voltage exists, go to next step. If battery voltage does not exist, repair Brown/Red wire. Go to step 6).

10) Turn ignition off. Connect all connectors. Turn ignition on. If DTC is not present, go to next step. If DTC is present, replace PCM. After repair, go to next step.

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11) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTCs are present, go to applicable test. If no DTCs are present, test is complete.

DTC P0446: FUEL TANK PRESSURE SENSOR PERFORMANCE MALFUNCTION

Condition

PCM detects not enough fuel tank pressure difference when monitoring evaporative system or when CDCV valve is closed. Possible causes are:

- * Fuel tank pressure sensor malfunction.
- * Purge solenoid valve malfunction.
- * CDCV malfunction.
- * Poor connection at CDCV, fuel tank pressure sensor or PCM.
- * Short in wiring.
- * Charcoal canister malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Turn ignition off. Turn ignition on. If DTCs P0443 and/or P1449 are not present, go to next step. If DTCs P0443 and/or P1449 are present, repair those DTCs first.

3) Disconnect purge solenoid valve hoses. Connect vacuum pump to purge solenoid valve to lower port. Apply vacuum. Turn ignition on. Using scan tool, access SIMULATION TEST, then turn CDCV PID on. If purge solenoid valve releases vacuum, go to next step. If purge solenoid valve does not release vacuum, replace purge solenoid valve. Go to step 5).

4) Disconnect CDCV hoses. Connect vacuum pump to CDCV and apply vacuum. Turn ignition on. Using scan tool, access SIMULATION TEST, then turn CDCV PID on. If CDCV holds vacuum for 3 seconds, go to next step. If CDCV does not hold vacuum, replace CDCV. Go to step 5).

5) Remove charcoal canister beside fuel tank. Inspect for clogging. If charcoal canister is okay, go to next step. If charcoal canister is clogged, replace canister. Go to step 5).

6) Inspect Fuel Tank Pressure (FTP) sensor. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If FTP sensor is okay, go to next step. If sensor is faulty, replace as needed, then go to step 5).

7) Turn ignition on. Ensure fuel gauge is between 1/4 and 3/4 full. Using scan tool, monitor PID data for the following:

- * BARO V is 21.3 in.hg or more.
- * ECT is 14-91°F (-10-32.5°C).
- * IAT is 14-140°F (-10-60°C).
- * FTL is .24-2.0 volts.

If any signals are not within specification, cool engine as

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necessary and recheck. If all signals are within specification, go to next step.

8) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Perform drive cycle mode No. 4. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, check system readiness test results. Check drive mode completion status. If evaporative purge system has been monitored, go to next step. If evaporative purge system has not been monitored, go to step 5).

9) Turn ignition on. Using scan tool, check FTP V PID. PID should be .2-4.8 volts. Check for same DTC in PENDING TROUBLE CODE information. If DTC is not present, go to next step. If DTC is present, replace PCM. after repair, go to next step.

10) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, verify PENDING TROUBLE CODE DTC and DIAGNOSTIC MONITORING TEST RESULTS. If any DTCs are present, go to applicable test and repair as needed. If no DTCs are present, testing is complete.

DTC P0452: FUEL TANK PRESSURE SENSOR LOW INPUT

Condition

DTC is set when engine is started, temperature is below 176°F (80°C) and fuel tank pressure sensor input is less than .2 volt. Possible causes are:

- * Fuel tank pressure sensor malfunction.
- * Open or short circuit between fuel tank pressure sensor and PCM.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Using scan tool, access PID/DATA MONITOR. Start engine. Record PID data for FTP V. If data is less than .2 volt, go to next step. If data is more than .2 volt, problem is intermittent (not current).

3) Disconnect FTP sensor connector. If PID data for FTP V is more than 4.8 volts, go to next step. If FTP V is 4.8 volts or less, go to step 6).

NOTE: If DTC P0107 and P0122 are present, check reference voltage. See REFERENCE VOLTAGE TEST.

4) Turn ignition off. Disconnect fuel tank pressure sensor connector. Turn ignition on. Measure voltage between ground and terminal "C" (Light Green/Red wire) on harness connector. If 4.5-5.5 volts is not present, go to next step. If 4.5-5.5 volts is present, check harness connector and FTP sensor terminal "C". Clean or repair as necessary. If no problem is found, replace fuel tank pressure

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sensor. Go to step 7).

5) Turn ignition off. Disconnect PCM harness connector. Check continuity between PCM harness connector No. 2 terminal "A" and ground. If continuity is present, repair short to ground on Red/Green wire. Go to next step. If continuity is not present, check for short on Black/Red wire and Light Green/Red wire between PCM and FTP sensor. Repair as necessary and go to next step.

6) Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Using scan tool, access PID/DATA MONITOR. Check PID data for FTP V. FTP V should be .2-4.8 volts. Check for DTCs. If same DTC is pending, replace PCM. If DTC is not pending, go to next step.

7) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P0453: FUEL TANK PRESSURE SENSOR HIGH INPUT

Condition

DTC is set when engine is started, engine temperature is below 176°F (80°C) and fuel tank pressure sensor input is more than 4.8 volts (P0453). Possible causes are:

- * Fuel tank pressure sensor malfunction.
- * Open or short circuit between fuel tank pressure sensor and Powertrain Control Module (PCM).

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Using scan tool, access PID/DATA MONITOR. Record PID data for FTP V. If data is more than 4.8 volts, go to next step. If data is 4.8 volts or less, problem is intermittent (not current).

3) Turn ignition off. Inspect FTP harness connector. If no problem is found, go to next step. If problem is found, repair as needed. go to step 13).

4) Check continuity between FTP sensor harness terminal "B" (Black/Red wire) and ground. If continuity is present, go to next step. If any problems are found, repair as needed and go to step 13).

5) Turn ignition off. Disconnect fuel tank pressure sensor connector. Check continuity between FTP harness sensor terminal "A" (Red/Green wire) and terminal "C" (Light Green/Red wire). If continuity is not present, go to next step. If continuity is present, repair short circuit between fuel tank pressure sensor wiring. Go to step 13).

6) Disconnect PCM harness connector. Check continuity between terminal "A" on FTP sensor harness connector and PCM harness connector No. 2 terminal "A". If continuity exists, go to next step. If continuity does not exist, repair Red/Green wire and go to step 13).

7) Inspect PCM harness connector. If no problem is found, go to next step. If problem is found, repair as needed. go to next step.

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8) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, access PID/DATA MONITOR. Check PID data for FTP V. FTP V should be .2-4.8 volts. Check for DTCs. If same DTC is pending, replace PCM. If DTC is not pending, go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P0455: EVAP SYSTEM EXCESSIVE LEAK DETECTED

Condition

DTC is set when PCM detects high pressure (no vacuum) in fuel tank measured immediately after purge control is stopped with Canister Drain Cut Valve (CDCV) closed. Possible causes are:

- * Purge solenoid valve malfunction.
- * CDCV malfunction.
- * Loose or missing fuel filler cap.
- * Charcoal canister malfunction.
- * Rollover valve malfunction.
- * Cracked fuel tank or leaking fittings.
- * Clogs or leakage in system hoses.
- * Fuel tank pressure sensor malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME data has been recorded. Check service bulletins. Go to next step.

2) Turn ignition off. Turn ignition on. If DTCs P0443 and/or P1449 are not present, go to next step. If DTCs P0443 and/or P1449 are present, repair those DTCs first.

3) Inspect fuel filler cap. Ensure filler cap is secure and not leaking. If cap is an after-market brand (non-OEM), replace with factory brand cap. Go to step 29). If cap is okay, go to next step.

4) Turn ignition on. Using scan tool, select SIMULATION TEST. Simulate PRGV PID at 50 per cent. If valve is heard operating, go to next step. If valve does not operate, replace solenoid purge valve. Go to step 29).

5) Using scan tool, select SIMULATION TEST. Simulate CDCV PID. If valve is heard operating, go to next step. If valve does not operate, replace canister drain cut valve. Go to step 29).

6) Perform evaporative emission control system inspection. Follow scan tool manufacturer's instructions. If system leaks, go to next step. If system passes, problem is intermittent (not current).

7) If evaporative system tester is not available, go to next step. Using EVAP tester, check evaporative system. Follow manufacturer's instructions. If system passes, go to next step. If system fails, diagnose and repair system. After repairs, go to step 29).

8) Review steps necessary to perform drive cycle mode No. 4.

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See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If mode No. 4 is possible, go to next step. If mode No. 4 is not possible, go to step 23).

9) Turn ignition on. Ensure fuel gauge is between 1/4 and 3/4 full. Using scan tool, monitor PID data for the following:

- * BARO V is 21.3 in.hg or more.
- * ECT is 14-95°F (-10-32.5°C).
- * IAT is 14-140°F (-10-60°C).
- * FTL V is .24-2.0 volts.

If any signals are not within specification, cool engine as necessary and recheck. If all signals are within specification, go to next step.

10) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Perform drive cycle mode No. 4. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, check CDCV and FTP results. If FTP does not change, evaporative system monitoring is inoperative. Go to next step. If FTP changes, but does not reach .59 in.hg, there is a large leak. Go to step 16). If FTP reaches .59 in.hg, but suddenly returns to atmospheric pressure, tank will not hold vacuum. Check rollover valve and fuel tank. Repair or replace as necessary. After repair, go to step 34).

11) Turn ignition on. Connect vacuum pump to purge solenoid valve. Apply vacuum. Purge solenoid valve should hold vacuum. Using scan tool, select SIMULATION TEST and PRGV PID. Set duty cycle to 50 per cent. Purge solenoid valve should release vacuum. If purge solenoid valve operates as specified, go to next step. If purge solenoid valve does not operate as specified, replace purge solenoid valve. After repair, go to step 29).

12) Disconnect fuel tank pressure sensor hose. Using scan tool, check FTP V PID. If PID is 2.25-2.75 volts, go to next step. If PID is not 2.25-2.75 volts, replace FTP sensor. After repair, go to step 29).

13) Connect vacuum pump to fuel tank pressure sensor. Apply 1.97 in.hg to sensor. Using scan tool, check FTP V PID. If PID is .45-.55 volt, go to next step. If PID is not .45-.55 volt, replace FTP sensor. After repair, go to step 29).

14) Remove catch tank in engine compartment. Inspect for damage or clogging. If catch tank is okay, go to next step. If catch tank is faulty, replace and go to step 29).

15) Remove charcoal canister. Inspect for damage or clogging. If charcoal canister is okay, go to next step. If charcoal canister is faulty, replace canister. After repair, go to step 29).

16) Turn ignition on. Connect vacuum pump to CDCV. Apply vacuum. CDCV should not hold vacuum. Using scan tool, select SIMULATION TEST and CDCV on. CDCV should hold vacuum. If CDCV operates as specified, repair leaking evaporative system hoses. After repair, go to step 29). If CDCV does not operate as specified, replace CDCV. After repair, go to step 29).

17) Using scan tool, perform whole system inspection. Follow

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scan tool manufacturer's instructions. System pressure should drop and hold for at least 2 minutes. If system does not hold vacuum, leaks are present. Go to next step. If system holds vacuum, no leaks are present. Go to step 29).

18) Disconnect fuel tank pressure sensor hose. Using scan tool, check FTP V PID. If PID is 2.25-2.75 volts, go to next step. If PID is not 2.25-2.75 volts, replace FTP sensor. After repair, go to step 29).

19) Connect vacuum pump to fuel tank pressure sensor. Apply 1.97 in.hg to sensor. Using scan tool, check FTP V PID. If PID is .45-.55 volt, go to next step. If PID is not .45-.55 volt, replace FTP sensor. After repair, go to step 29).

20) Connect scan tool. Perform evaporative emission control system inspection check from charcoal canister to fuel tank. Follow scan tool manufacturer's instructions. If readings are not as specified, go to next step. If readings are as specified, go to step 27).

21) Inspect fuel tank and sending unit for leakage or damage. If fuel tank and sending unit are okay, go to next step. If problems are found, repair as necessary and go to step 29).

22) Check fuel shut off valve. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If valve is okay, go to next step. If valve is faulty, replace fuel tank. Go to step 29).

23) Inspect rollover valve operation. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If rollover valve is faulty, replace fuel tank. If rollover valve is okay, repair hoses between charcoal canister and fuel tank. After repair, go to step 29).

24) Connect scan tool. Perform evaporative emission control system inspection check from charcoal canister to purge solenoid valve. Follow scan tool manufacturer's instructions. System pressure should drop and hold for at least 2 minutes. If system does not hold vacuum, leaks are present. Go to next step. If system holds vacuum, no leaks are present. Go to step 29).

25) Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If purge solenoid valve is okay, go to next step. If purge solenoid valve is faulty, replace valve and go to step 29).

26) Remove charcoal canister. Inspect for damage or clogging. If charcoal canister is okay, go to next step. If charcoal canister is faulty, replace canister. After repair, go to step 29).

27) Turn ignition on. Connect vacuum pump to Canister Drain Cut Valve (CDCV). Apply vacuum to CDCV. Vacuum should be released. Using scan tool, select SIMULATION TEST. Turn CDCV from OFF to ON. Apply vacuum to CDCV. Vacuum should be held when CDCV is turned on. If system operates correctly, repair hoses between CDCV and charcoal canister. If system does not operate correctly, replace CDCV and go to next step.

28) Connect all connectors. Turn ignition on. Ensure fuel gauge is between 1/4 and 3/4 full. Using scan tool, monitor PID data for the following:

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- * BARO V is 21.3 in.hg or more.
- * ECT is 14-95°F (-10-32.5°C).
- * IAT is 14-140°F (-10-60°C).
- * FTL V is .24-2.0 volts.

If any signals are not within specification, go to next step. If all signals are within specification, go to step 32).

29) Perform evaporative emission control system inspection. Follow scan tool manufacturer's instructions. If system fails, go to next step. If system passes, repair is complete. Go to step 6).

30) Turn ignition on. Ensure fuel gauge is between 1/4 and 3/4 full. Using scan tool, monitor PID data for the following:

- * BARO V is 21.3 Hg or higher.
- * ECT is 32-95°F (0-35°C).
- * IAT is 50-140°F (0-60°C).

If any signals are not within specification, cool engine as necessary and recheck. If all signals are within specification, go to next step.

31) Erase DTC. See CLEARING CODES in appropriate SELF-DIAGNOSTICS - INTRODUCTION article. Review steps necessary to perform drive cycle mode No. 4. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If mode No. 4 is not possible, go to next step. If mode No. 4 is possible, go to step 33).

32) Perform evaporative emission control system inspection. Follow scan tool manufacturer's instructions. If system fails, replace PCM. After repair, go to step 6). If system passes, repair is complete. Go to step 6).

33) Perform drive cycle mode No. 4. See DRIVE CYCLE PROCEDURE under SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Using scan tool, check system readiness test results. If evaporative system has been monitored, go to next step. If evaporative system has not been monitored, go to step 30).

34) Using scan tool, verify TEST #10:22:00 in DIAGNOSTIC MONITORING TEST RESULTS. If test does not exceed MAX value, go to next step. If test exceeds MAX value, replace PCM. After repair, go to next step.

35) Using scan tool, verify PENDING TROUBLE CODE DTC and DIAGNOSTIC MONITORING TEST RESULTS. If any DTCs are present, go to applicable test and repair as needed. If no DTCs are present, testing is complete.

DTC P0461: FUEL LEVEL SENSOR CIRCUIT OUT OF RANGE

Condition

DTC is set when fuel gauge sending unit operation range is less than one percent when fuel consumption is more than 8 gallons. Possible causes are:

- * Sending unit malfunction.

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Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Check fuel sending unit. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. If sending unit is okay, replace PCM and go to next step. If sending unit is faulty, replace sending unit and go to next step.
- 3) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If DTC is not present, test is complete.

DTC P0462: FUEL LEVEL SENSOR CIRCUIT LOW INPUT

Condition

DTC is set when fuel gauge sending unit voltage is less than .01 volt for 5 seconds. Possible causes are:

- * Sending unit malfunction.
- * Open or short in wiring.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Turn ignition on. Using scan tool, access PID/DATA MONITOR. Record PID data for FTL V. If FTL V PID is .1 volt or less, go to next step. If FTP V PID is more than .1 volt, problem is intermittent (not current).
- 3) Turn ignition off. Disconnect sending unit harness connector. Check terminals for poor contact or corrosion. If no problem is found, go to next step. If problem is found, repair as needed. go to step 6).
- 4) Ensure sending unit harness connector is disconnected. Using scan tool, access PID/DATA MONITOR. Record PID data for FTL V. If FTL V PID is 4.9 volts or less, go to next step. If FTP V PID is more than 4.9 volt, repair or replace sending unit. After repair, go to step 6).
- 5) Check continuity of Red/Blue wire between sending unit harness connector terminal "C" and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground and go to step 6).
- 6) Check continuity between sending unit harness connector terminals "A" (Black wire) and "C" (Red/Blue wire). If continuity is not present, go to next step. If continuity is present, replace sending unit and go to next step.
- 7) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Turn ignition on. If DTC is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.
- 8) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS -

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INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If DTC is not present, test is complete.

DTC P0463: FUEL LEVEL SENSOR CIRCUIT HIGH INPUT

Condition

DTC is set when fuel gauge sending unit voltage is more than 5.4 volts for 5 seconds. Possible causes are:

- * Sending unit malfunction.
- * Open or poor connection in wiring.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Turn ignition on. Using scan tool, access PID/DATA MONITOR. Record PID data for FLT V. If data is more than 5.4 volts, go to next step. If data is 5.4 volts or less, problem is intermittent (not current).
- 3) Turn ignition off. Disconnect sending unit connector. Inspect harness connector terminals. If no problem is found, go to next step. If problem is found, repair as needed. Go to step 4).
- 4) Turn ignition on. Connect a jumper wire between sending unit harness connector terminals "A" (Red wire) and "C" (Red/Blue wire). Using scan tool, access PID/DATA MONITOR. Record PID data for FLT V. If data is more than .1 volt, go to next step. If data is .1 volts or less, replace sending unit and go to step 4).
- 5) Check voltage between sending unit harness connector terminal "C" (Red/Blue wire) and ground. If voltage is less than 5 volts, go to next step. If voltage is 5 volts or more, go to step 7).
- 6) Turn ignition off. Disconnect PCM connectors. Inspect harness connector terminals. If no problem is found, repair Red/Blue wire between PCM and sending unit. If problem is found, repair terminals. After all repairs, go to step 4).
- 7) Turn ignition off. Check continuity between sending unit harness connector terminal "A" (Black wire) and ground. If continuity is present, go to next step. If continuity is not present, repair open in Black wire. Go to next step.
- 8) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If same DTC is not pending, go to next step. If same DTC is pending, replace PCM. Go to next step.
- 9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If DTC is not present, test is complete.

DTC P0464: FUEL GAUGE PERFORMANCE (SLOSH CHECK)

Condition

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DTC is set when sending unit input voltage changes too much for 14 seconds when vehicle stopped. Possible causes are:

- * Fuel sending unit malfunction.
- * VSS malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Check fuel sending unit. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. If sending unit is okay, replace PCM and go to next step. If sending unit is faulty, replace sending unit and go to next step.

3) Check voltage at PCM connector No. 2 terminal "D" (White/Black wire) while driving vehicle. If voltage is about 2.5 volts, go to next step. If voltage is not about 2.5 volts, diagnose and repair vehicle speed signal circuit. After repair, go to next step.

4) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If DTC is not present, test is complete.

DTC P0500: VEHICLE SPEED SENSOR (VSS) MALFUNCTION

Condition

DTC is set when following conditions are met for more than 26 seconds:

- * Vehicle speed signal is less than 2.3 MPH.
- * Engine speed greater than 2000 RPM.
- * Charging efficiency is more than 20 percent (M/T) or 40 percent (A/T).
- * Transmission is in D, S or L (A/T), or in gear with clutch released (M/T).

Possible causes are:

- * PCM malfunction.
- * Instrument cluster malfunction.
- * VSS malfunction.
- * Open or short circuit.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Start engine. Drive vehicle. If speedometer moves, go to next step. If speedometer does not move, go to step 10) (Manual Transmission) or step 16) (Automatic Transmission).

3) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Warm engine to operating temperature. Using scan tool, access PID/DATA MONITOR. Record PID data for LOAD and RPM. Drive vehicle for at least 34

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seconds under the following conditions:

- * Load PID is 40 percent or more (Automatic Transmission) or 20 percent (Manual Transmission).
- * Engine speed is 2000 RPM or more.

If DTC P0500 is present, go to next step. If DTC P0500 is not present, go to step 6).

4) Turn ignition off. Disconnect instrument cluster and PCM connectors. Check continuity between PCM harness connector No. 2 terminal "D" (White/Black wire) and ground. If continuity is present, repair short to ground on White/Black wire. If continuity is not present, replace instrument cluster. After repairs, go to step 9).

5) Turn ignition off. Disconnect PCM connectors. Inspect all harness connectors. If no problems are found, go to next step. If any problems are found, repair as necessary and go to step 9).

6) Disconnect instrument cluster connectors. Check continuity of White/Black wire between PCM harness connector No. 2 terminal "D" and instrument cluster connector terminal 2L. If continuity is present, go to step 9). If continuity is not present, repair open on White/Black wire. After repair, go to step 9).

7) Turn ignition off. Disconnect instrument cluster and VSS connectors. Check continuity of circuit (Orange wire and White/Black wire) between VSS harness connector terminal "A" and instrument cluster harness connector terminal 2M. Check continuity of Yellow wire between VSS harness connector terminal "B" and instrument cluster harness connector terminal 1M. If continuity is present, go to next step. If continuity is not present, repair open circuit as necessary. After repairs, go to step 9).

8) Check continuity between VSS harness connector terminals "A" and "B". If continuity is not present, go to next step. If continuity is present, repair short between circuits. After repair, go to step 9).

9) Check continuity between instrument cluster harness connector terminal 2M and ground. Check continuity between instrument cluster harness connector terminal 1M and ground. If continuity is not present, go to next step. If continuity is present, repair short circuit to ground. After repairs, go to step 9).

10) Remove VSS, located at back of speedometer. Check VSS output. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. If VSS voltage is okay, check speedometer. Repair as necessary and go to step 9). If VSS output voltage is not okay, replace VSS. Go to step 9).

11) Turn ignition off. Disconnect Transmission Control Module (TCM) connector. Check continuity between TCM harness connector terminal AC (Black/White wire) and ground. Check continuity between instrument cluster harness connector terminal 1M and ground. If continuity is not present, go to next step. If continuity is present, repair short circuit to ground. After repairs, go to step 9).

12) Turn ignition off. Disconnect TCM and instrument cluster connectors. Check continuity of Black/White wire between instrument cluster harness connector terminal 2M and TCM harness connector

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terminal AC. If continuity is present, go to next step. If continuity is not present, repair open circuit. Go to step 9).

13) Turn ignition off. Disconnect output speed sensor connector. Check continuity of Red wire between output speed sensor harness connector terminal "A" and TCM harness connector terminal "W". Check continuity of White wire between output speed sensor harness connector terminal "B" and TCM harness connector terminal "Z". If continuity is present, go to next step. If continuity is not present, repair open circuit(s). Go to step 9).

14) Check continuity between output speed sensor harness connector terminals "A" (Red wire) and "B" (White wire). If continuity is not present, go to next step. If continuity is present, repair short between circuit(s). Go to step 9).

15) Check continuity between output speed sensor harness connector terminal "A" (Red wire) and ground. Check continuity between output speed sensor harness connector terminal "B" (White wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground. Go to step 9).

16) Check resistance between output speed sensor terminals "A" and "B". If resistance is not as specified, replace output speed sensor. Go to step 9). If resistance is present, check speedometer. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. Go to step 9).

17) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Drive vehicle for at least 34 seconds under the following conditions:

- * Load PID is 40 percent or more (Automatic Transmission) or 20 percent (Manual Transmission).
- * Engine speed is 2000 RPM or more.

Check for DTCs. If DTC is not pending, go to next step. If DTC is pending, replace PCM. Go to next step.

18) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If DTC is not present, test is complete.

DTC P0506: IDLE CONTROL SYSTEM IDLE RPM IS LOWER THAN EXPECTED

Condition

DTC is set when actual engine speed is 100 RPM lower than target speed preset in PCM for more than 14 seconds with brake pedal depressed and steering wheel straight ahead. Possible causes are:

- * Idle Air Control (IAC) valve malfunction.
- * Air filter or intake clogged.
- * A/C compressor control circuit malfunction.
- * Generator control circuit malfunction.
- * Purge control solenoid valve malfunction.

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- * Low engine compression.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Check DTCs. If any other DTCs are present, go to appropriate test and repair first. If no other DTCs are present, go to next step.
- 3) Start engine. Using scan tool in SIMULATION TEST mode, simulate IACV PID at 100 percent. If engine speed increases, go to next step. If engine speed does not increase, replace IAC valve. After repair, go to step 7).
- 4) Ensure A/C switch is off. If A/C compressor is not operating, go to next step. If compressor is operating, diagnose and repair A/C system and go to step 7).
- 5) Start engine. Using scan tool in SIMULATION TEST mode, simulate ALTF PID at zero percent. If engine speed increases, go to next step. If engine speed does not increase, repair short to power in generator control circuit. After repair, go to step 7).
- 6) Start engine. Using scan tool in SIMULATION TEST mode, simulate PRGV PID at zero percent. If engine speed increases, go to next step. If engine speed does not increase, replace PRGV. After repair, go to step 7).
- 7) With engine running, remove air cleaner. If engine speed does not increase, go to next step. If engine speed increases, replace air filter. After repair, go to step 7).
- 8) Check throttle body for clogging. If throttle body is okay, go to next step. If throttle body is clogged, clean or repair as necessary. Go to step 7).
- 9) Check engine compression. If compression is okay, go to next step. If compression problems are found, repair or replace as necessary and go to next step.
- 10) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Depress brake pedal for 15 seconds or more. Check for DTCs. If DTC is not pending, go to next step. If DTC is pending, replace PCM. Go to next step.
- 11) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If DTC is not present, test is complete.

DTC P0507: IDLE CONTROL SYSTEM IDLE RPM IS HIGHER THAN EXPECTED

Condition

DTC is set when actual engine speed is 200 RPM higher than target speed preset in PCM for more than 14 seconds with brake depressed and steering wheel straight. Possible causes are:

- * Idle Air Control (IAC) valve malfunction.

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- * Throttle cable or actuator cable misadjustment.
- * Throttle valve malfunction.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Check DTCs. If any other DTCs are present, go to appropriate test and repair first. If no other DTCs are present, go to next step.
- 3) Start engine. Using scan tool in SIMULATION TEST mode, simulate IACV PID at zero percent. If engine speed decreases, go to next step. If engine speed does not decrease, replace IAC valve. After repair, go to step 4).
- 4) Check throttle cable free play. If adjustment is okay, go to next step. If adjustment is needed, adjust and go to step 4).
- 5) Check actuator cable free play. If adjustment is okay, go to next step. If adjustment is needed, adjust and go to step 4).
- 6) Check vacuum routing. If no vacuum routing problems are present, go to next step. If vacuum is not routed properly, repair as necessary and go to step 4).
- 7) Check throttle body. If throttle body is fully closed, go to next step. If throttle body is damaged or stuck, clean or replace throttle body and go to next step.
- 8) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Depress brake pedal for 15 seconds or more. Check for DTCs. If DTC is not pending, go to next step. If DTC is pending, replace PCM. Go to next step.
- 9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If DTC is not present, test is complete.

DTC P0550: POWER STEERING SWITCH MALFUNCTION

Condition

DTC is set when vehicle speed is 37 MPH or more, coolant temperature is 140°F (60°C) or more and PCM receives power steering switch signal continuously for more than 60 seconds. Possible causes are:

- * Power Steering Pressure (PSP) switch malfunction.
- * Open or short circuit between PSP switch and Powertrain Control Module (PCM).
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Turn ignition on. Ensure steering wheel is straight ahead. Using scan tool, access PID/DATA MONITOR. Record PID data for PSP SW.

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If PID is on, go to next step. If PID is not on, problem is not current (intermittent).

3) Turn ignition off. Disconnect PSP switch connector. Turn ignition on. Ensure steering wheel is straight ahead. Using scan tool, access PID/DATA MONITOR. Record PID data for PSP SW. If PID is not on, go to next step. If PID is on, replace PSP switch. Go to step 5).

4) Turn ignition off. Disconnect PCM harness connectors. Check continuity between PCM connector No. 1 terminal "G" (Brown wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground. Go to next step.

5) Connect all connectors. Start engine. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Ensure ECT PID is at least 140°F (60°C). Drive vehicle at 38 MPH or more for at least one minute. If DTC resets, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set. Repair as necessary and go to next step.

6) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If no DTC is set, test is complete. If any DTC is set, go to appropriate test for diagnosis and repair.

DTC P0703: BRAKE SWITCH MALFUNCTION

Condition

DTC is set when PCM has not received brake switch signal when vehicle has accelerated from zero to more than 19 MPH 10 consecutive times. Possible causes are:

- * Brake switch malfunction.
- * Open or short circuit between brake switch and Powertrain Control Module (PCM).
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Using scan tool, access PID/DATA MONITOR. Record PID data for BRK SW. Depress and release brake pedal several times. PID should read on when pedal is depressed, off when pedal is released. If data is not as specified, go to next step. If data is as specified, problem is not current (intermittent).

3) If PID is on with pedal released, go to next step. If PID is not on with pedal released, go to step 11).

4) Disconnect brake switch. Record PID data for BRK SW. If PID does not change to off, go to next step. If PID changes to off, replace switch. Go to step 5).

5) Check voltage between brake switch harness connector terminal "B" (Green wire) and ground. If battery voltage is not present, go to step 5). If battery voltage is present, repair short to power on Green wire. Go to step 5).

6) If PID is always off, go to next step. If PID is not

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always off, go to step 5).

7) Turn ignition off. Disconnect brake switch. Inspect brake switch terminals and harness connectors. If no problems are found, go to next step. If problem is found, repair as needed and go to step 5).

8) Connect a jumper wire between brake switch harness connector terminals. Turn ignition on. Record PID data for BRK SW. If PID does not change to on, go to next step. If PID changes to on, replace switch. Go to step 5).

9) Check voltage between brake switch harness connector terminal "A" (White/Green wire) and ground. If battery voltage is present, go to next step. If battery voltage is not present, repair open in White/Green wire. Go to step 5).

10) Turn ignition off. Disconnect PCM. Inspect PCM terminals and harness connectors. If no problems are found, go to next step. If problem is found, repair as needed and go to step 5).

11) Connect brake switch connector. Turn ignition on. Depress brake pedal. Check voltage at PCM harness connector No. 1 terminal "F" (Green wire) and ground. If battery voltage is present, go to next step. If battery voltage is not present, repair open in Green wire. Go to next step.

12) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Drive vehicle at more than 19 MPH. Depress brake pedal at least 10 times. If same DTC is not present, go to next step. If same DTC is present, replace PCM. After repair, go to next step.

13) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If no DTC is present, testing is complete. If any DTC is present, go to applicable test.

DTC P0704: CLUTCH SWITCH MALFUNCTION

Condition

DTC is set when PCM has not received clutch switch signal when vehicle has accelerated from zero to more than 19 MPH, 10 consecutive times. DTC is also set when clutch switch does not turn off when engine speed is below 400 RPM. Possible causes are:

- * Clutch switch malfunction.
- * Open or short circuit between clutch switch and Powertrain Control Module (PCM).
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Using scan tool, access PID/DATA MONITOR. Record PID data for CLT SW. Depress and release clutch pedal several times. PID should read on when pedal is depressed, off when pedal is released. If data is not as specified, go to next step. If data is as specified, problem is not current (intermittent).

3) If PID is on with clutch pedal released, go to next step.

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If PID is not on with clutch pedal released, go to step 11).

4) Disconnect clutch switch. Record PID data for CLT SW. If PID does not change to off, go to next step. If PID changes to off, replace switch. Go to step 5).

5) Check voltage between clutch switch harness connector terminal "A" (Brown/White wire) and ground. If voltage is present, go to next step. If no voltage is present, repair short to ground on Brown/White wire. Go to step 5).

6) Depress clutch pedal. If PID is always off, go to next step. If PID is not always off, go to step 5).

7) Turn ignition off. Disconnect clutch switch. Inspect switch terminals and harness connector. If no problems are found, go to next step. If problem is found, repair as needed and go to step 5).

8) Connect a jumper wire between clutch switch harness connector terminals. Turn ignition on. Record PID data for CLT SW. If PID does not change to on, go to next step. If PID changes to on, replace switch. Go to step 5).

9) Check continuity between clutch switch harness connector terminal "B" (Black wire) and ground. If continuity is present, go to next step. If continuity is not present, repair open in Black wire. Go to step 5).

10) Turn ignition off. Disconnect PCM. Inspect PCM terminals and harness connectors. If no problems are found, go to next step. If problem is found, repair as needed and go to step 5).

11) Ensure clutch switch and PCM are disconnected. Check continuity of Brown/White wire between PCM harness connector No. 3 terminal "I" and clutch switch harness connector terminal "A". If continuity is present, go to next step. If continuity is not present, repair open in Brown/White wire. Go to next step.

12) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Drive vehicle at more than 19 MPH. Depress clutch pedal at least 10 times. If same DTC is not present, go to next step. If same DTC is present, replace PCM. After repair, go to next step.

13) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If no DTC is present, testing is complete. If any DTC is present, go to applicable test.

DTC P0705: NEUTRAL SWITCH MALFUNCTION

Condition

DTC is set when PCM has not received neutral switch signal when vehicle speed is more than 19 MPH and clutch pedal has been depressed more than 14 times. Possible causes are:

- * Neutral switch malfunction.
- * Powertrain Control Module (PCM) malfunction.
- * Open or short in wiring between neutral switch and PCM.

Diagnosis & Repair Procedure

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1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Using scan tool, access PID/DATA MONITOR. Record PID data for NL SW. Shift into and out of gear several times. PID should read on when transmission is in neutral, off when in gear. If data is not as specified, go to next step. If data is as specified, problem is not current (intermittent).

3) Shift into gear. If PID is on, go to next step. If PID is not on, go to step 11).

4) Disconnect neutral switch. Record PID data for NL SW. If PID does not change to off, go to next step. If PID changes to off, replace neutral switch. Go to step 4).

5) Check voltage between neutral switch harness connector terminal "A" (Violet wire) and ground. If voltage is present, go to next step. If no voltage is present, repair short to ground on Violet wire. Go to step 4).

6) Shift transmission into neutral. If PID is always off, go to next step. If PID is not always off, go to step 4).

7) Turn ignition off. Disconnect neutral switch. Inspect switch terminals and harness connector. If no problems are found, go to next step. If problem is found, repair as needed and go to step 4).

8) Connect a jumper wire between neutral switch harness connector terminals. Turn ignition on. Record PID data for NL SW. If PID does not change to on, go to next step. If PID changes to on, replace switch. Go to step 4).

9) Check continuity between neutral switch harness connector terminal "B" (Black wire) and ground. If continuity is present, go to next step. If continuity is not present, repair open in Black wire. Go to step 4).

10) Turn ignition off. Disconnect PCM. Inspect PCM terminals and harness connectors. If no problems are found, go to next step. If problem is found, repair as needed and go to step 4).

11) Ensure neutral switch and PCM are disconnected. Check continuity of Violet wire between PCM harness connector No. 1 terminal "V" and neutral switch harness connector terminal "A". If continuity is present, go to next step. If continuity is not present, repair open in Violet wire. Go to next step.

12) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Drive vehicle at more than 19 MPH. Shift gears at least 14 times. If same DTC is not present, go to next step. If same DTC is present, replace PCM. After repair, go to next step.

13) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If no DTC is present, testing is complete. If any DTC is present, go to applicable test.

DTC P1102: MASS AIR FLOW INPUT LOW

Condition

DTC is set if input voltage from Mass Air Flow (MAF) sensor is less than expected for 5 seconds when engine speed is more than 500

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RPM and throttle is opened more than 50 percent. Possible causes are:

- * MAF sensor malfunction.
- * TP sensor malfunction.
- * Corrosion or voltage drop on signal circuit.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Inspect all applicable harness connectors. If problem is found, repair as needed.

2) Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for ECT, MAF and TP. Start engine. Ensure ECT PID is 176°F (80°C) or more. Drive vehicle for at least 5 seconds with TP PID at 50 percent or more. If MAF PID is less than .70 lb/min, check TP sensor. replace as necessary. If TP sensor is okay, go to next step. If MAF PID is more than .70 lb/min, problem is not current (intermittent).

3) Disconnect MAF sensor. Check connector and sensor for damage or corrosion. If no problem is found, go to next step. If any problem is found, repair connector terminals or replace MAF sensor and go to step 4).

4) Disconnect PCM. Check connector and PCM for damage or corrosion. If no problem is found, go to next step. If any problem is found, repair as necessary. Go to next step.

5) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Drive vehicle for at least 5 seconds under the following conditions:

- * MAF PID is more than .70 lb/min.
- * TP PID is 50 percent or more.

If same DTC is not present, go to next step. If same DTC is present, replace PCM. After repair, go to next step.

6) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If no DTC is present, testing is complete. If any DTC is present, go to applicable test.

DTC P1103: MASS AIR FLOW INPUT HIGH

Condition

DTC is set if input voltage from Mass Air Flow (MAF) sensor is more than expected for 5 seconds when engine speed is less than 2000 RPM and ECT is 176°F (80°C) or more. Possible causes are:

- * MAF sensor malfunction.
- * MAF signal circuit corrosion or voltage drop.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Inspect all applicable harness connectors. If

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problem is found, repair as needed.

2) Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for ECT, MAF and RPM. Start engine. Ensure ECT PID is 176°F (80°C) or more. Drive vehicle for at least 5 seconds with RPM PID at 2000 RPM or less. If MAF PID is more than 9.88 lb/min, go to next step. If MAF PID is 9.88 lb/min or less, problem is not current (intermittent).

3) Disconnect MAF sensor. Check connector and sensor for damage or corrosion. If no problem is found, go to next step. If any problem is found, repair connector terminals or replace MAF sensor and go to step 7).

4) Disconnect PCM. Check connector and PCM for damage or corrosion. If no problem is found, go to next step. If any problem is found, repair as necessary. Go to next step.

5) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Ensure ECT PID is 176°F (80°C) or more. Drive vehicle for at least 5 seconds under the following conditions:

- * RPM PID is 2000 RPM or less.
- * MAF PID is less than 9.88 lb/min.

If same DTC is not present, go to next step. If same DTC is present, replace PCM. After repair, go to next step.

6) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If no DTC is present, testing is complete. If any DTC is present, go to applicable test.

DTC P1122: TP SENSOR INPUT IS STUCK CLOSED

Condition

DTC is set if TP sensor position is less than 12 percent when engine coolant is 176°F (80°C) or more and MAF flow is more than 63.2 g/sec. Possible causes are:

- * TP sensor malfunction.
- * PCM function.
- * Corrosion or voltage drop in signal circuit.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check for service bulletins. Go to next step.

2) Using scan tool, retrieve pending and stored DTCs. See SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If DTC P1103 is not present, go to next step. If DTC P1103 is present, go to appropriate test and repair first.

3) Using scan tool, access PID/DATA MONITOR. Record PID data for ECT, TP and MAF. Start engine. Ensure ECT PID is 176°F (80°C) or more. Drive vehicle with MAF PID more than 8.36 lb/min. If TP PID is less than 12.5 percent, go to next step. If TP PID is 12.5 percent or

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more, problem is not current (intermittent).

4) Turn ignition off. Disconnect TP sensor. Inspect TP sensor and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 3).

5) Check TP sensor resistance while gradually opening throttle. If resistance changes smoothly, go to next step. If resistance does not change smoothly, replace TP sensor. Go to step 3).

6) Turn ignition off. Disconnect PCM connectors. Inspect PCM and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 3).

7) Connect PCM connectors. turn ignition on. Check voltage drop of Light Green/Red wire by measuring voltage between TP sensor harness connector terminal "A" and PCM harness connector No. 2 terminal "I". Check voltage drop of Green/Black wire by measuring voltage between TP sensor harness connector terminal "C" and PCM harness connector No. 3 terminal "E". If no voltage is present, go to next step. If voltage is present, repair as necessary. Go to next step.

8) Connect all connectors. Start engine. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Ensure ECT PID is 176°F (80°C) or more. Drive vehicle for at least 5 seconds under the following conditions:

- * MAF PID is more than 8.36 lb/min.
- * TP PID is 12.5 percent or more.

If same DTC is not pending, go to next step. If same DTC is pending, replace PCM. After repair, go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1123: TP SENSOR INPUT IS STUCK OPEN

Condition

DTC is set if TP sensor position is more than 50 percent when engine speed is more than 500 RPM and MAF flow is less than 5.3 g/sec. Possible causes are:

- * TP sensor malfunction.
- * MAF sensor malfunction.
- * Open or short circuit in wiring.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Clear DTCs. Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for TP, MAF and RPM. With MAF PID less than .7 lb/min. and engine speed more than 500RPM, TP PID should be less than 50 percent. If data is within specification, go to next step. If data is not within specification, go to step 7).

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3) Using scan tool, access PID/DATA MONITOR. Record PID data for MAF V. Drive vehicle. If data is not within specification, check MAF sensor. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. Replace as needed and go to step 7). If data is within specification, problem is not current (intermittent).

4) Check TP sensor and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7).

5) Check resistance between TP sensor harness connector terminal "B" (Black/Red wire) and ground. If no resistance is present, go to next step. If resistance is found, repair poor connection or open circuit. After repair, go to step 7).

6) using ohmmeter connected to TP sensor terminals "A" and "C", check TP sensor resistance. If resistance changes smoothly when throttle is opened, go to next step. If resistance does not change smoothly, replace TP sensor. Go to step 7).

7) Check PCM and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to next step.

8) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Using scan tool, access PID/DATA MONITOR. Record PID data for TP, MAF and RPM. With MAF PID less than .7 lb/min. and engine speed more than 500 RPM, TP PID should be less than 50 percent. If DTC is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1135: FRONT O2 SENSOR HEATER CIRCUIT LOW

Condition

PCM supplies ground to heater to complete circuit. DTC is set if PCM detects voltage less than 5.8 volts when no ground is supplied to heater. Possible causes are:

- * Front O2 sensor heater malfunction.
- * Open or short circuit in wiring.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Inspect front O2 sensor and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 5).

3) Check resistance of front O2 sensor between terminals "C" and "D". If resistance is 15.7 ohms, go to next step. If resistance is not 15.7 ohms, replace O2 sensor and go to step 5).

4) Disconnect front oxygen sensor. Turn ignition on. Check

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voltage at O2 sensor harness connector terminal "C" (Black/White wire). If battery voltage is present, go to next step. If battery voltage is not present, repair open or short in circuit between ignition switch and O2 sensor. Go to step 5).

5) Inspect PCM and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 5).

6) Check continuity between front O2 sensor harness connector terminal "D" (Violet/Yellow wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground. Go to step 5).

7) Check continuity of Violet/Yellow wire between front O2 sensor harness connector terminal "D" and PCM connector No. 1 terminal "U". If no problem is found, go to next step. If problem is found, repair as necessary and go to next step.

8) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If DTC is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If DTC is not present, test is complete.

DTC P1136: FRONT O2 SENSOR HEATER CIRCUIT HIGH

Condition

PCM controls ground for O2 sensor heater. DTC is set if PCM detects voltage is more than 11.5 volts when ground is supplied to heater. Possible causes are:

- * Front O2 sensor heater malfunction.
- * Short circuit in wiring.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Inspect front O2 sensor and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7).

3) Check resistance of front O2 sensor between terminals "C" and "D". If resistance is 15.7 ohms, go to next step. If resistance is not 15.7 ohms, replace O2 sensor and go to step 7).

4) Inspect PCM and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7).

5) Disconnect front oxygen sensor. Turn ignition on. Check voltage at O2 sensor harness connector terminal "D" (Violet/Yellow wire). If battery voltage is not present, go to next step. If battery voltage is present, repair short to power in Violet/Yellow wire between PCM and O2 sensor. Go to next step.

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6) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Allow to warm to operating temperature. If DTC is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.

7) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1141: REAR O2 SENSOR HEATER CIRCUIT LOW

Condition

PCM controls ground for O2 sensor heater. DTC is set if PCM voltage is less than 5.8 volts when no ground is supplied to heater. Possible causes are:

- * Rear O2 sensor heater malfunction.
- * Open or short circuit in wiring.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Disconnect rear oxygen sensor. Inspect rear O2 sensor and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 5).

3) Check resistance of rear O2 sensor between terminals "C" and "D". If resistance is 15.7 ohms, go to next step. If resistance is not 15.7 ohms, replace O2 sensor and go to step 5).

4) Turn ignition on. Check voltage at O2 sensor harness connector terminal "C" (Black/White wire). If battery voltage is present, go to next step. If battery voltage is not present, repair open or short in circuit between ignition switch and O2 sensor. Go to step 5).

5) Turn ignition off. Disconnect PCM. Inspect PCM and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 5).

6) Check continuity between rear O2 sensor harness connector terminal "D" (Red/Yellow wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground. Go to step 5).

7) Check continuity of Red/Yellow wire between rear O2 sensor harness connector terminal "D" and PCM connector No. 3 terminal "V". If no problem is found, go to next step. If problem is found, repair as necessary and go to next step.

8) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Warm engine to operating temperature. If DTC is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS -

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INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If DTC is not present, test is complete.

DTC P1142: REAR O2 SENSOR HEATER CIRCUIT HIGH

Condition

DTC is set if PCM voltage is more than 11.5 volts when power is supplied to heater. Possible causes are:

- * Rear O2 sensor heater malfunction.
- * Short circuit in wiring.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Inspect rear O2 sensor and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 8).

3) Check resistance of rear O2 sensor between terminals "C" and "D". If resistance is 15.7 ohms, go to next step. If resistance is not 15.7 ohms, replace O2 sensor and go to step 8).

4) Inspect PCM and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 8).

5) Disconnect rear oxygen sensor. Turn ignition on. Check voltage at O2 sensor harness connector terminal "D" (Red/Yellow wire). If battery voltage is not present, go to next step. If battery voltage is present, repair short to power in Red/Yellow wire between PCM and O2 sensor. Go to next step.

6) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Allow to warm to operating temperature. If DTC is not pending, go to next step. If DTC is pending, replace PCM. After repair, go to next step.

7) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1170: FRONT OXYGEN SENSOR NO INVERSION

Condition

DTC is set when front oxygen sensor signal voltage is more than or less than .45 volt and remains unchanged for 42 seconds after engine is started and has reached normal operating temperature. Engine speed at 1500 RPM or greater. Possible causes are:

- * Front oxygen sensor.
- * Fuel system malfunction.
- * Purge solenoid malfunction.
- * Vacuum leak.

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- * PCV valve malfunction.
- * Ignition malfunction.
- * Engine malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Turn ignition off. Turn ignition on. Check stored DTCs. If any other DTCs are present, repair first. If no other DTCs are present, go to next step.
- 3) Verify if DTC P1170 is present in FREEZE FRAME PID data. If DTC P1170 is present, go to next step. If DTC P1170 is not present in FREEZE FRAME PID data, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.
- 4) Start engine. Ensure engine is at operating temperature. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to wide open position and release to race engine. Scan tool should display O2 sensor voltage greater than .45 volt during acceleration (rich condition) and less than .45 volt during deceleration fuel cut (lean condition). If voltage is as specified, go to next step. If voltage is not as specified, replace O2 sensor and go to step 10).
- 5) Using scan tool, monitor LONGFT1 data. Compare with FREEZE FRAME DATA from step 1. If fuel trim is less in freeze frame, go to next step. If fuel trim is more in freeze frame, go to step 11).
- 6) Check fuel line pressure. If line pressure is 53-61 psi, go to next step. If pressure is not 53-61 psi, check pump maximum pressure and fuel return line for clogging. repair as necessary. If no problems are found, replace fuel pressure regulator. After repair, go to step 10).
- 7) Turn ignition off. Disconnect both purge solenoid hoses. Blow air through valve. If air flows through valve, replace purge solenoid valve. If air does not flow through valve, go to step 12).
- 8) Check PCV system. See applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 10).
- 9) Check fuel line pressure. See BASIC DIAGNOSTIC PROCEDURES article. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 15).
- 10) Check fuel pump maximum pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum pressure is okay, go to next step. If maximum pressure is not okay, repair fuel pump circuit or replace fuel pump and go to step 10).
- 11) Check for leaks in fuel lines between fuel filter and fuel return to tank. If any leaks are found, repair as necessary and go to step 10). If no leaks are found, check for clogging at fuel filter. Repair or replace as necessary. If no problems are found, replace pressure regulator and go to step 10).
- 12) Using a timing light connected to each spark plug wire in turn, start engine and check for stable and regular flashing of timing light. If any spark plug wires do not cause timing light to flash

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properly, go to next step. If all spark plug wires cause timing light to flash properly, go to step 18).

13) Turn ignition off. Check suspect spark plug lead. If no problem is found, go to next step. If suspect spark plug lead is faulty, replace as necessary. Go to step 10).

14) Disconnect suspect ignition coil connector. Turn ignition on. Check voltage at ignition coil harness connector terminal "A" (Black/White wire). If battery voltage is present, go to next step. If battery voltage is not present, repair open circuit between coil and ignition switch. Go to step 10).

15) Check ignition coil resistance. See BASIC DIAGNOSTIC PROCEDURES article. If coil is okay, go to next step. If coil is faulty, replace coil and go to step 10).

16) Check engine compression. If compression is okay, go to next step. If compression is not okay, repair as necessary. Go to next step.

17) Check fuel injectors. See applicable test in SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If no problem is found, go to next step. If problem is found, replace injector(s) and go to step 10).

18) Check cooling system for combustion gases. If no problem is found, go to next step. If combustion gases are found in cooling system, repair leak and go to next step.

19) Connect all connectors. Turn ignition on. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Warm engine to operating temperature. Ensure ECT PID is 176°F (80°C) or more. Raise engine speed to more than 1500 RPM for at least one second. Verify if DTC is stored in PENDING TROUBLE CODE information. If DTC is not present, go to next step. If DTC is present, replace PCM and go to next step.

20) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Verify if any DTCs are stored or are present in PENDING TROUBLE CODE information. If no DTCs are present, testing is complete. If any DTCs are present, go to applicable test and repair.

DTC P1345: CAMSHAFT POSITION SENSOR MALFUNCTION

Condition

DTC is set when there is no SGC signal input from Camshaft Position (CMP) sensor for 8 crankshaft revolutions. Possible causes are:

- * CMP sensor malfunction.
- * Poor connection, open or short circuit in wiring.

Diagnosis & Repair Procedure

- 1) Check service bulletins. Go to next step.
- 2) Start engine. If DTC is still present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.
- 3) Disconnect camshaft position (CMP) sensor connector.

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Inspect sensor and harness connector terminals. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 8).

4) Turn ignition on. Measure voltage between ground and terminal "A" (White/Red wire). If battery voltage is present, go to next step. If battery voltage is not present, repair open or short to ground on White/Red wire and go to step 8).

5) Turn ignition off. Disconnect PCM connectors. Check continuity of Gray/Blue wire between CMP harness connector terminal "B" and PCM connector No. 2 terminal "H". If continuity is present, go to next step. If continuity is not present, repair Gray/Blue wire and go to step 8).

6) Turn ignition on. Check voltage between CMP harness connector terminal "B" (Gray/Blue wire) and ground. If battery voltage is not present, go to next step. If battery voltage is present, repair short to power on Gray/Blue wire. Go to step 8).

7) Turn ignition off. Check continuity between CMP harness connector terminal "B" (Gray/Blue wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground on Gray/Blue wire. Go to step 8).

8) Turn ignition off. Check continuity between CMP harness connector terminal "C" (Black/Blue wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground on Black/Blue wire. Go to step 8).

9) Reconnect connectors. Check voltage at PCM connector No. 2 terminal "H" while cranking engine. If voltage pulse is present, go to next step. If voltage pulse is not present, replace camshaft pulley. Go to step 8).

10) Check CMP sensor. See BASIC DIAGNOSTIC PROCEDURES article. Check camshaft pulley. Check for DTC P0335. If no problem is found, go to next step. If any problem is found, repair or replace as necessary and go to step 8).

11) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

12) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1449: CANISTER DRAIN CUT VALVE (CDCV) - OPEN OR SHORT CIRCUIT

Condition

DTC is set when PCM detects open or short circuit in CDCV system with ignition switch on. Possible causes are:

- * CDCV malfunction.
- * Open or short circuit.
- * PCM malfunction.

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Diagnosis & Repair Procedure

- 1) Check service bulletins. Go to next step.
- 2) Turn ignition off. Turn ignition on. If DTC is still present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.
- 3) Turn ignition off. Disconnect CDCV. Inspect CDCV harness connector terminals. If no problem is found, go to next step. If problem is present, repair as necessary and go to step 7).
- 4) Check resistance between CDCV component terminals. If resistance is 25-29 ohms, go to next step. If resistance is not 25-29 ohms, replace CDCV. Go to step 7).
- 5) Turn ignition on. Measure voltage between terminal "A" (White/Red wire) on CDCV harness connector and ground. If battery voltage is present, go to next step. If battery voltage is not present, repair White/Red wire between solenoid and main relay. Go to step 7).
- 6) Turn ignition off. Disconnect PCM connectors. Inspect PCM harness connector terminals. If no problem is found, go to next step. If problem is present, repair as necessary and go to step 7).
- 7) Check continuity between CDCV harness connector terminal "B" (Blue/Orange wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground on Blue/Orange wire. Go to step 7).
- 8) Connect CDCV connector. Turn ignition on. Check voltage between PCM harness connector No. 3 terminal "U" (Blue/Orange wire) and ground. If battery voltage is present, go to next step. If battery voltage is not present, repair Blue/Orange wire between CDCV and PCM. Go to next step.
- 9) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.
- 10) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1450: EVAP SYSTEM MALFUNCTION - EXCESSIVE VACUUM

Condition

DTC is set when PCM detects fuel tank pressure is low (15.7 inHg) after engine is started in cold condition and vehicle speed is less than 62 MPH. Possible causes are:

- * Canister Drain Cut Valve (CDCV) malfunction.
- * EVAP air filter clogged.
- * Charcoal canister malfunction.
- * Blockage or leakage in system hoses.
- * Fuel tank pressure sensor malfunction.
- * Purge solenoid valve malfunction.

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1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Turn ignition off. Turn ignition on. If DTCs P0443 and/or P1449 are present, repair those DTCs first. If DTCs P0443 and/or P1449 are not present, go to next step.

3) Using scan tool, run IGNITION ON TEST in SIMULATION TEST. Turn Canister Drain Cut Valve (CDCV) from OFF to ON. CDCV should be heard operating. If system operates correctly, go to next step. If system does not operate correctly, repair wiring or replace CDCV. Go to step 4).

4) Disconnect intake manifold hose from purge solenoid valve. Connect vacuum pump to valve. Apply vacuum to valve. If vacuum holds, remove vacuum pump and reconnect hose to valve. Go to next step. If vacuum does not hold, replace valve. Go to step 4).

5) Remove charcoal canister beside fuel tank. Inspect for damage or clogging. If charcoal canister is okay, go to next step. If charcoal canister is not okay, replace as needed. Go to step 4).

6) Inspect Fuel Tank Pressure (FTP) sensor. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If FTP sensor is okay, go to next step. If FTP sensor is not okay, replace as needed. Go to step 4).

7) Inspect EVAP air filter for clogging. See SYSTEM & COMPONENT TESTING - MIATA, MILLENIA, MPV, PROTEGE & 626 article. If EVAP air filter is not okay, replace as needed. Go to next step. If EVAP air filter is okay, repair or replace clogged hoses between charcoal canister, canister drain cut valve and two-way check valve. Go to next step.

8) Turn ignition on. Ensure fuel gauge is between 1/4 and 3/4 full. Using scan tool, monitor PID data for the following:

- * BARO V is 21.3 in.hg or higher.
- * ECT is 14-90.5°F (-10-32.5°C).
- * IAT is 14-140°F (-10-60°C).

If all signals are within specification, go to next step. If any signals are not within specification, perform steps to get readings within specifications. Go to next step.

9) Perform drive mode 4. Stop vehicle. Using scan tool, check drive mode completion status. If EVAP system has monitored, go to next step. If EVAP system has not been monitored, go to step 4).

10) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not pending, go to next step. If same DTC is pending, replace PCM. Go to next step.

11) Using scan tool, verify PENDING TROUBLE CODE DTC and DIAGNOSTIC MONITORING TEST RESULTS. If any DTCs are present, go to applicable test and repair as needed. If no DTCs are present, testing is complete.

DTC P1487: EGR BOOST SENSOR SOLENOID VALVE CIRCUIT
MALFUNCTION

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Condition

DTC is set when PCM detects EGR boost sensor solenoid valve input is less than 2.7 volts when ignition is turned on. Possible causes are:

- * EGR boost sensor solenoid valve malfunction.
- * Open or short circuit in wiring.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Check service bulletins. Go to next step.
- 2) Turn ignition off. Turn ignition on. If same DTC is present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.
- 3) Leave ignition on. Disconnect EGR valve vacuum hose at EGR boost sensor solenoid valve. Connect vacuum pump at port on EGR boost sensor solenoid valve. Apply vacuum to valve. If vacuum does not hold for 5 seconds, go to next step. If vacuum holds for 5 seconds, go to step 9).
- 4) Turn ignition off. Disconnect EGR boost sensor solenoid valve connector. Apply vacuum to valve. If vacuum does not hold for 5 seconds, replace valve. Go to step 8). If vacuum holds for 5 seconds, repair short to ground on Gray./Black wire between valve and PCM connector No. 3 terminal "T". Go to step 8).
- 5) Check valve and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary. Go to step 8).
- 6) Check resistance of EGR boost sensor solenoid valve. If resistance is 23-27 ohms, go to next step. If resistance is not 23-27 ohms, replace EGR boost sensor solenoid valve and go to step 8).
- 7) Turn ignition on. Measure voltage between harness connector terminal "A" (White/Red wire) and ground. If battery voltage is present, go to next step. If battery voltage is not present, repair White/Red wire and go to step 8).
- 8) Turn ignition off. Disconnect PCM connectors. Check PCM and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary. Go to step 8).
- 9) Connect EGR boost sensor solenoid valve connector. Disconnect PCM connectors. Turn ignition on. Check voltage between PCM harness connector No. 3 terminal "T" (Gray/Black wire) and ground. If battery voltage is present, go to next step. If battery voltage is not present, repair Gray/Black wire and go to step 8).
- 10) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Turn ignition off. Turn ignition on. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.
- 11) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

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DTC P1504: IDLE AIR CONTROL (IAC) CIRCUIT MALFUNCTION

Condition

DTC is set when PCM detects no voltage from IAC for one second. DTC will not set during cranking. Possible causes are:

- * IAC valve malfunction.
- * Open or short circuit in wiring.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Using scan tool, clear DTCs. Start engine. Allow to warm to operating temperature. If DTC is reset, go to next step. If DTC does not reset, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.

3) Turn ignition off. Disconnect IAC valve connector. Inspect valve and harness connector terminals. If no problem is found, go to next step. If any connector is faulty, repair as necessary and go to step 5).

4) Check resistance between IAC valve terminals "A" and "B". If resistance is 8.7-10.5 ohms, go to next step. If resistance is not 8.7-10.5 ohms, replace IAC valve. Go to step 5).

5) Turn ignition on. Check voltage between IAC valve harness connector terminal "A" (Orange wire) and ground. If battery voltage is not present, problem is in power supply. Go to next step. If battery voltage is present, problem is in ground control circuit. Go to step 12).

6) Turn ignition off. Disconnect PCM connectors. Inspect PCM and harness connector terminals. If no problem is found, go to next step. If any connector is faulty, repair as necessary and go to step 5).

7) Check continuity between IAC valve harness connector terminal "A" (Orange wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground. Go to step 5).

8) Check continuity of Orange wire between PCM connector No. 3 terminal "M" and terminal "A" on TP sensor harness connector. If continuity exists, go to step 5). If continuity does not exist, repair Orange wire and go to step 5).

9) Turn ignition off. Disconnect PCM connectors. Inspect PCM and harness connector terminals. If no problem is found, go to next step. If any connector is faulty, repair as necessary and go to step 5).

10) Turn ignition on. Check voltage between IAC valve harness connector terminal "B" (Violet/Red wire) and ground. If voltage is not present, go to next step. If voltage is present, repair short to power. Go to step 5).

11) Turn ignition off. Check continuity between IAC valve harness connector terminal "B" (Violet/Red wire) and ground. If continuity is not present, go to next step. If continuity is present,

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repair short to ground. Go to step 5).

12) Check continuity of Violet/Red wire between IAC valve harness connector terminal "B" and PCM harness connector No. 3 terminal "O". If continuity is present, go to next step. If continuity is not present, repair open circuit. Go to next step.

13) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Warm to operating temperature. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

14) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1496: EGR VALVE MOTOR COIL NO. 1 OPEN OR SHORT DTC P1497:

EGR VALVE MOTOR COIL NO. 2 OPEN OR SHORT

Condition

DTC is set when PCM detects open or short in EGR valve with ignition on. Possible causes are:

- * EGR valve malfunction.
- * Open or short circuit in wiring.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Check service bulletins. Go to next step.
- 2) Turn ignition off. Turn ignition on. If DTC is still present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.
- 3) If DTC P1496 and P1497 are present, problem is in valve or power circuit. Go to next step. If only DTC P1496 or P1497 is present, problem is in valve or control circuit. Go to step 10).
- 4) Turn ignition off. Disconnect EGR valve connector. Check valve and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 5).
- 5) Turn ignition on. Check voltage between harness connector terminal "C" (White/Red wire) and ground. If battery voltage is not present, repair open in White/Red wire and go to step 5). If battery voltage is present, replace EGR valve and go to step 5).
- 6) Turn ignition off. Disconnect EGR valve connector. Check valve and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 5).
- 7) Check continuity of EGR valve between EGR terminal "C" and applicable terminal. See CODE/TERMINAL IDENTIFICATION table. If continuity is present, go to next step. If continuity is not present, replace EGR valve and go to step 5).
- 8) Disconnect PCM connectors. Check PCM and harness connector terminals. If no problem is found, go to next step. If any problem is

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found, repair as necessary and go to step 5).

9) Check continuity of applicable wire between EGR valve harness connector and ground. See CODE/TERMINAL IDENTIFICATION table. If continuity is not present, go to next step. If continuity is present, repair short to ground and go to step 5).

10) Check continuity of applicable wire between EGR valve harness connector and PCM harness connector. See CODE/TERMINAL IDENTIFICATION table. If continuity is present, go to next step. If continuity is not present, repair wiring and go to next step.

11) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Turn ignition off. Turn ignition on. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

12) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

CODE/TERMINAL IDENTIFICATION

DTC	EGR Terminal	Wire Color	PCM Connector/Terminal
P1496	E	Violet	2/M
P1497	A	White/Green	2/N
P1498	B	Pink/Black	2/O
P1499	F	Pink	2/P

DTC P1498: EGR VALVE MOTOR COIL NO. 3 OPEN OR SHORT
DTC P1499: EGR VALVE MOTOR COIL NO. 4 OPEN OR SHORT

Condition

DTC is set when PCM detects open or short in EGR valve with ignition on. Possible causes are:

- * EGR valve malfunction.
- * Open or short circuit in wiring.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Check service bulletins. Go to next step.
2) Turn ignition off. Turn ignition on. If DTC is still present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.

3) If DTC P1498 and P1499 are present, problem is in valve or power circuit. Go to next step. If only DTC P1498 or P1499 is present, problem is in valve or control circuit. Go to step 10).

4) Turn ignition off. Disconnect EGR valve connector. Check valve and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step

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- 8).
- 5) Turn ignition on. Check voltage between harness connector terminal "D" (White/Red wire) and ground. If battery voltage is not present, repair open in White/Red wire and go to step 8). If battery voltage is present, replace EGR valve and go to step 8).
 - 6) Turn ignition off. Disconnect EGR valve connector. Check valve and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 8).
 - 7) Check continuity of EGR valve between EGR terminal "D" and applicable terminal. See CODE/TERMINAL IDENTIFICATION table. If continuity is present, go to next step. If continuity is not present, replace EGR valve and go to step 8).
 - 8) Disconnect PCM connectors. Check PCM and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 8).
 - 9) Check continuity of applicable wire between EGR valve harness connector and ground. See CODE/TERMINAL IDENTIFICATION table. If continuity is not present, go to next step. If continuity is present, repair short to ground and go to step 8).
 - 10) Check continuity of applicable wire between EGR valve harness connector and PCM harness connector. See CODE/TERMINAL IDENTIFICATION table. If continuity is present, go to next step. If continuity is not present, repair wiring and go to next step.
 - 11) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Turn ignition off. Turn ignition on. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.
 - 12) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1504: IDLE AIR CONTROL (IAC) VALVE CIRCUIT MALFUNCTION

Condition

DTC is set when Powertrain Control Module (PCM) detects no voltage from IAC valve for one second with ignition switch on (not cranking). Possible causes are:

- * IAC valve malfunction.
- * Open or short circuit.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.
- 2) Using scan tool, erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Warm to operating temperature. If DTC is reset, go to

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next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.

3) Turn ignition off. Disconnect IAC valve connector. Check valve and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 4).

4) Check resistance between IAC valve terminals "A" and "B". If resistance is 8.7-10.5 ohms, go to next step. If resistance is not 8.7-10.5 ohms, replace IAC valve. Go to step 4).

5) Turn ignition on. Check voltage between harness connector terminal "A" (Orange wire) and ground. If battery voltage is not present, go to next step. If battery voltage is present, go to step 12).

6) Turn ignition off. Disconnect PCM connectors. Check PCM and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 4).

7) Check continuity between IAC valve harness connector terminal "A" (Orange wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground and go to step 4).

8) Check continuity of Orange wire between IAC valve harness connector terminal "A" and PCM harness connector No. 3 terminal "M". If continuity is present, go to step 4). If continuity is not present, repair wiring and go to step 4).

9) Turn ignition off. Disconnect PCM connectors. Check PCM and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 4).

10) Turn ignition on. Check voltage between harness connector terminal "B" (Violet/Red wire) and ground. If battery voltage is not present, go to next step. If battery voltage is present, repair short to power. Go to step 4).

11) Turn ignition off. Check continuity between IAC valve harness connector terminal "B" (Violet/Red wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground and go to step 4).

12) Disconnect PCM connectors. Check continuity of Violet/Red wire between IAC valve harness connector terminal "B" and PCM harness connector No. 3 terminal "O". If continuity is present, go to next step. If continuity is not present, repair open circuit and go to next step.

13) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. Warm to operating temperature. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

14) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1523: VARIABLE INDUCTION SYSTEM (VICS) MALFUNCTION

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Condition

DTC is set when Powertrain Control Module (PCM) detects open or short circuit in VICS solenoid valve with ignition switch on.

Possible causes are:

- * VICS solenoid valve malfunction.
- * Open or short circuit.
- * PCM malfunction.

Diagnosis & Repair Procedure

- 1) Check service bulletins. Go to next step.
- 2) Turn ignition off. Turn ignition on. If DTC is still present, go to next step. If DTC is not present, see TROUBLE SHOOTING in BASIC DIAGNOSTIC PROCEDURES article.
- 3) Leave ignition on. Disconnect manifold vacuum hose at VICS solenoid valve. Connect vacuum pump at port on VICS solenoid valve. Apply vacuum to valve. If vacuum does not hold for 5 seconds, go to next step. If vacuum holds for 5 seconds, go to step 9).
- 4) Turn ignition off. Disconnect VICS solenoid valve connector. Apply vacuum to valve. If vacuum does not hold for 5 seconds, replace valve. Go to step 3). If vacuum holds for 5 seconds, repair short to ground on White/Blue wire between valve and PCM connector No. 3 terminal "Q". Go to step 3).
- 5) Disconnect VICS solenoid connector. Inspect valve and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 3).
- 6) Check resistance of VICS solenoid valve. If resistance is 36-40 ohms, go to next step. If resistance is not 36-40 ohms, replace VICS solenoid valve and go to step 3).
- 7) Disconnect VICS solenoid connector. Turn ignition on. Measure voltage between ground and terminal "A" (White/Red wire) on harness connector. If battery voltage is present, go to next step. If battery voltage is not present, check for open or short circuit in White/Red wire between VICS solenoid connector and main relay. Repair as needed and go to step 3).
- 8) Disconnect PCM connectors. Inspect PCM and harness connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary and go to step 3).
- 9) Connect VICS solenoid valve connector. Turn ignition on. Check voltage between PCM harness connector No. 3 terminal "Q" (White/Blue wire) and ground. If battery voltage is present, go to next step. If battery voltage is not present, repair White/Blue wire and go to next step.
- 10) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Turn ignition on. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.
- 11) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

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DTC P1562: PCM = BB VOLTAGE LOW

Condition

DTC is set when Powertrain Control Module (PCM) backup memory voltage at connector No. 1 terminal "A" is less than 1.4 volt.

Possible causes are:

- * Faulty ROOM fuse.
- * Open or short circuit.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Turn ignition off. Check ROOM fuse, located in fuse block under instrument cluster. If fuse is faulty, go to next step. If fuse is not installed correctly, repair as necessary and go to step 7). If fuse is okay, go to step 5).

3) Disconnect both battery cables. Check resistance between left ROOM fuse terminal and ground. If resistance is more than 500 ohms, go to step 7). If resistance is 500 ohms or less, repair short to ground. Replace fuse and go to step 7).

4) Disconnect PCM connectors. Check PCM and connector terminals. If no problem is found, go to next step. If any problem is found, repair as necessary. Go to step 7).

5) Check continuity of circuit between positive battery terminal and PCM harness connector No. 1 terminal "A" (Blue/Red wire). If continuity exists, go to next step. If continuity is not present, repair as needed and go to next step.

6) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

7) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1601: COMMUNICATION LINE ERROR (AUTOMATIC TRANSMISSION)

Condition

DTC is set when there is no Transmission Control Module (TCM) to Powertrain Control Module (PCM) communication. Possible causes are:

- * Open or short circuit between TCM and PCM.
- * PCM malfunction.
- * TCM malfunction.

Diagnosis & Repair Procedure

1) Ensure FREEZE FRAME PID data has been recorded. Check service bulletins. Go to next step.

2) Turn ignition off. Using scan tool, RTQ1 and RTQ2 PIDs.

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Drive vehicle. Upshift and downshift transmission. If PIDs don't change, go to next step. If PIDs change, go to step 9).

3) Turn ignition off. Disconnect PCM connectors. Inspect PCM harness connector terminals. If no problem is found, go to next step. If any terminal is faulty, repair as necessary and go to step 9).

4) Turn ignition on. Check voltage between PCM connector No. 1 terminal "N" (Pink/Black wire) and ground. If voltage is 4.5-5.5 volts, go to next step. If voltage is not 4.5-5.5 volts, check for open or short on Pink/Black wire. Repair as necessary and go to step 9).

5) Turn ignition off. disconnect TCM connector. Inspect TCM harness connector terminals. If no problem is found, go to next step. If any terminal is faulty, repair as necessary and go to step 9).

6) Connect TCM connector. Disconnect PCM connectors. Turn ignition on. Check voltage between TCM connector terminal AL (Violet/Green wire) and ground. If voltage is 4.5-5.5 volts, go to next step. If voltage is not 4.5-5.5 volts, check for open or short on Violet/Green wire. Repair as necessary and go to step 9).

7) Turn ignition off. Connect all connectors. Using scan tool, check TCM DTCs and voltage. If TCM is okay, go to next step. If any problem is present, replace TCM. Go to next step.

8) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1608: POWERTRAIN CONTROL MODULE (PCM) MALFUNCTION

Condition

DTC is set when Powertrain Control Module (PCM) does not read DTCs from output devices. Possible causes are:

- * Short to power on signal circuit.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Check service bulletins. Go to next step.
2) Disconnect the following component connectors and check for voltage between harness connector terminals listed and ground:

- * Purge solenoid valve terminal "B" (Brown/Red wire).
- * EGR valve terminal "E" (Violet wire).
- * EGR valve terminal "A" (White/Green wire).
- * EGR valve terminal "B" (Pink/Black wire).
- * EGR valve terminal "F" (Pink wire).
- * VICS solenoid valve terminal "B" (White/Blue wire).
- * EGR boost sensor solenoid valve terminal "B" (Gray wire).

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* CDCV terminal "B" (Blue/Orange wire).

If no voltage is present, go to next step. If voltage is present, repair short to power on affected circuit. Go to next step.

3) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

4) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1609: POWERTRAIN CONTROL MODULE (PCM) KNOCK CIRCUIT MALFUNCTION

Condition

DTC is set when Powertrain Control Module (PCM) detects extraordinary signal on misfire circuit. Cause is malfunctioning PCM.

Diagnosis & Repair Procedure

1) Check service bulletins. Go to next step.

2) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

3) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1631: GENERATOR OUTPUT MALFUNCTION

Condition

DTC is set when PCM detects generator output voltage less than 8.5 volts for 5 seconds with engine running. Possible causes are:

- * Generator malfunction.
- * Open or short circuit between generator and PCM.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) Check service bulletins. Go to next step.

2) Turn ignition on. Using scan tool, access PID/DATA MONITOR. Record PID data for ALT V. Start engine. If ALTT V PID is less than 8.4 volts, go to next step. If ALTT V PID is 8.4 volts or more, problem is intermittent (not current).

3) Turn ignition off. check belt tensioner. If belt tensioner is out of limits or belt is faulty, repair as necessary and go to step 6). If no problem is found, go to next step.

4) Turn ignition off. Disconnect PCM connectors. Inspect PCM and harness connector terminals. If no problem is found, go to next

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step. If any terminal is faulty, repair as necessary and go to step 6).

5) Disconnect generator connector. Inspect generator and harness connector terminals. If no problem is found, go to next step. If any terminal is faulty, repair as necessary and go to step 6).

6) Check continuity between generator harness connector terminal "D" (Gray/Red wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground. Go to step 6).

7) Check continuity between generator harness connector terminal "P" (Gray wire) and ground. If continuity is not present, go to next step. If continuity is present, repair short to ground. Go to step 6).

8) Check continuity of Gray/Red wire between harness connector terminal "D" and PCM connector No. 1 terminal "O". If continuity is present, go to next step. If continuity is not present, repair Gray/Red wire and go to step 6).

9) Check continuity of Gray wire between harness connector terminal "P" and PCM connector No. 1 terminal "T". If continuity is present, replace generator and go to next step. If continuity is not present, repair Gray wire and go to next step.

10) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Turn ignition off. Start engine. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

11) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1633: BATTERY OVERCHARGE

Condition

DTC is set when PCM detects generator output is more than 18 volts or battery voltage is more than 16 volts for 5 seconds. Possible causes are:

- * Generator malfunction (overcharge).
- * PCM malfunction.
- * Short circuit.

Diagnosis & Repair Procedure

1) Check service bulletins. Go to next step.

2) Turn ignition on. Using scan tool, access PID/DATA

MONITOR. Record PID data for B+ and ALT V. Start engine. If ALTT V PID is more than 18.5 volts, and B+ PID is more than 16 volts, go to next step. If ALTT V PID is 18.5 volts or less and B+ PID is 16 volts or less, problem is intermittent (not current).

3) Turn ignition off. Disconnect generator connector. Inspect generator and harness connector terminals. If no problem is found, go to next step. If any connector is faulty, repair as necessary and go to step 6).

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4) Turn ignition on. Check voltage at harness connector terminal "D" (Gray/Red wire). If battery voltage is present, go to next step. If battery voltage is not present, generator is faulty. Go to step 7).

5) Turn ignition off. Disconnect PCM connectors. Inspect PCM and harness connector terminals. If no problem is found, go to next step. If any connector is faulty, repair as necessary and go to step 6).

6) Turn ignition on. Check voltage between generator harness connector terminal "D" (Gray/Red wire) and ground. If voltage is not present, go to next step. If voltage is present, repair short to power. Go to step 6).

7) Check voltage between generator terminal "D" and ground. If voltage is not present, go to next step. If voltage is present, replace generator (internal short to power). Go to next step.

8) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

9) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

DTC P1634: GENERATOR TERMINAL "B" CIRCUIT OPEN

Condition

DTC is set when generator output is more than 17 volts and battery voltage is less than 11 volts while idling. Possible causes are:

- * PCM malfunction.
- * Battery malfunction.
- * Open or short circuit between battery and generator.

Diagnosis & Repair Procedure

1) Check service bulletins. Go to next step.
2) Using scan tool, access PID/DATA MONITOR. Record PID data for B+ and ALT V. Start engine. If ALTT V PID is more than 17 volts, and B+ PID is less than 11 volts, go to next step. If ALTT V PID is 17 volts or less and B+ PID is 11 volts or more, problem is intermittent (not current).

3) Turn ignition off. Check battery. If battery is okay, go to next step. If battery is faulty, replace battery and go to step 7).

4) Check generator terminal "B". If no problem is found, go to next step. If connector is loose, repair as necessary and go to step 7).

5) Check battery positive cable. If no problem is found, go to next step. If connection is loose, repair as necessary and go to step 7).

6) Connect cable. Start engine. Disconnect positive battery cable. If engine does not stall, go to next step. If engine stalls,

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repair open circuit between generator and battery. Go to next step.

7) Connect all connectors. Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. Start engine. If same DTC is not present, go to next step. If same DTC is present, replace PCM. Go to next step.

8) Erase DTC. See CLEARING CODES in SELF-DIAGNOSTICS - INTRODUCTION - MIATA, MILLENIA, MPV & PROTEGE article. If any DTC is present, go to appropriate test. If no DTC is present, test is complete.

REFERENCE VOLTAGE TEST

Condition

PCM supplies 5 volts reference voltage to EGR boost sensor, TP sensor and FTP sensor. If reference voltage is not 4.5-5.5 volts, DTCs P0107, P0122 and P0452 will set. Possible causes are:

- * Short to power or ground.
- * Sensor malfunction.
- * PCM malfunction.

Diagnosis & Repair Procedure

1) If suspect reference voltage being checked is 6 volts or less, go to next step. If suspect reference voltage being checked is more than 6 volts, go to step 14).

2) Turn ignition on. If battery voltage is more than 10.5 volts, go to next step. If battery voltage 10.5 volts or less, check charging system.

3) Disconnect sensor with suspect reference voltage. Check voltage between battery positive terminal and suspect sensor harness connector ground terminal (Black/Red wire). If voltage is more than 10.5 volts and within one volt of battery voltage, go to next step. If voltage is 10.5 volts or less, or more than one volt less than battery voltage, go to step 11).

4) Turn ignition on. Using scan tool, access PID/DATA MONITOR. If ECT PID cannot be accessed, go to next step. If ECT PID can be accessed, go to step 8).

5) Turn ignition off. Disconnect TP sensor. Turn ignition on. Check voltage between TP sensor terminals "A" (Light Green/Red wire) and "B" (Black/Red wire). If voltage is 4.5-5.5 volts, replace TP sensor. If voltage is less than 4.5 volts, disconnect EGR boost sensor. Check voltage at TP sensor harness connector. If voltage is 4.5-5.5 volts, replace EGR boost sensor. If voltage is less than 4.5 volts, disconnect FTP sensor. Check voltage at TP sensor harness connector. If voltage is 4.5-5.5 volts, replace FTP sensor. If voltage is less than 4.5 volts, go to next step.

6) Turn ignition off. Disconnect PCM connectors. Turn ignition on. Check voltage between PCM harness connector harness connector No. 1 terminal "B" (White/Red wire) and connector No. 3 terminal "B" (Black/Yellow wire). If battery voltage is present, go to next step. If battery voltage is not present, repair White/Red wire between PCM and main relay.

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7) Turn ignition off. Leave PCM and all sensors disconnected. Disconnect scan tool. Check resistance between PCM harness connector No. 2 terminal "I" (Light Green/Red wire) and connector No. 3 terminal "B" (Black/Yellow wire). If resistance is less than 10,000 ohms, repair short to ground on Light Green/Red wire. If resistance is 10,000 ohms or more, reconnect all components and recheck reference voltage. If reference voltage is still not 4.5-5.5 volts, replace PCM.

8) Turn ignition off. Disconnect PCM connectors. Disconnect suspect sensor connector. Check resistance between PCM connector No. 2 terminal "I" and sensor harness connector reference voltage terminal (Light Green/Red wire). If resistance is 5 ohms or more, repair open circuit or poor connection. If resistance is less than 5 ohms, recheck reference voltage. If reference voltage is still not 4.5-5.5 volts, replace PCM.

9) Turn ignition on. Using scan tool, access PID/DATA MONITOR. If ECT PID cannot be accessed, go to next step. If ECT PID can be accessed, go to step 13).

10) If two or more DTCs for sensors connected to sensor ground circuit (PCM connector No. 3 terminal "F") are present, go to next step. Sensors include the following:

- * EGR boost sensor.
- * TP sensor.
- * IAT sensor.
- * ECT sensor.
- * FTP sensor.
- * Front O2 sensor (Bank No. 1).
- * Front O2 sensor (Bank No. 2).

If any other DTCs are not present, repair open reference voltage circuit between PCM and sensor.

11) Turn ignition off. Disconnect scan tool. Disconnect suspect sensor. Ensure PCM is disconnected. Check resistance of Black/Red wire between sensor harness connector and PCM harness connector No. 3 terminal "F". If resistance is less than 5 ohms, reconnect sensor and go to next step. If resistance is 5 ohms or more, repair open Black/Red wire.

12) Turn ignition off. Disconnect scan tool. Disconnect suspect sensor. Ensure PCM is disconnected. Check resistance between negative battery terminal and PCM harness connector No.3 terminals "A", "B" and "C". If all circuits have resistance of less than 5 ohms, go to next step. If any circuit has resistance of 5 ohms or more, repair open wire.

13) Check resistance of Black/Red wire between each sensor harness connector listed in step 10 and PCM harness connector No. 3 terminal "F". If resistance is less than 5 ohms, ground circuits are okay. If resistance is 5 ohms or more, recheck reference voltage. If reference voltage is still not 4.5-5.5 volts, replace PCM.

14) Turn ignition off. Disconnect PCM connectors and all sensors listed in step 10. Turn ignition on. Check voltage between TP sensor terminal "A" (Light Green/Red wire) and battery negative terminal. If voltage is 56 volts or more, repair short to power. If

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voltage is less than 6 volts, recheck reference voltage. If reference voltage is still not 4.5-5.5 volts, replace PCM.

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