DIAGNOSTIC INFORMATION & PROCEDURES

DIAGNOSTIC STARTING POINT - ENGINE CONTROLS

Begin the system diagnosis with **Diagnostic System Check - Engine Controls** . The Diagnostic System Check-Engine Controls will provide the following information:

- The identification of the control modules which command the system
- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes (DTCs) and the codes' statuses

The use of the Diagnostic System Check-Engine Controls will identify the correct procedure for diagnosing the system and where the procedure is located.

DIAGNOSTIC SYSTEM CHECK - ENGINE CONTROLS

Description

The Diagnostic System Check is an organized approach to identifying a condition created by an electronic engine control system malfunction. The Diagnostic System Check must be the starting point for any driveability concern. The Diagnostic System Check directs the service technician to the next logical step in diagnosing the concern. Understanding the table and using the table correctly reduces diagnostic time and prevents the replacement of good parts.

Diagnostic System Check - Engine Controls

Step	Action	Yes	No
1	Perform the following preliminary inspections: 1. Ensure that the battery is fully charged. Refer to **Battery Inspection/Test** in Engine Electrical. 2. Ensure that the battery cables are clean and tight. 3. Inspect the easily accessible systems or the visible system components for obvious damage or conditions that could cause the symptom. Refer to **Strategy Based Diagnosis** in General Information		

	4. Ensure that the engine and control module grounds are clean, tight, and in the correct location. 5. Inspect for aftermarket devices that could affect the operation of the system. Refer to **Checking Aftermarket Accessories** in Wiring Systems. Did you find and correct the condition?	System OK	Go to **Step 2**
2	1. Install a scan tool. 2. Turn ON the scan tool. Does the scan tool turn ON?	Go to **Step 3**	Go to **Scan Tool Does Not Power Up** in Data Link Communications
3	1. Turn ON the ignition, with the engine OFF. 2. Attempt to establish communication with the listed control modules. If you are using a Tech 2, obtain the information using the Class 2 Message Monitor feature: • Powertrain control module (PCM) • Electronic brake control module (EBCM) • Body control module (BCM) Does the scan tool communicate with all the listed modules?	Go to **Step 4**	Go to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications
4	**IMPORTANT:** **The engine may start during the following step. Turn OFF the engine as soon as you have observed the Crank power mode.** 1. Access the Class 2 Power Mode in the Diagnostic Circuit Check on the scan tool. 2. Rotate the ignition switch through all positions while observing the ignition switch power mode parameter.		

	Refer to the **Body Control System Description and Operation** in Body Control Systems, for a list of the power mode states that correspond to each ignition switch position. Does the ignition switch parameter reading match the ignition switch position for all switch positions?	Go to **Step 5**	Go to **Power Mode Mismatch** in Body Control System
5	Attempt to start the engine. Does the engine crank?	Go to **Step 6**	Go to **Symptoms - Engine Electrical** in Engine Electrical
6	Did the engine start and idle?	Go to **Step 7**	Go to **Engine Cranks but Does Not Run**
7	**IMPORTANT:** **Do NOT clear the DTCs unless instructed by a diagnostic procedure.** 1. Select the DTC display function for the following control modules and record the DTCs: • PCM • EBCM • BCM 2. If multiple powertrain DTCs are stored, diagnose the DTCs in the following order: 1. Component level DTCs. For example, sensor DTCs, solenoid DTCs, and relay DTCs. Begin with the lowest number DTC unless the diagnostic table directs you otherwise. 2. System level DTCs. For example, misfire DTCs, EVAP system DTCs, fuel trim DTCs, and system		

	voltage DTCs. 3. Search for applicable service bulletins. Does the scan tool display any DTCs?	Go to **Step 8**	Go to **Step 9**
8	If there are any powertrain DTCs, select Capture Info to store the powertrain DTC information with a scan tool. Did you complete the action?	Go to **Diagnostic Trouble Code (DTC) List** for applicable diagnostic procedure	-
9	Is the customer's concern with Inspection/Maintenance (I/M) testing?	Go to **Inspection/Maintenance (I/M) System Check**	Go to **Step 10**
10	Are there any driveability symptoms observed?	Go to **Symptoms - Engine Controls**	System OK

SCAN TOOL DATA LIST

The Engine Scan Tool Data List contains all engine related parameters that are available on the scan tool. The list is arranged in alphabetical order. A parameter may appear in any one of the data lists, and in some cases may appear more than once, or in more than one data list in order to group certain related parameters together.

Use the Engine Scan Tool Data List only after the following conditions are determined:

- The Diagnostic System Check-Engine Controls is completed.
- There are no diagnostic trouble codes (DTCs).
- The On-Board diagnostics are functioning properly.

Scan tool values from a properly running engine may be used for comparison with the engine you are diagnosing. The Engine Scan Tool Data List represents the values that would be seen on a normal running engine.

IMPORTANT: Do not use a scan tool that displays faulty data. The scan tool concern should be reported to the manufacturer. Use of a faulty scan tool can result in misdiagnosis and in unnecessary parts replacement.

Only the parameters listed below are referenced in this service manual for use in diagnosis. If all values are within the typical range described below, refer to **Symptoms - Engine Controls** for diagnosis.

The column labeled Data List indicates where a parameter is located on the scan tool. Review the scan tool operating manual for the exact locations of the data lists. The following is a description of each term listed:

All

The Parameter is in all data lists indicated below.

Eng 1

Engine Data 1 List

Eng 2

Engine Data 2 List

Eng 3

Engine Data 3 List

CC

Cruise Control Data

EE

Enhanced EVAP Data

FT

Fuel Trim Data List

HO2S

HO2S Data List

MF

Misfire Data List

TAC

TAC Data List

Scan Tool Data List

Scan Tool Parameter	Data List	Parameter Range/Units	Typical Data Values
Engine Idling/Radiator Hose Hot/Closed Throttle/Park or Neutral/Closed Loop/Accessories Off			
A/C Clutch Feedback Signal	Eng 2	On/Off	Off
A/C High Side Pressure Sensor	Eng 2	kPa/psi	680 kPa/98 psi
A/C High Side Pressure Sensor	Eng 2	Volts	1.2-1.3

A/C Relay Command	Eng 1, Eng 2, Eng 3, MF	On/Off	Off
A/C Request Signal	Eng 2	Yes/No	No
Air Fuel Ratio	ENG 3, Eng 2	Ratio	14.7:1
AIR Pump Relay Command	Eng 1, FT	On/Off	Off
AIR Solenoid Command	Eng 1, FT	On/Off	Off
APP Average	TAC	Counts	0
APP Indicated Angle	ENG 1, Eng 2, EE, FT, CC, TAC, HO2S	0-100%	0
APP Sensor 1	TAC	Volts	0.25-1.1V
APP Sensor 2	TAC	Volts	3.9-4.8
APP Sensor 3	TAC	Volts	3.2-4.5
APP Sensor 1	TAC	0-100%	0%
APP Sensor 2	TAC	0-100%	0%
APP Sensor 3	TAC	0-100%	0%
APP Sensor 1 and 2	TAC	Agree/Disagree	agree
APP Sensor 1 and 3	TAC	Agree/Disagree	agree
APP Sensor 2 and 3	TAC	Agree/Disagree	agree
BARO	Eng 1, FT, EE	kPa/Volts	65-104 kPa/3.5-4.9V (Varies w/Altitude)
CMP Sensor High to Low	Eng 2	Counts	cycles
CMP Sensor Low to High	Eng 2	Counts	cycles
Clutch Pedal Switch	CC, Eng 1	Applied/Released	Released
Cold Start Up	EE	Yes/No	Varies
Column Lock Fuel Disable-ABS DTC	Eng 3	Yes/No	No
Column Lock Fuel Disable-BCM DTC	Eng 3	Yes/No	No
Column Lock PCM-BCM Com.	Eng 3	Fault/OK	OK
Cruise Control Active	Eng 1, Eng 2, Eng 3, TAC, CC	Yes/No	No
Cruise Disengage History 1-8	CC	Go to **Diagnostic System Check - Cruise Control** in Cruise Control	Varies
Cruise ON/OFF Switch	CC, TAC	On/Off	Off
Cruise Resume/Accel	TAC, CC	On/Off	Off
Cruise Set/Coast	TAC, CC	On/Off	Off

Current Gear	Eng 1, Eng 2, FT	1-4	1
Cycles Of Misfire Data	MF	Counts	cycles
Decel Fuel Cutoff	HO2S	ON/OFF	OFF
Desired Idle Speed	Eng 1, Eng 2, Eng 3, EE, TAC	RPM	PCM Controlled
DTC Set This Ignition	Eng 1, Eng 2, EE, FT, CC, HO2S	Yes/No	No
ECT Sensor	Eng 1, Eng 2, Eng 3, EE, FT, MF, HO2S	-39° to 140°C (-38° to 284°F)	90° to 110°C (194° to 230°F)
Engine Load	All	0-100%	2% at Idle 9% at 2500 RPM
Engine Oil Level Switch	Eng 2, Eng 3	OK/Not OK	OK
Engine Oil Life Remaining	Eng 3	0-100%	Varies
Engine Oil Pressure Sensor	Eng 3	kPa/psi/Volts	Varies
Engine Run Time	ALL	Hrs, Min, Sec	Varies
Engine Speed	All	0-10,000 RPM	Varies
EVAP Purge Solenoid Command	Eng 1, EE, FT	0-100%	20
EVAP Vent Solenoid Command	Eng 1, EE, FT	Venting/Not Venting	Venting
Extended Travel Brake Pedal Switch	Eng 1, Eng 2, Eng 3	Applied/Released	Released
FC Relay 1 Command	Eng 2, Eng 3	On/Off	Depends on engine temperature and A/C Pressure
FC Relay 2 and 3 Command	Eng 2, Eng 3	On/Off	Depends on engine temperature and A/C Pressure
Fuel Level Sensor Left Tank	EE	5-0V	0.7-2.5 Volts
Fuel Level Sensor Right Tank	EE	5-0V	0.7-2.5 Volts
Fuel Tank Level Remaining	FT, EE	0-19 gal./0-73L	Varies
Fuel Tank Level Remaining	EE	0-100%	Varies
Fuel Tank Pressure Sensor	Eng 1, EE	-32.7 to 14.0 mm/Hg -17.5 to 7.5 in/H2O	Varies
Fuel Tank Pressure Sensor	EE	0-5 Volts	Varies

Fuel Tank Rated Capacity	EE	73L (19 gal.)	73L (19 gal.)
Fuel Trim Cell	Eng 1, FT, EE	0-23	Varies
Fuel Trim Learn	Eng 1, EE, FT	Enabled/Disabled	Enabled (may Toggle)
Gen F-Terminal Signal	Eng 2	0-100%	Varies
Gen L-Terminal Signal	Eng 2	Voltage/No Voltage	Voltage
HO2S Bank 1 Sensor 1	Eng 1, FT, EE, HO2S	Millivolts	10-1,000 mV and Varying
HO2S Bank 1 Sensor 2	Eng 1, FT, HO2S	Millivolts	10-1,000 mV and Varying
HO2S Bank 2 Sensor 1	Eng 1, FT, EE, HO2S	Millivolts	10-1,000 mV and Varying
HO2S Bank 2 Sensor 2	Eng 1, FT, HO2S	Millivolts	10-1,000 mV and Varying
HO2S Heater Bank 1 Sensor 1	HO2S	Amps	0.65-0.85
HO2S Heater Bank 1 Sensor 2	HO2S	Amps	0.43-0.59
HO2S Heater Bank 2 Sensor 1	HO2S	Amps	0.65-0.85
HO2S Heater Bank 2 Sensor 2	HO2S	Amps	0.43-0.59
IAT Sensor	Eng 1, Eng 2, Eng 3, EE, FT	-39° to 140°C (-38° to 284°F)	Varies
Ignition 1 Signal	Eng 1, Eng 2, Eng 3, EE, CC, FT, TAC	0-25 Volts	11.5-14.5
Inj. PWM Bank 1 Average	Eng 2, FF, FT, MF	Milliseconds	1-4
Inj. PWM Bank 2 Average	Eng 2, FT, FF, MF	Milliseconds	1-4
Knock Retard	Eng 1	0°-16°	0
Long Term FT Avg. Bn 1	FT	Percentage	Near 0 %
Long Term FT Avg. Bn 2	FT	Percentage	Near 0 %
Long Term FT Bank 1	Eng 1, Eng 2, Eng 3, EE, FT, HO2S	Percentage	Near 0 %
Long Term FT Bank 2	Eng 1, Eng 2, Eng 3, EE, FT, HO2S	Percentage	Near 0 %
Loop Status	Eng 1, Eng 2, Eng 3, EE, FT, HO2S	Open/Closed	Closed
	Eng 1, Eng 2, Eng		5-9 at Idle (depends on

MAF Sensor	3, EE, FT, MF, TAC, HO2S	Grams Per Second (g/s)	altitude)
MAF Sensor	Eng 3	Hz	2800-2900
MAP Sensor	Eng 1, Eng 2, Eng 3, EE, FT, MF, TAC, HO2S	kPa	20-48 kPa
MAP Sensor	Eng 1, Eng 2, Eng 3	Volts	1.0-2.0 V (varies w/altitude)
MIL Command	Eng 1	Off/On	Off
Mileage Since DTC Cleared	Eng 3	km/Miles	Varies
Misfire Current 1-8	MF	0-200	0
Misfire History 1-8	MF	0-65,535	0
PCM Reset	Eng 1, EE, FT	Yes/No	No
PCM/VCM in VTD Fail Enable	Eng 3	Yes/No	No
Power Enrichment	Eng 2, FT, HO2S	Active/Inactive	Inactive
Powertrain Induced Chassis Pitch	Eng 3	Active/Inactive	Inactive
Reduced Engine Power	Eng 1, Eng 3, TAC, CC	Active/Inactive	Inactive
Reverse Inhibit Solenoid	Eng 1	On/Off	No
Short Term FT Avg. Bn 1	FT	Percentage	Near 0 %
Short Term FT Avg. Bn 2	FT	Percentage	Near 0 %
Short Term FT Bank 1	Eng 1, Eng 2, Eng 3, EE, FT, HO2S	Percentage	Near 0 %
Short Term FT Bank 2	Eng 1, Eng 2, Eng 3, EE, FT, HO2S	Percentage	Near 0 %
Skip Shift Lamp Command	Eng 1	On/Off	Off
Skip Shift Solenoid Command	Eng 1	No Skip/Skip	No Skip
Spark	Eng 1, Eng 2, Eng 3, FT, MF, HO2S	Degrees	16-19
Start Up ECT	Eng 2, EE, FT	C°/F°	Varies
Stoplamp Pedal Switch	Eng 1, Eng 2, Eng 3, TAC, CC	Applied/Released	Released
TAC/PCM Communication Signal	TAC, CC	OK/Fault	OK
TCC/Cruise Brake	TAC, Eng 1, Eng	Applied/Released	Released

Pedal Switch	2, Eng 3, CC		
TCC Enable Solenoid Command	Eng 1, Eng 2, MF, CC	Enabled/Disabled	Disabled
TFP Sw.	Eng 2, Eng 3, CC, FT	Park/Neutral, Reverse, Drive 4, Drive 3, Drive 2, Drive 1, Invalid	Park/Neutral
Torque Delivered Signal	ENG 2, TAC,	N.m/lb.ft.	16-20 Nm / 11-14 lb.ft.
Torque Request Signal	ENG 2, TAC	N.m/Ft-Lbs	473 Nm / 349 lb.ft
TP Desired Angle	Eng 1, Eng 2, EE, TAC, CC	Percentage	3-10 %
TP Indicated Angle	All	Percentage	3-9%
TP Sensor 1	TAC	Percentage	3-10
TP Sensor 1	TAC	Volts	0.25-1.5 V
TP Sensor 2	TAC	Percentage	3-10
TP Sensor 2	TAC	Volts	4.0-1.5 V
TP Sensors 1 and 2	TAC	Agree/Disagree	agree
Traction Control Signal	CC	Active/Inactive	Inactive
Traction Control Status	Eng 2, TAC	Active/Inactive	Inactive
Tr Sw.	FT, Eng 2, Eng 3, CC	Transaxle Gear Position	Park/Neutral
Vehicle Speed Sensor	ALL	km/h/mph	0 km/h (0 mph)
VTD Auto Learn Timer	Eng 3	Active/Inactive	Inactive
VTD Fuel Disable	Eng 3	Active/Inactive	Inactive
VTD Fuel Disable Until Ign. Off	Eng 3	Yes/No	No
Warm-Ups w/o Emis. Faults	Eng 3	Counts	0-255
Warm-Ups w/o Non-Emis. Faults	Eng 3	Counts	0-255

SCAN TOOL DATA DEFINITIONS

The Engine Scan Tool Data Definitions contain a brief description of all engine related parameters available on the scan tool. The list is in alphabetical order. A given parameter may appear in any one of the data lists. In some cases, the parameter may appear more than once or in more than one data list in order to group certain related parameters together.

Skip Shift Lamp Command

The scan tool displays On or Off. When the powertrain control module (PCM) enables the skip shift solenoid, the skip shift lamp comes on and the scan tool displays ON. The scan tool displays OFF under the normal operating conditions.

Skip Shift Solenoid Command

The scan tool displays Skip or No Skip. When the PCM enables the skip shift solenoid, the scan tool displays Skip. The scan tool displays No Skip under the normal operating conditions.

A/C Clutch Feedback Signal

The scan tool displays ON or OFF. This parameter displays the signal received from the A/C clutch to the powertrain control module (PCM) to indicate that the A/C clutch is ON or OFF.

A/C Relay Command

The scan tool displays On or Off. The A/C clutch represents the PCM commanded state of the A/C clutch control relay. When the scan tool indicates ON, the A/C clutch should be engaged.

A/C High Side Pressure

The scan tool displays 103-3116 kPa/15-452 psi. This parameter represents the A/C refrigerant pressure sensor signal. The amount of pressure indicates the amount of load that the A/C compressor places on the engine. The PCM uses this information in order to adjust the idle, and in order to control the cooling fans.

A/C High Side Pressure

The scan tool displays 0-5 volts. This parameter represents the A/C refrigerant pressure sensor signal. The amount of pressure indicates the amount of load that the A/C compressor places on the engine. The PCM uses this information in order to adjust the idle, and in order to control the cooling fans.

A/C Request

The scan tool displays Yes or No. The A/C Request indicates the state of the A/C request input circuit from the HVAC controls (C60). Vehicles equipped with the CJ2 A/C system, use the class 2 serial data in order to inform the PCM that the A/C is requested. The PCM uses the A/C request signal in order to determine whether the A/C compressor operation is being requested.

Air Fuel Ratio

The scan tool displays the ratio of the air to fuel. A typical ratio is about 14.7:1.

AIR Pump Relay

The scan tool displays On or Off. When the PCM grounds the secondary air injection (AIR) pump relay control circuit, the scan tool indicates ON. When the PCM disables the ground circuit, the scan tool indicates OFF.

AIR Solenoid Command

The scan tool displays On or Off. When the PCM grounds the AIR pump solenoid control circuit, the scan tool indicates ON. When the PCM disables the ground circuit, the scan tool indicates OFF.

APP Average

The scan tool displays 0-125 counts. The throttle actuator control (TAC) module takes the voltages from the 3 accelerator pedal position (APP) sensors, averages the readings, and converts the readings into counts. The scan tool displays the average. The average is different on every vehicle.

APP Indicated Angle

The scan tool displays 0-100 percent. The scan tool displays the accelerator pedal position (APP) as a percentage. When the APP is at rest, the display shows 0 percent. When the APP is fully depressed, the display shows 100 percent.

APP Sensor 1

The scan tool displays 0-5 volts. When the accelerator pedal is at 0 percent, the pedal is at rest, the display shows less than 1.1 volt. When the accelerator pedal is at 100 percent the pedal is fully depressed, the display shows more than 2.0 volts.

APP Sensor 2

The scan tool displays 5-0 volts. When the accelerator pedal is at 0 percent the pedal is at rest, the display shows more than 3.9 volts. When the accelerator pedal is at 100 percent, the pedal is fully depressed, the display shows less than 3.0 volt.

APP Sensor 3

The scan tool displays 5-0 volts. When the accelerator pedal is at 0 percent, the pedal is at rest, the display shows more than 3.2 volts. When the accelerator pedal is at 100 percent, the pedal is fully depressed, the display shows less than 3.5 volts.

APP Sensor 1 Angle

The scan tool displays 0-100 percent. When the accelerator pedal is at rest, the display shows 0 percent. When the accelerator pedal is fully depressed, the display shows 100 percent. This percentage indicates to the throttle actuator control (TAC) module the actual pedal position.

APP Sensor 2 Angle

The scan tool displays 0-100 percent. When the accelerator pedal is at rest, the display shows 0 percent. When the accelerator pedal is fully depressed, the display shows 100 percent. This percentage indicates to the TAC module the actual pedal position

APP Sensor 3 Angle

The scan tool displays 0-100 percent. When the accelerator pedal is at rest, the display shows 0 percent. When the accelerator pedal is fully depressed, the display shows 100 percent. This percentage indicates to the TAC module the actual pedal position.

APP Sensor 1 and 2

The scan tool displays Agree or Disagree. When the TAC module receives a signal voltage from APP sensor 1 that is not in proper relationship to APP sensor 2, the scan tool displays Disagree. The scan tool displays Agree under the normal operating conditions.

APP Sensor 1 and 3

The scan tool displays Agree or Disagree. When the TAC module receives a signal voltage from APP sensor 1 that is not in proper relationship to APP sensor 3, the scan tool displays Disagree. The scan tool displays Agree under the normal operating conditions.

APP Sensor 2 and 3

The scan tool displays Agree or Disagree. When the TAC module receives a signal voltage from APP sensor 2 that is not in proper relationship to APP sensor 3, the scan tool displays Disagree. The scan tool displays Agree under the normal operating conditions.

BARO

Scan Tool Range 10-105 kPa/0.0-5 volts. The barometric pressure (BARO) reading is determined from the manifold absolute pressure (MAP) sensor signal. The PCM monitors the MAP signal during key up and wide-open throttle (WOT) conditions. The barometric pressure compensates for altitude differences.

CMP Sensor High to Low

The scan tool displays 0-65,535 counts. The counts increment as the PCM detects the camshaft sensor signal voltage going from high to low.

CMP Sensor Low to High

The scan tool displays 0-65,535 counts. The counts increment as the PCM detects the camshaft sensor signal voltage going from low to high.

Clutch Pedal Switch

The scan tool displays Applied or Released. When the vehicle clutch pedal is depressed the scan tool display shows Applied, and the cruise control will disengage. When the vehicle clutch pedal is released, the scan tool displays Released, and the cruise control can be resumed.

Cold Start Up

The scan tool displays Yes or No. A cold start-up is when the engine coolant temperature (ECT) rises

above a predetermined temperature during an ignition cycle. The next ignition cycle the engine coolant temperature should be below a predetermined temperature. Also the engine coolant temperature and the air intake temperature are less than 50°C (122°F) and are within 3°C (5°F) of each other at start-up. When the above conditions are true the scan tool displays Yes.

Column Lock Fuel Disable-ABS DTC

The scan tool displays Yes or No. The PCM disables the fuel when an antilock brake system (ABS) wheel speed sensor and a body control module (BCM) DTC set. When this failure occurs, the engine will start and then stall after 5 seconds. The engine will not start if you attempt to start the engine during that same ignition cycle.

Column Lock Fuel Disable-BCM DTC

The scan tool displays Yes or No. The PCM disables the fuel when a BCM DTC related to the column lock system is detected. The engine will start and idle. When the vehicle reaches 1.5 mph, the PCM disables the fuel. This occurs because the status of the column lock position is unknown.

Column Lock PCM-BCM Com.

The scan tool displays Fault or OK. The PCM disables fuel when a serial data communication malfunction occurs between the PCM and the BCM. The engine will start and idle. When the vehicle reaches 1.5 mph, the PCM disables the fuel. This occurs because the status of the column lock position is unknown.

Cruise Control Active

The scan tool displays Yes or No. When the cruise control switch is ON and the set/coast switch is activated, the scan tool displays YES. When the cruise control switch is ON and the set/coast switch is released, the scan tool displays NO.

Cruise Disengage History 1-8

The Scan tool displays the last 8 cruise control disengages in order from 1 to 8. There are 20 possible causes for the cruise control to disengage. Refer to **Diagnostic System Check - Cruise Control** in Cruise Control for descriptions.

Cruise Resume/Accel

The scan tool displays On or Off. When the Cruise control switch is ON and the resume/accel switch is activated, the scan tool displays ON. When the resume/accel switch is released the scan tool displays OFF.

Cruise Set/Coast

The scan tool displays On or Off. When the cruise control switch is ON and the set/coast switch is activated, the scan tool displays ON. When the set/coast switch is released, the scan tool displays OFF.

Current Gear

The scan tool displays 0-4. The scan tool displays which gear the transmission is in. The scan tool displays 9 if the transmission gear is unknown.

Cycles of Misfire Data

Scan Tool Range 0-100. The PCM counts the number of misfire tests during 200 revolutions.

DTC Set This Ignition

The scan tool displays Yes or No. This parameter indicates if a diagnostic trouble code (DTC) has set on the current ignition cycle.

Desired Idle Speed

Scan Tool Range 0-3187 RPM. The PCM commands the desired idle speed. The PCM compensates for various engine loads in order to keep the engine at the desired speed.

ECT

Scan Tool Range -39°C to 140°C (-38°F to 284°F). The engine coolant temperature (ECT) sensor parameter displays the temperature of the engine.

Engine Load

Scan Tool Range 0-100 percent. The PCM calculates the engine load from engine speed and mass air flow (MAF) sensor readings. The engine load increases with an increase in RPM or airflow.

Engine Oil Level Switch

The scan tool displays OK or Not OK. The parameter displays Not OK if the engine oil level remains low, about 1 quart or more, for a sufficient period of time.

Engine Oil Life Remaining

The scan tool displays 0-100 percent. The scan tool displays the percent of Engine Oil Life Remaining. The PCM calculates the Engine Oil Life by monitoring engine load, engine temperature, and engine speed, etc.

Engine Oil Pressure Sensor

The scan tool displays 0-992 kPa/0-144 psi. The scan tool displays engine oil pressure.

Engine Oil Pressure Sensor

The scan tool displays 0-5 volts. The scan tool displays the engine oil pressure in volts.

Engine Run Time

The scan tool displays Hours, Minutes, Seconds. This indicates the amount of Engine Run Time. When the ignition is cycled OFF, the timer will reset to zero.

Engine Speed

Scan Tool Range 0-10,000 RPM. The PCM computes the engine speed from the ignition reference pulses. The engine speed should remain close to the desired idle under various engine loads with the engine idling.

EVAP Purge Solenoid Command

Scan Tool Range 0-100 percent. The PCM commands the pulse width modulation (PWM) duty cycle of the evaporative emission (EVAP) purge solenoid valve. 0 percent displayed indicates no purge and 100 percent displayed indicates full purge.

EVAP Vent Solenoid Command

The scan tool displays Venting or Not Venting. The EVAP canister vent valve is normally open, or venting. The PCM commands the EVAP canister vent valve closed, or not venting during testing of the EVAP system.

Extended Travel Brake Pedal Switch

The scan tool displays Applied or Released. This parameter indicates the state of the extended travel brake switch. This switch is normally closed with the brake pedal released. The scan tool displays Released with the brake pedal released. The scan tool displays Applied with the brake pedal applied approximately greater than 40 percent.

Fail Counter

The scan tool displays the number of times a diagnostic failed.

FC Relay 1

The scan tool displays On or Off. When the PCM commands a coolant fan relay ON, the scan tool indicates ON. When cooling fan relay #1 is activated, both fans are enabled on low speed.

FC Relay 2 and 3

The scan tool displays On or Off. When the PCM commands a coolant fan relay ON, the scan tool indicates ON. When cooling fan relays #2 and #3 are activated, in conjunction with cooling fan relay #1, the cooling fans are enabled on high speed.

Fuel Level Sensor Left Tank

The scan tool displays 5-0 volts. The PCM supplies a 5-volt signal circuit to the fuel level sensor. The float inside the fuel tank is a variable resistor which varies the resistance based on the fuel level. The PCM then averages this voltage and the signal voltage from the right tank in order to determine the fuel level. The scan tool displays close to 0.7 volts for an empty tank, and close to 2.5 volts for a full tank.

Fuel Level Sensor Right Tank

The scan tool displays 0-5 volts. The PCM supplies a 5-volt signal circuit to the fuel level sensor. The float inside the fuel tank is a variable resistor which varies resistance based on the fuel level. The PCM then averages this voltage as well as the signal voltage from the left tank in order to determine the fuel level. The scan tool displays close to 0.7 volts for an empty tank, and close to 2.5 volts for a full tank

Fuel Tank Level Remaining

The scan tool displays 0-73 L (0-19 gal). The scan tool displays the amount of fuel remaining in the fuel tank in liters or gallons.

Fuel Tank Level Remaining

The scan tool displays 0-100 percent. The scan tool displays the amount of fuel remaining in the fuel tanks in percentage.

Fuel Tank Pressure Sensor

The scan tool displays -32.7 to 13.96 mm/Hg or -17.4 to 7.5 in/H2O. This parameter indicates the pressure/vacuum inside the fuel tank. A negative value indicates a vacuum. A positive value indicates a pressure.

Fuel Tank Pressure Sensor

The scan tool displays 0-5 volts. The scan tool displays in voltage the pressure/vacuum inside the fuel tank.

Fuel Tank Rated Capacity

The scan tool displays 73 L (19 gal). The scan tool displays the capacity of the fuel tank in liters or gallons.

Fuel Trim Cell

The scan tool displays a range of 0 to 23. The PCM determines from the MAP sensor and the engine speed which fuel trim cell to use in order to operate the engine. The fuel trim cell displayed on the scan tool is the cell that the engine is operating under.

Fuel Trim Learn

The scan tool displays Enabled or Disabled. When conditions are appropriate for enabling long term fuel trim corrections, the scan tool displays Enabled. This indicates that the long term fuel trim is responding to the short term fuel trim. If the scan tool displays Disabled, then long term fuel trim will not respond to changes in short term fuel trim.

Generator F Terminal

The scan tool displays 0-100 percent. The display shows generator F terminal duty cycle in percent from 0-100 percent. The generator is able to produce the desired voltage by varying the duty cycle of the field current.

Generator L Terminal

The scan tool displays Voltage or No Voltage. The scan tool displays No Voltage if the PCM does not detect a correct voltage on the L terminal circuit. The scan tool displays Voltage under the normal operating conditions.

HO2S Bank 1 and Bank 2 Sensor 1

Scan Tool Range 0-1,000 mV. The heated oxygen sensor (HO2S) bank 1 and 2 sensor 1 parameter represents the fuel control exhaust oxygen sensor output voltage. The voltage should fluctuate constantly within a range between 10 mV, or lean exhaust and 1,000 mV, or rich exhaust while operating in Closed Loop.

HO2S Bank 1 and Bank 2 Sensor 2

Scan Tool Range 0-1,000 mV. The HO2S bank 1 and bank 2 sensor 2 parameter represents the rear exhaust oxygen sensor output voltage. The voltage should fluctuate constantly within a range between 10 mV, or lean exhaust and 1,000 mV, or rich exhaust while operating in Closed Loop.

IAT

Scan Tool Range -39°C to 140°C (-38°F to 284°F). The PCM converts the resistance of the intake air temperature (IAT) sensor to degrees. The PCM uses the intake air temperature (IAT) in order to adjust the fuel delivery and the spark timing according to the incoming air temperature.

Ignition 1

The scan tool displays 0-25.5 volts. The ignition-1 represents the system voltage measured by the PCM at its ignition feed.

Inj. PWM Average Bank 1 and Bank 2

Scan Tool Range 0-1,000 m/sec. The injector average Indicates the amount of time the PCM commands each injector ON during each engine cycle. A longer injector pulse width causes more fuel to be delivered. The injector pulse width should increase with an increased engine load.

Knock Retard

Scan Tool Range 0°-16°. The knock retard indicates the amount of spark advance the PCM removes from the ignition control (IC) spark advance in response to the signal from the knock sensors.

Long Term FT Avg. Bn 1 and Bn 2

The scan tool displays Percentage. This parameter indicates the average of all long term fuel trim cells. The short term fuel trim cells are rated, or weighted for the amount of which they are used. For example, an idle cell is rated higher then a wide open cell. If a fueling malfunction occurs in the idle cell and the wide open cell, the average would be more affected by the idle cell then the wide open cell. A negative value significantly below 0 percent indicates that the fuel system is rich and fuel delivery is being reduced, or a decreased injector pulse width. A positive value significantly greater than 0 percent indicates that a lean condition exists and the PCM compensates by adding fuel, or an increased injector pulse width. When the average of the cells reach a predetermined high or low, a fuel trim DTC will set.

Long Term FT Bank 1 and 2

The scan tool displays Percentage. The PCM derives the Long Term Fuel Trim from the Short Term Fuel Trim value. The Long Term Fuel Trim represents a long-term correction of the fuel delivery. A value of 0 percent indicates that the fuel delivery requires no compensation in order to maintain the PCM commanded air/fuel ratio. A negative value significantly below 0 percent indicates that the fuel system is rich and the PCM is reducing the fuel delivery, or decreasing injector pulse width. A positive value significantly greater than 0 percent indicates that a lean condition exists and the PCM compensates by adding fuel, or increasing injector pulse width. Fuel trim values at maximum authority may indicate an excessively rich or lean system.

Loop Status

The scan tool displays Open or Closed. Closed Loop indicates that the PCM is controlling the fuel delivery according to the oxygen sensor (O2S) voltage. In Open Loop, the PCM ignores the oxygen sensor voltage and bases the amount of fuel to be delivered on throttle position (TP) sensor, engine coolant sensor, and MAF sensor inputs only.

MAF

Scan Tool Range 0.0-655 g/s. Mass air flow (MAF) is the MAF input frequency converted to grams of air per second. This indicates the amount of air entering the engine.

MAF Frequency

The scan tool displays 0-31,999 Hz. The MAF converts the current draw required to keep the hot wires at a constant temperature into a frequency signal. The scan tool displays this frequency in Hertz.

MAP

Scan Tool Range 10-105 kPa/0.0-5 volts. The manifold absolute pressure (MAP) sensor measures the

change in the intake manifold pressure from engine load, and speed changes. As intake manifold pressure increases, the intake vacuum decreases, resulting in a higher MAP sensor voltage and kPa reading. The PCM uses the MAP sensor signal for the following: (1) Updating the BARO reading; (2) As an enabling factor for several of the diagnostics.

MIL Command

The scan tool displays On or Off. The scan tool indicates if the PCM has commanded the malfunction indicator lamp (MIL) ON.

Mileage Since DTC Cleared

The scan tool displays Km or Miles. This parameter indicates the mileage accumulated since an emission diagnostic trouble code cleared. The PCM stores this mileage in the Freeze Frame/Failure Records memory.

Mileage Since First Fail

The scan tool displays Km or Miles. This parameter indicates the mileage accumulated since an emission diagnostic trouble code first failed. The PCM stores this mileage in the Freeze Frame/Failure Records memory.

Mileage Since Last Fail

The scan tool displays Km or Miles. This parameter indicates the mileage accumulated since an emission diagnostic trouble code last failed. The PCM stores this mileage in the Failure Records memory.

Mileage Since MIL Request

The scan tool displays Km or Miles. This parameter displays the mileage accumulated since the PCM requested the MIL to illuminate. The PCM stores the mileage in the Failure Records memory.

Misfire Current Cylinder 1- 8

Scan Tool Range 0-255 Counts. The misfire current counters increment at a rate according to the number of possible misfires the PCM detects on each cylinder during the last 200 firing events. The counters may normally display some activity, but the activity should be nearly equal for all the cylinders.

Misfire History Cylinder 1- 8

Scan Tool Range 0-65,535 Counts. The misfire history counters display the total level of misfires that have been detected on each cylinder. The misfire history counters will not update or show any activity until a misfire DTC P0300 has become active. The misfire history counters will update every 200 firing events.

Not Run Counter

The scan tool displays 0-65,535 counts. The scan tool displays the number of times a DTC has not reached the predetermined criteria in order to run since the first failure.

Pass Counter

The scan tool displays 0-65,535 counts. The scan tool displays the number of times a DTC has passed, since the first failure.

PCM/VCM in VTD Fail Enabled

The scan tool displays YES or NO. If the BCM and PCM lose communications with each other after sending the correct password, the PCM will enable a VTD Fail-Enable mode. This allows the driver to restart the vehicle on future ignition cycles until the communications between the BCM and PCM are restored. The scan tool displays NO under normal operating conditions.

PCM Reset

The scan tool displays Yes or No. This parameter indicates when the PCM resets. The scan tool displays YES when an internal PCM reset occurred. The scan tool displays NO under the normal operating conditions.

Power Enrichment

The scan tool displays Active or Inactive. When Active is displayed, the powertrain control module (PCM) has detected conditions appropriate to operate in power enrichment mode. The PCM will command power enrichment mode when a large increase in throttle position and load is detected.

Powertrain Induced Chassis Pitch

The scan tool displays Active or Inactive. The scan tool displays Active when the PCM determines from various inputs (MAF, TP, APP, MAP, etc.) that occurring conditions would cause the vehicles chassis to pitch. The scan tool displays Inactive under the normal operating conditions.

Reduced Engine Power

The scan tool displays Active or Inactive. The scan tool displays Active when the PCM receives a signal from the TAC module that a throttle actuator control system fault is occurring. The PCM limits the engine power.

Reverse Inhibit

The scan tool displays Yes or No (manual transmission). When the vehicle speed is above 4 mph, the PCM enables the reverse inhibit solenoid, and the scan tool indicates Yes.

Short Term FT Avg. Bn 1 and Bn 2 Average

The scan tool displays Percentage. This parameter indicates the average of the short term fuel trim cells.

The short term fuel trim cells are rated, or weighted for the amount of which they are used. For example, the PCM rates an idle cell higher then a wide open cell. If a fueling malfunction occurs in the idle cell and the wide open cell, the idle cell would affect more than then the wide open cell. A negative value significantly below 0 percent indicates that the fuel system is rich and the PCM is reducing the fuel delivery, or decreasing injector pulse width. A positive value significantly greater than 0 percent indicates that a lean condition exists and the PCM is compensating by adding fuel, or increasing injector pulse width. When the average of the cells reach a predetermined high or low, a fuel trim DTC sets.

Short Term FT Bank 1 and 2

The scan tool displays Percentage. The Short Term Fuel Trim represents a short-term correction to the fuel delivery by the PCM in response to the amount of time the fuel control oxygen sensor voltage spends above or below the 450 mV threshold. If the oxygen sensor voltage averages less than 450 mV, indicating a lean air/fuel mixture, short term fuel trim increases into the positive range above 0 percent. The PCM adds fuel. If the oxygen sensor voltage averages above the 450 mV threshold, the short term fuel trim decreases below 0 percent into the negative range. The PCM reduces the fuel delivery in order to compensate for the indicated rich condition. Under certain conditions such as an extended idle and a high ambient temperature, the canister purge may cause the Short Term Fuel Trim to read in the negative range during normal operation. The Fuel trim values at maximum authority may indicate an excessively rich or lean system.

Spark

Scan Tool Range -64° to 64°. Displays the amount the PCM commands the spark advance on the IC circuit. The PCM computes the desired spark advance using the following: (1) The engine coolant temperature, (2) The engine speed (RPM), (3) The load, (4) The vehicle speed.

Start Up ECT

Scan Tool Range -39°C to 140°C (-38°F to 284°F). Indicates the engine coolant temperature at the time the engine was started. The PCM uses Start Up ECT for certain DTCs.

Stop Lamp Pedal Switch

The scan tool displays Applied or Released. When the brake pedal is depressed, the scan tool displays applied and the stop lamps go ON. When the brake pedal is at rest, the scan tool displays Released and the stop lamps go OFF.

TAC/PCM Communication

The scan tool displays OK or Fault. If the communication between the TAC module and the PCM is interrupted, the scan tool displays Fault. The scan tool displays OK under the normal operating conditions.

TCC/Cruise Brake Pedal Switch

The scan tool displays Applied or Released. This parameter indicates the state of the TCC/CC brake

switch circuit input. Open indicates 0 voltage input, the brake switch is open and the brake pedal is applied. Closed indicates a B+ voltage input, the brake switch is closed and the brake pedal is released. When you apply the vehicle brakes, the scan tool displays Applied. The torque converter clutch and cruise control disengage. When you release the vehicle brakes, the scan tool displays Released. This allows the cruise control resume and the torque converter clutch to engage.

TCC Enable Solenoid Command

The scan tool displays Enabled or Disabled. When the PCM applies a voltage to the TCC enable solenoid, the scan tool displays Enabled.

Torque Delivered Signal

The scan tool displays -473 to 473 N.m/-349 to 349 ft/lbs. This is the calculated torque output from the engine to the transaxle used by the EBTCM for the traction control system operation.

Torque Request Signal

The scan tool displays -473 to 473 N.m/-349 to 349 ft-lbs. The EBTCM sends a Desired Torque Level signal request to the PCM. This decreases torque from the powertrain in order to reduce wheel slip during acceleration for the traction control.

TP Desired Angle

The scan tool displays 0-100 percent. The PCM indicates the desired throttle angle commanded by the vehicle operator.

TP Indicated Angle

The scan tool displays 0-100 percent. The TP Indicated Angle displays in percentage the amount of throttle opening.

TP Sensor 1

The scan tool displays 0-100 percent. The scan tool displays the amount of throttle opening in percentage. Closed throttle displays 0 percent and wide open throttle displays near 100 percent.

TP Sensor 2

The scan tool displays 0-100 percent. The scan tool displays the amount of throttle opening in percentage. Closed throttle displays 0 percent and wide open throttle displays near 100 percent.

TP Sensor 1

The scan tool displays 0-5 volts. The scan tool displays the amount of throttle opening in volts. Closed throttle displays about 1 volt and wide open throttle displays above 3.5 volts.

TP Sensor 2

The scan tool displays 5-0 volts. The scan tool displays the amount of throttle opening in volts. Closed throttle displays about 4 volts and wide open throttle displays below 1.5 volts.

TP Sensors 1 and 2

The scan tool displays Agree or Disagree. When the TAC module receives a signal voltage from one of the Throttle Position Sensors not in proper relationship to the other, the scan tool displays Disagree. The scan tool displays Agree under normal operating conditions.

Traction Control Signal

The scan tool displays Active or Inactive (if equipped). The scan tool displays active if the PCM receives a signal from the electronic brake and traction control module (EBTCM) requesting torque reduction during a traction control maneuver.

Traction Control Status

The scan tool displays Active or Inactive (if equipped). The scan tool displays active if the PCM receives a signal from the electronic brake and traction control module (EBTCM) requesting torque reduction during a traction control maneuver.

TFT Sensor (Export only)

Scan Tool Range -39°C to 140°C (-38°F to 284°F). The Transmission Fluid Temperature. sensor parameter displays the temperature of the manual transmission.

TFT SW.

The scan tool displays Park/Neutral, Reverse, Drive 4, Drive 3, Drive 2, Drive 1, or Invalid. This parameter is the decoded status of the three A/B/C inputs from the automatic transmission fluid pressure manual valve position switch. Invalid is displayed when the powertrain control module (PCM) does not recognize a valid combination of inputs.

TR SW.

Scan tool displays the transaxle gear position.

Vehicle Speed

The scan tool displays km/h and mph. The vehicle speed sensor (VSS) signal is converted into km/h and mph for display.

VTD Auto Learn Timer

The scan tool displays Active or Inactive. The auto learn timer indicates if the vehicle theft deterrent (VTD) system is in the learn mode and has not timed out (10 minutes).

VTD Fuel Disable

The scan tool displays Active or Inactive. If the PCM has not received the correct password from the body control module (BCM), the PCM will disable the fuel system, and Active will be displayed on the scan tool. The scan tool displays Inactive under normal running conditions.

VTD Fuel Disable Until Ign. Off

The scan tool displays Yes or No. With the ignition ON and a VTD code present the scan tool displays YES. With the ignition OFF the scan tool displays NO.

Warm-Ups w/o Emissions Faults

Scan Tool Range 0-255. This parameter counts the number of warm up cycles without an emission fault present. The counter increments to 255 and resets to 0 unless a fault occurs. If a fault occurs, the counter reverts back to 0 until the fault is corrected. Clearing the information with a scan tool or a loss of power to the PCM also resets the counter to 0.

Warm Ups w/o Non-Emissions Faults

Scan Tool Range 0-255. This parameter counts the number of warm up cycles without a non-emission fault present. The counter increments to 255 and resets to 0 unless a fault occurs. If a fault occurs, the counter reverts back to 0 until the fault is corrected. Clearing information with a scan tool or a loss of power to the PCM also resets the counter to 0.

SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
AIR Pump Relay	Engine Output Controls / AIR System	Activates the AIR pump relay. The normal commanded state of the AIR pump relay is NONE. With the AIR pump relay commanded ON, the AIR pump relay and pump only remains ON for a maximum of 30 seconds.
AIR Solenoid	Engine Output Controls / AIR System	Activates the AIR solenoid. The normal commanded state of the AIR solenoid is NONE. With the AIR solenoid commanded ON, the AIR solenoid only remains ON for a maximum of 30 seconds.
AIR System	Engine Output Controls / AIR System	Activates the AIR Solenoid and AIR pump relay. The normal commanded state of the AIR pump relay is NONE. With the system commanded ON, the system remains ON for a maximum of 30 seconds.

Crankshaft Position Variation Learn	-	Enables the powertrain control module (PCM) to learn the variations in the crankshaft position (CKP) system. The PCM will learn the variations once the following conditions are met: • Engine coolant temperature (ECT) is more than a specified value. • All instructions on the scan tool have been completed. • The accelerator pedal is smoothly applied until the fuel cut-OFF, as specified on the scan tool, is achieved, and then immediately released. The PCM learns the variation values on the deceleration from fuel cut-OFF.
Cylinder Power Balance	Fuel System	Enables/Disables a cylinder by turning OFF the fuel injector to the cylinder. The fuel injector is normally enabled. The PCM disables the fuel injector when the following conditions are met: • All instruction on the scan tool are completed • Stabilized engine speed • The fuel injector is selected When Disable is selected the PCM turns the injector OFF for 30 seconds. During this period, the engine operates with a misfire.
Engine Speed Control	TAC System	Activates the throttle activation control (TAC) system to change engine RPM. The normal commanded state is None. To enable the RPM control, all instruction on the scan tool must be completed. The system will increase or decrease the RPM within a range of 350-2,000 RPM. The set step value changes the RPM by increments of 25 RPM, 100 RPM, and 500 RPM. The system remains in the commanded state until cancelled by the scan tool.
EVAP Purge Solenoid	Engine Output Controls / EVAP System	Activates the EVAP Purge Valve. The normal commanded state is NONE. The system will INCREASE or DECREASE the amount of EVAP purge valve opening by 10 percent increments within a range of 0% to 100%. The system remains in the commanded state until cancelled by the tool or the fuel tank pressure exceeds 24 mm Hg (12 inches H20).
EVAP Purge/Seal	Engine Output Controls / EVAP System	This control enables two functions. One function increases or decreases the amount of purge by changing the duty cycle of the purge valve and commanding the vent ON (non-venting). The normal commanded state of both valves is NONE. The system will INCREASE or DECREASE the amount of EVAP purge valve opening by 10 percent increments within a range of 0 percent to 100 percent. The second function seals the system after using the purge function to obtain a specific amount of fuel tank pressure. When activated the purge valve is commanded to 0% and the vent valve is commanded ON (non-venting). Both functions remain in the commanded state until cancelled by the tool or the fuel tank pressure exceeds 24 mm Hg (12 inches H20).

EVAP Vent Solenoid	Engine Output Controls / EVAP System	Activates the EVAP vent solenoid. The normal commanded state is NONE. When commanded ON, the vent valve switches to non-venting. The system remains in the commanded state unless one of the following conditions occurs: • Cancelled by the tool • Purge is greater than 0%, and the fuel tank pressure exceeds 24 mm Hg (12 inches H20)
Fuel Injector Balance	Fuel System	Enables the fuel injector in order to verify proper fuel injector flow. The PCM will pulse the selected injector when the following conditions are met: • All instruction on the scan tool completed • Fuel injector selected • Key ON, engine OFF The selected fuel injector can only be flowed/pulsed once per ignition cycle.
Fuel Pump	Engine Output Controls	Controls the fuel pump relay. The normal commanded state is NONE. When commanded ON/OFF, the PCM turns the fuel pump ON/OFF. If the engine is running, and the fuel pump is commanded OFF, the engine will stall. The system remains in the commanded state until cancelled by the scan tool.
Fuel Trim Reset	Fuel System	Activates the reset of fuel trim data in all of the fuel trim cells.
Loop Status	Engine Output Controls	Controls the system loop status. The commanded states include NONE, OPEN, or CLOSED. The normal commanded state is NONE. When commanded OPEN or CLOSED, the system remains in the commanded state until cancelled by the scan tool.
Malfunction Indicator Lamp	Engine Output Controls	Controls the malfunction indicator lamp (MIL). The commanded states include NONE, ON, and OFF. When commanded ON or OFF, the system remains in the commanded state until cancelled by the scan tool.
Misfire Graphic	-	Graphs the accumulated misfires occurring in each cylinder. The scan tool allows for a reset of the misfire graph.
O2S Heater Control	Engine Output Controls	Activates the HO2S Heater. The commanded states include None, ON, and OFF. The normal commanded state is None. On a cold engine, with the key ON, engine OFF, the HO2S signal will continue to drop below bias when commanded ON. The system remains in the commanded state until cancelled by the tool.
Request PCM/VCM Info for SPS	-	Allows a technician to program a control module through the data link connector (DLC). This procedure offers the ability to install software/calibrations matched to a particular vehicle. Follow Service Programming System (SPS) Procedures. Refer to **Service Programming System (SPS)** in Vehicle Control Systems.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

Diagnostic Trouble Code (DTC) List

DTC	Diagnostic Procedure	Module(s)
P0068	**DTC P0068**	PCM
P0101	**DTC P0101**	PCM
P0102	**DTC P0102**	PCM
P0103	**DTC P0103**	PCM
P0106	**DTC P0106**	PCM
P0107	**DTC P0107**	PCM
P0108	**DTC P0108**	PCM
P0112	**DTC P0112**	PCM
P0113	**DTC P0113**	PCM
P0116	**DTC P0116**	PCM
P0117	**DTC P0117**	PCM
P0118	**DTC P0118**	PCM
P0120	**DTC P0120**	PCM
P0125	**DTC P0125**	PCM
P0128	**DTC P0128**	PCM
P0131	**DTC P0131 or P0151**	PCM
P0132	**DTC P0132 or P0152**	PCM
P0133	**DTC P0133 or P0153**	PCM
P0134	**DTC P0134 or P0154**	PCM
P0135	**DTC P0135, P0141, P0155, or P0161**	PCM
P0136	**DTC P0136 or P0156**	PCM
P0137	**DTC P0137 or P0157**	PCM
P0138	**DTC P0138 or P0158**	PCM
P0140	**DTC P0140 or P0160**	PCM
P0141	**DTC P0135, P0141, P0155, or P0161**	PCM
P0151	**DTC P0131 or P0151**	PCM
P0152	**DTC P0132 or P0152**	PCM
P0153	**DTC P0133 or P0153**	PCM
P0154	**DTC P0134 or P0154**	PCM
P0155	**DTC P0135, P0141, P0155, or P0161**	PCM
P0156	**DTC P0136 or P0156**	PCM
P0157	**DTC P0137 or P0157**	PCM
P0158	**DTC P0138 or P0158**	PCM
P0160	**DTC P0140 or P0160**	PCM
P0161	**DTC P0135, P0141, P0155, or P0161**	PCM
P0171	**DTC P0171 or P0174**	PCM
P0172	**DTC P0172 or P0175**	PCM

P0174	**DTC P0171 or P0174**	PCM
P0175	**DTC P0172 or P0175**	PCM
P0200	**DTC P0200**	PCM
P0218	**DTC P0218** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0220	**DTC P0220**	PCM
P0230	**DTC P0230**	PCM
P0300	**DTC P0300**	PCM
P0315	**DTC P0315**	PCM
P0325	**DTC P0325**	PCM
P0327	**DTC P0327 or P0332**	PCM
P0332	**DTC P0327 or P0332**	PCM
P0335	**DTC P0335**	PCM
P0336	**DTC P0336**	PCM
P0341	**DTC P0341**	PCM
P0342	**DTC P0342**	PCM
P0343	**DTC P0343**	PCM
P0351-P0358	**DTC P0351-P0358**	PCM
P0410	**DTC P0410**	PCM
P0412	**DTC P0412**	PCM
P0418	**DTC P0418**	PCM
P0420	**DTC P0420 or P0430**	PCM
P0430	**DTC P0420 or P0430**	PCM
P0442	**DTC P0442**	PCM
P0443	**DTC P0443**	PCM
P0446	**DTC P0446**	PCM
P0449	**DTC P0449**	PCM
P0452	**DTC P0452**	PCM
P0453	**DTC P0453**	PCM
P0455	**DTC P0455**	PCM
P0461	**DTC P0461** in Instrument Panel, Gages, and Console	PCM, IPC
P0462	**DTC P0462** in Instrument Panel, Gages, and Console	PCM, IPC
P0463	**DTC P0463** in Instrument Panel, Gages, and Console	PCM, IPC
P0480	**DTC P0480** in Engine Cooling	PCM
P0481	**DTC P0481** in Engine Cooling	PCM
P0491	**DTC P0491 or P0492**	PCM
P0492	**DTC P0491 or P0492**	PCM
P0496	**DTC P0496**	PCM
P0500	**DTC P0500** in Manual Transmission - MM6/M12	PCM
P0502	**DTC P0502** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0503	**DTC P0503** in Automatic Transmission - 4L60-E/4L65-E	PCM

P0506	**DTC P0506**	PCM
P0507	**DTC P0507**	PCM
P0522	**DTC P0522** in Instrument Panel, Gages, and Console	PCM, IPC
P0523	**DTC P0523** in Instrument Panel, Gages, and Console	PCM, IPC
P0530	**DTC P0530** in HVAC Systems - Automatic	PCM
P0562	**DTC P0562** in Engine Electrical	PCM
P0563	**DTC P0563** in Engine Electrical	PCM
P0567	**DTC P0567** in Cruise Control	PCM
P0568	**DTC P0568** in Cruise Control	PCM
P0571	**DTC P0571** in Cruise Control	PCM
P0601-P0607	**DTC P0601-P0607, P1600, P1621, P1627, P1680, P1681, P1683, or P2610**	PCM
P0608	**DTC P0608** in Instrument Panel, Gages, and Console	PCM, IPC
P0622	**DTC P0622** In Engine Electrical	PCM
P0641	**DTC P0641**	PCM
P0645	**DTC P0645** in HVAC Systems - Automatic	PCM
P0650	**DTC P0650**	PCM
P0651	**DTC P0651**	PCM
P0654	**DTC P0654** in Instrument Panel, Gages, and Console	PCM, IPC
P0706	**DTC P0706** in Automatic Transmission - 4L60-E/4L65-E	PCM, IPC
P0711	**DTC P0711** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0712	**DTC P0712** in Automatic Transmission - 4L60-E/4L65-E or **DTC P0712** in Manual Transmission - MM6/M12	PCM
P0713	**DTC P0713** in Automatic Transmission - 4L60-E/4L65-E or **DTC P0713** in Manual Transmission - MM6/M12	PCM
P0719	**DTC P0719** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0724	**DTC P0724** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0740	**DTC P0740** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0742	**DTC P0742** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0748	**DTC P0748** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0751	**DTC P0751** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0752	**DTC P0752** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0753	**DTC P0753** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0756	**DTC P0756** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0757	**DTC P0757** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0758	**DTC P0758** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0785	**DTC P0785** in Automatic Transmission - 4L60-E/4L65-E	PCM
P0801	**DTC P0801** in Manual Transmission - MM6/M12	PCM
P0803	**DTC P0803** in Manual Transmission - MM6/M12	PCM
P0804	**DTC P0804** in Manual Transmission - MM6/M12	PCM
P0833	**DTC P0833** in Manual Transmission - MM6/M12	PCM

P0856	**DTC C1277 or P0856** in Antilock Brake System	EBCM
P0894	**DTC P0894** in Manual Transmission - MM6/M12	PCM
P1111	**DTC P1111**	PCM
P1112	**DTC P1112**	PCM
P1114	**DTC P1114**	PCM
P1115	**DTC P1115**	PCM
P1125	**DTC P1125**	PCM
P1133	**DTC P1133 or P1153**	PCM
P1134	**DTC P1134 or P1154**	PCM
P1153	**DTC P1133 or P1153**	PCM
P1154	**DTC P1134 or P1154**	PCM
P1258	**DTC P1258** in Engine Cooling	PCM
P1380	**DTC P1380**	PCM
P1381	**DTC P1381**	PCM
P1516	**DTC P1516**	PCM
P1539	**DTC P1539** in HVAC Systems - Automatic	PCM
P1546	**DTC P1546** in HVAC Systems - Automatic	PCM
P1574	**DTC P1574** in Cruise Control	PCM
P1575	**DTC P1575** in Cruise Control	PCM
P1626	**DTC P1626** in Theft Deterrent	PCM
P1630	**DTC P1630** in Theft Deterrent	PCM
P1631	**DTC P1631** in Theft Deterrent	PCM
P1637	**DTC P1637** in Engine Electrical	PCM
P1638	**DTC P1638** in Engine Electrical	PCM
P1689	**DTC C1276, P1644, or P1689** in Antilock Brakes	PCM
P1810	**DTC P1810** in Automatic Transmission - 4L60-E/4L65-E	PCM
P2066	**DTC P2066** in Instrument Panel, Gages, and Console	PCM
P2067	**DTC P2067** in Instrument Panel, Gages, and Console	PCM
P2068	**DTC P2068** in Instrument Panel, Gages, and Console	PCM
P2101	**DTC P2101**	PCM
P2108	**DTC P2108**	PCM
P2120	**DTC P2120**	PCM
P2121	**DTC P2121**	PCM
P2125	**DTC P2125**	PCM
P2126	**DTC P2126**	PCM
P2130	**DTC P2130**	PCM
P2131	**DTC P2131**	PCM
P2135	**DTC P2135**	PCM
P2610	**DTC P0601-P0607, P1600, P1621, P1627, P1680, P1681, P1683, or P2610**	PCM
P2761	**DTC P2761** in Automatic Transmission - 4L60-E/4L65-E	PCM

U0107	**DTC U0107**	PCM
UXXXX	**Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications	PCM, BCM, IPC, VTD, EBCM