ENGINE PERFORMANCE

Self-Diagnostics - 1.6L

INTRODUCTION

Perform all basic diagnostic procedures in BASIC DIAGNOSTIC PROCEDURES article. If no fault is found while performing basic diagnostic procedures, proceed with ADDITIONAL SYSTEM FUNCTIONS below.

ADDITIONAL SYSTEM FUNCTIONS

DESCRIPTIONS

Use the NGS tester for diagnosis on OBD-II equipped vehicles. The NGS tester has a generic scan tool function that is standard across the automotive industry in the United States. It also performs the manufacture's specific functions; that is, the NGS tester can perform various functions according to the vehicle and program card selected.

GENERIC FUNCTIONS

Use these functions by selecting " GENERIC OBDII FUNCTIONS " from the NGS tester menu screen. These functions enable you to monitor on-board diagnostic system data and DTCs that are related to emissions, as defined and fixed by OBD-II regulations. These functions are found even in commonly marketed scan tools and are called "generic functions".

SPECIFIC FUNCTIONS

"Specific functions" are original scan tool functions created by various manufactures in order to be able to troubleshoot effectively. When using these functions, the correct vehicle model and program card must be selected.

PENDING TROUBLE CODES

The following functions are generic functions.

These appear when a problem is detected in a monitored system. The MIL is illuminated when a problem is detected in two consecutive drive cycles. The code for a failed system is stored in the PCM memory in the first drive cycle. This code is called the pending code. If the problem is not found in the second drive cycle, the PCM judges that the system returned to normal or the problem was mistakenly detected, and deletes the pending code. If the problem is found in the second drive cycle too, the PCM judges that the system has failed, deletes the pending code, illuminates the MIL and stored the DTC.

FREEZE FRAME DATA

This is the technical data which indicates the engine's condition at the time of the first malfunction. This data will remain in the memory even if another emission-related DTC is stored, with the exception of the Misfire or Fuel System DTCs. Once freeze frame data for the Misfire or Fuel System DTC is stored, it will overwrite any previous data and the freeze frame will not be overwritten again.

ON-BOARD SYSTEM READINESS TEST

This shows OBD-II systems operating status. If any monitor function is incomplete, NGS tester will identify which monitor function has not been completed. Misfires, Fuel System and Comprehensive Components (CCM) are continuous monitoring-type functions and will display a "CONT" message on the screen of the NGS tester. The catalyst, EGR system, evaporation system and oxygen sensor will be monitored under drive cycles. The NGS tester will display a "YES" message once those system monitor functions are completed. The OBD-II diagnostic system is initialized by performing the DTC cancellation procedure or disconnecting the negative battery cable.

DIAGNOSTIC MONITORING TEST RESULTS

These results from the intermittent monitor system's technical data, which are used to determine whether the system is normal or not. They also display the system's thresholds and diagnostic results. The intermittent monitor system monitors the oxygen sensor, evaporative purge system, catalyst and the EGR system.

READ/CLEAR DIAGNOSTIC TEST RESULTS

The following functions are generic functions.

This retrieves all stored DTCs in the PCM and clears the DTC, Freeze Frame Data, On-Board Readiness Test Results, Diagnostic Monitoring Test Results and Pending Trouble Codes.

PARAMETER IDENTIFICATION (PID) ACCESS

The PID mode allows access to certain data values, analog and digital inputs and outputs, calculated values and system status information. Since PID values for output devices are PCM internal data values, perform the Simulation Test to identify which output devices are malfunctioning.

SIMULATION TEST

Output devices can be turned on and off by sending simulation command signals from the NGS tester to the PCM. The "Idling Test" and "Ignition ON Test" are available in this test. These tests will verify the PCM status, output devices, and related circuit wiring harnesses.

OBDII DRIVE MODE PROTEGE 1.6L

Performing the Drive Mode inspects the OBD II system for proper operation and must be performed to ensure that no additional DTCs are present.

During Drive Mode, the following systems are inspected:

- EGR system
- Oxygen sensor (HO2S)
- Oxygen sensor heater
- Catalytic converter (TWC)
- Fuel, misfire and evaporative (EVAP) system

CAUTION: While performing the Drive Mode, always operate the vehicle in a safe and lawful manner.

When the NGS tester is used to observe monitor system status while

driving, be sure to have another technician with you, or record the data in the NGS tester using the PID/DATA MONITOR AND RECORD function and inspect later.

NOTE: Vehicle speed and engine speed detected by the PCM may differ from that indicated by the speedometer and tachometer. Use the NGS tester to monitor vehicle speed.

If the OBD II system inspection is not completed during the Drive Mode, the following causes are considered:

1. **The OBD II system detects the malfunction.**
2. **The Drive Mode procedure is not completed correctly.**

Disconnecting the battery will reset the memory. Do not disconnect the battery during and after Drive Mode.

The NGS tester can be used at anytime through the course of Drive Mode to monitor the completion status. Monitoring can be

Mode 1 (PCM adaptive memory produce drive mode)

NOTE: The PCM adaptive memory status can be confirmed with RFC FLAG PID.

If RFC FLAG PID is ON, Mode 1 is not necessary, because PCM already has adaptive memory.

If RFC FLAG PID is OFF, Mode 1 should be performed before Mode 2 or 3.

1. Start the engine and warm up completely.
2. Verify the following conditions and correct if necessary:
   - All accessory loads (A/C, headlights, blower fan, rear window defroster) are off.
   - Initial ignition timing and idle speed are within specification.
   - TEN and GND of DLC are not connected.
3. With the transmission set in Park or Neutral, perform no load racing at the engine speed, 2300-2700 rpm for more than 15 seconds, increase to 3800-4200 rpm for more than 15 seconds, then idle the engine for more than 20 seconds after the cooling fan stopped. If possible, monitor RPM PID for engine speed and FAN3 PID for cooling fan status during this procedure.
4. Turn the ignition key off then on again.
5. Access to RFC FLAG PID to confirm PCM adaptive memory status. If RFC FLAG PID is ON, Mode 1 is completed.
6. If RFC FLAG PID is still OFF, go back to Step 1

Mode 2 (EGR system repair verification drive mode)

1. Access to RFC FLAG PID to confirm PCM adaptive memory status. If RFC FLAG PID is OFF, perform Mode 1 first.
2. If RFC FLAG PID is ON, start the engine and warm up completely.

3. Verify all accessory loads (A/C, headlights, blower fan, rear window defroster) are off.
4. Drive the vehicle as shown in the graph.**Fig. 1**
5. Stop the vehicle and access to ON BOARD SYSTEM READINESS menu of GENERIC OBD II FUNCTION to inspect the Drive Mode completion status. If completed, RFC changes from NO to YES.
6. If not completed, turn the ignition key off then go back to Step 4.
7. Access to DIAGNOSTIC MONITORING TEST RESULTS menu of GENERIC OBD II FUNCTIONS to inspect the monitor results. If MEAS are not within specification, repair has not completed.
8. Verify no DTCs are available.

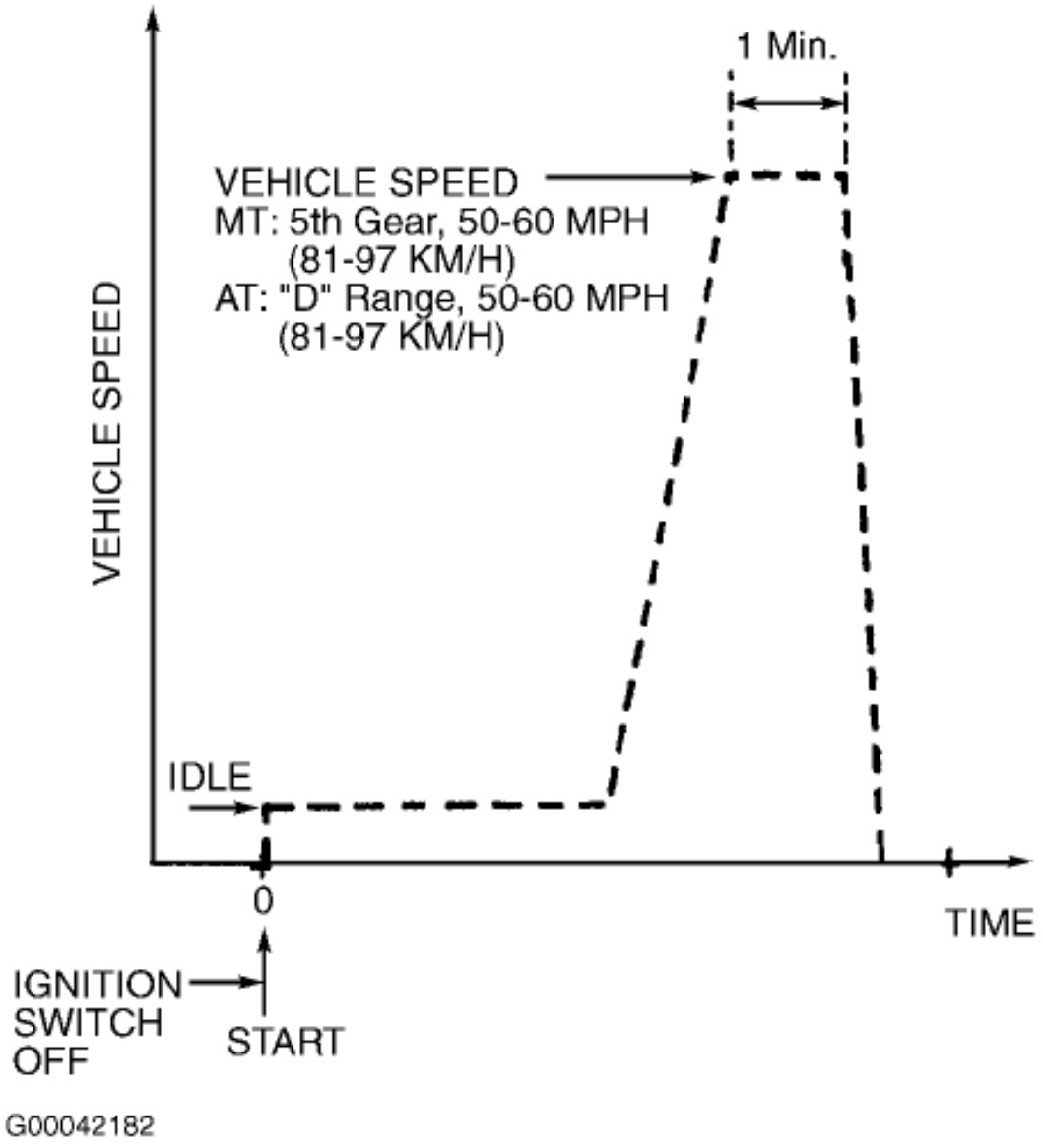

Fig. 1: EGR Monitor Repair Verification Drive Mode, Vehicle Speed Table
Courtesy of MAZDA MOTORS CORP.

Mode 3 HO2S heater, HO2S, and TWC repair verification drive mode)

1. Access to RFC FLAG PID to confirm PCM adaptive memory status. if RFC FLAG PID is OFF, perform Mode 1 first. **Mode 1 (PCM adaptive memory produce drive mode)**
2. If RFC FLAG PID is NO, start the engine and warm up completely.
3. Verify all accessory loads (A/C, headlights, blower fan, rear window defroster) are off.
4. Drive the vehicle as shown in the graph. **Fig. 2** Driving condition before the constant speed driving is not specified.
5. Stop the vehicle and access to ON BOARD SYSTEM READINESS menu of GENERIC OBD II FUNCTION to inspect the Drive Mode completion status. If completed, RFC changes from NO to YES.
6. If not completed, turn the ignition key off then go back to Step 4.
7. Access to DIAGNOSTIC MONITORING TEST RESULTS menu of GENERIC OBD II FUNCTIONS to inspect the monitor results. If MEAS are not within specification, repair has not completed.
8. Verify no DTCs are available.

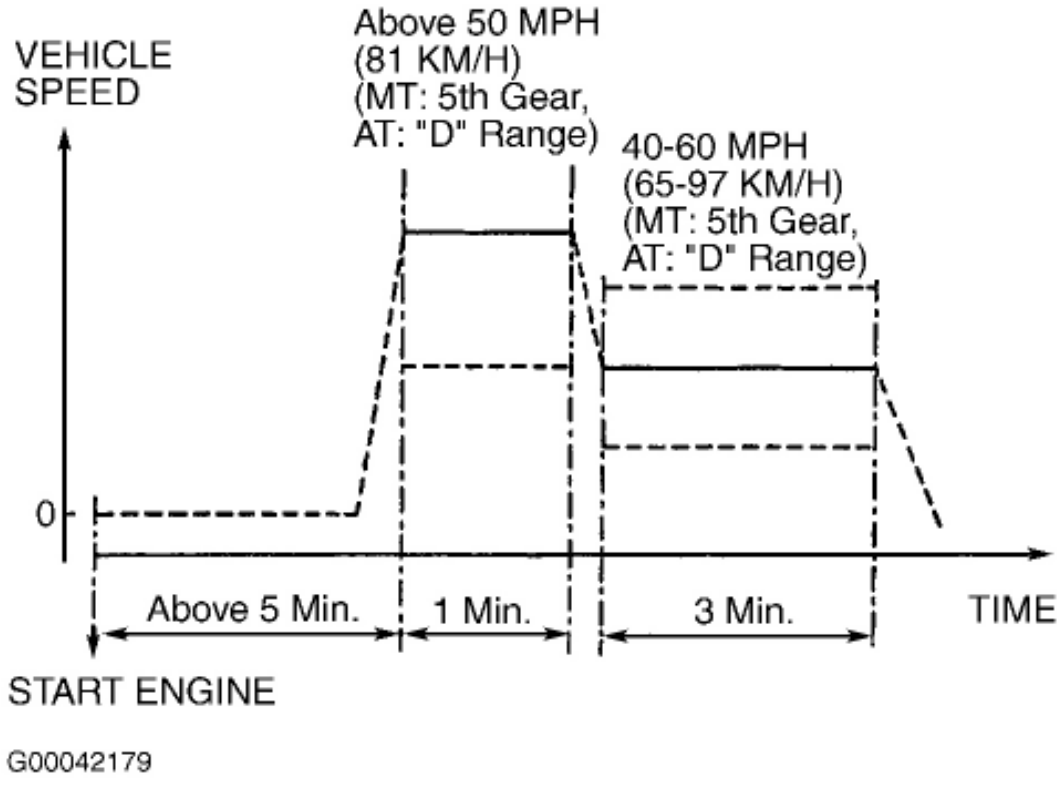

Fig. 2: HO2S/TWC Monitor Repair Verification Drive Mode, Vehicle Speed Table
Courtesy of MAZDA MOTORS CORP.

Mode 4 (EVAP system repair verification drive mode)

NOTE: If Mode 4 can not be performed (you can not drive the vehicle under Mode 4

condition), perform evaporative system test procedure as an alternative. (Engine Performance - Testing and Diagnostics - System & Component Testing - Emission Systems & Sub-Systems - Fuel Evaporation.)

Mode 4 can be performed regardless RFC FLAG condition.

1. Verify all following PIDs are within the following specifications. All PIDs must be within specifications before engine started to initiate the evaporative system test.
   - BARO: 72.0 kPa {540 nmHg, 21.3 inHg} or higher
   - IAT: 10-60 °C {50-140 °F}
   - FTL V: 0.5-2.5 V
   - ECT is -10 °C-X °C {14 °F-X °F} (X, the ECT upper limit, is determined according to the barometric pressure as shown the graph below.) **Fig. 3**
2. Verify all accessory loads (A/C, headlights, blower fan, rear window defroster) are off.
3. Start the engine and race it at 3,500 rpm to warm up completely.
4. Drive the vehicle as shown in the graph. **Fig. 4**
5. Stop the vehicle and access to ON BOARD SYSTEM READINESS menu of GENERIC OBD II FUNCTION to inspect the Drive Mode completion status. If completed, RFC changes from NO to YES.
6. If not completed, turn the ignition key off then go back to Step 1.
7. Access to DIAGNOSTIC MONITORING TEST RESULTS menu of GENERIC OBD II FUNCTIONS to inspect the monitor results. If MEAS are not within specification, repair has not completed.
8. Verify no DTCs are available.

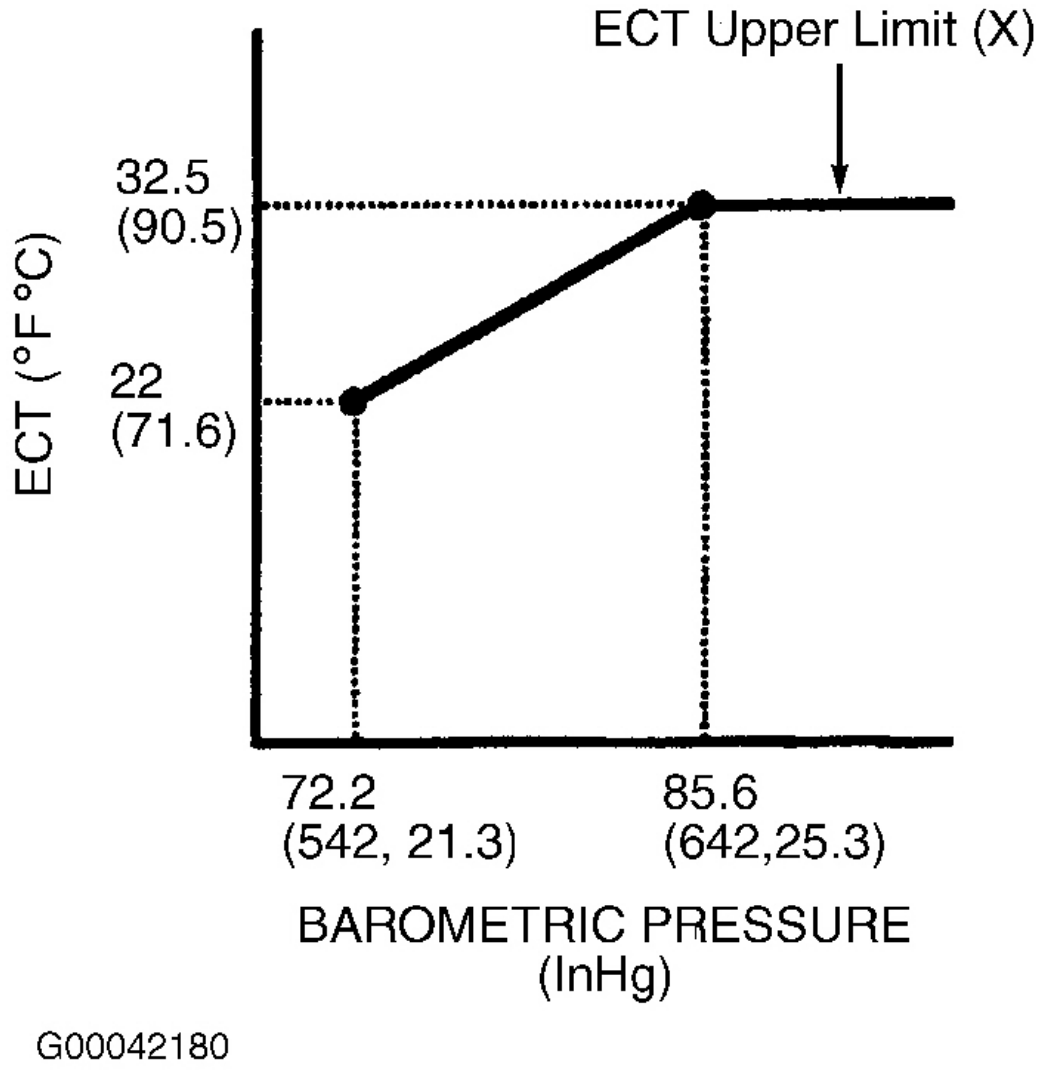

Fig. 3: Engine Coolant Temperature - To - Barometric Pressure Gradient
Courtesy of MAZDA MOTORS CORP.

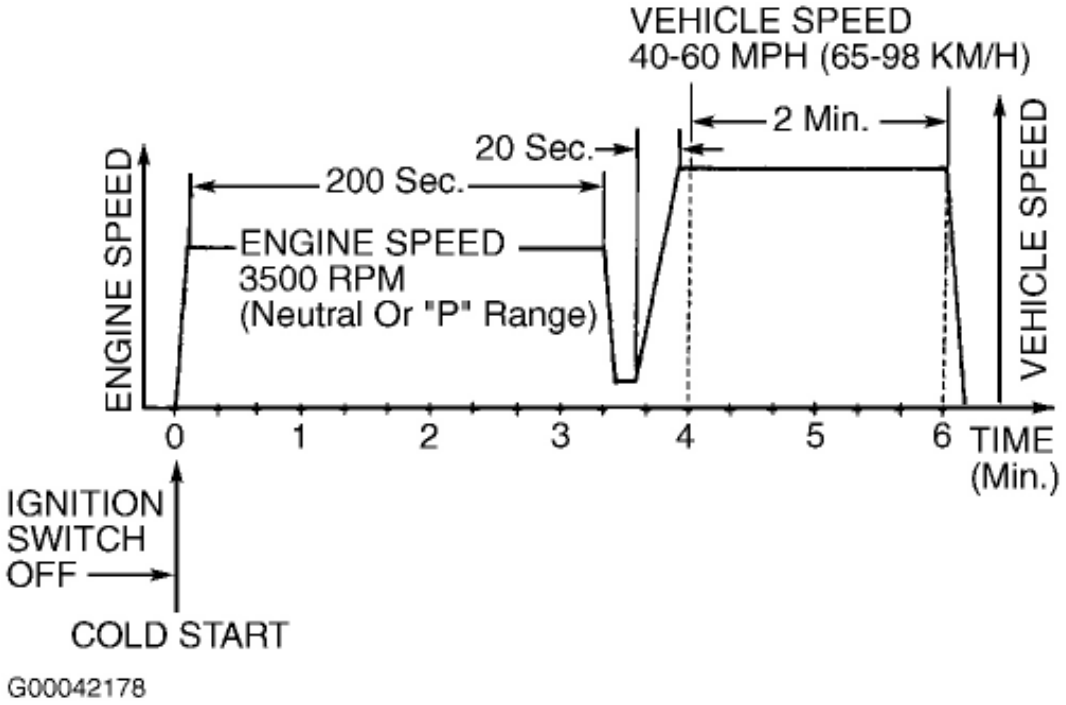

Fig. 4: EVAP Monitor Repair Verification Drive Mode, Vehicle Speed Table
Courtesy of MAZDA MOTORS CORP.

DIAGNOSTIC TESTS

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

NOTE: For wiring diagram, see WIRING DIAGRAMS article. Always perform applicable drive cycle test after repair is performed to verify 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 - PROTEGE 1.6L & 1.8L article.

DIAGNOSTIC TROUBLE CODE IDENTIFICATION TABLE

DIAGNOSTIC TROUBLE CODE IDENTIFICATION

DTC	Description
P0102	MASS Airflow (MAF) Sensor Circuit, Low Input
P0103	MASS Airflow (MAF) Sensor Circuit, High Input

P0106	BARO Circuit Performance Problem
P0107	BARO Circuit Low Input
P0108	BARO Circuit High Input
P0111	Intake Air Temperature (IAT) Sensor Performance Problem
P0112	Intake Air Temperature (IAT) Sensor Low Input
P0113	Intake Air Temperature (IAT) Sensor High Input
P0117	Engine Coolant Temperature (ECT) Sensor Circuit Low Input
P0118	Engine Coolant Temperature (ECT) Sensor Circuit High Input
P0122	Throttle Position (TP) Sensor Circuit Low Input
P0123	Throttle Position (TP) Sensor Circuit High Input
P0125	Excessive Time To Enter Closed Loop
P0130	Front Heated Oxygen Sensor Malfunction
P0134	Front Heated Oxygen Sensor - No Activity Detected
P0138	Rear Heated Oxygen Sensor Circuit High Input
P0140	Rear Heated Oxygen Sensor - No Activity Detected
P0171	Fuel Trim Too Lean
P0172	Fuel Trim Too Rich
P0300	Random Misfire Detected
P0301	Cylinders No. 1 Misfire Detected
P0302	Cylinders No. 2 Misfire Detected
P0303	Cylinders No. 3 Misfire Detected
P0304	Cylinders No. 4 Misfire Detected
P0335	Crankshaft Position Sensor Circuit Malfunction
P0401	EGR Flow Insufficient
P0402	EGR Flow Malfunction
P0420	Catalyst System Efficiency Below Limit (Except California Emissions)
P0421	Warm-Up Catalyst System Efficiency Below Limit (California Emissions)
P0442	EVAP System Malfunction - Leak Detected
P0443	EVAP System - Purge Control Valve Circuit Malfunction
P0451	Fuel Tank Pressure (FTP) Sensor Stuck Low
P0452	EVAP System - Pressure Sensor Low Input
P0453	EVAP System - Pressure Sensor Low Input
P0455	EVAP System Malfunction - Excessive Leak Detected
P0461	Fuel Level Sensor Circuit Performance
P0462	Fuel Level Sensor Circuit Low Input
P0463	Fuel Level Sensor Circuit High Input
P0464	Fuel Level Sensor Circuit Performance (Slosh Check)
P0500	Vehicle Speed Sensor (VSS) Malfunction
P0506	Idle Control System RPM Lower Than Expected
P0507	Idle Control System RPM Higher Than Expected
P0550	Power Steering Switch Malfunction
P0703	Brake Switch Malfunction
P0704	Clutch Switch Input Circuit Malfunction (M/T)
P0705	Neutral Switch Input Circuit Malfunction (M/T)
P1102	

	MAF Sensor Inconsistent With TP Sensor (Lower Than Expected)
P1103	MAF Sensor Inconsistent With RPM Sensor (Higher Than Expected)
P1122	TP Sensor Stuck Closed
P1123	TP Sensor Stuck Open
P1135	Front Heated Oxygen Sensor Low Heater Circuit Input
P1136	Front Heated Oxygen Sensor High Heater Circuit Input
P1141	Rear Heated Oxygen Sensor Low Heater Circuit Input
P1142	Rear Heated Oxygen Sensor High Heater Circuit Input
P1170	Front Heated Oxygen Sensor - Inversion
P1250	Pressure Regulator Control (PRC) Solenoid Valve Malfunction
P1345	No SGC Signal
P1449	Canister Drain Cut Valve (CDCV) - Open Or Short Circuit
P1450	EVAP System Malfunction - Excessive Leak Detected
P1487	EGR Boost Sensor Solenoid Valve - Open Or Short Circuit
P1496	EGR Valve Stepping Motor No. 1 Coil - Open Or Short Circuit
P1497	EGR Valve Stepping Motor No. 2 Coil - Open Or Short Circuit
P1498	EGR Valve Stepping Motor No. 3 Coil - Open Or Short Circuit
P1499	EGR Valve Stepping Motor No. 4 Coil - Open Or Short Circuit
P1504	Idle Air Control Circuit Malfunction
P1512	Variable Tumble Control System (VTCS) Malfunction
P1562	Low Voltage To PCM Power Supply Circuit
P1569	Variable Tumble Control System (VTCS) Solenoid Valve Circuit, Low Input
P1570	Variable Tumble Control System (VTCS) Solenoid Valve Circuit, High Input
P1631	Generator Malfunction
P1632	Battery Voltage Circuit Malfunction
P1633	Battery Voltage Circuit - Overcharging Condition
P1634	Generator Battery Terminal - Open Circuit

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

Condition

DTC is set when input voltage from MAF sensor is less than .21 volt once ignition is switch to ON position. Possible causes are:

- MAF sensor malfunction.
- MAF sensor intake air passage is blocked.
- Poor connection of PCM and MAF sensor connectors.
- Incorrect intake manifold pressure.
- Open or short to ground of Light Green/Black wire between terminal No. 88 on Powertrain Control Module (PCM) and terminal "C" on MAF sensor.
- Open of White/Red wire between terminal "D" on main relay and terminal "A" on MAF sensor.
- Open of Black/White wire between ground and terminal "B" on MAF sensor.
- Open circuit between ground and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Using scan tool, check for DTCs and pending codes. If DTCs P0443, P1250, P1345, P1449, P1487, P1496, P1497, P1498, P1499, P1569 or P1570 are present, go to next step. If listed DTCs are not present, go to step 4.
3. Check for open of White/Red wire between terminal "D" on main relay and purge solenoid valve, PRC solenoid valve, Camshaft Position (CMP) sensor, Exhaust Gas Recirculating (EGR) boost solenoid valve, canister drain cut valve, EGR valve or VTCS solenoid valve, individually. Also check for open between ground and terminals No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM, individually. See **Fig. 5**. Repair as needed and go to step 12.
4. Check poor connections at MAF sensor and PCM connectors. Repair as needed and go to step 12. If connectors are okay, go to next step.
5. Check intake air system. Repair as needed and go to step 12. If intake air system is okay, go to next step.
6. Turn ignition off. Disconnect MAF sensor connector. Turn ignition on. Measure voltage between ground and terminal "A" on harness connector. If battery voltage is present, go to next step. If battery voltage is not present, check for open or short of White/Red wire between terminal "C" on MAF sensor and terminal "D" on main relay. Repair as needed and go to step 12. If wire is okay, go to next step.
7. Turn ignition off. Disconnect PCM connector. Check for open of Black/White wire between terminal "B" on MAF sensor and terminal No. 77 on PCM connector. See **Fig. 5**. Repair as needed and go to step 12. If wire is okay, go to next step.
8. Check for open of Light Green/Black wire between terminal "C" on MAF sensor and terminal No. 88 on PCM connector. See **Fig. 5**. Repair as needed and go to step 12. If wire is okay, go to next step.
9. Check for short to ground of circuit between terminal No. 88 on PCM connector and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM, individually. See **Fig. 5**. Repair as needed and go to step 12. If wire is okay, go to next step.
10. Check MAF sensor for blockage. Repair as needed and go to step 12. If MAF sensor is free of foreign material, go to next step.
11. Ensure ignition if off. Reconnect MAF sensor and PCM connectors. Using scan tool, access PID/DATA MONITOR. Record PID data for MAF V when air is blown into MAF sensor. If MAF V PID change when air is blown into MAF sensor, go to next step. If MAF V PID does not change when air is blown into MAF sensor, replace MAF sensor and go to next step.
12. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace or reprogram PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

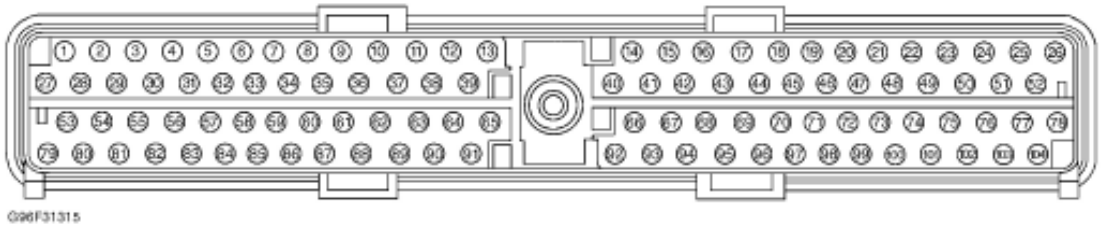

Fig. 5: Identifying Powertrain Control Module (PCM) Connector
Courtesy of MAZDA MOTORS CORP.

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 once ignition is switch to ON position. Possible causes are:

- MAF sensor malfunction.
- Incorrect intake manifold pressure.
- Short to power of Light Green/Black wire between terminal No. 88 on Powertrain Control Module (PCM) and terminal "C" on MAF sensor.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect air intake system. Repair as needed and go to step 4. If air intake system is okay, go to next step.
2. Turn ignition off. Disconnect MAF sensor and PCM connectors. Check continuity between terminals No. 88 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in Light Green/Black wire between terminal No. 88 on PCM harness connector and MAF harness connector and go to step 4. See **Fig. 5**. If continuity is not present, go to next step.
3. Ensure ignition if off. Remove MAF sensor. Reconnect MAF sensor PCM connectors. Using scan tool, access PID/DATA MONITOR. Record PID data for MAF V when air is blown into MAF sensor. If MAF V PID change when air is blown into MAF sensor, go to next step. If MAF V PID does not change when air is blown into MAF sensor, replace MAF sensor and go to next step.
4. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace or reprogram PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0106: BARO CIRCUIT PERFORMANCE PROBLEM

Condition

DTC is set when difference between intake manifold vacuum and atmospheric pressure is less than 1.9 in. Hg and engine coolant temperature is more than 176°F (80°C). EGR boost sensor detects atmospheric pressure by switching EGR boost sensor solenoid valve. Possible causes are:

- EGR boost sensor malfunction.

- Loose, damaged, misrouted or plugged vacuum hoses between EGR boost sensor and EGR boost solenoid valve, and between EGR pipe and EGR boost solenoid valve.
- EGR boost sensor air filter plugged.
- EGR boost solenoid valve stuck open or closed.
- EGR boost sensor power supply circuit, low voltage.
- EGR boost sensor ground circuit, high voltage.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect EGR boost sensor, EGR boost solenoid valve or PCM harness connectors. Repair as needed and go to step 8. If connectors are okay, go to next step.
2. Using scan tool, check for DTCs and pending codes. If DTCs P0107, P0108 or P1487 are present, repair as needed and go to step 8. If listed DTCs are not present, go to next step.
3. Check for loose, damaged, misrouted or plugged vacuum hoses between EGR boost sensor and EGR boost solenoid valve, and between EGR pipe and EGR boost solenoid valve. Repair or replace as needed and go to step 8. If vacuum hoses are okay, go to next step.
4. Check for plugged EGR boost sensor air filter. Repair or replace as needed and go to step 8. If filter is okay, go to next step.
5. Check for a stuck open or closed EGR boost sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 8. If EGR boost sensor is okay, go to next step.
6. Turn ignition off. Disconnect EGR boost sensor connector. Turn ignition on. Check for voltage between ground and EGR boost sensor harness connector terminal "C" (Pink/Black wire). See **Fig. 11**. If 5 volts is present, go to next step. If 5 volts is not present, go to step 9. Repair as needed and go to step 8.
7. Reconnect EGR boost sensor connector. Turn ignition on. Disconnect PCM connector. To check EGR boost sensor ground circuit, measure voltage between ground and terminal No. 91 (Orange wire) on PCM harness connector. See **Fig. 5**. See PIN VOLTAGE/PID VALUE CHARTS article for test results. If voltage at terminal No. 91 (Orange wire) on PCM harness connector is within specification, go to next step. If voltage at terminal No. 91 (Orange wire) on PCM harness connector is not within specification, check harness and connectors related to PCM connector terminal No. 91 (Orange wire) and go to next step.
8. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace or reprogram PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.
9. Ensure EGR boost sensor connector is disconnected. Turn ignition on. Measure voltage between ground and power supply circuit (Orange wire) on EGR boost sensor harness connector. See **Fig. 11**. If voltage is more than 6 volts, go to step 21. If voltage is not more than 6 volts, go to next step.
10. If battery voltage is more than 10.5 volts, go to next step. If battery voltage is not more than 10.5 volts, check charging system.
11. Turn ignition off. Measure voltage between positive battery terminal and terminal "A" (Orange wire) on EGR boost sensor harness connector. See **Fig. 11**. If voltage is more than 10.5 volts and is within one volt of battery voltage, go to next step. If volage is not as specified, go to step 16.
12. Turn ignition on. Using scan tool, attempt to access ECT PID. If ECT PID can be accessed, go to step 15. If ECT PID can not be accessed, go to next step.

13. Turn ignition off. Disconnect TP sensor, EGR boost sensor, fuel tank pressure sensor and PCM connectors. Turn ignition on. Measure voltage between terminals No. 71 (White/Black wire) or No. 97 (White wire) and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) or No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If voltage is more than 10.5 volts, go to next step. If voltage is not more than 10.5 volts, repair open in circuits between main relay and terminal No. 71 (White/Black wire) or No. 97 (White wire) on PCM harness connector.
14. Measure resistance between terminal No. 90 (Pink/Black wire) and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) or No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If resistance is more than 10,000 ohms, replace or reprogram PCM and repeat this step. If resistance is not more than 10,000 ohms, check for short to ground in suspect wire.
15. Turn ignition off. Ensure TP sensor is disconnected. Disconnect PCM connector. Measure resistance of Pink/Black wire between terminal No. 90 of PCM harness connector and terminal "C" on EGR boost sensor. See **Fig. 11**. If resistance is less than 5 ohms, replace or reprogram PCM and repeat this step. If resistance is not less than 5 ohms, check for open in Pink/Black wire between PCM and EGR boost sensor.
16. Reconnect TP sensor connector. Turn ignition on. Using scan tool, attempt to access ECT PID. If ECT PID can not be accessed, go to step 19. If ECT PID can be accessed, go to next step.
17. Using scan tool, check for DTCs P0106, P0107, P0108, P0111, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0130, P0134, P0138, P0140, P0452, P0453, P1122 or P1123. If 2 or more of listed DTCs are present, go to next step. If 2 or more of listed DTCs are not present, check for open in Orange wire between EGR boost sensor and terminal No. 91 on PCM harness connector. See **Fig. 5**.
18. Disconnect PCM connector. Check resistance of Orange wire between terminal No. 91 on PCM harness connector and terminal "A" on EGR boost sensor. See **Fig. 5** and **Fig. 11** . If resistance is less than 5 ohms, reconnect EGR boost sensor connector and repair DTCs set in previous step. If resistance is not less than 5 ohms, check for open in Orange wire between PCM and EGR boost sensor. Repair as needed.
19. Turn ignition off. Ensure PCM connector is disconnected. Measure resistance between negative battery terminal and terminals No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If resistance is less than 5 ohms, go to next step. If resistance is not less than 5 ohms, repair open in suspect wire.
20. Ensure ignition is off. Measure resistance between ground and ground circuit (Orange wire) on TP sensor, EGR boost sensor, fuel tank pressure sensor, ECT sensor, IAT sensor, front and rear heated oxygen sensor connectors. If resistance is less than 5 ohms, replace or reprogram PCM and repeat this step. If resistance is not less than 5 ohms, for open in Orange wire between listed sensors.
21. Ensure TP sensor, EGR boost sensor, fuel tank pressure sensor and PCM connectors are disconnected. Turn ignition on. Measure voltage between constant voltage (Pink/Black wire) and negative battery terminal. If 5 volts is present, replace or reprogram PCM and repeat this step. If 5 volts is not present, check for short to power in Pink/Black wire.

DTC P0107: BARO CIRCUIT LOW INPUT

Condition

DTC is set when input voltage from BARO sensor is less than 1.99 volts and ignition is on. Possible causes are:

- EGR boost sensor malfunction.
- Poor connection of PCM and EGR boost sensor connectors.
- Short to ground in Pink wire between EGR boost sensor connector and PCM connector terminal No. 34.
- Open in Orange wire between EGR boost sensor connector and PCM connector terminal No. 91.
- Open in Pink/Black wire between EGR boost sensor connector and PCM connector terminal No. 90.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect EGR boost sensor and PCM harness connectors. Repair as needed and go to step 6. If connectors are okay, go to next step.
2. Turn ignition off. Disconnect EGR boost sensor connector. Turn ignition on. Check for voltage between ground and Pink/Black wire on EGR boost sensor harness connector. If 5 volts is present, go to next step. If 5 volts is not present, check for open Pink/Black wire between EGR boost sensor connector terminal "B" and PCM connector terminal No. 90. See **Fig. 5** and **Fig. 11** . Repair as needed and go to step 6.
3. Turn ignition off. Disconnect PCM connector. Check continuity in Pink wire between EGR boost sensor harness connector and PCM harness connector terminal No. 34. See **Fig. 5** and **Fig. 11** .
4. Check for continuity between PCM harness connector terminal No. 34 (Pink wire) and terminals No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire). See **Fig. 5**. If continuity is present, check for short to ground. Repair as needed and go to step 6. If continuity is not present, go to next step.
5. Inspect EGR boost sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 6. If EGR boost sensor is okay, go to next step.
6. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace or reprogram PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0108: BARO CIRCUIT HIGH INPUT

Condition

DTC is set when input voltage from BARO sensor is less than 4.3 volts and ignition is on. Possible causes are:

- EGR boost sensor malfunction.
- Short to power in Pink wire between EGR boost sensor connector and PCM connector terminal No. 34.
- Short to power or open in Orange wire between EGR boost sensor connector and PCM connector terminal No. 91.
- Short to power in Pink/Black wire between EGR boost sensor connector and PCM connector terminal No. 90.
- Open circuit between ground and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect EGR boost sensor and PCM harness connectors. Repair as needed and go to step 7. If connectors are okay, go to next step.
2. Turn ignition off. Disconnect EGR boost sensor connector. Turn ignition on. Check for voltage between ground and Pink/Black wire on EGR boost sensor harness connector terminal. If 5 volts is present, go to next step. If 5 volts is not present, go to step 4.
3. Check for open or short to power in Orange wire between PCM harness connector terminal No. 91 and IAT sensor, ECT sensor, TP sensor, front heated oxygen sensor and fuel tank pressure sensor connectors, individually. Also check for open or short to power between negative battery terminal and 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. Repair as needed and go to step 7.
4. Turn ignition off. Disconnect PCM connector. Check continuity in Orange wire between EGR boost sensor harness connector and PCM harness connector terminal No. 91. See **Fig. 5**. If continuity is present, go to next step. If continuity does not exit, check for short to power in Pink/Black wire between EGR boost sensor connector and PCM harness connector terminal No. 90. Repair as needed and go to step 7.
5. Check for continuity between PCM harness connector terminal No. 34 (Pink wire) and terminals No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire). See **Fig. 5**. If continuity is present, check for short to ground. Repair as needed and go to step 7. If continuity is not present, go to next step.
6. Inspect EGR boost sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to next step. If EGR boost sensor is okay, go to next step.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace or reprogram PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0111: INTAKE AIR TEMPERATURE (IAT) SENSOR PERFORMANCE PROBLEM

NOTE: IAT sensor is part of Mass Air Flow (MAF) sensor.

Conditions

DTC is set when intake air temperature is 104° F (40° C) greater than engine coolant temperature and ignition is on. Possible causes are:

- IAT sensor malfunction.
- ECT sensor malfunction.
- IAT sensor circuit high or low input.
- ECT sensor circuit high or low input.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect IAT sensor, ECT sensor and PCM connectors. Repair as needed and go to step 7.
2. Verify stored DTCs and pending codes. If DTCs P0112, P0113, P0117 or P0118 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, go to next step.
3. Using scan tool, access PID/DATA MONITOR. Record PID readings for IAT. Compare reading with

ambient temperature. If PID readings for IAT correspond with ambient temperature, go to step 5. If PID readings for IAT do not correspond with ambient temperature, go to next step.

4. Inspect IAT sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 7. If IAT sensor is okay, go to next step.
5. Allow engine to cool. Using scan tool, access PID/DATA MONITOR. Start engine and allow it to reach normal operating temperature. Record PID readings for ECT. If PID readings for ECT increase to more than 104° F (40° C), go to step 7. If PID readings for ECT does not increase to more than 104° F (40° C), go to next step.
6. Inspect ECT sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to next step. If ECT sensor is okay, go to next step.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

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

NOTE: IAT sensor is part of Mass Air Flow (MAF) sensor.

Conditions

DTC is set when voltage from IAT sensor is less than .16 volts and ignition if on. Possible causes are:

- IAT sensor malfunction.
- Poor MAF sensor and PCM connections.
- Short to ground in Blue/White wire between PCM connector terminal No. 39 and MAF sensor connector.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect MAF sensor and PCM connectors. Repair as needed and go to step 4.
2. Turn ignition off. Disconnect MAF sensor and PCM connectors. Check continuity between PCM harness connector terminal No. 39 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire). See **Fig. 5**. If continuity is present, repair suspect wire and go to step 4. If continuity is not present, go to next step.
3. Inspect IAT sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to next step. If IAT sensor is okay, go to next step.
4. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

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

NOTE: IAT sensor is part of Mass Air Flow (MAF) sensor.

Conditions

DTC is set when voltage from IAT sensor is more than 4.84 volts and ignition if on. Possible causes are:

- IAT sensor malfunction.
- Poor MAF sensor and PCM connections.
- Open or short to power in Blue/White wire between MAF sensor connector and PCM connector terminal No. 39.
- Open in Orange wire between MAF sensor connector and PCM connector terminal No. 91.
- Open circuit between negative battery terminal and PCM connector terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect MAF sensor and PCM connectors. Repair as needed and go to step 7.
2. Verify stored DTCs and pending codes. If DTCs P0108, P0118, P0123, P0134 or P0453 are present, go to next step. If listed DTCs are not present, go to step 7.
3. Check for open or short to power in Orange wire between PCM harness connector terminal No. 91 and EGR boost sensor, ECT sensor, TP sensor, heated oxygen sensor and fuel tank pressure sensor connectors, individually. See **Fig. 5**. Also check for open or short to power between negative battery terminal and PCM connector terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire). Repair as needed and go to step 7.
4. Turn ignition off. Disconnect MAF sensor connector. Turn ignition on. Check for voltage between ground and Blue/White wire at MAF sensor harness connector. If 5 volts is present, go to next step. If 5 volts is not present, check for open or short to power in Blue/White wire between MAF sensor and PCM. Repair as needed and go to step 7.
5. Check continuity in Orange wire between PCM harness connector terminal No. 91 and MAF sensor connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, repair open in Orange wire and go to step 7.
6. Inspect IAT sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to next step. If IAT sensor is okay, go to next step.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

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.
- Poor connection at ECT sensor and PCM connectors.
- Open or short to ground in Red/Blue wire between ECT sensor and terminal No. 38 on Powertrain Control Module (PCM).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect ECT sensor and PCM harness connectors. Repair as needed and go to step 4. If connectors are okay, go to next step.
2. Disconnect ECT sensor and PCM connectors. Check for continuity between PCM connector terminal No. 38 (Red/Blue wire) and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire), individually. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 4. If continuity is not present, go to next step.
3. Inspect ECT sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to next step. If ECT sensor is okay, go to next step.
4. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

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

Condition

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

- ECT sensor malfunction.
- Short to power in Red/Blue wire between ECT sensor and Powertrain Control Module (PCM) connector terminal No. 38.
- Open in Orange wire between terminal No. 91 on Powertrain Control Module (PCM) and ECT sensor.
- Open circuit between negative battery terminal and PCM connector terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect ECT sensor and PCM harness connectors. Repair as needed and go to step 7. If connectors are okay, go to next step.
2. Verify stored DTCs and pending codes. If DTCs P0108, P0113, P0123, P0134 or P0453 are present, go to next step. If listed DTCs are not present, go to step 7.
3. Check for open or short to power in Orange wire between PCM harness connector terminal No. 91 and EGR boost sensor, IAT sensor, TP sensor, heated oxygen sensor and fuel tank pressure sensor connectors, individually. See Fig. 5. Also check for open or short to power between negative battery terminal and PCM connector terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire). Repair as needed and go to step 7.
4. Turn ignition off. Disconnect ECT sensor connector. Turn ignition on. Measure voltage between ground and Red/Blue wire on ECT sensor harness connector. If 5 volts is present, go to next step. If 5 volts is not present, check for short to power in Red/Blue wire between ECT sensor and PCM connector terminal No. 38. See **Fig. 5**. Repair as needed and go to step 7.
5. Turn ignition off. Disconnect PCM connector. Check for continuity in Orange wire between ECT sensor harness connector and PCM harness connector terminal No. 91. See **Fig. 5**. If continuity is

present, go to next step. If continuity is not present, check for open in Orange wire between ECT sensor and PCM. Repair as needed and go to step 7.

6. Inspect ECT sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. If ECT sensor is okay, go to next step.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

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.
- Poor connection at PCM and TP sensor connectors.
- Short to ground in Brown/Yellow wire between terminal No. 89 on Powertrain Control Module (PCM) and TP sensor.
- Open in Pink/Black wire between terminal No. 90 on Powertrain Control Module (PCM) and TP sensor.
- Open in Orange wire between terminal No. 91 on Powertrain Control Module (PCM) and TP sensor.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect TP sensor and PCM harness connectors. Repair as needed and go to step 6. If connectors are okay, go to next step.
2. Turn ignition off. Disconnect TP sensor connector. Turn ignition on. Measure voltage between ground and Pink/Black wire at TP sensor harness connector. If 5 volts is present, go to next step. If 5 volts is not present, check for open in Pink/Black wire between PCM connector terminal No. 90 and TP sensor. See **Fig. 5**. If wire is okay, check for loose or corroded connector terminals. Repair as needed and go to step 6.
3. Turn ignition off. Disconnect PCM connector. Check continuity in Brown/Yellow wire between TP harness connector and terminal No. 89 on PCM harness connector. See **Fig. 5**. If continuity does not exits, check for open in Brown/Yellow wire. Repair as needed and go to step 6. If continuity is present, go to next step.
4. Check continuity between PCM connector terminals No. 89 (Brown/Yellow wire) and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire), individually. See **Fig. 5**. If continuity is present, check for short to ground is suspect wire. Repair as needed and go to step 6. If continuity is not present, go to next step.
5. Reconnect TP sensor and PCM connectors. Using scan tool, access PID/DATA MONITOR. Record PID readings for TP V. Turn ignition on. Slowly depress accelerator pedal to wide open throttle. TP V PID should increase evenly as throttle opening is increased. If TP V PID changes as specified, go to next step. If TP V PID does not change as specified, replace TP sensor and go to next step.
6. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally

set.

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

Condition

DTC is set when input voltage from TP sensor is greater than 4.8 volts when ignition is turned on. Possible causes are:

- TP sensor malfunction.
- Open or short to power in Orange wire between terminal No. 91 on Powertrain Control Module (PCM) and TP sensor.
- Short to power in Pink/Black wire between terminal No. 90 on Powertrain Control Module (PCM) and TP sensor.
- Short to power in Brown/Yellow wire between terminal No. 89 on Powertrain Control Module (PCM) and TP sensor.
- Open circuit between negative battery terminal and PCM connector terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs and pending codes. If DTCs P0108, P0113, P0118, P0134 or P0453 are present, go to next step. If listed DTCs are not present, go to step 8.
2. Check for open or short to power in Orange wire between PCM harness connector terminal No. 91 and EGR boost sensor, IAT sensor, ECT sensor, front heated oxygen sensor and fuel tank pressure sensor connectors, individually. See **Fig. 5**. Also check for open or short to power between negative battery terminal and PCM connector terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire), individually. See **Fig. 5**. Repair as needed and go to step 8.
3. Turn ignition off. Disconnect TP sensor connector. Turn ignition on. Measure voltage between ground and Pink/Black wire at TP sensor harness connector. If 5 volts is present, go to next step. If 5 volts is not present, check for short to power in Pink/Black wire between PCM connector terminal No. 90 and TP sensor. See **Fig. 5**. Repair as needed and go to step 8.
4. Turn ignition off. Disconnect PCM connector. Check for continuity in Orange wire between TP sensor connector and PCM harness connector terminal No. 91. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for open in Orange wire between TP sensor and PCM. Repair as needed and go to step 8.
5. Check for continuity PCM harness connector terminals No. 91 (Orange wire), and No. 71 (White/Black wire) and No. 97 (White wire), individually. See **Fig. 5**. If continuity is present, check for short to power in suspect wire and go to step 8. If continuity is not present, go to next step.
6. Check for continuity PCM harness connector terminals No. 89 (Brown/Yellow wire), and No. 71 (White/Black wire) and No. 97 (White wire), individually. See **Fig. 5**. If continuity is present, check for short to power in suspect wire and go to step 8. If continuity is not present, go to next step.
7. Reconnect TP sensor and PCM connectors. Using scan tool, access PID/DATA MONITOR. Record PID readings for TP V. Turn ignition on. Slowly depress accelerator pedal to wide open throttle. TP V PID should increase evenly as throttle opening is increased. If TP V PID changes as specified, go to next step. If TP V PID does not change as specified, replace TP sensor and go to next step.

8. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

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.
- Thermostat malfunction.
- Engine cooling fan system malfunction.
- Water pump malfunction.
- Engine coolant passage clogged or leaks.
- Engine coolant level or mixture incorrect.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect cooling fan system. See appropriate article in ENGINE COOLING. Repair as needed and go to step 5. If cooling fan system is okay, go to next step.
2. Inspect ECT sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 5. If ECT sensor is okay, go to next step.
3. Using scan tool, access PID/DATA MONITOR. Record PID data for ECT. Ensure ECT PID increases to normal operating temperature with engine. See PIN VOLTAGE/PID VALUE CHARTS article. If data is not within specification, go to next step. If data is within specification, go to step 5.
4. Inspect engine cooling system. Check water pump, drive belt, thermostat, coolant level and correct mixture. Repair as needed and go to next step. If cooling system is okay, go to next step.
5. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent system malfunction may have caused DTC to originally set.

DTC P0130: FRONT HEATED OXYGEN SENSOR MALFUNCTION

Condition

DTC is set when front heated oxygen sensor signal fluctuates at longer intervals than allowed during normal driving conditions. For this DTC to set the vehicle must be under the following conditions: Engine load should be at 20-59 percent, engine speed should be 1410-4000 RPM, vehicle speed should be over 2.4 MPH (3.8 km/h), engine load variation should be less then 40 percent (A/T) or 32 percent (M/T), throttle valve opening angle variation should be less than 13.3 percent (A/T) or 7 percent (M/T), engine coolant temperature should be more than 14°F (-10°C), and engine speed should not vary more than 594 RPM. Possible causes are:

- Front heated oxygen sensor.
- Fuel injection system malfunction.

- Pressure Regulator Control (PRC) solenoid valve malfunction.
- Pulsation damper malfunction.
- Pressure regulator malfunction.
- Fuel pump malfunction.
- Plugged fuel filter.
- Fuel delivery hose plugged or leaking.
- Fuel return hose plugged.
- Leaking intake system.
- Leaking exhaust system.
- PCV valve malfunction.
- Purge solenoid valve malfunction.
- Purge solenoid hoses misrouted.
- Ignition coil malfunction.
- Insufficient compression.
- Mass Air Flow (MAF) sensor malfunction.
- Engine Coolant Temperature (ECT) sensor malfunction.
- Throttle Position (TP) sensor malfunction.
- Vehicle Speed Sensor (VSS) malfunction.
- Exhaust Gas Recirculation (EGR) system malfunction.
- Open or short in wiring harness.
- Poor connector connections.
- Damaged or loose vacuum hoses.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA and DIAGNOSTIC MONITORING TEST results have been recorded. Verify stored DTCs. If DTCs P0102, P0103, P0117, P0118, P0122, P0123, P0125, P0443, P0500, P1102, P1103, P1122, P1123, P1250, P1496, P1497, P1498 and/or P1499 are present, repair those DTC(s) first and go to step 26. If listed DTCs are not present, go to next step.
2. Verify if DTCs P0130 is present in FREEZE FRAME PID DATA. If DTC is present, go to next step. If DTC is not present, repair any other DTC(s) present in FREEZE FRAME PID DATA and go to step 26.
3. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L 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, go to next step. If no test exceeds MAX value, problem may be intermittent. Ensure all applicable connections are clean and tight. Recheck for DTCs.
4. Using scan tool, access PID/DATA MONITOR. Record PID data for MAF V, ECT V, TP V, RPM and VS. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
5. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for MAF V, ECT V, TP V, RPM and VS. Compare readings with specifications.

See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.

6. Check for exhaust gas leaks upstream of front heated oxygen sensor. Repair as needed and go to step 26. If exhaust system is okay, go to next step.
7. Ensure front heated oxygen sensor is installed properly. Repair as needed and go to step 26. If heated oxygen sensor is installed properly, go to next step.
8. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to Wide Open Throttle (WOT) and release to race engine. Scan tool should display front heated oxygen sensor voltage greater than .45 volt during rich condition and less than .45 volt during lean condition. If voltage is as specified, go to next step. If voltage is not as specified, replace heated oxygen sensor and retest.
9. Inspect heated oxygen sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 26. If heated oxygen sensor is okay, go to next step.
10. Check for open in circuits between each fuel injector and PCM or main relay. Repair as needed and go to step 26. If circuits are okay, go to next step.
11. Perform a volume check for each fuel injector. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 26. If fuel injectors are okay, go to next step.
12. Monitor LONGFT1 and SHRTFT1 on FREEZE FRAME PID DATA. If fuel trim is shifting to lean condition, go to next step. If fuel trim is inactive or slow to respond, go to step 17.
13. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 26. If purge solenoid valve is okay, go to next step.
14. Inspect PCV valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 26. If PCV valve is okay, go to next step.
15. Check fuel pressure. See BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is as specified, check for fuel leakage and injection volume. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 26. If fuel pressure is not okay, go to next step.
16. Inspect PRC solenoid valve purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 26. If PRC solenoid valve is okay, check for plugged fuel return hose and go to step 26.
17. Inspect air intake system for leaks. Repair as needed and go to step 26. If intake system leaks are not found, go to next step.
18. Check for correct amount of vacuum at intake manifold. Repair as needed and go to step 26. If vacuum is okay, go to next step.
19. Check fuel pressure. See BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is as specified, go to step 23. If fuel pressure is not okay, go to next step.
20. Check maximum fuel pump pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum fuel pump pressure is as specified, go to step 26. If maximum fuel pump pressure is not okay, go to next step.
21. Check pulsation damper. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step . If pulsation damper is okay, inspect fuel filter for plugging. Replace as needed and go to next step. If fuel filter 5is okay, inspect fuel tank for foreign materials. Clean fuel tank and fuel line between fuel tank and fuel filter. Replace fuel filter and go to step 26. If inside of fuel tank is okay, replace fuel filter and go to step 26.

22. Inspect fuel line between fuel rail and fuel pump for leaks and plugging. Repair as needed and go to step 26. If fuel line is okay, replace pressure regulator and go to step 26.
23. Ensure secondary ignition system, including ignition coil, is working properly. See BASIC DIAGNOSTIC PROCEDURES article. Repair as needed and go to step 26. If secondary ignition system is working properly, check for poor connections and damaged wire harness between ignition coil and PCM. Repair as needed and go to step 26. If wire harness and connectors are okay, go to next step.
24. If equipped, inspect EGR valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 26. If EGR valve is okay, go to next step.
25. Check for internal cooling system leaks. Repair as needed and go to next step. If cooling system is okay, check engine compression. Repair as needed and go to next step. If engine compression is okay, go to next step.
26. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent system malfunction may have caused DTC to originally set.

DTC P0134: FRONT HEATED OXYGEN SENSOR - NO ACTIVITY DETECTED

Condition

DTC is set when front heated oxygen sensor signal voltage does not exceed .55 volt for 94.4 seconds after engine has reached normal operating temperature. Engine speed at 1500 RPM or greater. Possible causes are:

- Front heated oxygen sensor
- Open or short in Pink/Blue wire between front heated oxygen sensor and PCM connector terminal No. 60.
- Open or short in Black/Blue wire between front heated oxygen sensor and main relay.
- Poor connections at PCM and front heated oxygen sensor connectors.
- Fuel injector malfunction.
- Pressure regulator malfunction.
- Fuel pump malfunction.
- Fuel delivery hose or fuel filter plugged or leaking.
- Intake system leaks.
- Exhaust system leaks.
- Ignition coil or ignitor malfunction. Ignitor is part of ignition coil.
- Insufficient compression.
- MAF sensor malfunction.
- ECT sensor malfunction.
- TP sensor malfunction.
- EGR system malfunction, if equipped.
- Damaged or loose vacuum hoses.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs P0102,

P0103, P0117, P0118, P0122, P0123, P0443, P0500, P1102, P1103, P1122, P1496, P1497, P01498 and/or P1499 are present, repair those DTC(s) first and go to step 18. If listed DTCs are not present, go to next step.

2. Verify if DTC P0134 is present in FREEZE FRAME PID DATA. If DTC is present, go to next step. If DTC is not present, repair DTC(s) present in FREEZE FRAME PID DATA and go to step 18.
3. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Referring to FREEZE FRAME PID DATA data, operate vehicle for at least 2 minutes under same conditions as when DTC was set (RPM, engine coolant temperature and vehicle speed). Verify if DTC P0134 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 and go to step 18.
4. Using scan tool, access PID/DATA MONITOR. Record PID data for ECT V, RPM and TP V. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
5. Check for exhaust system leaks. Repair as needed and go to step 18. If exhaust system is okay, check front heated oxygen sensor installation. Repair as needed and go to step 18. If front heated oxygen sensor is installed properly, go to next step.
6. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to Wide Open Throttle (WOT) and release to race engine. Scan tool should display heated oxygen sensor voltage greater than .45 volt during rich condition and less than .45 volt during lean condition. If voltage is as specified, go to next step. If voltage is not as specified, inspect heated oxygen sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair or replace as needed and go to step 18.
7. Check for open in White/Yellow wire between main relay and each fuel injector. Also check for open in circuits between each fuel injector and PCM. Repair as needed and go to step 18. If wires are okay, go to next step.
8. Perform a volume check for each fuel injector. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 18. If fuel injectors are okay, go to next step.
9. Inspect air intake system for leaks. Repair as needed and go to step 18. If intake system leaks are not found, go to next step.
10. Check for correct amount of vacuum at intake manifold. Repair as needed and go to step 18. If vacuum is okay, go to next step.
11. Check fuel pressure. See BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is as specified, go to step 15. If fuel pressure is not okay, go to next step.
12. Check maximum fuel pump pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum fuel pump pressure is as specified, go to step 18. If maximum fuel pump pressure is not okay, go to next step.
13. Inspect fuel filter for plugging. Replace as needed and go to next step. If fuel filter is okay, inspect fuel tank for foreign materials. Clean fuel tank and replace fuel filter and go to step 18. If inside of fuel tank is okay, replace fuel filter and go to step 18.
14. Inspect fuel line between fuel rail and fuel pump for leaks and plugging. Repair as needed and go to step 18. If fuel line is okay, replace pressure regulator and go to step 18.
15. Ensure secondary ignition system, including ignition coil, is working properly. See BASIC DIAGNOSTIC PROCEDURES article. Repair as needed and go to step 18. If secondary ignition system is working properly, check for poor connections and damaged wire harness between ignition coil and PCM. Repair as needed and go to step 18. If wire harness and connectors are okay, go to next

step.

16. If equipped, inspect EGR valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 18. If EGR valve is okay, go to next step.
17. Check for internal cooling system leaks. Repair as needed and go to next step. If cooling system is okay, check engine compression. Repair as needed and go to next step. If engine compression is okay, go to next step.
18. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent system malfunction may have caused DTC to originally set.

DTC P0138: REAR HEATED OXYGEN SENSOR CIRCUIT HIGH INPUT

Condition

DTC is set when rear heated oxygen sensor input exceeds .45 volt for 6 seconds during decelerations (fuel cut). Possible causes are:

- Rear heated oxygen sensor malfunction.
- Short to power in Yellow/Blue wire between PCM connector terminals No. 35 and rear heated oxygen sensor.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify if DTC P0138 is present in FREEZE FRAME PID DATA. If DTC is present, go to next step. If DTC is not present, repair DTC (s) present in FREEZE FRAME PID DATA and go to step 5.
2. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Referring to FREEZE FRAME PID DATA data, operate vehicle for at least 1 minutes under same conditions as when DTC was set (RPM, engine coolant temperature and vehicle speed). 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.
3. Inspect rear heated oxygen sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 5. If rear heated oxygen sensor is okay, go to next step.
4. Disconnect PCM connector. Check for continuity in Yellow/Blue wire between rear heated oxygen sensor and PCM harness connector terminal No. 35. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for short to power in Yellow/Blue wire between rear heated oxygen sensor and PCM.
5. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0140: REAR HEATED OXYGEN SENSOR - NO ACTIVITY DETECTED

Condition

DTC is set when rear heated oxygen sensor signal voltage does not exceed .55 volt for 30.4 seconds after engine has reached normal operating temperature. Engine speed at 1500 RPM or greater. Possible causes

are:

- Rear heated oxygen sensor.
- Rear heated oxygen sensor malfunction.
- Fuel injector malfunction.
- Pressure regulator malfunction.
- Fuel pump malfunction.
- Fuel filter plugged.
- Fuel delivery hose plugged or leaking.
- Leaking intake system.
- Leaking exhaust system.
- Ignition coil malfunction.
- Ignition control module (located in ignition coil) malfunction.
- Insufficient compression.
- MAF sensor malfunction.
- ECT sensor malfunction.
- TP sensor malfunction.
- EGR system malfunction.
- Open or short in wire harness.
- Poor connection as connectors.
- Damaged or loose vacuum hose.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0117, P0118, P0122, P0123, P0500, P1102, P1103, P1122, P1123, P1496, P1497, P01498 and/or P1499 are present, repair those DTC(s) first and go to step 20. If listed DTCs are not present, go to next step.
2. Verify if DTC P0140 is present in FREEZE FRAME PID DATA. If DTC is present, go to next step. If DTC is not present, repair DTC(s) present in FREEZE FRAME PID DATA and go to step 20.
3. Verify if pending code P0134 is present. If pending code is not present, go to next step. If DTC is present, repair DTC and go to step 20.
4. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Referring to FREEZE FRAME PID DATA data, operate vehicle for at least 2 minutes under same conditions as when DTC was set. Verify if DTC P0140 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.
5. Using scan tool, access PID/DATA MONITOR. Record PID data for ECT V, RPM and TP V. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
6. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for ECTV, RPM and TP V. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable

test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.

7. Check for exhaust system leaks. Repair as needed and go to step 20. If exhaust system is okay, check rear heated oxygen sensor installation. Repair as needed and go to step 20. If rear heated oxygen sensor is installed properly, go to next step.
8. Using scan tool, access PID/DATA MONITOR. Monitor RHO2S. Depress accelerator pedal to Wide Open Throttle (WOT) and release to race engine. Scan tool should display heated oxygen sensor voltage between 0-1 volt. Greater during rich condition and less during lean condition. If voltage is as specified, go to next step. If voltage is not as specified, inspect heated oxygen sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair or replace as needed and go to step 20.
9. Check for open in White/Yellow wire between main relay and each fuel injector. Also check for open in circuits between each fuel injector and PCM. Repair as needed and go to step 20. If wires are okay, go to next step.
10. Perform a volume check for each fuel injector. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 20. If fuel injectors are okay, go to next step.
11. Inspect air intake system for leaks. Repair as needed and go to step 20. If intake system leaks are not found, go to next step.
12. Check for correct amount of vacuum at intake manifold. Repair as needed and go to step 20. If vacuum is okay, go to next step.
13. Check fuel pressure. See BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is as specified, go to step 17. If fuel pressure is not okay, go to next step.
14. Check maximum fuel pump pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum fuel pump pressure is as specified, go to step 20. If maximum fuel pump pressure is not okay, go to next step.
15. Inspect fuel filter for plugging. Replace as needed and go to next step. If fuel filter is okay, inspect fuel tank for foreign materials. Clean fuel tank and replace fuel filter and go to step 20. If inside of fuel tank is okay, replace fuel filter and go to step 20.
16. Inspect fuel line between fuel rail and fuel pump for leaks and plugging. Repair as needed and go to step 20. If fuel line is okay, replace pressure regulator and go to step 20.
17. Ensure secondary ignition system, including ignition coil, is working properly. See BASIC DIAGNOSTIC PROCEDURES article. Repair as needed and go to step 20. If secondary ignition system is working properly, check for poor connections and damaged wire harness between ignition coil and PCM. Repair as needed and go to step 20. If wire harness and connectors are okay, go to next step.
18. If equipped, inspect EGR valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 20. If EGR valve is okay, go to next step.
19. Check for internal cooling system leaks. Repair as needed and go to next step. If cooling system is okay, check engine compression. Repair as needed and go to next step. If engine compression is okay, go to next step.
20. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent system malfunction may have caused DTC to originally set.

DTC P0171: FUEL TRIM TOO LEAN

Condition

DTC is set when fuel injection closed loop correction and learning correction are more than specified value do to a lean system. Possible causes are:

- Fuel injector malfunction.
- Fuel pump malfunction.
- Fuel filter plugged.
- Fuel delivery hose plugged or leaking.
- Pressure regulator malfunction.
- Purge Solenoid Valve (PRC) solenoid valve malfunction.
- Pulsation damper malfunction.
- Ignition coil malfunction.
- Secondary ignition wires.
- Spark plugs.
- Intake system leaks.
- Exhaust system leaks.
- Oil pan leaks.
- Insufficient compression.
- MAF sensor malfunction.
- ECT sensor malfunction.
- TP sensor malfunction.
- Front heated oxygen sensor.
- Vehicle Speed Sensor (VSS) malfunction.
- Open or short in wiring harness.
- Poor connector connection.
- Damaged or loose vacuum hoses.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0117, P0118, P0122, P0123, P0125, P0443, P0500, P1102, P1103, P1122 and/or P1123 are present, repair those DTC(s) first and go to step 18. If listed DTCs are not present, go to next step.
2. Verify if DTC P0171 is present in FREEZE FRAME PID DATA. If DTC is present, go to next step. If DTC is not present, repair DTC(s) present in FREEZE FRAME PID DATA and go to step 18.
3. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Referring to FREEZE FRAME PID DATA data, operate vehicle for at least 20 seconds under same conditions as when DTC was set. Verify if DTC P0171 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. Using scan tool, access PID/DATA MONITOR. Record PID data for ECT V, RPM and TP V. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
5. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was

set. Record PID data for ECTV, RPM and TP V. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.

6. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to Wide Open Throttle (WOT) and release to race engine. Scan tool should display heated oxygen sensor voltage greater than .45 volt during rich condition and less than .45 volt during lean condition. If voltage is as specified, go to next step. If voltage is not as specified, inspect heated oxygen sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair or replace as needed and go to step 18.
7. Inspect air intake system for leaks. Repair as needed and go to step 18. If intake system leaks are not found, go to next step.
8. Check for correct amount of vacuum at intake manifold. Repair as needed and go to step 18. If vacuum is okay, go to next step.
9. Check for exhaust system leaks. Repair as needed and go to step 18. If exhaust system is okay, go to next step.
10. Check fuel pressure. See BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is as specified, go to step 14. If fuel pressure is not okay, go to next step.
11. Check maximum fuel pump pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum fuel pump pressure is as specified, go to step 18. If maximum fuel pump pressure is not okay, go to next step.
12. Check pulsation damper. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 18. If pulsation damper is okay, inspect fuel filter for plugging. Replace as needed and go to next step. If fuel filter is okay, inspect fuel tank for foreign materials. Clean fuel tank. Replace fuel filter and go to step 18. If inside of fuel tank is okay, replace fuel filter and go to step 18.
13. Inspect fuel line between fuel rail and fuel pump for leaks and plugging. Repair as needed and go to step 18. If fuel line is okay, replace pressure regulator and go to step 18.
14. Check for open in White/Yellow wire between main relay and each fuel injector. Also check for open in circuits between each fuel injector and PCM. Repair as needed and go to step 18. If wires are okay, go to next step.
15. Perform a volume check for each fuel injector. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 18. If fuel injectors are okay, go to next step.
16. Ensure secondary ignition system, including spark plug, ignition wires and ignition coil, is working properly. See BASIC DIAGNOSTIC PROCEDURES article. Repair as needed and go to step 18. If secondary ignition system is working properly, check for poor connections and damaged wire harness between ignition coil and PCM. Repair as needed and go to step 18. If wire harness and connectors are okay, go to next step.
17. Check for internal cooling system leaks. Repair as needed and go to next step. If cooling system is okay, check engine compression. Repair as needed and go to next step. If engine compression is okay, go to next step.
18. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0172: FUEL TRIM TOO RICH

Condition

DTC is set when fuel injection closed loop correction and learning correction are greater than specified value because of system is too rich. Possible causes are:

- Fuel injector malfunction.
- Fuel return hose plugged.
- Fuel pressure regulator malfunction.
- Pressure Regulator Control (PRC) solenoid malfunction.
- Purge solenoid malfunction.
- PCV valve malfunction.
- Mass Airflow (MAF) sensor malfunction.
- Engine Coolant Temperature (ECT) sensor malfunction.
- TP sensor malfunction.
- Front heated oxygen sensor malfunction.
- Vehicle Speed Sensor (VSS) malfunction.
- Open or short in wiring harness.
- Poor connector connection.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0117, P0118, P0122, P0123, P0443, P0500, P1102, P1103, P1122 and/or P1123 are present, repair those DTC(s) first and go to step 13. If listed DTCs are not present, go to next step.
2. Verify if DTC P0172 is present in FREEZE FRAME PID DATA. If DTC is present, go to next step. If DTC is not present, repair DTC(s) present in FREEZE FRAME PID DATA and go to step 13.
3. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Referring to FREEZE FRAME PID DATA data, operate vehicle for at least 20 seconds under same conditions as when DTC was set. Verify if DTC P0172 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. Using scan tool, access PID/DATA MONITOR. Record PID data for ECT V, RPM and TP V. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
5. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to Wide Open Throttle (WOT) and release to race engine. Scan tool should display heated oxygen sensor voltage greater than .45 volt during rich condition and less than .45 volt during lean condition. If voltage is as specified, go to next step. If voltage is not as specified, inspect heated oxygen sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair or replace as needed and go to step 13.
6. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 13. If purge solenoid valve is okay, go to next step.
7. Inspect PCV valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 13. If PCV valve is okay, go to next step.

8. Check fuel pressure. See BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is as specified, check for fuel leakage and injection volume. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 13. If fuel pressure is not okay, go to next step.
9. Inspect PRC solenoid valve purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 13. If PRC solenoid valve is okay, check for plugged fuel return hose and go to step 13.
10. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for ECTV, RPM and TP V. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
11. Monitor LONGFT1 and SHRTFT1 on FREEZE FRAME PID DATA. If fuel trim is shifting to lean condition, go to next step. If fuel trim is inactive or slow to respond, inspect air intake system for leaks. Repair as needed and retest.
12. Monitor LONGFT1 and SHRTFT1 on GENERIC OBDII FUNCTIONS. Add values to data received in step **7)** . If values are within 15 percent, go to next step. If values are not within 15 percent, go to step 3.
13. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L 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 P0300: RANDOM MISFIRE DETECTED

Condition

DTC is set when PCM input signal from Crankshaft Position (CKP) sensor signal is irregular. Possible causes are:

- Ignition timing out of specification.
- Incorrect CKP sensor air gap.
- Secondary ignition system malfunction.
- Fuel injector malfunction.
- Fuel pump malfunction.
- Fuel filter plugged.
- Fuel delivery hose plugged or leaking.
- Fuel return hose plugged.
- Pressure regulator malfunction.
- Pressure Regulator Control (PRC) solenoid malfunction.
- Pulsation damper malfunction.
- Purge solenoid valve malfunction.
- PCV valve malfunction.
- Intake air system leaks.

- Insufficient compression.
- EGR system malfunction.
- Vibration of drive unit.
- Excessive load of accessories mounted to engine.
- MAF sensor malfunction.
- ECT sensor malfunction.
- IAT sensor malfunction.
- CKP sensor malfunction.
- CMP sensor malfunction.
- TP sensor malfunction.
- Front heated oxygen sensor malfunction.
- VSS malfunction.
- Break switch malfunction.
- Open or short in wiring harness.
- Poor connection of connectors.
- Damaged or loose vacuum hoses.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0111, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0335, P0443, P0500, P0703, P1102, P1103, P1122, P1123, P1496, P1497, P1498 and/or P1499 are present, repair those DTC(s) first and go to step 18. If listed DTCs are not present, go to next step.
2. Verify if DTC P0300 is present in FREEZE FRAME PID DATA. If DTC is present, go to next step. If DTC is not present, repair DTC(s), present in FREEZE FRAME PID DATA and go to step 24.
3. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Race engine in neutral 2 to 3 times. Referring to FREEZE FRAME PID DATA data, operate vehicle for at least 2 minutes under same conditions as when DTC was set. If MIL flashes, go to step 5. If MIL does not flash, go to next step.
4. Test drive vehicle under conditions reported by customer. If drive line vibrates, inspect and repair possible source of vibration. Go to step 24. If no vibration is present, go to next step.
5. Using scan tool, access PID/DATA MONITOR. Record PID data for RPM, TP 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 any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Go to step 24. If all data is within specification, go to next step.
6. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for RPM, TP V, ECT V, IAT V, MAF V, BRK SW and VS. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Go to step 24. If all data is within specification, go to next step.
7. Ensure ignition timing is within specification. See BASIC DIAGNOSTIC PROCEDURES article. If ignition timing is within specifications, go to next step. If ignition timing is not within specifications, Inspect CMP sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 24. If CMP sensor is okay, check timing belt and gears for

proper installation and damage. Repair or replace as needed.

8. Check condition and installation of crankshaft pulley and sensor plate. Replace as needed and go to step 24. If crankshaft pulley and sensor plate are okay, check installation and air gap of CMP sensor. See REMOVAL, OVERHAUL & INSTALLATION. If installation is loose or air gap is correct, go to next step.
9. Ensure secondary ignition system, including spark plug, ignition wires and ignition coil, is working properly. See BASIC DIAGNOSTIC PROCEDURES article. Repair as needed and go to step 18. If secondary ignition system is working properly, check for poor connections and damaged wire harness between ignition coil and PCM. Repair as needed and go to step 18. If wire harness and connectors are okay, go to next step.
10. Check for internal cooling system leaks. Repair as needed and go to next step. If cooling system is okay, check engine compression. Repair as needed and go to next step. If engine compression is okay, go to next step.
11. Inspect drive belt condition and go to step 18. Replace as needed. If drive belt is okay, inspect idler pulley installation. Repair or replace as needed and go to step 18. If idler pulley installation is okay, go to next step.
12. Check A/C refrigerant pressure, power steering hydraulic pressure and generator charge and output voltage. Ensure listed accessories do not apply excessive load to engine. Also ensure listed accessories are not installed loosely. Repair as needed and go to step 18.
13. If equipped, inspect EGR valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 20. If EGR valve is okay, go to next step.
14. Inspect heated oxygen sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 24. If heated oxygen sensor is okay, go to next step.
15. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to Wide Open Throttle (WOT) and release to race engine. Scan tool should display heated oxygen sensor voltage greater than .45 volt during rich condition and less than .45 volt during lean condition. If voltage is as specified, go to next step. If voltage is not as specified, replace heated oxygen sensor and retest.
16. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 24. If purge solenoid valve is okay, go to next step.
17. Inspect PCV valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 24. If PCV valve is okay, go to next step.
18. Inspect air intake system for leaks. Repair as needed and go to step 24. If intake system leaks are not found, go to next step.
19. Check for correct amount of vacuum at intake manifold. Repair as needed and go to step 24. If vacuum is okay, go to next step.
20. Check fuel pressure. See BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is as specified, go to step 14. If fuel pressure is not okay, go to next step.
21. Check maximum fuel pump pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum fuel pump pressure is as specified, go to step 24. If maximum fuel pump pressure is not okay, go to next step.
22. Check pulsation damper. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 24. If pulsation damper is okay, inspect fuel filter for plugging. Replace as needed and go to next step. If fuel filter is okay, inspect fuel tank for foreign materials. Clean fuel tank. Replace fuel filter and go to step 24. If inside of fuel tank is okay, replace fuel filter and go to step 24.
23. Inspect fuel line between fuel rail and fuel pump for leaks and plugging. Repair as needed and go to

step 24. If fuel line is okay, replace pressure regulator and go to next step.

24. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L 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. Possible causes are:

- Ignition timing out of specification.
- Incorrect CKP sensor air gap.
- Secondary ignition system malfunction.
- Fuel injector malfunction.
- Fuel pump malfunction.
- Fuel filter plugged.
- Fuel delivery hose plugged or leaking.
- Fuel return hose plugged.
- Pressure regulator malfunction.
- Pressure Regulator Control (PRC) solenoid malfunction.
- Pulsation damper malfunction.
- Purge solenoid valve malfunction.
- PCV valve malfunction.
- Intake air system leaks.
- Insufficient compression.
- EGR system malfunction.
- Vibration of drive unit.
- Excessive load of accessories mounted to engine.
- MAF sensor malfunction.
- ECT sensor malfunction.
- IAT sensor malfunction.
- CKP sensor malfunction.
- CMP sensor malfunction.
- TP sensor malfunction.
- Front heated oxygen sensor malfunction.
- VSS malfunction.
- Break switch malfunction.
- Open or short in wiring harness.
- Poor connection of connectors.

- Damaged or loose vacuum hoses.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0111, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0335, P0443, P0500, P0703, P1102, P1103, P1122, P1123, P1496, P1497, P1498 and/or P1499 are present, repair those DTC(s) first and go to step 22. If listed DTCs are not present, go to next step.
2. Verify if DTC P0301, P0302, P0303 and/or P0304 is present in FREEZE FRAME PID DATA. If DTC is present, go to next step. If DTC is not present, repair DTC(s), present in FREEZE FRAME PID DATA and go to step 22.
3. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Race engine in neutral 2 to 3 times. Referring to FREEZE FRAME PID DATA data, operate vehicle for at least 2 minutes under same conditions as when DTC was set. If MIL flashes, go to step 5. If MIL does not flash, go to next step.
4. Test drive vehicle under conditions reported by customer. If drive line vibrates, inspect and repair possible source of vibration. Go to step 22. If no vibration is present, go to next step.
5. Using scan tool, access PID/DATA MONITOR. 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 any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Go to step 22. If all data is within specification, go to next step.
6. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for RPM, TPS V, ECT V, IAT V, MAF V, BRK SW and VS. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Go to step 22. If all data is within specification, go to next step.
7. Ensure secondary ignition system, including spark plug, ignition wires and ignition coil, is working properly. See BASIC DIAGNOSTIC PROCEDURES article. Repair as needed and go to step 22. If secondary ignition system is working properly, check for poor connections and damaged wire harness between ignition coil and PCM. Repair as needed and go to step 22. If wire harness and connectors are okay, go to next step.
8. Using scan tool, access SIMULATION TEST and IDLING TEST. While performing IDLING TEST turn off each fuel injector, one at a time. Check engine speed after turning off each cylinder. If RPM drop is same for all cylinders, go to next step. If RPM drop is less in one cylinder, go to step 10.
9. Check for open in White/Yellow wire between main relay and each fuel injector. Also check for open in circuits between each fuel injector and PCM. Repair as needed and go to step 22. If wires are okay, go to next step.
10. Ensure ignition timing is within specification. See BASIC DIAGNOSTIC PROCEDURES article. If ignition timing is within specifications, go to next step. If ignition timing is not within specifications, Inspect CMP sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 22. If CMP sensor is okay, check timing belt and gears for proper installation and damage. Repair or replace as needed.
11. Check condition and installation of crankshaft pulley and sensor plate. Replace as needed and go to step 22. If crankshaft pulley and sensor plate are okay, check installation and air gap of CMP sensor. See REMOVAL, OVERHAUL & INSTALLATION. If installation is loose or air gap is correct, go to next step.
12. Check for internal cooling system leaks. Repair as needed and go to next step. If cooling system is

okay, check engine compression. Repair as needed and go to next step. If engine compression is okay, go to next step.

13. If equipped, inspect EGR valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 22. If EGR valve is okay, go to next step.
14. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to Wide Open Throttle (WOT) and release to race engine. Scan tool should display heated oxygen sensor voltage greater than .45 volt during rich condition and less than .45 volt during lean condition. If voltage is as specified, go to next step. If voltage is not as specified, replace heated oxygen sensor and retest.
15. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 22. If purge solenoid valve is okay, go to next step.
16. Inspect PCV valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 22. If PCV valve is okay, go to next step.
17. Inspect air intake system for leaks. Repair as needed and go to step 22. If intake system leaks are not found, go to next step.
18. Check for correct amount of vacuum at intake manifold. Repair as needed and go to step 22. If vacuum is okay, go to next step.
19. Check fuel pressure. See BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is as specified, go to step 22. If fuel pressure is not okay, go to next step.
20. Check maximum fuel pump pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum fuel pump pressure is as specified, go to step 22. If maximum fuel pump pressure is not okay, go to next step.
21. Check pulsation damper. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to next step. If pulsation damper is okay, inspect fuel filter for plugging. Replace as needed and go to next step. If fuel filter is okay, inspect fuel tank for foreign materials. Clean fuel tank. Replace fuel filter and go to next step. If inside of fuel tank is okay, replace fuel filter and go to next step.
22. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L 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 P0335: CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

Condition

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

- CKP sensor malfunction.
- Poor connection at CKP sensor and PCM connectors.
- Metal debris collecting on CKP sensor.
- Incorrect CKP sensor installation.
- Incorrect CKP sensor air gap.
- Open or short in Yellow wire between terminal No. 21 on Powertrain Control Module (PCM) connector and terminal "A" on CKP connector.

- Open or short in Orange/Black wire between terminal No. 22 on Powertrain Control Module (PCM) connector and terminal "B" on CKP connector.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect CKP and PCM harness connectors. Repair as needed. If connectors are okay, go to next step.
2. Inspect CKP sensor for any metal debris. Clean as needed and go to step 11. If CKP sensor is okay, go to next step.
3. Check CKP sensor installation. Repair as needed. If installation is okay, check CKP sensor air gap. See BASIC DIAGNOSTIC PROCEDURES article. Adjust as needed. If air gap as needed, go to next step.
4. Ensure ignition is off. Disconnect CKP sensor and PCM connectors. Check for open in Yellow wire between terminal "A" on CKP sensor harness connector and terminal No. 21 on PCM connector. See **Fig. 5** and **Fig. 6** . Repair as needed. If continuity is present, go to next step.
5. Check for open in Orange/Black wire between terminal "B" on CKP sensor harness connector and terminal No. 22 on PCM connector. See **Fig. 5** and **Fig. 6** . Repair as needed. If continuity is present, go to next step.
6. Check for continuity between terminals No. 21 (Yellow wire), and No. 71 (White/Black wire) and No. 97 (White wire) on PCM connector. See **Fig. 5**. If continuity is present, check for short to power in suspect wire and go to step 11. If continuity is not present, go to next step.
7. Check for continuity between terminals No. 22 (Orange/Black wire), and No. 71 (White/Black wire) and No. 97 (White wire) on PCM connector. See **Fig. 5**. If continuity is present, check for short to power in suspect wire and go to step 11. If continuity is not present, go to next step.
8. Check for continuity between terminals No. 21 (Yellow wire), and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM. If continuity is present, check for short to ground in suspect wire and go to step 11. If continuity is not present, go to next step.
9. Check for continuity between terminals No. 22 (Orange/Black wire), and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM. If continuity is present, check for short to ground in suspect wire and go to step 11. If continuity is not present, go to next step.
10. Check CKP sensor. See BASIC DIAGNOSTIC PROCEDURES article. Replace as needed. If CKP sensor is okay, go to next step.
11. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

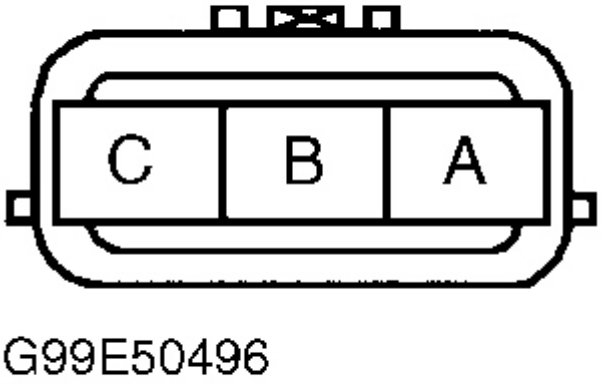

Fig. 6: Identifying Crankshaft Position (CKP) Sensor Connector
Courtesy of MAZDA MOTORS CORP.

DTC P0401: EGR FLOW INSUFFICIENT

Condition

DTC is set when difference in intake manifold pressure, when EGR is on or off, is too small. Possible causes are:

- EGR valve malfunction.
- EGR boost sensor malfunction.
- EGR boost sensor solenoid valve malfunction.
- EGR system plugged.
- MAF sensor malfunction.
- TP sensor malfunction.
- IAT sensor malfunction.
- Vehicle Speed Sensor (VSS) malfunction.
- Open or short in wiring harness.
- Damaged or loose vacuum hoses.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0106, P0107, P0108, P0111, P0112, P0113, P0122, P0123, P0125, P1102, P1103, P1122, P1123, P1487, P1496, P1497, P1498 and/or P1499 are present, repair those DTC(s) first and go to step 14. If listed DTCs are not present, go to next step.
2. Inspect engine vacuum. If vacuum is low or erratic, inspect and repair vacuum system and go to step 13. If engine vacuum is okay, go to next step.
3. Verify if DTC P0401 is recorded on FREEZE FRAME PID DATA. If DTC P0401 is present, go to

next step. If DTC P0400 is not present, go to step 5.

4. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 2 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Using scan tool, verify TEST #10:41:00 in DIAGNOSTIC MONITORING TEST RESULTS. If test is less then MIN value, go to next step. If test is not less than MIN value, problem may be intermittent. Ensure all applicable connections are clean and tight. Recheck for DTCs.
5. Using scan tool, access PID/DATA MONITOR. Record PID data for BARO V, MAFV, TP V, VS and IATV. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
6. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for BAROV, MAFV, TPV, VS and IATV. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
7. Using scan tool, conduct IGNITION ON TEST in SIMULATION TEST. Actuate EGRBV from OFF to ON. If EGR boost solenoid can be heard operating, go to next step. If solenoid cannot be heard operating, go to step 10.
8. Using scan tool, conduct IDLING TEST in SIMULATION TEST. Disconnect vacuum hose on EGR boost sensor. Connect vacuum gauge. Actuate EGRBV from OFF to ON. If vacuum is present, go to step 14. If no vacuum is present, go to step 10.
9. Inspect all EGR vent and vacuum hoses. Repair or replace as needed. If all hoses are okay, go to next step.
10. Inspect the EGR boost sensor solenoid. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. If EGR boost sensor solenoid is okay, go to next step.
11. Check for short or open in wire harness circuits between EGR boost solenoid valve and main relay and between EGR boost solenoid valve and PCM. Repair as needed and go to step 14. If wire harness is okay, replace EGR boost sensor solenoid valve, go to step 14.
12. Inspect EGR valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair or replace as needed. If EGR valve is okay, go to next step.
13. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 2 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Using scan tool, verify TEST #10:41:00 in DIAGNOSTIC MONITORING TEST RESULTS. If test is less then MIN value, go to next step. If test is not less than MIN value, problem may be intermittent. Ensure all applicable connections are clean and tight. Recheck for DTCs.
14. Using scan tool, verify PENDING TROUBLE CODE DTCs 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 P0402: EGR FLOW MALFUNCTION

Condition

DTC is set when difference in intake manifold pressure, when EGR is on and off, is too large. Possible causes are:

- EGR valve malfunction.
- EGR boost sensor malfunction.
- MAF sensor malfunction.
- TP sensor malfunction.
- IAT sensor malfunction.
- Vehicle Speed Sensor (VSS) malfunction.
- Open or short in wiring harness.
- Damaged or loose vacuum hoses.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0106, P0107, P0108, P0111, P0112, P0113, P0122, P0123, P0125, P1102, P1103, P1122, P1123, P1487, P1496, P1497, P1498 and/or P1499 are present, repair those DTC(s) first and go to step 8. If listed DTCs are not present, go to next step.
2. Inspect engine vacuum. If vacuum is low or erratic, inspect and repair vacuum system and go to step 8. If engine vacuum is okay, go to next step.
3. Verify if DTC P0402 is recorded on FREEZE FRAME PID DATA. If DTC P0402 is present, go to next step. If DTC P0400 is not present, go to step 5.
4. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 2 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Using scan tool, verify TEST #10:41:00 in DIAGNOSTIC MONITORING TEST RESULTS. If test exceeds MAX value, go to next step. If test does not exceed MAX value, problem may be intermittent. Ensure all applicable connections are clean and tight. Recheck for DTCs.
5. Using scan tool, access PID/DATA MONITOR. Record PID data for BARO V, MAFV, TP V, VS and IATV. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
6. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for BAROV, MAFV, TPV, VS and IATV. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
7. Inspect EGR valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. If EGR valve is okay, go to next step.
8. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 2 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Using scan tool, verify TEST #10:41:00 in DIAGNOSTIC MONITORING TEST RESULTS. If test exceeds MAX value, go to next step. If no test exceeds MAX value, problem may be intermittent. Ensure all applicable connections are clean and tight. Recheck for DTCs.

9. Using scan tool, verify PENDING TROUBLE CODE DTCs 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 P0420: CATALYST SYSTEM EFFICIENCY BELOW LIMIT (EXCEPT CALIFORNIA EMISSIONS)

Condition

DTC is set when front heated oxygen sensor value difference becomes closer to value of rear heated oxygen sensor. DTC is set under following conditions: 1500-3000 RPM, calculated load of 17-48 percent, vehicle speed of 18-75 MPH, engine speed variation less than 938 RPM, calculated load variation of less than 32-40 percent, and TP variation less than 7-13.3 percent. Possible causes are:

- Three-way catalytic converter deterioration.
- Exhaust system operation.
- Front heated oxygen sensor malfunction.
- Rear heated oxygen sensor malfunction.
- MAF sensor malfunction.
- TP sensor malfunction.
- VSS malfunction.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA and DIAGNOSTIC MONITORING TEST RESULTS have been recorded. Verify stored DTCs. If DTC P0102, P0103, P0122, P0123, P0500, P1102, P1103, P1122 and/or P1123 are present, inspect and repair first, then go to step 11. If listed DTC are not present, go to next step.
2. Determine if DTC P0420 is recorded on FREEZE FRAME PID DATA. If DTC P0420 is present, go to next step. If DTC P0420 is not present, inspect and repair any other recorded DTCs. Go to step 11.
3. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Using scan tool, verify TEST #10:11:11 in DIAGNOSTIC MONITORING TEST RESULTS. If test exceeds MIN value, go to next step. If test does not exceed MIN value, problem may be intermittent. Ensure all applicable connections are clean and tight. Recheck for DTCs.
4. Using scan tool, access PID/DATA MONITOR. Record PID data for MAFV, TPV and VS. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
5. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for MAFV, TPV and VS. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
6. Inspect exhaust system for any leakage. Repair as needed. Go to step 11. If exhaust system is okay, go to next step.

7. Inspect front and rear heated oxygen sensors. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 11. If both heated oxygen sensors are okay, go to next step.
8. Inspect front heated oxygen sensor heater. Repair as needed and go to step 11. If heated oxygen sensor heater is functioning correctly, go to next step.
9. Inspect rear heated oxygen sensor heater. Repair as needed and go to step 11. If heated oxygen sensor heater is functioning correctly, replace catalytic converter. Go to next step.
10. Repeat step 3. If test exceeds MIN value, go to next step. If test does not exceed MIN value, go to step 2.
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 P0421: WARM-UP CATALYST SYSTEM EFFICIENCY BELOW LIMIT (CALIFORNIA EMISSIONS)

Condition

DTC is set when front heated oxygen sensor value difference becomes closer to value of rear heated oxygen sensor. DTC is set under following conditions: 1500-3000 RPM, calculated load of 17-48 percent, vehicle speed of 18-75 MPH, engine speed variation less than 938 RPM, calculated load variation of less than 32-40 percent, and TP variation less than 7-13.3 percent. Possible causes are:

- Three-way catalytic converter deterioration.
- Exhaust system operation.
- Front heated oxygen sensor malfunction.
- Rear heated oxygen sensor malfunction.
- MAF sensor malfunction.
- TP sensor malfunction.
- VSS malfunction.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA and DIAGNOSTIC MONITORING TEST RESULTS have been recorded. Verify stored DTCs. If DTC P0102, P0103, P0122, P0123, P0500, P1102, P1103, P1122 and/or P1123 are present, inspect and repair first, then go to step 11. If listed DTC are not present, go to next step.
2. Determine if DTC P0420 is recorded on FREEZE FRAME PID DATA. If DTC P0421 is present, go to next step. If DTC P0421 is not present, inspect and repair any other recorded DTCs. Go to step 11.
3. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Using scan tool, verify TEST #10:11:11 in DIAGNOSTIC MONITORING TEST RESULTS. If test exceeds MIN value, go to next step. If test does not exceed MIN value, problem may be intermittent. Ensure all applicable connections are clean and tight. Recheck for DTCs.
4. Using scan tool, access PID/DATA MONITOR. Record PID data for MAFV, TPV and VS. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not

within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.

5. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for MAFV, TPV and VS. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
6. Inspect exhaust system for any leakage. Repair as needed. Go to step 11. If exhaust system is okay, go to next step.
7. Inspect front and rear heated oxygen sensors. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 11. If both heated oxygen sensors are okay, go to next step.
8. Inspect front heated oxygen sensor heater. Repair as needed and go to step 11. If heated oxygen sensor heater is functioning correctly, go to next step.
9. Inspect rear heated oxygen sensor heater. Repair as needed and go to step 11. If heated oxygen sensor heater is functioning correctly, replace catalytic converter. Go to next step.
10. Repeat step 3. If test exceeds MIN value, go to next step. If test does not exceed MIN value, go to step 2.
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 P0442: EVAP SYSTEM MALFUNCTION - LEAK DETECTED

Condition

DTC is set when PCM detects excessive difference in fuel tank pressures measured. Possible causes are:

- Purge solenoid malfunction.
- Canister Drain Cut Valve (CDCV) malfunction.
- Tank Pressure Control Valve (TPCV) malfunction.
- Loose fuel filler cap.
- Charcoal canister malfunction.
- Catch tank malfunction.
- Rollover valve malfunction.
- Cracked fuel tank.
- Poorly installed fuel tank components.
- Damaged or loose evaporative hoses.
- EGR boost sensor malfunction.
- Fuel tank level sensor malfunction.
- Fuel tank pressure sensor malfunction.
- ECT sensor malfunction.
- Intake Air Temperature (IAT) sensor malfunction.
- Throttle Position (TP) sensor malfunction.
- Mass Airflow (MAF) sensor malfunction.

- Vehicle Speed Sensor (VSS) malfunction.
- Open or short in wiring harness.
- Poor connector connections.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0111, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0335, P0443, P0500, P1102, P1103, P1122, P1123 and/or P1449 are present, repair those DTC(s) first and go to step 20. If listed DTCs are not present, go to next step.
2. Monitor PID data (BAROV, ECTV, FTLV, FTPV, IATV, MAFV, TPSV and VS). See PID DATA INFORMATION. If any signals are not within specification, see applicable component test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair harness or replace malfunctioning component as needed. After repair, go to step 20. If all signals are within specification, go to next step.
3. Continue monitoring PID data. Confirm RPM, LOAD, ECT and VSS FREEZE FRAME PID DATA. Operate vehicle for one minute and determine if any PID data items excessively change. BARO signal should change from atmospheric pressure to intake vacuum. If any signals suddenly change, check applicable component connections. Intermittent poor harness connection may have caused signal change. Repair harness or connector as needed. Go to step 20. If all signals stay consistent and within specification, go to next step.
4. 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 20. If cap is okay, go to next step.
5. Using scan tool, run ENGINE SYSTEM, EVAPORATIVE EMISSION CONTROL, SYSTEM INSPECTION and WHOLE SYSTEM inspections. If value on scan tool changes and holds for minimum of 2 minutes, system is okay at this time. If value on scan tool is not as specified, go to next step.
6. Clamp hose between tank pressure control valve and charcoal canister. Remove fuel filler cap. Using scan tool, run PID/DATA MONITOR and RECORD (FTP and FTP V) under DIAGNOSTIC DATA LINK. If FTP and FTP V values are at atmospheric pressure, install filler cap and go to step 8. If FTP and FTP V values are not at atmospheric pressure, go to next step.
7. Inspect Fuel Tank Pressure (FTP) sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 20. If FTP sensor is okay, go to next step.
8. Inspect vacuum lines between charcoal canister and fuel tank. Repair as needed. If vacuum lines are okay, go to next step.
9. Inspect Tank Pressure Control Valve (TPCV). See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 20. If TPCV is okay, go to next step.
10. Inspect fuel tank and sending unit for leakage or damage. Repair or replace as needed. If fuel tank and sending unit are okay, go to next step.
11. Inspect rollover valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 20. If rollover valve is okay, go to next step.
12. Inspect vacuum lines between charcoal canister and purge solenoid valve. Repair as needed. If vacuum lines are okay, go to next step.
13. Remove catch tank in engine compartment. Inspect for damage or clogging. Replace as needed. Go to step 20. If catch tank is okay, go to next step.
14. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 20. If purge solenoid valve is okay, go to next step.

15. Remove charcoal canister beside fuel tank. Inspect for damage or clogging. Replace as needed. Go to step 20. If charcoal canister is okay, go to next step.
16. Inspect vent cut valve for leakage. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace filler pipe assembly as needed. Go to step 20. If vent cut valve is okay, go to next step.
17. Inspect Canister Drain Cut Valve (CDCV). See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to next step. If CDCV is okay, go to next step.
18. Monitor PID data (BAROV, ECTV, and IATV). See PID DATA INFORMATION. If any signals are not within specification, see applicable component test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair harness or replace malfunctioning component as needed. After repair, go to step 20. If all signals are within specification, go to next step.
19. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Using scan tool, run RFC delete mode. If RFC on evaporation monitor display indicates OK, go to next step. If RFC on evaporation monitor display does not indicate OK, go to next step.
20. Determine if DTCs are present or DIAGNOSTIC MONITORING RESULTS is NG (no good). Go to appropriate DTC test. If no DTCs are present, test is completed.

DTC P0443: EVAP SYSTEM - PURGE CONTROL VALVE CIRCUIT MALFUNCTION

Condition

DTC is set when voltage is to high at PCM terminal No. 67 (Brown/Red wire) while PRG and ignition are on. DTC is also set when voltage is to low at PCM terminal No. 67 (Brown/Red wire) while PRG is off and ignition is on. Possible causes are:

- Purge solenoid valve malfunction.
- Poor connection of PCM and purge solenoid valve connectors.
- Open circuit between terminal "A" on purge solenoid valve and terminal "D" on main relay.
- Open or short circuit between terminal "B" on purge solenoid valve and terminal No. 67 on Powertrain Control Module (PCM).
- Open in circuit between negative battery terminal and terminals No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on Powertrain Control Module (PCM).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P1250, P1345, P1449, P1487, P1496, P1497, P1498, P1499, P1569 and/or P1570 are present, repair those DTC(s) first and go to step 8. If listed DTCs are not present, go to next step.
2. Inspect all applicable harness connectors. Repair as needed. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. If purge solenoid valve is okay, go to next step.
3. Turn ignition off. Disconnect purge solenoid valve connector. 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, check for open or short circuit between purge solenoid valve and main relay.
4. Disconnect PCM harness connector. Check continuity between terminal "B" on purge solenoid valve harness connector and terminal No. 67 on PCM harness connector. See **Fig. 5**. If continuity is present,

go to next step. If continuity is not present, repair Brown/Red wire.

5. Check for continuity between terminal No. 67 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, check for short to power in suspect circuit. Repair as needed. If continuity is not present, go to next step.
6. Check for continuity between terminal No. 67 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector. See **Fig. 5**. If continuity is present, check for short to ground in suspect circuit. Repair as needed. If continuity is not present, go to next step.
7. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to next step. If purge solenoid valve is okay, go to next step.
8. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0451: FUEL TANK PRESSURE (FTP) SENSOR STUCK LOW

Condition

DTC is set when variation in FTP sensor readings are too high or too low. PCM monitors FTP sensor wile operating EVAP leak monitor function or purge control valve. Possible causes are:

- Fuel tank pressure sensor malfunction.
- Canister Drain Cut Valve (CDCV) malfunction.
- Pressure control valve malfunction.
- Poor connection of CDCV, fuel tank pressure sensor and PCM connectors.
- Open or short circuit at CDCV and fuel tank pressure sensor harnesses.
- Evaporative gas check valve (2-way) plugged.
- Air filter plugged.
- Charcoal canister plugged.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0442, P0452, P0453, P0455, P1449 and/or P1450 are present, repair those DTC(s) first and go to step 8. If listed DTCs are not present, go to next step.
2. Using scan tool, operate CDCV on and off. If operation sound is heard, go to step 4. If operations sound is not heard, go to next step.
3. Inspect CDCV. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Ensure CDCV is airtight and not stuck closed. Replace as needed. If CDCV is okay check all appropriate wire harness. Repair as needed and go to step 8. If CDCV is okay, go to next step.
4. Remove charcoal canister beside fuel tank. Inspect for clogging. Replace as needed. Go to step 8. If charcoal canister is okay, go to next step.
5. Clamp hose between tank pressure control valve and charcoal canister. Remove fuel filler cap. Using scan tool, run PID/DATA MONITOR and RECORD (FTP and FTP V) under DIAGNOSTIC DATA LINK. If FTP and FTP V values are at atmospheric pressure, install filler cap and go to step 8. If FTP and FTP V values are not at atmospheric pressure, go to next step.

6. Inspect Fuel Tank Pressure (FTP) sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 8. If FTP sensor is okay, go to next step.
7. Inspect EVAP gas check valve (2-way) for plugging. Replace as needed. If check valve is okay, inspect air filter. If air filter is okay, check hoses between charcoal canister and CDCV, CDCV and air filter, and air filter and EVAP gas check valve (2-way) for plugging. Replace as needed. If all components are okay, go to next step.
8. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0452: EVAP SYSTEM - PRESSURE SENSOR LOW INPUT

Condition

DTC is set when input voltage from Fuel Tank Pressure (FTP) sensor is less than .2 volt with intake air temperature more than 14°F (-10°C) and engine coolant temperature less than 176°F (80°C). Possible causes are:

- Fuel tank pressure sensor malfunction.
- Poor connection at PCM and fuel tank pressure sensor connectors.
- Short to ground in circuit between terminal "B" on FTP sensor and terminal No. 62 on Powertrain Control Module (PCM).
- Open circuit between terminal "C" on FTP sensor and terminal No. 90 on Powertrain Control Module (PCM).
- Open circuit between terminal "B" on FTP sensor and terminal No. 91 on Powertrain Control Module (PCM).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. Turn ignition on. Access PCM harness connector. PCM is mounted in front of center console, under radio.
2. Turn ignition off. Disconnect FTP sensor connector. Turn ignition on. Check for voltage between ground and terminal "C" on FTP sensor connector. If 5 volts is present, go to next step. If 5 volts is not present, check for open in wire harness between FTP sensor and PCM.
3. Turn ignition off. Disconnect PCM sensor connector. Turn ignition on. Check for open in wire harness between terminal "B" on FTP sensor connector and terminal No. 64 on PCM connector. See **Fig. 5**. Repair as needed. If wire is okay, go to next step.
4. Check for continuity between terminal No. 64 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire harness. If continuity is not present, go to next step.
5. Inspect Fuel Tank Pressure (FTP) sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to next step. If FTP sensor is okay, go to next step.
6. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace

PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0453: EVAP SYSTEM - PRESSURE SENSOR LOW INPUT

Condition

DTC is set when input voltage from Fuel Tank Pressure (FTP) sensor is greater than 4.8 volts with intake air temperature more than 14°F (-10°C) and engine coolant temperature less than 176°F (80°C). Possible causes are:

- Fuel tank pressure sensor malfunction.
- Open or short circuit between terminal "A" on FTP sensor and terminal No. 91 on Powertrain Control Module (PCM).
- Short circuit between terminal "B" on FTP sensor and terminal No. 64 on Powertrain Control Module (PCM).
- Short circuit between terminal "C" on FTP sensor and terminal No. 90 on Powertrain Control Module (PCM).
- Open in circuit between negative battery terminal and terminals No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on Powertrain Control Module (PCM).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0108, P0113, P0118, P0123 and/or P0134 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, go to next step.
2. Turn ignition off. Disconnect FTP sensor connector. Turn ignition on. Measure voltage between ground and terminal "C" on FTP sensor connector. If 5 volts is present, go to next step. If 5 volts is not present, check for short to power in wire harness and connectors between FTP sensor and PCM. Repair as needed.
3. Turn ignition off. Disconnect PCM connector. Check for continuity between terminal "A" on FTP sensor connector and terminal No. 91 on PCM connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for open in circuit between FTP sensor and PCM. Repair as needed.
4. Check for continuity between terminal No. 91 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, check for short to power in suspect circuit. Repair as needed. If continuity is not present, go to next step.
5. Check for continuity between terminal No. 64 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, check for short to power in suspect circuit. Repair as needed. If continuity is not present, go to next step.
6. Inspect Fuel Tank Pressure (FTP) sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to next step. If FTP sensor is okay, go to next step.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0455: EVAP SYSTEM MALFUNCTION - EXCESSIVE LEAK DETECTED

Condition

DTC is set when PCM detects excessive difference in fuel tank pressure. DTC is set under following conditions; immediately after engine starts, intake air temperature is 14°F (-10°C), and engine coolant temperature is 14-90.5°F (-10-32.5°C). Also remaining fuel is 15-85 percent, atmospheric pressure is 21.3 in. Hg, vehicle speed is 25-65 MPH, engine speed is 1000-4000 RPM, calculated load is 9-65 percent, TP sensor is at 3.1-12.5 percent, fuel tank pressure is at -181 kPa, and intake air temperature is 14-140°F (-10-60°C). Possible causes are:

- Purge solenoid malfunction.
- Canister Drain Cut Valve (CDCV) malfunction.
- Tank Pressure Control Valve (TPCV) malfunction.
- Loose fuel filler cap.
- Charcoal canister malfunction.
- Catch tank malfunction.
- Rollover valve malfunction.
- Cracked fuel tank.
- Poorly installed fuel tank components.
- Damaged or loose evaporative hose.
- Insufficient manifold pressure.
- EGR boost sensor malfunction.
- Fuel tank level sensor malfunction.
- Fuel tank pressure sensor malfunction.
- Engine Coolant Temperature (ECT) sensor malfunction.
- Intake Air Temperature (IAT) sensor malfunction.
- Throttle Position (TP) sensor malfunction.
- Mass Airflow (MAF) sensor malfunction.
- Vehicle Speed Sensor (VSS) malfunction.
- Open or short in wire harness.
- Poor connector connection.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0111, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0335, P0443, P0500, P1102, P1103, P1122, P1123 and/or P1449 are present, repair those DTC(s) first and go to step 18. If listed DTCs are not present, go to next step.
2. Connect vacuum gauge to vacuum port beside purge control system. Start and idle engine. Monitor manifold vacuum. If engine vacuum is within normal specification, go to next step. If engine vacuum is not within normal specification, repair engine intake system and/or engine performance problem. Go to step 18.
3. Using scan tool, monitor PID data (BAROV, ECTV, FTLV, FTPV, IATV, MAFV, TPSV and VS). See PID DATA INFORMATION. If any signals are not within specification, see applicable component test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article.

After repairs, go to step 18. If all signals are within specification, go to next step.

4. Continue monitoring PID data. Confirm RPM, LOAD, ECT and VSS FREEZE FRAME PID DATA. Operate vehicle for one minute and determine if any PID data items excessively change. BARO signal should change from atmospheric pressure to intake vacuum. If any signals suddenly change, check applicable component connections. Intermittent poor harness connection may have caused signal change. Repair harness or connector as needed. If all signals stay consistent and within specification, go to next step.
5. 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 18. If cap is okay, go to next step.
6. Using scan tool, run IGNITION ON SIMULATION TEST. Turn Canister Drain Cut Valve (CDCV) from OFF to ON. CDCV should be heard operating. If system does not operate correctly, go to step 8. If system operates correctly, go to next step.
7. Inspect Canister Drain Cut Valve (CDCV). See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 18. If CDCV is okay, go to next step.
8. Inspect Tank Pressure Control Valve (TPCV). See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 18. If TPCV is okay, go to next step.
9. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 18. If purge solenoid valve is okay, go to next step.
10. Pinch off hose on fuel tank side of charcoal canister. Remove fuel filler cap. Using NGS tester, monitor PID data (FTP and FTPV). FTP (fuel tank pressure) and FTPV (fuel tank pressure signal voltage) should be the same as atmospheric pressure. If system operates correctly, install filler cap. Go to step 18. If system does not operate correctly, go to next step.
11. Inspect Fuel Tank Pressure (FTP) sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 18. If FTP sensor is okay, go to next step.
12. Inspect rollover valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 18. If rollover valve is okay, go to next step.
13. Inspect all vacuum and vapor lines. Repair or replace as needed. Go to step 18. If all lines are okay, go to next step.
14. Remove charcoal canister beside fuel tank. Inspect for damage or clogging. Replace as needed. Go to step 18. If charcoal canister is okay, go to next step.
15. Inspect fuel tank and sending unit for leakage or damage. Repair or replace as needed. If fuel tank and sending unit are okay, go to next step.
16. Remove catch tank in engine compartment. Inspect for damage or clogging. Replace as needed. Go to next step. If catch tank is okay, go to next step.
17. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Run RFC delete mode. If RFC on evaporation monitor indicates OK, go to next step. If RFC on evaporation monitor does not indicate OK, repeat test from step 1.
18. Determine if DTCs are present or DIAGNOSTIC MONITORING RESULTS is NG (no good). Go to appropriate DTC test. If no DTCs are present, test is complete.

DTC P0461: FUEL LEVEL SENSOR CIRCUIT PERFORMANCE

Condition

DTC is set when fuel level sensor signal does not match calculated fuel consumption level for PCM. Possible causes are:

- Fuel gauge sender malfunction.
- Open or short circuit between terminal "A" on fuel pump unit and terminal No. 63 on Powertrain Control Module (PCM).
- Open circuit between ground and terminal "C" on fuel pump unit.

Diagnosis & Repair Procedure

1. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Verify stored DTCs. If DTCs and pending codes P0462 and/or P0463 are present, repair those DTC(s) first and go to step 6. If listed DTCs are not present, go to next step.
3. Pinch off hose on fuel tank side of charcoal canister. Remove fuel filler cap. Using NGS tester, monitor PID data (FTP and FTPV). FTP (fuel tank pressure) and FTPV (fuel tank pressure signal voltage) should be the same as atmospheric pressure. If system operates correctly, install filler cap. Go to step 6. If system does not operate correctly, go to next step.
4. Inspect fuel gauge sender unit. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 6. If fuel gauge sender unit is okay, go to next step.
5. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Run RFC delete mode. If RFC on evaporation monitor indicates OK, go to next step. If RFC on evaporation monitor does not indicate OK, repeat test from step 1.
6. Determine if DTCs are present or DIAGNOSTIC MONITORING RESULTS is NG (no good). Go to appropriate DTC test. If no DTCs are present, test is complete.

DTC P0462: FUEL LEVEL SENSOR CIRCUIT LOW INPUT

Condition

DTC is set when input voltage from fuel level sensor is less than .08 volts and battery voltage is 11-16 volts. Possible causes are:

- Fuel gauge sender malfunction.
- Poor connection of fuel pump unit and PCM connectors.
- Short circuit between terminal "A" on fuel pump unit and terminal No. 63 on Powertrain Control Module (PCM).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect fuel pump unit and PCM harness connectors. Repair as needed. If connectors are okay, go to next step.
2. Turn ignition off. Disconnect fuel pump unit connector. Turn ignition on. Measure voltage between ground and fuel pump unit harness connector terminal "A". See **Fig. 7**. If 5 volts is present, go to next step. If 5 volts is not present, check for short to ground in suspect wire harness.
3. Inspect fuel gauge sender unit. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 5. If fuel gauge sender unit is okay, go to next step.
4. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Run RFC delete mode. If RFC on evaporation monitor indicates OK, go to next step. If RFC on evaporation monitor does not

indicate OK, repeat test from step 1.

5. Determine if DTCs are present or DIAGNOSTIC MONITORING RESULTS is NG (no good). Go to appropriate DTC test. If no DTCs are present, test is complete.

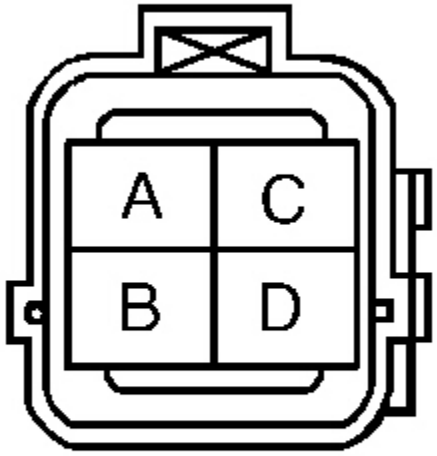

Fig. 7: Identifying Fuel Pump Unit Connector
Courtesy of MAZDA MOTORS CORP.

DTC P0463: FUEL LEVEL SENSOR CIRCUIT HIGH INPUT

Condition

DTC is set when input voltage from fuel level sensor is above 4.92 volts and battery voltage is 11-16 volts. Possible causes are:

- Fuel gauge sender malfunction.
- Poor connection at fuel pump unit and PCM connectors.
- Open or short circuit between terminal "A" on fuel pump unit and terminal No. 63 on Powertrain Control Module (PCM).
- Open circuit between ground and terminal "C" on fuel pump unit.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect fuel pump unit and PCM harness connectors. Repair as needed. If connectors are okay, go to next step.
2. Turn ignition off. Disconnect fuel pump unit connector. Turn ignition on. Measure voltage between ground and fuel pump unit harness connector terminal "A". See **Fig. 7**. If 5 volts is present, go to next step. If 5 volts is not present, check for short to ground in suspect wire harness.

3. Disconnect PCM connector. Check for continuity between PCM harness connector terminal No. 63 and fuel pump unit harness connector terminal "A". See **Fig. 5** and **Fig. 7** . If continuity is present, check for short to power in between PCM and fuel pump unit and go to next step. If continuity is not present, go to next step.
4. Inspect fuel gauge sender unit. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 6. If fuel gauge sender unit is okay, go to next step.
5. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Run RFC delete mode. If RFC on evaporation monitor indicates OK, go to next step. If RFC on evaporation monitor does not indicate OK, repeat test from step 1.
6. Determine if DTCs are present or DIAGNOSTIC MONITORING RESULTS is NG (no good). Go to appropriate DTC test. If no DTCs are present, test is complete.

DTC P0464: FUEL LEVEL SENSOR CIRCUIT PERFORMANCE (SLOSH CHECK)

Condition

DTC is set when input voltage from fuel level sensor fluctuates at more than 30 percent, after engine is started. Possible causes are:

- Fuel gauge sender malfunction.
- Poor connection at fuel pump unit and PCM connectors.
- Open or short circuit between terminal "A" on fuel pump unit and terminal No. 63 on Powertrain Control Module (PCM).
- Open circuit between ground and terminal "C" on fuel pump unit.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect fuel pump unit and PCM harness connectors. Repair as needed. If connectors are okay, go to next step.
2. Turn ignition off. Disconnect fuel pump unit connector. Turn ignition on. Measure voltage between ground and fuel pump unit harness connector terminal "A". See **Fig. 7**. If 5 volts is present, go to next step. If 5 volts is not present, check for short to ground in suspect wire harness.
3. Check for continuity between ground and fuel pump unit harness connector terminal "C". See **Fig. 7**. If continuity is present, go to next step. If continuity is not present, repair open in suspect wire harness.
4. Disconnect PCM connector. Check for continuity between PCM harness connector terminal No. 63 and fuel pump unit harness connector terminal "A". See **Fig. 5** and **Fig. 7** . If continuity is present, check for short to power in between PCM and fuel pump unit and go to next step. If continuity is not present, go to next step.
5. Inspect fuel gauge sender unit. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 7. If fuel gauge sender unit is okay, go to next step.
6. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Run RFC delete mode. If RFC on evaporation monitor indicates OK, go to next step. If RFC on evaporation monitor does not indicate OK, repeat test from step 1.
7. Determine if DTCs are present or DIAGNOSTIC MONITORING RESULTS is NG (no good). Go to appropriate DTC test. If no DTCs are present, test is complete.

DTC P0500: VEHICLE SPEED SENSOR (VSS) MALFUNCTION

Condition

DTC is set when vehicle speed signal is less than 2 MPH for more than 26 seconds while driving vehicle with engine speed greater than 2000 RPM. Possible causes are:

- Speedometer sensor malfunction.
- Poor connection of speedometer and PCM connectors.
- Open or short circuit between speedometer and speedometer sensor.
- Open or short circuit between speedometer and speedometer sensor.
- Open circuit between ground and speedometer sensor.
- Open or short circuit between speedometer and terminal No. 58 on Powertrain Control Module (PCM).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Drive vehicle to ensure speedometer is operating properly. If speedometer is not operating properly, go to step 6. If speedometer is operating properly, go to next step.
3. Turn ignition off. Remove instrument cluster. Disconnect speedometer and PCM harness connectors. Check for continuity between speedometer and terminal No. 58 on PCM harness connector. See **Fig. 5**. Repair as needed. If continuity is present, go to next step.
4. Check for continuity between terminals No. 58 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in circuit(s) as needed. If continuity is not present, go to next step.
5. Check for continuity between terminal No. 58 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire harness. If continuity is not present, go to next step.
6. Inspect speedometer. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace speedometer as needed. If speedometer is okay, go to next step.
7. Disconnect speedometer sensor. Check for continuity at speedometer input signal circuit. If continuity is present, go to next step. If continuity is not present, check for open in wire harness. Repair as needed.
8. Check for continuity between terminal 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector and speedometer input signal circuit. See **Fig. 5**. If continuity is present, check for short to power in wire harness. Repair as needed. If continuity is not present, go to next step.
9. Check for continuity between speedometer signal input terminal and terminal No. 58 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire harness. If continuity is not present, go to next step.
10. Inspect speedometer sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace speedometer sensor as needed. If speedometer sensor is okay, go to next step.
11. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally

set.

DTC P0506: IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED

Condition

DTC is set when actual engine speed is lower than target speed preset in PCM by 101 RPM for more than 14 seconds with brake switch on and power steering pressure switch off. PCM will cancel DTC P0506 when atmospheric pressure is less than 21 in. Hg or intake air temperature is less than 14°F (-10°C). Possible causes are:

- Open circuit in Idle Air Control (IAC) valve harness.
- IAC valve malfunction.
- Damaged or plugged IAC valve.
- Damaged throttle body.
- Leakage in intake air system.
- PCV valve malfunction.
- ECT sensor malfunction.
- Purge solenoid valve malfunction.
- Fuel system malfunction.
- A/C compressor not turning off.
- Low engine compression.
- EGR valve operation.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0117, P0171, P0172, P0443, P0507, P1496, P1497, P1498, P1499 and/or P1504 are present, repair those DTC(s) first and go to step 10. If listed DTCs are not present, go to next step.
2. Ensure ignition timing and idle speed are within specification. See BASIC DIAGNOSTIC PROCEDURES article. Adjust ignition timing and idle speed as needed. If ignition timing and idle speed are within specifications, go to next step.
3. Inspect air intake system for leaks. Repair as needed and go to step 10. If intake system leaks are not found, go to next step.
4. Inspect IAC valve sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace IAC valve sensor as needed. If IAC valve sensor is okay, go to step 7.
5. Remove throttle body. Check for bends or damage of throttle valve or throttle body. Replace as needed. If throttle body is okay, check A/C compressor operation. Ensure A/C compressor turns off. Repair as needed. If A/C compressor operates appropriately, go to next step.
6. Pinch off vacuum nose between intake manifold and purge solenoid valve. If idle quality improves, go to next step. If idle quality does not improve, go to step 8.
7. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace purge solenoid valve as needed. If purge solenoid valve is okay, go to next step.
8. Inspect PCV valve and hose. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace or repair PCV valve and hose as needed. If PCV valve and hose are okay, go to next step.

9. If equipped, inspect EGR valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to next step. If EGR valve is okay, check engine compression. Repair as needed. If engine compression correct, go to next step.
10. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0507: IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED

Condition

DTC is set when actual engine speed is excessively higher than target speed preset in PCM by 200 RPM for more than 14 seconds with brake switch on and power steering pressure switch off. PCM will cancel DTC P0507 when atmospheric pressure is less than 21 in. Hg or intake air temperature is less than 14°F (-10°C). Possible causes are:

- Short circuit in Idle Air Control (IAC) harness.
- IAC valve malfunction.
- Damaged or loose vacuum hoses.
- Damaged throttle body.
- Engine Coolant Temperature (ECT) sensor malfunction.
- Accelerator cable is improperly adjusted.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0118, P0125, P0506, P1504 and/or P1507 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, go to next step.
2. Ensure ignition timing and idle speed are within specification. See BASIC DIAGNOSTIC PROCEDURES article. Adjust ignition timing and idle speed as needed. If ignition timing and idle speed are within specifications, go to next step.
3. Check accelerator cable free paly. See SERVICE & ADJUSTMENT SPECIFICATIONS article. Adjust accelerator cable as needed. If accelerator cable free play is okay, go to next step.
4. Check for correct amount of vacuum at intake manifold. Repair as needed and go to step 7. If vacuum is okay, go to next step.
5. Inspect IAC valve sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace IAC valve sensor as needed. If IAC valve sensor is okay, go to next step.
6. Remove throttle body. Check for bends or damage of throttle valve or throttle body. Replace as needed. If throttle body is okay, check A/C compressor operation. Ensure A/C compressor turns off. Repair as needed. If A/C compressor operates appropriately, go to next step.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0550: POWER STEERING SWITCH MALFUNCTION

Condition

DTC is set when PCM receives power steering switch signal for more than 60 seconds while vehicle is operating at 37 MPH with engine coolant temperature more than 140°F (60°C). Possible causes are:

- Power Steering Pressure (PSP) switch malfunction.
- Poor connection at PCM and PSP switch connectors.
- Short circuit between PSP switch terminal and terminal No. 31 on Powertrain Control Module (PCM).
- Engine speed sensing power steering system malfunction.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Using scan tool, access PID/DATA MONITOR. Record PID data for PSP SW. Compare reading with specification. See PIN VOLTAGE/PID VALUE CHARTS article. If data is not within specification, go to next step. If data is within specification, go to step 5.
3. Turn ignition off. Disconnect PCM harness connectors. PCM is mounted in front of center console, under radio. Check continuity wire between terminal No. 31 on PCM connector and PSP switch terminal. See **Fig. 5**. Repair as needed. If continuity is present, go to next step.
4. Check power steering fluid pressure. Repair as needed. If power steering fluid pressure is okay, replace PSP switch and go to next step.
5. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC resets, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0703: BRAKE SWITCH MALFUNCTION

Condition

DTC is set when PCM has not received brake switch signal while vehicle is operating. Malfunction has to occur 10 consecutive times. Possible causes are:

- Brake switch malfunction.
- Improperly installed brake switch.
- Brake light malfunction.
- Poor connection of brake switch and PCM connectors.
- Short to power circuit between terminal "B" on brake switch terminal and terminal No. 92 on Powertrain Control Module (PCM).
- Short to power circuit between terminal "B" on brake switch terminal and brake light.
- Open circuit between terminal "A" on brake switch and terminal No. 92 on Powertrain Control Module (PCM).
- Open circuit between ground and brake light.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. Turn ignition on. If harness connectors are okay, go to next step.

2. Inspect brake switch installation. Repair as needed. If brake switch is installed properly, inspect brake light condition. If brake light remains on constantly, go to next step. If brake light never comes on, go to step 5.
3. Disconnect brake switch and PCM connectors. Check for continuity between terminal No. 92 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is not present, go to next step. If continuity is present, check for short to power in circuit between terminal "A" on brake switch harness connector and terminal No. 92 on PCM harness connector. Also check for short to power in circuit between terminal "A" on brake switch harness connector and brake light. Repair as needed.
4. Inspect brake switch. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace brake switch as needed. If brake switch is okay, go to next step.
5. Check for continuity between terminal No. 92 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM, individually. If continuity is present, repair open in suspect circuit. If continuity is not present, inspect brake light. Replace as needed. If brake light functions appropriately, go to next step.
6. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P0704: CLUTCH SWITCH INPUT CIRCUIT MALFUNCTION (M/T)

Condition

DTC is set when PCM has not received clutch switch signal while vehicle is operating. Malfunction has to occur 10 consecutive times. Possible causes are:

- Clutch switch malfunction.
- Poor connection of clutch switch and PCM connectors.
- Improperly installed clutch switch.
- Open or short circuit between terminal "A" on clutch switch terminal and terminal No. 6 on Powertrain Control Module (PCM).
- Open circuit between ground and terminal "B" on clutch switch.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. Turn ignition on. If harness connectors are okay, go to next step.
2. Inspect clutch switch installation. Repair as needed. If clutch switch is installed properly, go to next step.
3. Turn ignition on. Using scan tool, access CLT SW PID. Depress clutch pedal and observe scan tool. If CLT SW PID remains on constantly, go to next step. If CLT SW PID never comes on, go to step 5.
4. Turn ignition off. Disconnect clutch switch and PCM connectors. Check for continuity between terminal No. 6 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, repair short to ground in suspect circuit. If continuity is not present, go to step 8.
5. Check for continuity between ground and terminal "B" on clutch switch harness connector. See **Fig. 8**.

Repair as needed. If continuity is present, go to next step.

6. Check for continuity between terminal "A" on clutch switch harness connector and terminal No. 6 on PCM harness connector. See **Fig. 5** and **Fig. 8** . Repair as needed. If continuity is present, go to next step.
7. Check for continuity between terminals No. 6 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is not present, go to next step. If continuity is present, check for short to power in circuit between suspect wire harness. Repair as needed.
8. Inspect clutch switch. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace clutch switch as needed. If clutch switch is okay, go to next step.
9. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

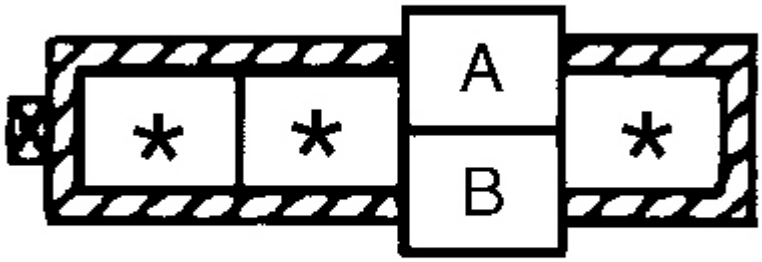

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Fig. 8: Identifying Clutch Switch Connector
Courtesy of MAZDA MOTORS CORP.

DTC P0705: NEUTRAL SWITCH INPUT CIRCUIT MALFUNCTION (M/T)

Condition

DTC is set when PCM has not received neutral switch signal while vehicle is operating. Malfunction has to occur 10 consecutive times. Possible causes are:

- Neutral switch malfunction.
- Poor connection of neutral switch and PCM connectors.
- Improperly installed neutral switch.
- Open or short circuit between terminal "A" on neutral switch terminal and terminal No. 64 on Powertrain Control Module (PCM).
- Open circuit between ground and terminal "B" on neutral switch.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. Turn ignition on. If harness connectors are okay, go to next step.
2. Inspect neutral switch installation. Repair as needed. If neutral switch is installed properly, go to next step.
3. Turn ignition on. Using scan tool, access NL SW PID. Shift transaxle into Neutral position and observe scan tool. If NL SW PID remains on constantly, go to next step. If NL SW PID never comes on, go to step 5.
4. Turn ignition off. Disconnect clutch switch and PCM connectors. Check for continuity between terminal No. 6 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, repair short to ground in suspect circuit. If continuity is not present, go to step 8.
5. Turn ignition off. Disconnect neutral switch connector. Check for continuity between ground and terminal "B" on neutral switch harness connector. If continuity is not present, repair open in suspect wire harness. If continuity is present, go to next step.
6. Disconnect PCM connector. Check for continuity between terminal "A" on neutral switch harness connector and terminal No. 64 on PCM harness connector. See **Fig. 5**. If continuity is not present, repair open in suspect wire harness. If continuity is present, go to next step.
7. Check for continuity between terminals No. 64 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is not present, go to next step. If continuity is present, check for short to power in circuit between suspect wire harness. Repair as needed.
8. Inspect neutral switch. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace neutral switch as needed. If neutral switch is okay, go to next step.
9. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1102: MAF SENSOR INCONSISTENT WITH TP SENSOR (LOWER THAN EXPECTED)

Condition

DTC is set when Mass Air Flow (MAF) sensor reading is less than .6 lbs/Min, Throttle Position (TP) sensor reading is more than 50 percent, and engine is running. Possible causes are:

- Open or short in MAF sensor wire harness.
- Open or short in TP sensor wire harness.
- MAF sensor malfunction.
- MAF sensor screen plugged.
- TP sensor malfunction.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0122, P0123, P0506, P0507 and/or P1103 are present, repair those DTC(s) first and go to step 6. If listed DTCs are not present, go to next step.
2. Turn ignition on. Using scan tool, access MAF V PID. Start engine and run it at idle and observe scan tool. If MAF V PID is okay, go to step 5. If MAF V PID is not okay, go to next step.

3. Turn ignition off. Remove MAF sensor. Ensure MAF sensor is not plugged. Repair as needed. If MAF sensor is okay, go to next step.
4. Turn ignition on. Using scan tool, access TP V PID. Turn ignition on and observe scan tool. If TP V PID is okay, go to step 6. If TP V PID is not okay, go to next step.
5. Inspect TP sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace TP sensor as needed. If TP sensor is okay, go to next step.
6. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1103: MAF SENSOR INCONSISTENT WITH RPM SENSOR (HIGHER THAN EXPECTED)

Condition

DTC is set when Mass Air Flow (MAF) sensor reading is more than 8.8 lbs/Min with engine speed less than 2000 RPM and engine coolant temperature is more than 176°F (80°C). Possible causes are:

- Open or short in MAF sensor wire harness.
- MAF sensor malfunction.
- Vacuum leak at MAF sensor.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0117, P0118, P0506, P0507, P1102 and/or P1504 are present, repair those DTC(s) first and go to step 4. If listed DTCs are not present, go to next step.
2. Turn ignition on. Using scan tool, access MAF V PID. Start engine and run it at idle and observe scan tool. If MAF V PID is okay, go to step 4. If MAF V PID is not okay, go to next step.
3. Check for vacuum leaks at or around MAF sensor. Repair or replace as needed. If no vacuum leaks are found, turn ignition off. Remove MAF sensor. Ensure MAF sensor is not plugged. Repair as needed. If MAF sensor is okay, go to next step.
4. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1122: TP SENSOR STUCK CLOSED

Condition

DTC is set when throttle opening angle remains less than 12.5 percent, engine coolant temperature is more than 176°F (80°C), and Mass Air Flow (MAF) sensor reading is more than 7.7 lbs/Min. Possible causes are:

- Throttle Position (TP) sensor malfunction.
- MAF sensor malfunction.
- Poor connection of Engine Coolant Temperature (ECT) sensor, Mass Air Flow (MAF) sensor, TP sensor and PCM connectors.

- Open or short in TP sensor wire harness.
- Open or short in MAF sensor wire harness.
- Open or short in ECT sensor wire harness.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0117, P0118, P0506, P0507, P1102, P1103 and/or P1504 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, go to next step.
2. Inspect all applicable harness connectors. Repair as needed. If all connectors are okay, go to next step.
3. Turn ignition on. Using scan tool, access TP V PID. Turn ignition on and observe scan tool. If TP V PID is okay, go to step 5. If TP V PID is not okay, go to next step.
4. Inspect TP sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace TP sensor as needed. If TP sensor is okay, go to next step.
5. Turn ignition on. Using scan tool, access MAF V PID. Start engine and run it at idle and observe scan tool. If MAF V PID is okay, go to step 7. If MAF V PID is not okay, go to next step.
6. Inspect MAF sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace MAF sensor as needed. If MAF sensor is okay, go to next step.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1123: TP SENSOR STUCK OPEN

Condition

DTC is set when throttle opening angle is more than 50 percent, engine speed is more than 500 RPM, and Mass Air Flow (MAF) sensor reading is less than .6 lbs/Min. Possible causes are:

- TP sensor malfunction.
- MAF sensor malfunction.
- Poor connection at Crankshaft Position (CKP) sensor, Mass Air Flow (MAF) sensor, TP sensor and PCM connectors.
- Open or short in CKP sensor wire harness.
- Open or short in TP sensor wire harness.
- Open or short in MAF sensor wire harness.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA have been recorded. Verify stored DTCs. If DTCs and pending codes P0102, P0103, P0335, P0506, P0507, P1102, P1103 and/or P1504 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, go to next step.
2. Inspect all applicable harness connectors. Repair as needed. If all connectors are okay, inspect throttle valve operation. Ensure throttle valve responds to accelerator correctly. Repair an needed. If throttle valve is working correctly, go to next step.
3. Turn ignition on. Using scan tool, access TP V PID. Turn ignition on and observe scan tool. If TP V

PID is okay, go to step 5. If TP V PID is not okay, go to next step.

4. Inspect TP sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace TP sensor as needed. If TP sensor is okay, go to next step.
5. Turn ignition on. Using scan tool, access MAF V PID. Start engine and run it at idle and observe scan tool. If MAF V PID is okay, go to step 7. If MAF V PID is not okay, go to next step.
6. Inspect MAF sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace MAF sensor as needed. If MAF sensor is okay, go to next step.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1135: FRONT HEATED OXYGEN SENSOR LOW HEATER CIRCUIT INPUT

Condition

DTC is set when PCM is receiving low voltage at terminal No. 94 with front heated oxygen sensor off and engine running. Possible causes are:

- Front heated oxygen sensor malfunction.
- Poor connection of front heated oxygen sensor and PCM connectors
- Open or short circuit between terminal No. 94 on Powertrain Control Module (PCM) and terminal "D" on front heated oxygen sensor.
- Open or short circuit between ignition switch and terminal "C" on front heated oxygen sensor.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect front heated oxygen sensor. Measure voltage between ground and terminal "C" on front heated oxygen sensor harness connector. See **Fig. 9**. If battery voltage is present, go to next step. If battery volage is not present, check for open or short is suspect wire harness.
3. Disconnect PCM connector. Check for continuity between terminal "D" on front heated oxygen sensor harness connector and terminal No. 94 on PCM harness connector. See **Fig. 5** and **Fig. 9** . If continuity is not present, check for open in suspect wire harness. Repair as needed. If continuity is present, go to next step.
4. Check for continuity between terminal No. 94 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, repair short to ground in suspect circuit. If continuity is not present, go to next step.
5. Inspect front heated oxygen sensor heater. Repair as needed and go to next step. If heated oxygen sensor heater is functioning correctly, go to next step.
6. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L 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.

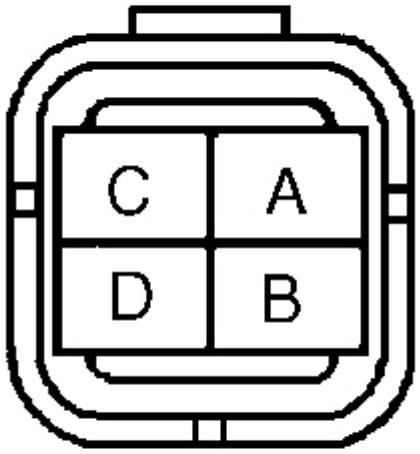

Fig. 9: Identifying Front Heater Oxygen Sensor Connector
Courtesy of MAZDA MOTORS CORP.

DTC P1136: FRONT HEATED OXYGEN SENSOR HIGH HEATER CIRCUIT INPUT

Condition

DTC is set when PCM is receiving high voltage at terminal No. 94 with front heated oxygen sensor on and engine running. Possible causes are:

- Front heated oxygen sensor malfunction.
- Poor connection of front heated oxygen sensor and PCM connectors
- Short circuit between terminal No. 94 on Powertrain Control Module (PCM) and terminal "D" on front heated oxygen sensor.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect front heated oxygen sensor and PCM connectors. Check for continuity between terminal No. 94 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is not present, go to next step. If continuity is present, check for short to power in circuit between suspect wire harness. Repair as needed.
3. Inspect front heated oxygen sensor heater. Repair as needed and go to next step. If heated oxygen sensor heater is functioning correctly, go to next step.
4. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode

No. 3 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L 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 P1141: REAR HEATED OXYGEN SENSOR LOW HEATER CIRCUIT INPUT

Condition

DTC is set when PCM is receiving low voltage at terminal No. 93 with rear heated oxygen sensor off and engine running. Possible causes are:

- Rear heated oxygen sensor malfunction.
- Poor connection of rear heated oxygen sensor and PCM connectors
- Open or short circuit between terminal No. 93 on Powertrain Control Module (PCM) and terminal "D" on rear heated oxygen sensor.
- Open or short circuit between ignition switch and terminal "C" on rear heated oxygen sensor.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect rear heated oxygen sensor connector. Turn ignition on. Measure voltage between ground and terminal "C" on heated oxygen sensor harness connector. If battery voltage is present, go to next step. If battery voltage is not present, check for open or short in wire harness between heated oxygen sensor and ignition switch.
3. Turn ignition off. Disconnect PCM connector. Check for continuity between terminal "D" on rear heated oxygen sensor harness connector and terminal No. 93 on PCM harness connector. See **Fig. 5** and **Fig. 10** . If continuity is present, go to next step. If continuity is not present, check for open in wire harness.
4. Check for continuity between terminal No. 93 and No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, repair short to ground in suspect circuit. If continuity is not present, go to next step.
5. Inspect rear heated oxygen sensor heater. Repair as needed and go to next step. If rear heated oxygen sensor heater is functioning correctly, go to next step.
6. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L 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.

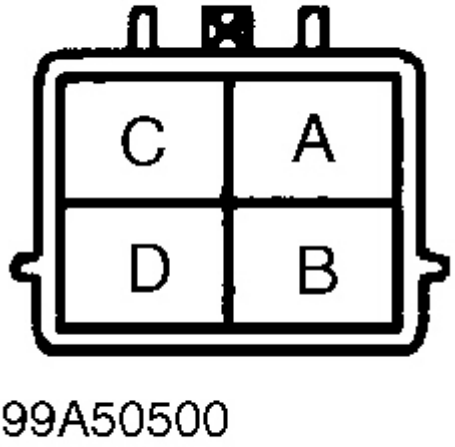

Fig. 10: Identifying Rear Heated Oxygen Sensor Connector
Courtesy of MAZDA MOTORS CORP.

DTC P1142: REAR HEATED OXYGEN SENSOR HIGH HEATER CIRCUIT INPUT

Condition

DTC is set when right front heated oxygen sensor signal voltage exceeds .45 volt and remains unchanged for 25 seconds after engine is started and has reached normal operating temperature. Engine speed at 1150 RPM or greater. Possible causes are:

- Rear heated oxygen sensor malfunction.
- Poor connection of rear heated oxygen sensor and PCM connectors.
- Short circuit between terminal No. 93 on Powertrain Control Module (PCM) and terminal "D" on rear heated oxygen sensor.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect rear heated oxygen sensor and PCM connectors. Check for continuity between terminal No. 93 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is not present, go to next step. If continuity is present, check for short to power in circuit between suspect wire harness. Repair as needed.
3. Inspect rear heated oxygen sensor heater. Repair as needed and go to next step. If rear heated oxygen sensor heater is functioning correctly, go to next step.
4. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L 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 P1170: FRONT HEATED OXYGEN SENSOR - INVERSION

Condition

DTC is set when front heated oxygen sensor signal voltage is more or less than .45 volt for 43 seconds after engine is started and has reached normal operating temperature. Engine speed more than 1500 RPM. Possible causes are:

- Front heated oxygen sensor.
- Fuel injector malfunction.
- Pressure regulator malfunction.
- Fuel pump malfunction
- Plugged or leaking fuel delivery hose and/or fuel filter.
- Plugged or leaking fuel return nose.
- Intake air system leaks.
- PCV valve malfunction.
- Purge solenoid valve malfunction.
- Purge solenoid hoses installed incorrectly.
- Ignition coil and igniter malfunction.
- Insufficient compression.
- MAF sensor malfunction.
- ECT sensor malfunction.
- TP sensor malfunction.
- EGR system malfunction (if equipped).
- Open or short circuit between terminal No. 60 on Powertrain Control Module (PCM) and terminal "A" on front heated oxygen sensor.
- Open or short circuit between terminal "D" on main relay and terminal "C" on front heated oxygen sensor.
- Poor connection of PCM and front heated oxygen sensor connectors.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0103, P0117, P0118, P0122, P0123, P0443, P0500, P1102, P1103, P1122, P1496, P1497, P1498 and/or P1499 are present, repair those DTC(s) first and go to step 25 If listed DTCs are not present, go to next step.
2. Verify if DTC P1170 are present in FREEZE FRAME PID DATA. If DTC is present, go to next step. If DTC is not present, repair DTC(s) present in FREEZE FRAME PID DATA and go to step 6.
3. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Referring to FREEZE FRAME PID DATA data, operate vehicle for at least 2 minutes under same conditions as when DTC was set. Verify if DTC P1170 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. Using scan tool, access PID/DATA MONITOR. Record PID data for ECT, RPM, and TP V. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
5. Referring to FREEZE FRAME PID DATA, operate vehicle under same conditions as when DTC was set. Record PID data for MAFV, ECTV and TPV. Compare readings with specifications. See PIN VOLTAGE/PID VALUE CHARTS article. If any data is not within specification, go to applicable test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. If all data is within specification, go to next step.
6. Inspect exhaust system for leaks upstream of front heated oxygen sensor. Repair as needed. If exhaust system is okay, check front heated oxygen sensor for proper installation. Repair as needed. If front heated oxygen sensor is installed properly, go to next step.
7. Using scan tool, access PID/DATA MONITOR. Monitor FHO2S. Depress accelerator pedal to Wide Open Throttle (WOT) and release to race engine. Scan tool should display heated oxygen sensor voltage greater than .45 volt during rich condition and less than .45 volt during lean condition. If voltage is as specified, go to next step. If voltage is not as specified, replace heated oxygen sensor and retest.
8. Inspect front heated oxygen sensor heater. Repair as needed and go to next step. If heated oxygen sensor heater is functioning correctly, go to next step.
9. Check for open in White/Yellow wire between main relay and each fuel injector. Also check for open in circuits between each fuel injector and PCM. Repair as needed and go to step 25. If wires are okay, go to next step.
10. Perform a volume check for each fuel injector. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed and go to step 25. If fuel injectors are okay, go to next step.
11. Monitor LONGFT1 and SHRTFT1 on FREEZE FRAME PID DATA. If fuel trim is shifting to lean condition, go to next step. If fuel trim is inactive or slow to respond, inspect air intake system for leaks. Repair as needed and retest.
12. Inspect purge control system operation. Repair as needed. If purge control system is okay, go to next step.
13. Inspect PCV valve and hose. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace or repair PCV valve and hose as needed. If PCV valve and hose are okay, go to next step.
14. Inspect fuel line pressure. If fuel line pressure is okay, go to next step. If fuel line pressure is not okay, check for fuel leakage and injection amount. Repair or replace as needed.
15. Inspect fuel pressure regulator. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace or repair fuel pressure regulator as needed. If fuel pressure regulator is okay, go to next step.
16. Inspect air intake system for leaks. Repair as needed and go to step 25. If intake system leaks are not found, go to next step.
17. Check for correct amount of vacuum at intake manifold. Repair as needed and go to step 25. If vacuum is okay, go to next step.
18. Check fuel pressure. See BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is as specified, go to step 21. If fuel pressure is not okay, go to next step.
19. Check maximum fuel pump pressure. See BASIC DIAGNOSTIC PROCEDURES article. If maximum fuel pump pressure is as specified, go to step 25. If maximum fuel pump pressure is not okay, go to next step.

20. Inspect fuel filter for plugging. Replace as needed and go to next step. If fuel filter is okay, inspect fuel tank for foreign materials. Clean fuel tank and fuel line between fuel tank and fuel filter. Replace fuel filter and go to step 25. If inside of fuel tank is okay, replace fuel filter and go to step 25.
21. Ensure secondary ignition system, including ignition coil, is working properly. See BASIC DIAGNOSTIC PROCEDURES article. Repair as needed and go to step 25. If secondary ignition system is working properly, check for poor connections and damaged wire harness between ignition coil and PCM. Repair as needed and go to step 25. If wire harness and connectors are okay, go to next step.
22. Inspect fuel hose between fuel rail and fuel pump for leakage or plugging. Inspect fuel return line between fuel rail and fuel tank for leakage. Repair as needed. If fuel lines and hoses are okay, go to next step.
23. Inspect EGR system. See appropriate DTCs. Repair as needed. If EGR system is okay, go to next step.
24. Check for internal cooling system leaks. Repair as needed and go to next step. If cooling system is okay, check engine compression. Repair as needed and go to next step. If engine compression is okay, go to next step.
25. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 3 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L 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 P1250: PRESSURE REGULATOR CONTROL (PRC) SOLENOID VALVE MALFUNCTION

Condition

DTC is set when open or short circuit is detected in PRC solenoid valve when ignition is on. Possible causes are:

- PRC solenoid valve malfunction.
- Poor connection of PCM and PRC connectors.
- Open or short circuit between terminal "B" on PRC solenoid valve and terminal No. 95 on Powertrain Control Module (PCM).
- Open circuit between terminal "A" on PRC solenoid valve and terminal "D" on main relay.
- Open circuit between ground and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0443, P1345, P1449, P1487, P1496, P1497, P1498, P1499, P1569 and/or P1570 are present, repair those DTC(s) first and go to step 8. If listed DTCs are not present, go to next step.
2. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
3. Disconnect PRC solenoid valve harness connector. Ensure ignition is on. Measure voltage between ground and terminal "A" on PRC solenoid valve harness connector. If battery voltage is present, go to next step. If battery voltage is not present, repair open in circuit between solenoid and main relay.
4. Turn ignition off. Disconnect PCM harness connector. Check continuity between terminal "B" on

PRC solenoid valve harness connector and terminal No. 95 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, repair for open in wire harness.

5. Check for continuity between terminals No. 95 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect circuit in wire harness. If continuity is not present, go to next step.
6. Check for short to ground of circuit between terminal No. 95 on PCM connector and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM, individually. See **Fig. 5**. Repair as needed and go to step 8. If wire is okay, go to next step.
7. Inspect PRC solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace or repair PRC solenoid valve as needed. If PRC solenoid valve is okay, go to next step.
8. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1345: NO SGC SIGNAL

Condition

DTC is set when single or double Camshaft Position (CMP) sensor signal does not match set criteria in PCM, and Mass Air Flow (MAF) sensor is more than .3 lbs/Min. Possible causes are:

- CMP sensor malfunction.
- Metal particles on CMP sensor.
- Improper CMP sensor installation.
- Poor connection of PCM and CMP sensor connectors.
- Open or short circuit between terminal "B" on CMP sensor and terminal No. 85 on Powertrain Control Module (PCM).
- Open circuit between terminal "A" on CMP sensor and terminal "D" main relay.
- Open circuit between terminal "C" on CMP sensor and negative battery terminal.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0103, P0443, P1250, P1449, P1487, P1496, P1497, P1498, P1499, P1569 and/or P1570 are present, repair those DTC(s) first and go to step 9. If listed DTCs are not present, inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Check CMP sensor installation. Repair as needed. If installation is okay, inspect CMP sensor for any metal debris. Clean as needed and go to step 9. If CMP sensor is okay, go to next step.
3. Turn ignition off. Disconnect CMP sensor connector. Turn ignition on. Measure voltage between ground and terminal "A" on CMP sensor harness connector. If battery voltage is present, check for open in circuit between terminal "A" on CMP sensor terminal "D" on main relay. If battery voltage is not present, go to next step.
4. Turn ignition off. Disconnect PCM connector. Check for continuity between terminal "B" on CMP sensor harness connector and terminal No. 85 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for open in suspect circuit.

5. Check for continuity between terminals No. 85 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire, and go to step 9. If continuity is not present, go to next step.
6. Check for continuity between terminal No. 85 and terminals No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM, individually. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 9. If continuity is not present, go to next step.
7. Check for continuity between terminal "C" on CMP sensor harness connector and terminals No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire) and No. 77 (Black/White wire) on PCM, individually. If continuity is present, go to next step. If continuity is not present, check for open is suspect wire. Repair as needed and go to step 9.
8. Inspect CMP sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to next step. If CMP sensor is okay, go to next step.
9. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

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.
- Poor connection at PCM and CDCV connectors.
- Open or short circuit between terminal "B" on CDCV and terminal No. 18 on Powertrain Control Module (PCM).
- Open circuit between terminal "A" on CDCV and terminal "D" on main relay.
- Open circuit between ground and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0443, P1250, P1345, P1487, P1496, P1497, P1498, P1499 and/or P1570 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Disconnect CDCV harness connector. Ensure ignition is on. Measure voltage between ground and terminal "A" on CDCV harness connector. If battery voltage is present, go to next step. If battery voltage is not present, repair open wire between solenoid and main relay.
3. Turn ignition off. Disconnect PCM harness connector. PCM is mounted in front of center console, under radio. Check continuity between terminal "B" on CDCV harness connector and terminal No. 18 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, repair open wire.
4. Check continuity between terminals No. 18 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire, and go to step 7. If continuity is not present, go to next step.

5. Check for continuity between terminal No. 18 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. If continuity is present, repair short to ground in suspect wire and go to step 7. If continuity is not present, go to next step.
6. Inspect CDCV. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to next step. If CDCV is okay, go to next step.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1450: EVAP SYSTEM MALFUNCTION - EXCESSIVE LEAK DETECTED

Condition

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

- Purge solenoid valve malfunction.
- Canister Drain Cut Valve (CDCV) malfunction.
- Tank Pressure Control Valve (TPCV) malfunction.
- Charcoal canister malfunction.
- Plugged air filter.
- Two-way check valve clogged.
- Clogs or leakage in system hoses.
- Fuel tank pressure sensor malfunction.
- Engine Coolant Temperature (ECT) sensor malfunction.
- Vehicle Speed Sensor (VSS) malfunction.
- Open or short in wiring harness.
- Poor connector connections.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0117, P0118, P0335, P0443, P0500 and/or P1449 are present, repair those DTC(s) first and go to step 15. If no other engine performance related DTCs are present, go to next step.
2. Monitor PID data (BAROV, ECTV, FTLV, FTPV, IATV, MAFV, TPV and VS). See PID DATA INFORMATION. If all signals are within specification, go to next step. If any signals are not within specification, see applicable component test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair harness or replace malfunctioning component as needed. Go to step 15.
3. Continue monitoring PID data. Confirm RPM, LOAD, ECT and VSS FREEZE FRAME PID DATA. Operate vehicle for one minute and determine if any PID data items excessively change. BARO signal should change from atmospheric pressure to intake vacuum. If any signals suddenly change, check applicable component connections. Intermittent poor harness connection may have caused signal change. Repair harness or connector as needed. Go to step 16. If all signals stay consistent and within specification, go to next step.

4. Using scan tool, run IGNITION ON SIMULATION TEST. Turn Canister Drain Cut Valve (CDCV) from OFF to ON. CDCV and Tank Pressure Control Valve (TPCV) should be heard operating. If system does not operate correctly, go to step 7. If system operates correctly, go to next step.
5. Using scan tool, run IDLE SIMULATION TEST. Detach vacuum hose on charcoal canister. Increase PRGV (purge solenoid valve) from zero to 100 percent. Measure negative pressure (vacuum). Reading should change from atmospheric pressure to intake manifold negative pressure. If system operates correctly, go to step 8. If system does not operate correctly, go to next step.
6. Inspect purge solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 16. If purge solenoid valve is okay, go to step 16.
7. Inspect Canister Drain Cut Valve (CDCV). See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 16. If CDCV is okay, go to next step.
8. Remove charcoal canister beside fuel tank. Inspect for damage or clogging. Replace as needed. Go to step 16. If charcoal canister is okay, go to next step.
9. Pinch off hose on fuel tank side of charcoal canister. Remove fuel filler cap. Monitor PID data (FTP and FTPV). FTP (fuel tank pressure) and FTPV (fuel tank pressure signal voltage) should be the same as atmospheric pressure. If system operates correctly, install filler cap. Go to step 16. If system does not operate correctly, go to next step.
10. Inspect Fuel Tank Pressure (FTP) sensor. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 16. If FTP sensor is okay, go to next step.
11. Inspect Tank Pressure Control Valve (TPCV). See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 16. If TPCV is okay, go to next step.
12. Remove TPCV and install a "T" fitting. Attach vacuum pump to "T" fitting. Monitor PID data (FTP and FTPV). Apply vacuum to fitting. If FTP and FTPV values change to vacuum readings, go to step 16. If FTP and FTPV values do not change to vacuum readings, go to next step.
13. Inspect two-way check valve for leakage or clogging. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to step 16. If two-way check valve is okay, go to next step.
14. Inspect EVAP air filter for clogging. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace as needed. Go to next step. If EVAP air filter is okay, go to next step.
15. Monitor PID data (BARO, ECT and IAT). See PID DATA INFORMATION. If all signals are within specification, go to next step. If any signals are not within specification, see applicable component test in SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair harness or replace malfunctioning component as needed.
16. Erase DTCs. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Conduct drive cycle mode No. 4 under DRIVE CYCLE PROCEDURE. See SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Recheck for DTCs. 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 - OPEN OR SHORT CIRCUIT

Condition

DTC is set PCM detects open or short circuit in EGR boost sensor solenoid valve system when ignition switch is on. Possible causes are:

- EGR boost sensor solenoid valve malfunction.
- Poor connection at PCM and EGR boost sensor solenoid valve connectors.
- Open or short circuit between terminal No. 98 on Powertrain Control Module (PCM) and terminal "B" on EGR boost sensor solenoid valve.
- Open circuit between terminal "A" on EGR boost sensor solenoid valve and terminal "D" on main relay.
- Open circuit between ground and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0443, P1250, P1345, P1449, P1496, P1497, P1498, P1499, P1569 and/or P1570 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect EGR boost sensor solenoid valve connector. Turn ignition on. Measure voltage between ground and terminal "A" on harness connector. See **Fig. 11**. If battery voltage is present, go to next step. If battery is not present, check for open or short circuit between EGR boost sensor solenoid valve connector and main relay. Repair as needed.
3. Turn ignition off. Disconnect PCM harness connector. Check for continuity between terminal "B" on EGR boost sensor solenoid valve harness connector and terminal No. 98 on PCM harness connector. See **Fig. 5** and **Fig. 11** . If continuity is not present, check for open in suspect wire. Repair as needed. If continuity is present, go to next step.
4. Check for continuity between terminals No. 98 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire. If continuity is not present, go to next step.
5. Check for continuity between terminal No. 98 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 7. If continuity is not present, go to next step.
6. Check continuity between EGR boost sensor solenoid valve component terminals. If continuity is present, go to next step. If continuity is not present, replace EGR boost sensor solenoid valve.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

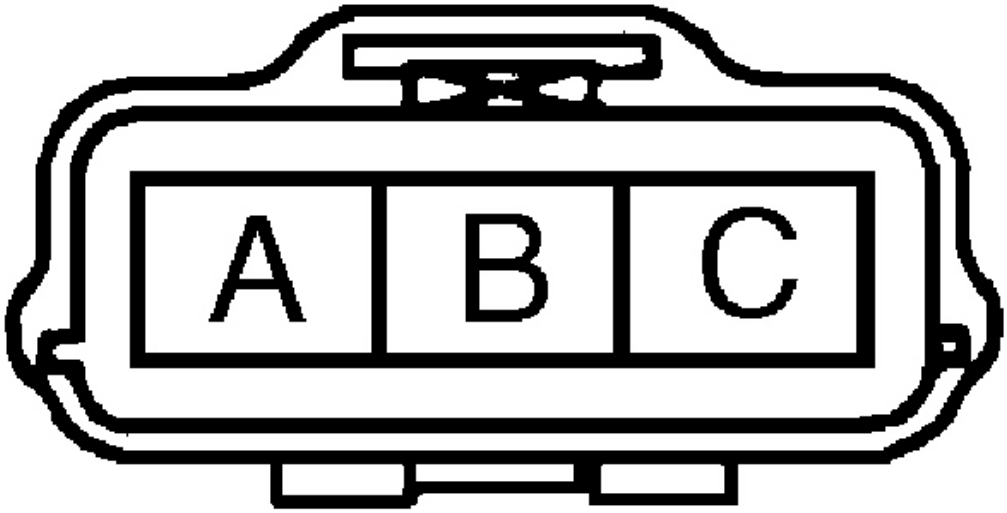

Fig. 11: Identifying Exhaust Gas Recirculation (EGR) Boost and Throttle Position (TP) Sensor Connectors
Courtesy of MAZDA MOTORS CORP.

DTC P1496: EGR VALVE STEPPING MOTOR NO. 1 COIL - OPEN OR SHORT CIRCUIT

Condition

DTC is set PCM detects open or short circuit in EGR valve stepping motor No. 1 coil when ignition switch is on. Possible causes are:

- EGR valve stepping motor (coil No. 1) malfunction.
- Poor connection at EGR valve and PCM connectors.
- Open or short circuit between terminal No. 68 on Powertrain Control Module (PCM) and terminal "E" on EGR valve stepper motor.
- Open circuit between terminal "C" on EGR valve stepping motor and terminal "D" on main relay.
- Open circuit between ground and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0443, P1250, P1345, P1449, P1487, P1497, P1498, P1499, P1569 and/or P1570 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect EGR valve connector. Turn ignition on. Measure voltage between ground and terminal "C" on harness connector. If battery voltage is present, go to next step. If battery

is not present, check for open or short circuit between EGR valve connector and main relay. Repair as needed.

3. Turn ignition off. Disconnect PCM harness connector. Check for continuity between terminal "E" on EGR valve harness connector and terminal No. 68 on PCM harness connector. See **Fig. 5**. If continuity is not present, check for open in suspect wire. Repair as needed. If continuity is present, go to next step.
4. Check for continuity between terminals No. 68 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire. If continuity is not present, go to next step.
5. Check for continuity between terminal No. 68 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 7. If continuity is not present, go to next step.
6. Check continuity between terminals "C" and "E" on EGR valve component terminals. If continuity is present, go to next step. If continuity is not present, replace EGR valve.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1497: EGR VALVE STEPPING MOTOR NO. 2 COIL - OPEN OR SHORT CIRCUIT

Condition

DTC is set PCM detects open or short circuit in EGR valve stepping motor No. 2 coil when ignition switch is on. Possible causes are:

- EGR valve stepping motor (coil No. 2) malfunction.
- Poor connection at EGR valve and PCM connectors.
- Open or short circuit between terminal No. 72 on Powertrain Control Module (PCM) and terminal "A" on EGR valve stepper motor.
- Open circuit between terminal "C" on EGR valve stepping motor and terminal "D" on main relay.
- Open circuit between ground and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0443, P1250, P1345, P1449, P1487, P1496, P1498, P1499, P1569 and/or P1570 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect EGR valve connector. Turn ignition on. Measure voltage between ground and terminal "C" on harness connector. If battery voltage is present, go to next step. If battery is not present, check for open or short circuit between EGR valve connector and main relay. Repair as needed.
3. Turn ignition off. Disconnect PCM harness connector. Check continuity of wire between terminal "A" on EGR valve harness connector and terminal No. 72 on PCM harness connector. See **Fig. 5**. If continuity is not present, check for open in suspect wire. Repair as needed. If continuity is present, go to next step.

4. Check for continuity between terminals No. 72 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire. If continuity is not present, go to next step.
5. Check for continuity between terminal No. 72 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 7. If continuity is not present, go to next step.
6. Check continuity between terminals "C" and "A" on EGR valve component terminals. If continuity is present, go to next step. If continuity is not present, replace EGR valve.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1498: EGR VALVE STEPPING MOTOR NO. 3 COIL - OPEN OR SHORT CIRCUIT

Condition

DTC is set PCM detects open or short circuit in EGR valve stepping motor No. 3 coil when ignition switch is on. Possible causes are:

- EGR valve stepping motor (coil No. 3) malfunction.
- Poor connection at EGR valve and PCM connectors.
- Open or short circuit between terminal No. 46 on Powertrain Control Module (PCM) and terminal "B" on EGR valve stepper motor.
- Open circuit between terminal "D" on EGR valve stepping motor and terminal "D" on main relay.
- Open circuit between ground and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0443, P1250, P1345, P1449, P1487, P1496, P1497, P1499, P1569 and/or P1570 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect EGR valve connector. Turn ignition on. Measure voltage between ground and terminal "D" on harness connector. If battery voltage is present, go to next step. If battery is not present, check for open circuit between EGR valve connector and main relay. Repair as needed.
3. Turn ignition off. Disconnect PCM harness connector. Check continuity of wire between terminal "B" on EGR valve harness connector and terminal No. 46 on PCM harness connector. See **Fig. 5**. If continuity is not present, check for an open in suspect wire. Repair as needed. If continuity is present, go to next step.
4. Check for continuity between terminals No. 46 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire. If continuity is not present, go to next step.
5. Check for continuity between terminal No. 46 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 7. If continuity is not present, go to next step.

6. Check continuity between terminals "C" and "B" on EGR valve component terminals. If continuity is present, go to next step. If continuity is not present, replace EGR valve.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1499: EGR VALVE STEPPING MOTOR NO. 4 COIL - OPEN OR SHORT CIRCUIT

Condition

DTC is set PCM detects open or short circuit in EGR valve stepping motor No. 4 coil when ignition switch is on. Possible causes are:

- EGR valve stepping motor (coil No. 4) malfunction.
- Poor connection at EGR valve and PCM connectors.
- Short circuit between terminal No. 56 on Powertrain Control Module (PCM) and terminal "B" on EGR valve stepper motor.
- Open or short circuit between terminal No. 56 on Powertrain Control Module (PCM) and terminal "F" on EGR valve stepper motor.
- Open circuit between terminal "D" on EGR valve stepping motor and terminal "D" on main relay.
- Open circuit between ground and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0443, P1250, P1345, P1449, P1487, P1496, P1497, P1498, P1569 and/or P1570 are present, repair those DTC(s) first and go to step 7. If listed DTCs are not present, inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect EGR valve connector. Turn ignition on. Measure voltage between ground and terminal "D" on harness connector. If battery voltage is present, go to next step. If battery is not present, check for open circuit between EGR valve connector and main relay. Repair as needed.
3. Turn ignition off. Disconnect PCM harness connector. Check continuity of wire between terminal "F" on EGR valve harness connector and terminal No. 56 on PCM harness connector. See **Fig. 5**. If continuity is not present, check for open in suspect wire. Repair as needed. If continuity is present, go to next step.
4. Check for continuity between terminals No. 56 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire. If continuity is not present, go to next step.
5. Check for continuity between terminal No. 56 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 7. If continuity is not present, go to next step.
6. Check continuity between terminals "C" and "F" on EGR valve component terminals. If continuity is present, go to next step. If continuity is not present, replace EGR valve.
7. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace

PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1504: IDLE AIR CONTROL CIRCUIT MALFUNCTION

Condition

DTC is set when PCM detects that controlled current is out of preprogrammed range. Possible causes are:

- Idle Air Control (IAC) valve malfunction.
- Poor connection at IAC valve and PCM connectors.
- Open or short circuit between terminal No. 54 on Powertrain Control Module (PCM) and terminal "A" on IAC valve.
- Open or short circuit between terminal No. 83 on Powertrain Control Module (PCM) and terminal "B" on IAC valve.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect IAC valve and PCM connectors. Check for continuity between terminal "A" on IAC valve harness connector and terminal No. 54 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for open in suspect wire. Repair as needed.
3. Check for continuity between terminals No. 54 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire. If continuity is not present, go to next step.
4. Check for continuity between terminal No. 54 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 9. If continuity is not present, go to next step.
5. Check for continuity between terminal "B" on IAC valve harness connector and terminal No. 83 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for open in suspect wire. Repair as needed.
6. Check for continuity between terminals No. 83 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire. If continuity is not present, go to next step.
7. Check for continuity between terminal No. 83 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 9. If continuity is not present, go to next step.
8. Inspect IAC valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace IAC valve as needed. If IAC valve is okay, go to next step.
9. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1512: VARIABLE TUMBLE CONTROL SYSTEM (VTCS) MALFUNCTION

Condition

DTC is set when PCM detects that VTCS solenoid valve is stuck closed under following conditions; mass airflow is less than expected, throttle opening angle is more than preset value and engine coolant temperature is more than 176°F (80°C). Possible causes are:

- VTCS solenoid valve malfunction (stuck closed).
- VTCS solenoid valve air filter plugged.
- VTCS shutter valve actuator stuck.
- VTCS delay valve plugged.
- VTCS one-way check valve plugged.
- VTCS vacuum chamber plugged.
- Incorrect vacuum.
- VTCS related vacuum hoses plugged.
- PCM malfunction.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P1569 and/or P1570 are present, repair those DTC(s) first and go to step 6. If listed DTCs are not present, go to next step.
2. Inspect air intake system for leaks. Repair as needed and go to step 6. If intake system leaks are not found, check VTCS related vacuum hoses for plugging. Repair or replace as needed. If vacuum hoses are okay, go to next step.
3. Inspect VTCS solenoid valve air filter for plugging. Repair as needed. If air filter is not plugged, inspect VTCS shutter valve actuator. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair or replace VTCS shutter valve actuator as needed. If VTCS shutter valve actuator is okay, go to next step.
4. Inspect VTCS delay valve for plugging. Repair as needed. If VTCS delay valve is not plugged, inspect VTCS one-way check valve for plugging. Repair as needed. If VTCS one-way check valve is okay, inspect VTCS vacuum chamber for plugging. Repair as needed. If VTCS vacuum chamber is okay, go to next step.
5. Inspect VTCS solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Repair or replace VTCS solenoid valve as needed. If VTCS solenoid valve is okay, go to next step.
6. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1562: LOW VOLTAGE TO PCM POWER SUPPLY CIRCUIT

Condition

DTC is set when PCM detects less than 2.5 volts at power supply terminal. Possible causes are:

- ROOM fuse blown.
- Open circuit between terminal No. 55 on Powertrain Control Module (PCM) and positive battery

terminal.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Inspect ROOM fuse. Replace as needed. Inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect PCM connector. Turn ignition on. Measure voltage between ground and terminal No. 55 on PCM harness connector. See **Fig. 5**. If battery volage is present, go to next step. If battery voltage is not present, check for open in suspect wire. Repair as needed.
3. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1569: VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SOLENOID VALVE CIRCUIT, LOW INPUT

Condition

DTC is set when PCM detects low voltage input at terminal No. 19 with VTCS solenoid valve off and ignition on. Possible causes are:

- VTCS solenoid valve malfunction.
- Poor connection at VTCS solenoid valve and PCM connectors.
- Open or short circuit between terminal No. 19 on Powertrain Control Module (PCM) and terminal "B" on VTCS solenoid valve.
- Open circuit between terminal "D" on main relay and terminal "A" on VTCS solenoid valve.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0443, P1250, P1345, P1449, P1496, P1497, P1498 and/or P1499 are present, repair those DTC(s) first and go to step 6. If listed DTCs are not present, inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect VTCS solenoid valve. Turn ignition on. Measure voltage between ground and terminal "A" on VTCS solenoid valve harness connector. If battery voltage is present, go to next step. If battery volage is not present, check for open circuit between terminal "A" on VTCS solenoid valve and terminal "D" on main relay. Repair as needed.
3. Turn ignition off. Disconnect PCM connector. Check for continuity between terminal "B" on VTCS solenoid valve harness connector and terminal No. 19 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for open in suspect wire. Repair as needed.
4. Check for continuity between terminal No. 19 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 6. If continuity is not present, go to next step.
5. Inspect VTCS solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace VTCS solenoid valve as needed. If VTCS solenoid valve is okay, go to next

step.

6. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1570: VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SOLENOID VALVE CIRCUIT, HIGH INPUT

Condition

DTC is set when PCM detects high voltage input at terminal No. 19 with VTCS solenoid valve on and ignition on. Possible causes are:

- VTCS solenoid valve malfunction.
- Poor connection at VTCS solenoid valve and PCM connectors.
- Open or short circuit between terminal No. 19 on Powertrain Control Module (PCM) and terminal "B" on VTCS solenoid valve.
- Open circuit between terminal "D" on main relay and terminal "A" on VTCS solenoid valve.
- PCM malfunction.

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Verify stored DTCs. If DTCs P0102, P0443, P1250, P1345, P1449, P1496, P1497, P1498 and/or P1499 are present, repair those DTC(s) first and go to step 6. If listed DTCs are not present, inspect all applicable harness connectors. Repair as needed. If harness connectors are okay, go to next step.
2. Turn ignition off. Disconnect VTCS solenoid valve. Turn ignition on. Measure voltage between ground and terminal "A" on VTCS solenoid valve harness connector. If battery voltage is present, go to next step. If battery volage is not present, check for open circuit between terminal "A" on VTCS solenoid valve and terminal "D" on main relay. Repair as needed.
3. Turn ignition off. Disconnect PCM connector. Check for continuity between terminal "B" on VTCS solenoid valve harness connector and terminal No. 19 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for open in suspect wire. Repair as needed.
4. Check for continuity between terminals No. 19 and 71 (White/Black wire) and No. 97 (White wire) on PCM harness connector. See **Fig. 5**. If continuity is present, repair short to power in suspect wire. If continuity is not present, go to next step.
5. Inspect VTCS solenoid valve. See SYSTEM & COMPONENT TESTING - EXCEPT B2500, B3000 & B4000 article. Replace VTCS solenoid valve as needed. If VTCS solenoid valve is okay, go to next step.
6. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1631: GENERATOR MALFUNCTION

Condition

DTC is set PCM detects generator output voltage less than 8.5 volts after PCM demands increased output greater than 20 amps. Possible causes are:

- Generator malfunction.
- Open or short circuit between terminal "P" on generator and terminal No. 30 on Powertrain Control Module (PCM).
- Open or short circuit between terminal "D" on generator and terminal No. 53 on Powertrain Control Module (PCM).

Diagnosis & Repair Procedure

1. Inspect all applicable harness connections. Inspect generator operation, voltage and amperage output. See appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS. Repair as needed. If generator is okay, go to step 8.
2. Start vehicle and allow it to idle. Using scan tool, verify ALTT V PID. If ALTT V PID is okay, go to next step. If ALTT V PID is not okay, go to step 5.
3. Turn ignition off. Access PCM harness connector. PCM is mounted in front of center console, under radio. Disconnect PCM and generator connectors. Check for continuity between terminal "P" on generator harness connector and terminal No. 30 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for open in suspect wire. Repair as needed.
4. Check for continuity between terminal No. 30 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, check for short to ground in suspect wire. Repair as needed and go to step 8. If continuity is not present, go to next step.
5. Reconnect PCM and generator connectors. Start vehicle and allow it to idle. Using scan tool, verify ALTF V PID. If ALTF V PID is okay, go to step 8. If ALTT V PID is not okay, go to next step.
6. Turn ignition off. Disconnect PCM and generator connectors. Check continuity between terminal "D" on generator harness connector and terminal No. 53 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, repair suspect wire as needed.
7. Check for continuity between terminal No. 53 and terminal No. 24 (Black/White wire), No. 51 (Black/White wire), No. 76 (Black/White wire), No. 77 (Black/White wire) and No. 103 (Black/Red wire) on PCM harness connector, individually. See **Fig. 5**. If continuity is present, check for open in suspect wire. Repair as needed and go to next step. If continuity is not present, go to next step.
8. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1632: BATTERY VOLTAGE CIRCUIT MALFUNCTION

Condition

DTC is set PCM detects positive battery voltage less than 8 volts. Possible causes are:

- Battery malfunction.
- Poor connection at generator and PCM connectors.
- Open circuit between main relay and terminal No. 4 on Powertrain Control Module (PCM).
- Short circuit between battery positive terminal and terminal No. 4 on Powertrain Control Module

(PCM).

Diagnosis & Repair Procedure

1. Inspect all applicable harness connections. If connectors are okay, check battery. Recharge or replace as needed. If battery is okay, go to next step.
2. Turn ignition off. Access PCM harness connector. PCM is mounted in front of center console, under radio. Disconnect PCM and battery positive terminal connectors. Check for continuity between battery positive cable and terminal No. 4 on PCM harness connector. See **Fig. 5**. If continuity is present, go to next step. If continuity is not present, check for open in suspect circuit. Repair as needed.
3. Reconnect PCM connector. Check for continuity between battery positive cable and ground. If continuity is present, go to next step. If continuity is not present, check for short. Repair as needed.
4. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

DTC P1633: BATTERY VOLTAGE CIRCUIT - OVERCHARGING CONDITION

Condition

DTC is set when PCM detects generator output voltage greater than 18.5 volts or battery voltage greater than 16 volts. Possible causes are:

- Generator malfunction.
- PCM malfunction.
- Short circuit between terminal "D" on generator and terminal No. 53 on Powertrain Control Module (PCM).

Diagnosis & Repair Procedure

1. Ensure FREEZE FRAME PID DATA has been recorded. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. Start and idle engine. Retrieve DTCs. If DTC P1633 is set, go to next step. If DTC P1633 is not set, PCM detected surging voltage momentarily when battery terminal was disconnected. Test is complete.
2. Start vehicle and allow it to idle. Using scan tool, verify ALTT V and ALTF PID. If ALTF value decreases when ALTT V voltage increases, go to step 4. If ALTF value does not decreases when ALTT V voltage increases, go to step.
3. Turn ignition off. Disconnect generator connector. Check for continuity between ground and terminal "D" on generator harness connector. If continuity is present, repair or replace connectors. If continuity is not present, go to next step.
4. Inspect generator operation, voltage and amperage output. See appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS. Repair as needed. If generator is okay, go to next step.
5. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally

set.

DTC P1634: GENERATOR BATTERY TERMINAL - OPEN CIRCUIT

Condition

DTC is set when PCM detects generator output voltage greater than 17 volts and battery voltage less than 11 volts with engine at idle. Possible causes are:

- Battery malfunction.
- Generator malfunction.
- Open circuit between main relay and terminal No. 4 on Powertrain Control Module (PCM).
- Open circuit between battery positive terminal and terminal "B" on generator.
- PCM malfunction.

Diagnosis & Repair Procedure

1. Inspect and repair all applicable connections. Inspect condition of battery. Repair as needed. If battery is okay, go to next step.
2. Disconnect terminal "B" on generator. Measure voltage between ground and terminal "B". If battery voltage is present, go to next step. If battery voltage is not present, repair open circuit between battery and terminal "B" as needed.
3. Disconnect PCM connector. Measure voltage between ground and terminal No. 4 on PCM harness connector. See **Fig. 5**. If battery voltage is present, go to next step. If battery voltage is not present, repair open circuit as needed.
4. Inspect generator operation, voltage and amperage output. See appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS. Repair as needed. If generator is okay, go to next step.
5. Erase DTC. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - INTRODUCTION - PROTEGE 1.6L & 1.8L article. If DTC is present, replace PCM. If DTC is not present, intermittent poor harness connection may have caused DTC to originally set.

