Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aides
P0102 - Mass Air Flow (MAF) Circuit Low Input	The MAF sensor circuit is monitored by the PCM for low air flow (or voltage) input through the comprehensive component monitor (CCM). If during key ON engine running the air flow (or voltage) changes below a minimum calibrated limit, the test fails.	• MAF sensor disconnected • MAF circuit open to PCM • VPWR open to MAF sensor • PWR GND open to MAF sensor • MAF RTN circuit open to PCM • MAF circuit shorted to GND • Intake air leak (near MAF sensor) • A closed [throttle indication throttle position (TP) sensor system] • Damaged MAF sensor • Damaged PCM	A MAF V PID (MAF PID) reading less than 0.23 volts (Refer to equivalent grams/second chart in Pinpoint Test DC) in continuous memory or key ON and engine running indicates a hard fault.
P0103 - Mass Air Flow (MAF) Circuit High Input	The MAF sensor circuit is monitored by the PCM for high air flow (or voltage) input through the comprehensive component monitor (CCM). If during key ON engine OFF or key ON engine running the air flow (or voltage) changes above a maximum calibrated limit, the test fails.	• MAF sensor screen is blocked • MAF circuit shorted to VPWR • Damaged MAF sensor • Damaged PCM	A MAF V PID (MAF PID) reading less than 4.6 volts (Refer to equivalent grams/second chart in Pinpoint Test DC) in continuous memory or key ON and engine running indicates a hard fault.
P0106 - Barometric (BARO) Pressure Sensor Circuit Performance	Baro sensor input to the PCM is monitored and is not within the calibrated value.	• Slow responding BARO sensor • Electrical circuit failure • Damaged BARO sensor • Damaged PCM	▪ VREF voltage should be between 4.0 and 6.0 volts ▪ PID reading is in frequency

P0107 - BARO Sensor Low Voltage Detected	Sensor operating voltage is less than 5.0 volts (VREF), as a result it failed below the minimum allowable calibrated parameter.	• Open in the circuit, or short to ground • VREF circuit open, or short to ground • Damaged BARO sensor • Damaged PCM	▪ VREF should be greater than 4.0 volts ▪ PID reading is in frequency
P0108 - BARO Sensor High Voltage Detected	Sensor operating voltage is greater than 5.0 volts (VREF), as a result it failed above maximum allowable calibrated parameter.	• VREF shorted to VWPR • BARO signal shorted to VPWR • Damaged BARO sensor • Damaged PCM	▪ VREF should be less than 6.0 volts. • PID reading is in frequency
P0109 - BARO Sensor Circuit Intermittent	The sensor signal to the PCM is failing intermittently.	• Loose electrical connection • Damaged BARO sensor	Check harness and connection.
P0112 - Intake Air Temperature (IAT) Circuit Low Input	Indicates the sensor signal is less than Self-Test minimum. The IAT sensor minimum is 0.2 volts or 121°C (250°F).	• Grounded circuit in harness • Damaged sensor • Improper harness connection • Damaged PCM	▪ Using signal simulation, disconnect sensor and simulate 1.0V on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM.
P0113 - Intake Air Temperature (IAT) Circuit High Input	Indicates the sensor signal is greater than Self-Test maximum. The IAT sensor maximum is 4.6 volts or -50°C (-46°F).	• Open circuit in harness • Sensor signal short to power • Damaged sensor • Improper harness connection • Damaged PCM	▪ Using signal simulation, disconnect sensor and simulate 1.0V on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM.
P0117 - Engine Coolant Temperature (ECT) Circuit Low Input	Indicates the sensor signal is less than Self-Test minimum. The ECT sensor minimum is 0.2 volts or 121°C (250°F). Note on some vehicles that are not equipped with an ECT sensor, CHT can be used and can set this DTC.	• Grounded circuit in harness • Damaged sensor • Improper harness connection • Damaged PCM	▪ Using signal simulation, disconnect sensor and simulate 1.0V on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM.

P0118 - Engine Coolant Temperature (ECT) Circuit High Input	Indicates the sensor signal is greater than Self-Test maximum. The ECT sensor maximum is 4.6 volts or -50°C (-46° F). Note on some vehicles that are not equipped with an ECT sensor, CHT can be used and can set this DTC.	• Open circuit in harness • Sensor signal short to power • Damaged PCM • Improper harness connection • Damaged sensor	▪ Using signal simulation, disconnect sensor and simulate 1.0V on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM.
P0121 - Throttle Position (TP) Circuit Performance Problem	The TP sensor circuit is monitored by the PCM for a none closed throttle position at idle. If key ON engine running self-test terminates upon placing the transmission range selector in gear (DRIVE or REVERSE) or when closing the throttle (idle) after opening it (in PARK or NEUTRAL) the TP closed throttle position is not attained, the test fails.	• Binding throttle linkage • Damaged throttle body • TP circuit open to PCM • Damaged TP sensor • SIG RTN circuit open to TP sensor	Drive vehicle, bring to a stop, turn key OFF. Start vehicle, run key ON engine running self-test at idle. Access KOER diagnostic trouble codes on scan tool.
P0122 - Throttle Position (TP) Circuit Low Input	The TP sensor circuit is monitored by the PCM for a low TP rotation angle (or voltage) input through the comprehensive component monitor (CCM). If during key ON engine OFF or key ON engine running the TP rotation angle (or voltage) changes below a minimum calibrated limit, the test fails.	• TP sensor not seated properly • TP circuit open to PCM • VREF open to TP sensor • TP circuit short to GND • Damaged TP sensor • Damaged PCM	A TP PID (TP V PID) reading less than 3.42% (0.17 volt) in key ON engine OFF, continuous memory or key ON engine running indicates a hard fault.

P0123 - Throttle Position (TP) Circuit High Input	The TP sensor circuit is monitored by the PCM for a high TP rotation angle (or voltage) input through the comprehensive component monitor (CCM). If during key ON engine OFF or key ON engine running the TP rotation angle (or voltage) changes above maximum calibrated limit, the test fails.	• TP sensor not seated properly • TP circuit short to PWR • VREF short to PWR • SIG RTN circuit open to TP sensor • Damaged TP sensor • Damaged PCM	A TP PID (TP V PID) reading greater than 93% (4.65 volts) in key ON engine OFF, continuous memory or key ON engine running indicates a hard fault.
P0125 - Insufficient Coolant Temperature For Closed Loop Fuel Control	Indicates the ECT sensor has not achieved the required temperature level to enter closed loop operating conditions within a specified amount of time after starting engine.	• Insufficient warm up time • Low engine coolant level • Leaking or stuck open thermostat • Malfunctioning ECT sensor	Compare ECT PID to thermostat specification when vehicle is at operating temperature. Temperature readings should be similar.
P0127 - Intake Air Temperature Too High	Indicates that IAT2 sensor has detected a potential abnormality in the intercooler system. This condition will cause the boost from the supercharger to be bypassed to avoid potential engine damage.	• Blockage of heat exchangers • Low fluid level • Fluid leakage • Intercooler pump or relay failure • Crossed intercooler coolant lines	Monitor IAT2 PID. Typical IAT2 temperature should be greater than IAT1. Refer to Section 6 , Reference Values for ranges.
P0131 - HO2S Sensor Circuit Out of Range Low Voltage (HO2S-11)	The HO2S sensor is monitored for a negative voltage known as characteristic shift downward (CSD). If the sensor is thought to be switching from 0 volts to -1 volts during testing, the PCM will use this input and remain in fuel control.	• Contaminated HO2S (water, fuel, etc) • Crossed HO2S signal/signal return wiring	

P0133 - HO2S Sensor Circuit Slow Response (HO2S-11)	The HEGO Monitor checks the HO2S Sensor frequency and amplitude. If during testing the frequency and amplitude were to fall below a calibrated limit, the test will fail.	• Contaminated HO2S sensor. • Exhaust leaks. • Shorted /open wiring. • Improper fueling. • MAF sensor. • Deteriorating HO2S sensor. • Inlet air leaks.	Access HO2S test results from the Generic OBD-II menu to verify DTC.
P0135 - HO2S Sensor Circuit Malfunction (HO2S-11)	During testing the HO2S Heaters are checked for opens/shorts and excessive current draw. The test fails when current draw exceeds a calibrated limit and/or an open or short is detected.	• Short to VPWR in harness or HO2S. • Water in harness connector. • Open VPWR circuit. • Open GND circuit. • Low battery voltage. • Corrosion or poor mating terminals and wiring • Damaged HO2S heater. • Damaged PCM.	▪ wiring. ▪ Damaged HO2S heater. ▪ Damaged PCM.
P0136 - HO2S Sensor Circuit Malfunction (HO2S-12)	The downstream HO2S sensor(s) are continuously checked for maximum and minimum voltages. The test fails when the voltages fail to meet the calibrated limits.	• Pinched, shorted, and corroded wiring and pins. • Crossed sensor wires. • Exhaust leaks. • Contaminated or damaged sensor.	
P0141 - HO2S Sensor Circuit Malfunction (HO2S-125)	See DTC P0135		
P0151 - HO2S Sensor Circuit Out of Range Low Voltage (HO2S-21)	See DTC P0131		
P0153 - HO2S Sensor Circuit Slow Response (HO2S-21)	See DTC P0133.		

DTC	Description	Possible Causes	Diagnostic Aides

P0155 - HO2S Sensor Circuit Malfunction (HO2S-21)	See DTC P0135		
P0156 - HO2S Sensor Circuit Malfunction (HO2S-22)	See DTC P0136		
P0161 - HO2S Sensor Circuit Malfunction (HO2S-22)	See DTC P0135		
P0171 - System to Lean (Bank 1)	The Adaptive Fuel Strategy continuously monitors fuel delivery hardware. The test fails when the adaptive fuel tables reach a rich calibrated limit.		
P0172 - System to Rich (Bank 1)	The Adaptive Fuel Strategy continuously monitors the fuel delivery hardware. The test fails when the adaptive fuel tables reach a lean calibrated limit.	See Possible Causes for DTC P0171	
P0174 - System to Lean (Bank 2)	The Adaptive Fuel Strategy continuously monitors the fuel delivery hardware. The test fails when the adaptive fuel tables reach a rich calibrated limit.	See Possible Causes for DTC P0171.	

P0175 - System to Rich (Bank 2)	The Adaptive Fuel Strategy continuously monitors the fuel delivery hardware. The test fails when the adaptive fuel tables reach a lean calibrated limit.	See Possible Causes for DTC P0171.
		For lean and rich DTCs:
		• Fuel system
		• Excessive fuel pressure.
		• Leaking/contaminated fuel injectors.
		• Leaking fuel pressure regulator.
		• Low fuel pressure or running out of fuel.
		• Vapor recovery system.
		• Induction system:
		  ■ Air leaks after the MAF.
		  ■ Vacuum Leaks.
			A SHRTFT-1,2 PID value between -25% to +35% and a LONGFT-1,2 PID value between -35% to +35% is acceptable. Reading beyond these values indicate a failure.

		■ PCV system. ■ Improperly seated engine oil dipstick. ● EGR system: ■ Leaking gasket. ■ Stuck EGR valve. ■ Leaking diaphragm or EVR. ● Base Engine: ■ Oil overfill. ■ Cam timing. ■ Cylinder compression. ■ Exhaust leaks before or near the HO2Ss.	
P0176 - Flexible Fuel (FF) Sensor Circuit Malfunction	The FF sensor input signal to PCM is continuously monitored. The test fails when the signal falls out of a maximum or minimum calibrated range.	● Open or short in FF sensor VPWR circuit ● Open in battery ground to FF sensor circuit ● Open in FF sensor signal circuit ● Short to ground in FF sensor signal circuit ● Fuel contamination ● Short to VPWR in FF sensor battery ground circuit ● Short to VPWR in FF sensor signal circuit ● Fuel separation ● Damaged FF sensor ● Damaged PCM	A flex fuel (FF) PID reading of 0 Hz with the key ON and engine OFF or with engine at idle indicates a hard fault.
P0180 - Engine Fuel Temperature Sensor A Circuit Low Input (EFT)	The comprehensive component monitor (CCM) monitors the EFT sensor circuit to the PCM for low and high voltage. If voltage were to fall below or exceed a calibrated limit and amount of time during testing, the test will fail.	● Open or short in harness. ● Low ambient temperature operation. ● Improper harness connection. ● Damaged EFT sensor. ● Damaged PCM.	Verify EFT-PID value to determine open or short.

P0181 - Engine Fuel Temperature Sensor A Circuit Range/ Performance (EFT)	The comprehensive component monitor (CCM) monitors the EFT Temperature for acceptable operating temperature. If during testing voltage were to fall below or exceed a calibrated limit, a calibrated amount of time the test will fail.	• Open or short in harness. • Low ambient temperature operation. • Improper harness connection. • Damaged EFT sensor. • Damaged PCM.	Verify EFT-PID value to determine open or short.
P0182 - Engine Fuel Temperature Sensor A Circuit Low Input (EFT)	The comprehensive component monitor (CCM) monitors the EFT sensor circuit to the PCM for low voltage. If voltage were to fall below a calibrated limit and amount of time during testing, the test will fail.	• Short in harness. • VREF open or shorted. • Low ambient temperature operation. • Improper harness connection. • Damaged EFT sensor. • Damaged PCM.	Verify EFT-PID and VREF values to determine open or short.
P0183 - Engine Fuel Temperature Sensor A Circuit High Input (EFT)	The comprehensive component monitor (CCM) monitors the EFT sensor circuit to the PCM for high voltage. If voltage were to exceed a calibrated limit and a calibrated amount of time during testing, the test will fail.	• Open or short to PWR in harness. • Damaged EFT sensor. • Improper harness connection. • Damaged PCM.	Verify EFT-PID value to determine open or short.
P0186 - Engine Fuel Temperature Sensor B Circuit Range/Performance (EFT)	See DTC P0181.		
P0187 - Engine Fuel Temperature Sensor B Circuit Low Input (EFT).	See DTC P0182.		
P0188 - Engine Fuel Temperature Sensor B Circuit High Input (EFT)	See DTC P0183.		

P0190 - Fuel Rail Pressure Sensor Circuit Malfunction (FRP)	The comprehensive component monitor (CCM) monitors the FRP sensor to the PCM for VREF voltage. The test fails when the VREF voltage from the PCM drops to a voltage less than a minimum calibrated value.	• VREF open in harness. • VREF open in sensor. • VREF open in PCM.	Verify VREF voltage between 4.0 and 6.0V.
P0191 - Fuel Rail Pressure Sensor Circuit Performance (FRP)	The comprehensive component monitor (CCM) monitors the FRP pressure for acceptable fuel pressure. The test fails when the fuel pressure falls below or exceeds a minimum/maximum calibrated value for a calibrated period of time.	• High fuel pressure. • Low fuel pressure. • Damaged FRP sensor. • Excessive resistance in circuit. • Low or no fuel.	A FRP PID value during KOER of 138 kpa (20 psi) and 413 kpa (60 psi) for gasoline or 586 kpa (85 psi) and 725 kpa (105 psi) for natural gas vehicles (NG) is acceptable.
P0192 - Fuel Rail Pressure Sensor Circuit Low Input (FRP)	The comprehensive component monitor (CCM) monitors the FRP sensor circuit to the PCM for low voltage. If voltage were to fall below a calibrated limit and amount of time during testing, the test will fail.	• FRP signal shorted to SIG RTN or PWR GND. • FRP signal open (NG only) • Low fuel pressure (NG only) • Damaged FRP sensor. • Damaged PCM.	A FRP PID value during KOER or KOEO less than 0.3 volts for gasoline or 0.5 volts for natural gas vehicles (NG) would indicate a hard fault.
P0193 - Fuel Rail Pressure Sensor Circuit High Input (FRP)	The comprehensive component monitor (CCM) monitors the FRP sensor circuit to the PCM for high voltage. If voltage were to fall below a calibrated limit and a calibrated amount of time during testing, the test will fail.	• FRP signal shorted to VREF or VPWR. • FRP signal open (gasoline only) • Low fuel pressure (NG only) • Damaged FRP sensor. • Damaged PCM. • High fuel pressure (caused by damaged fuel pressure regulator) NG.	A FRP PID value during KOER or KOEO less than 0.3 volts for gasoline or 0.5 volts for natural gas vehicles (NG) would indicate a hard fault.

P0217 - Engine Coolant Over-temperature Condition	Indicates an engine overheat condition was detected by the cylinder head temperature (CHT)sensor. This condition will cause the boost from the supercharger to be bypassed to avoid potential engine damage.	• Engine cooling system concerns • Low engine coolant level • Base engine concerns	Monitor CHT PID for overheat condition. Typical CHT temperature should be close to cooling system opening thermostat specification.
P0230 - Fuel Pump Primary Circuit Malfunction	NOTE: For natural gas applications, the following description applies to the fuel shutoff valve (FSV) circuit. The PCM monitors the fuel pump (FP) circuit output from the PCM. The test fails if: With the FP output commanded ON (grounded), excessive current draw is detected on the FP circuit; or with the FP output commanded OFF, voltage is not detected on the FP circuit (the PCM expects to detect VPWR voltage coming through the fuel pump relay coil to the FP circuit).	• Open or shorted fuel pump (FP) circuit • Open VPWR circuit to fuel pump relay • Damaged fuel pump relay • Damaged PCM	• When the FPF PID reads YES, a fault is currently present. • An open circuit or short to ground can only be detected with the fuel pump commanded OFF. • A short to power can only be detected with the fuel pump commanded ON. • During KOEO and KOER self-test, the fuel pump output command will be cycled ON and OFF.
P0231 - Fuel Pump Secondary Circuit Low	NOTE: For natural gas applications, the following description applies to the fuel shutoff valve monitor (FSVM) and the fuel shutoff valve power (FSV PWR) circuits. The PCM monitors the fuel pump monitor (FPM) circuit. The test fails if the PCM commands the	• Open B+ circuit to the fuel pump relay • Open FP PWR circuit between the fuel pump relay and its connection to the FPM circuit • Damaged fuel pump relay • Damaged PCM (engine will start) • For 4.6L Mustang, open FP PWR circuit from low speed fuel pump relay, through resistor to FPM splice	During KOEO self-test, the PCM will command the fuel pump ON so this test can be performed.

	fuel pump ON and B+ voltage is not detected on the FPM circuit.	(engine will start) • For 5.4L SC Lightning, damaged IFS switch, IFS switch relay, or concern with related circuits.	
P0232 - Fuel Pump Secondary Circuit High	NOTE: For natural gas applications, the following description applies to the fuel shutoff valve monitor (FSVM) and the fuel shutoff valve power (FSV PWR) circuits. The PCM monitors the fuel pump monitor (FPM) circuit. This test fails when the PCM detects voltage on the FPM circuit while the fuel pump is commanded OFF. The FPM circuit is wired to a pull-up voltage inside the PCM. The FPM circuit will go high if, with the key ON and the fuel pump commanded OFF, the FPM/FP PWR circuit loses its path to ground through the fuel pump. The FPM circuit will also go high if the FPM/FP PWR circuit is shorted to power.	• Inertia fuel shutoff (IFS) switch not reset or electrically open • Open circuit between the fuel pump and the FPM connection to the FP PWR circuit • Poor fuel pump ground • Fuel pump electrically open • Fuel pump secondary circuits short to power • Fuel pump relay contacts always closed • Open FPM circuit between PCM and connection to FP PWR circuit • Damaged low speed fuel pump relay or concern with related circuits (if equipped). • Damaged PCM	P0232 can be set if the fuel pump circuit is activated when the PCM expected the circuit to be off (i.e. fuel system test or prime procedure). • EDIS system failure • High speed fuel pump failure • Engine speed exceeds calibrated threshold • Transmission electronic pressure control (EPC) solenoid failure • Cylinder head temperature (CHT) exceed calibrated limit
P0234 - Supercharger Overboost Condition	The PCM disables (bypasses) the supercharger boost and sets a diagnostic trouble code (DTC) to keep from damaging the powertrain (engine or transmission) during potential harmful operating conditions.	• Brake torque (brake on and throttle at wide open) • Transmission oil temperature (TOT) exceeds calibrated threshold • Engine over temperature • Ignition misfire exceeds calibrated threshold • Knock sensor (KS) failure or knock detected • Low speed fuel pump relay not switching	Check for other diagnostic trouble codes accompanying the P0234 or check appropriate and available PIDs related to above possible causes.

P0243 - Supercharger (Boost) Bypass Solenoid Circuit Malfunction	The PCM monitors the supercharger (boost) bypass (SCB) solenoid circuit for an electrical failure. The test fails when the signal moves outside the minimum or maximum allowable calibrated parameters for a specified SCB solenoid duty cycle (100% or 0%) by PCM command.	• VPWR circuit open to SCB solenoid • SCB solenoid circuit shorted to PWR GND or CHASSIS GND • Damaged SCB solenoid • SCB solenoid circuit open • SCB solenoid circuit shorted to VPWR • Damaged PCM	Disconnect SCB solenoid. Connect test lamp to SCB solenoid harness connector. Cycle SCB driver in PCM by Output Test Mode. Test lamp cycle on and off - SCB solenoid is suspect. Test lamp always on - SCB signal short in harness or PCM. Test always off - SCB signal or VPWR open in harness or PCM.
P0298 - Engine Oil Over Temperature Condition	Indicates the Engine Oil Temperature Protection strategy in the PCM has been activated. This will temporarily prohibit high engine speed operation by disabling injectors, therefore reducing the risk of engine damage from high engine oil temperature. Note: On engines which are equipped with an oil temperature sensor, the PCM reads oil temperature to determine if it is excessive. When an oil temperature sensor is not present, the PCM uses an oil algorithm to infer actual temperature. Engine shutdown strategy function is the same on vehicles with and without oil temperature sensors.	• Very high engine rpm for extended period of time. • Over-heating condition. • Malfunction EOT sensor or circuit (vehicles w/EOT sensor). • Base engine concerns.	Engine operating in high rpm range, due to improper gear selection. May cause Lack/Loss of Power or Surge customer concern.

DTC	Description	Possible Causes	Diagnostic Aides
P0300 - Random Misfire	The random misfire DTC indicates multiple cylinders are misfiring or the PCM cannot identify which cylinder is misfiring.	• Camshaft position sensor (CMP) • Low fuel: less than 1/8 tank • Stuck open EGR valve	
P0301 through P0310 - Misfire Detection Monitor	The misfire detection monitor is designed to monitor engine misfire and identify the specific cylinder in which the misfire has occurred. Misfire is defined as lack of combustion in a cylinder due to absence of spark, poor fuel metering, poor compression, or any other cause.	• Ignition system • Fuel injectors • Running out of fuel • EVAP canister purge valve • Fuel pressure • Evaporative emission system • Base engine	The MIL will blink once per second when a misfire is detected severe enough to cause catalyst damage. If the MIL is on steady state, due to a misfire, this will indicate the threshold for emissions was exceeded and cause the vehicle to fail an inspection and maintenance tailpipe test.
P0320 - Ignition Engine Speed Input Circuit Malfunction	The ignition engine speed sensor input signal to PCM is continuously monitored. The test fails when the signal indicates that two successive erratic profile ignition pickup (PIP) pulses have occurred.	• Loose wires/ connectors. • Arcing secondary ignition components (coil, wires and plugs) • On board transmitter (2-way radio)	The DTC indicates that two successive erratic PIP pulses occurred.
P0325 - Knock Sensor 1 Circuit Malfunction (Bank 1)			

P0326 - Knock Sensor 1 Circuit Range/ Performance (Bank 1)	The knock sensor detects vibrations upon increase and decrease in engine rpm. The knock sensor generates a voltage based on this vibration. Should this voltage go outside a calibrated level a DTC will set.	• Knock sensor circuit short to GND • Knock sensor circuit short to PWR • Knock sensor circuit open • Damaged knock sensor • Damaged PCM	A knock sensor voltage greater than 0.5V with the key ON and engine OFF indicates a hard fault.
P0330 - Knock Sensor 2 Circuit Malfunction (Bank 2)			
P0331 - Knock Sensor 2 Circuit Range/performance (Bank 2)	The knock sensor detects vibration upon increase and decrease in engine rpm. The knock sensor generates a voltage based on this vibration. Should this voltage go outside a calibrated level a DTC will set.	• Knock sensor circuit short to GND • Knock sensor circuit short to PWR • Damaged knock sensor • Damaged PCM • Knock sensor circuit open	A knock sensor voltage greater than 0.5V with the key ON and engine OFF indicates a hard fault.
P0340 - Camshaft Position (CMP) Sensor Circuit Malfunction	The test fails when the PCM can no longer detect the signal from the CMP sensor.	• CMP circuit open • CMP circuit short to GND • CMP circuit short to PWR • SIG RTN open (VR sensor) • CMP GND open (Hall effect sensor) • CMP misinstalled (Hall effect sensor) • Damaged CMP sensor shielding • Damaged CMP sensor • Damaged PCM	Harness routing, harness alterations, improper shielding, or electrical interference from other improperly functioning systems may have intermittent impact on the CMP signal.

P0350 - Ignition Coil (Undetermined) Primary/ Secondary Circuit Malfunction	Each ignition primary circuit is continuously monitored. The test fails when the PCM does not receive a valid IDM pulse signal from the ignition module (integrated in PCM).	• Open or short in Ignition START/RUN circuit • Open coil driver circuit • Coil driver circuit shorted to ground • Damaged coil • Damaged PCM • Coil driver circuit shorted to VPWR	
P0351 Through P0360 - Ignition Coil A through J Primary/ Secondary Circuit Malfunction	Each ignition primary circuit is continuously monitored. The test fails when the PCM does not receive a valid IDM pulse signal from the ignition module (integrated in PCM).	• Open or short in Ignition START/RUN circuit • Open coil driver circuit in harness • Coil driver circuit shorted to ground • Damaged coil • Damaged PCM • Coil driver circuit shorted to PWR	
P0401 - EGR Flow Insufficient Detected	The EGR system is monitored during steady state driving conditions while the EGR is commanded on. The test fails when the signal from the DPF EGR sensor indicates that EGR flow is less than the desired minimum.	• Vacuum supply • EGR valve stuck closed • EGR valve leaks vacuum • EGR flow path restricted • EGRVR circuit shorted to PWR • VREF open to DPF EGR sensor • DPF EGR sensor downstream hose off or plugged • EGRVR circuit open to PCM • VPWR open to EGRVR solenoid • DPF EGR sensor hoses both off • DPF EGR sensor hoses reversed • Damaged EGR orifice tube • Damaged EGRVR solenoid • Damaged PCM	Perform KOER self-test and look for DTC P1408 as an indication of a hard fault. If P1408 is not present, look for contamination, restrictions, leaks, and intermittents.

P0402 - EGR Flow Excessive Detected	The EGR system is monitored for undesired EGR flow during idle. The EGR monitor looks at the DPF EGR signal at idle and compares it to the stored signal measured during key ON and engine OFF. The test fails when the signal at idle is greater than at key ON engine OFF by a calibrated amount.	• EGR valve stuck open • Plugged EGR vacuum regulator solenoid vent • Plugged EGR tube • Slow responding DPF EGR sensor • Damaged DPF EGR sensor • Improper vacuum hose connection • Plugged vacuum hoses • EGRVR circuit shorted to ground • Damaged EGR vacuum regulator solenoid • Damaged PCM	A DPFEGR PID reading that is greater at idle than during key ON and engine OFF by 0.5 volt or a rough engine idle, may indicate a hard fault.
P0411 - Secondary Air Injection (AIR) system upstream flow	See DTC P1411		
P0412 - Secondary Air Injection System (AIR) circuit malfunction	The PCM attempts to control when air is injected in the exhaust. The DTC indicates a Secondary Air injection system AIR circuit fault.	• AIR circuit open • AIR bypass solenoid fault • Damaged PCM • AIR circuit short to power • Solid state relay fault • Damaged AIR pump	The AIR circuit is normally held high through the AIR bypass solenoid and SSR when the output driver is off. Therefore, a low AIR circuit indicates a driver is always on and a high circuit indicates an open in the PCM.
P0420 - Catalyst System Efficiency Below Threshold (Bank 1)	Indicates Bank 1 catalyst system efficiency is below the acceptable threshold	• Use of leaded fuel • Damaged HO2S • Malfunctioning ECT • High fuel pressure • Damaged exhaust manifold • Damaged catalytic converter • Oil contamination • Cylinder misfiring • Downstream HO2S wires improperly connected • Damaged exhaust system pipe • Damaged muffler/tailpipe assembly • Retarded spark timing	■ Compare HO2S upstream & downstream switch rate. Under normal closed loop fuel conditions, high efficiency catalysts have oxygen storage which makes the switching frequency of the downstream HO2S quite slow compared to the upstream HO2S.

			As catalyst efficiency deteriorates, its ability to store oxygen declines and the downstream HO2S signal begins to switch more rapidly approaching the switching rate of the upstream HO2S. Once beyond an acceptable limit the DTC is set.
P0430 - Catalyst System Efficiency Below Threshold (Bank 2)	Indicates Bank 2 catalyst system efficiency is below the acceptable threshold.	• Use of leaded fuel • Damaged HO2S • Malfunctioning ECT • High fuel pressure • Damaged exhaust manifold • Damaged catalytic converter • Oil contamination • Cylinder misfiring • Downstream HO2S wires improperly connected • Damaged exhaust system pipe • Damaged muffler/ tailpipe assembly • Retarded spark timing	Compare HO2S upstream & downstream switch rate. Under normal closed loop fuel conditions, high efficiency catalysts have oxygen storage which makes the switching frequency of the downstream HO2S quite slow compared to the upstream HO2S. As catalyst efficiency deteriorates, its ability to store oxygen declines and the downstream HO2S signal begins to switch more rapidly approaching the switching rate of the upstream HO2S. Once beyond an acceptable limit the DTC is set.

P0442 - EVAP Control System Leak Detected (Small Leak)	The PCM monitors the complete EVAP control system for presence of a small fuel vapor leak. The system failure occurs when a fuel vapor leak from an opening as small as 0.10 cm (0.04 inch) is detected by the EVAP running loss monitor test.	• After-market EVAP hardware (such as fuel filler cap) non-conforming to required specifications • Small holes or cuts in fuel vapor hoses/tubes • Canister vent solenoid stays partially open on closed command • Damaged, cross-threaded or loosely installed fuel filler cap • Loose fuel vapor hose/tube connections to EVAP system components • EVAP system component seals leaking (EVAP canister purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve assembly)	
P0443 - EVAP Control System Canister Purge Valve Circuit Malfunction	The PCM monitors the EVAP canister purge valve circuit for an electrical failure. The test fails when the signal moves outside the minimum or maximum allowable calibrated parameters for a specified purge duty cycle by PCM command.	• VPWR circuit open • EVAP canister purge valve circuit shorted to GND • Damaged EVAP canister purge valve • EVAP canister purge valve circuit open • EVAP canister purge valve circuit shorted to VPWR • Damaged PCM	Monitor EVAPPDC PID and voltage between EVAP canister valve signal and PWR GND in output test mode with key ON engine OFF (or in key ON engine RUNNING mode). EVAPPDC PID at 0% and voltage less than 1.0 volts (or EVAPPDC PID at 100% and voltage less than 0.5 volts) indicates a hard fault.
P0451 - FTP Sensor Circuit Noisy	The fuel tank pressure changes greater than 14 inches of H2O in 0.10 seconds.	• Intermittent open or short in the FTP sensor or the FTP sensor signal	Monitor the FTP PID and does it change from above 15 inches of H2O to below a minus (-) 15 inches of H2O often in 1.0 minute.

P0452 - FTP Sensor Circuit Low Voltage Detected	The PCM monitors the EVAP control system FTP sensor input signal to the PCM. The test fails when the signal average drops below a minimum allowable calibrated parameter.	• Contamination internal to FTP sensor connector • Damaged PCM • FTP circuit shorted to GND or SIG RTN • Damaged FTP sensor	FTP V PID reading less than 0.22 volt with key ON and engine OFF or during any engine operating mode indicates a hard fault.
P0453 - FTP Sensor Circuit High Voltage Detected	The PCM monitors the EVAP control system FTP sensor input signal to the PCM. The test fails when the signal average jumps above a minimum allowable calibrated parameter.	• FTP circuit open • VREF shorted to VPWR • Damaged PCM • FTP circuit shorted to VREF or VPWR • SIG RTN circuit open • Damaged FTP sensor	FTP V PID reading greater than 4.50 volts with key ON and engine OFF or during any engine operating mode indicates a hard fault.
P0455 - EVAP Control System Leak Detected (No Purge Flow or Large Leak)	The PCM monitors the complete EVAP control system for no purge flow, the presence of a large fuel vapor leak or multiple small fuel vapor leaks. The system failure occurs when no purge flow (attributed to fuel vapor blockages or restrictions), a large fuel vapor leak or multiple fuel vapor leaks are detected by the EVAP running loss monitor test with	• After-market EVAP hardware (such as fuel filler cap) non-conforming to required specifications • Disconnected or cracked fuel EVAP canister tube, EVAP canister purge outlet tube or EVAP return tube • EVAP canister purge valve stuck closed • Damaged EVAP canister • Damaged or missing fuel filler cap • Insufficient fuel filler cap installation • Loose fuel vapor hose/tube connections to EVAP system components • Blockages or restrictions in fuel vapor hoses/tubes (items also listed under disconnections or cracks) • Fuel vapor control valve	Check for audible vacuum noise or significant fuel odor in the engine compartment or near the EVAP canister and fuel tank.

	the engine running (but not at idle).	tube assembly or fuel vapor vent valve assembly blocked • Canister vent (CV) solenoid stuck open • Mechanically inoperative fuel tank pressure (FTP) sensor	
P0457 - EVAP Control System Leak Detected (Fuel Filler Cap Loose/Off)	A fuel tank pressure change greater than a minus(-) 7 inches of H2O in 30 seconds has occurred after refueling; or there is excessive purge (fuel vapor) flow greater than 0.06 pounds per minute.	• Fuel filler cap not installed on refueling (storing continuous memory DTC). • Fuel filler cap missing, loose or cross-threaded.	Check for missing fuel filler cap or integrity of the cap. If OK, clear continuous memory DTCs and reinitiate EVAP Emission Running Loss Monitor Drive Cycle.
P0460 - Fuel Level Sensor Circuit Malfunction	The PCM monitors the fuel level input (FLI) circuit for electrical failure. The test fails when the signal moves outside the minimum or maximum allowable calibrated parameters for a specified fuel fill percentage in the fuel tank.	• Empty fuel tank • Fuel pump (FP) module stuck open • Incorrectly installed fuel gauge • Damaged instrument cluster • CASE GND circuit open • FLI shorted to VPWR • Damaged PCM • Overfilled fuel tank • Fuel pump (FP) module stuck closed • Damaged fuel gauge • FLI circuit open • FLI circuit shorted to CASE GND or PWR GND • CSE GND shorted to VPWR	Monitor FLI PID and FLI V PID in key ON engine RUNNING. FLI PID at 25% fill (with none matching fuel gauge) and FLI V PID less than 0.90 volts [for FLI PID at 75% fill (with none matching fuel gauge) and FLI V PID greater than 2.45 volts] indicates a hard fault.
P0500 - Vehicle Speed Sensor (VSS) Malfunction	Indicates the powertrain control module (PCM) detected an error in the vehicle speed information. Vehicle speed data is received from either the vehicle speed sensor (VSS), transfer case	• Open in VSS+/VSS- harness circuit. • Open in TCSS signal or TCSS signal return harness circuit. • Short to GND in VSS harness circuit. • Short to GND in TCSS harness circuit. • Short to PWR in VSS harness circuit. • Short to PWR in TCSS harness circuit.	Diagnostic Aids: - Monitor VSS PID while driving vehicle. This DTC is set when the PCM detects a sudden loss of VSS signal over a period of time. If vehicle speed data is lost, check source of where vehicle speed signal originates. Note TCSS does not have a PID,

	speed sensor (TCSS), anti-lock brake system (ABS) control module, generic electronic module (GEM), or central timer module (CTM). If the engine rpm is above the torque converter stall speed (automatic transmission) and engine load is high, it can be inferred that the vehicle must be moving. If there is insufficient vehicle speed data input, a malfunction is indicated and a DTC is set. On most vehicle applications the malfunction indicator lamp (MIL) will be triggered when this DTC is set.	• Open or short in the vehicle speed circuit(s) (VSC) between the PCM and appropriate control module. • Damaged VSS or TCSS. • Damaged wheel speed sensors. • Damaged wheel speed sensor harness circuits. • Damage in module(s) connected to VSC/VSS circuit. • Damage drive mechanism for VSS or TCSS.	circuitry frequency must be checked for sudden loss of sensor signal.
P0501 - Vehicle Speed Sensor (VSS) Range/ Performance	Indicates the powertrain control module (PCM) detected an error in the vehicle speed information. This DTC is set the same way as P0500, however the malfunction indicator lamp (MIL) is not triggered.	• Refer to possible causes for P0500.	Refer to diagnostic aids for P0500.

P0503 - Vehicle Speed Sensor (VSS) Intermittent	Indicates poor or noisy VSS performance. Vehicle speed data is received from either the vehicle speed sensor (VSS), transfer case speed sensor (TCSS), anti-lock brake system (ABS) control module, generic electronic module (GEM), or central timer module (CTM).	• Noisy VSS/TCSS input signal from Radio Frequency Interference/Electro-Magnetic Interference (RFI/EMI) external sources such as ignition components or charging circuit. • Damaged VSS or driven gears. • Damaged TCSS. • Damaged wiring harness or connectors. • Malfunction in module(s) or circuit connected to VSS/TCSS circuit. • After market add-on.	Monitor VSS PID while driving vehicle, check for intermittent vehicle speed indication. Verify ignition and charging system are functioning.
P0503 - Vehicle Speed Sensor (VSS) Intermittent	Indicates poor or noisy VSS performance.	• Noisy VSS input signal from Radio Frequency Interference/ Electro-Magnetic Interference (RFI/EMI) external sources such as ignition components or charging circuit. • Damaged VSS or driven gears. • Damaged wiring harness or connectors. • Malfunction in module(s) or circuit connected to VSS circuit.	Verify ignition and charging system are functioning correctly. Check for good VSS (-) to ground.
P0505 - Idle Air Control System Malfunction	The PCM attempts to control engine speed during KOER self-test. The test fails when the desired rpm could not be reached or controlled during the self-test.	• IAC circuit open • VPWR to IAC solenoid open • IAC circuit shorted to PWR • Air inlet is plugged • Damaged IAC valve • Damaged PCM	The IAC solenoid resistance is from 6 to 13 ohms.

P0552 - Power Steering Pressure (PSP) Sensor Circuit Malfunction	The PSP sensor input signal to the PCM is continuously monitored.The test fails when the signal is open or shorted to ground.	• PSP sensor damaged • SIG RTN circuit open or shorted • VREF circuit open or shorted • PSP sensor signal circuit open or shorted • Damaged PCM	The DTC indicates the PSP sensor circuit is open or shorted to ground.

DTC	Description	Possible Causes	Diagnostic Aides
P0553 - Power Steering Pressure (PSP) Sensor Circuit Malfunction	The PSP sensor input signal to PCM is continuously monitored. The test fails when the signal is shorted to power.	• PSP sensor damaged • SIG RTN circuit shorted to power • VREF circuit shorted to power • PSP sensor signal circuit shorted to power • Damaged PCM	The code indicates the PSP sensor circuit is shorted to power.
P0602 - Control Module Programming Error	This Diagnostic Trouble Code (DTC) indicates programming error within Vehicle ID block (VID).	• VID data corrupted by the scan tool during VID reprogramming	Using the scan tool, reprogram the VID block. If PCM does not allow reprogramming of the VID block, reflashing PCM will be required.
P0603 - Powertrain Control Module KAM Test Error	Indicates the PCM has experienced an internal memory fault. However there are external items that can cause this DTC.	• Reprogramming • Battery terminal corrosion • KAPWR to PCM interrupt/open • Loose battery connection • Damaged PCM	If KAPWR is interrupted to the PCM because of a battery or PCM disconnect, DTC can be generated on the first power-up.
P0605 - PCM Read Only Memory (ROM) error	The PCM ROM has been corrupted.	• An attempt was made to change the calibration • Module programming error • Physically damaged PCM	■ Reprogram or update calibration ■ Reprogram VID block (use as built data) ■ Check for other DTC's or drive symptoms for further action

P0703 - Brake Switch Circuit Input Malfunction	Indicates PCM did not receive a brake pedal position (BPP) input.	• Open or short in BPP circuit • Open or short in stoplamp circuits • Damaged PCM • Malfunction in module(s) connected to BPP circuit. (Rear Electronic Module [REM] Windstar and LS6/LS8 or Lighting Control Module (LCM) Continental and Town Car. • Damaged brake switch • Misadjusted brake switch	Check for proper function of stoplamps. Follow correct Self-Test procedures, refer to Section 2 of Quick Test .
P0704 - Clutch Pedal Position Switch Malfunction	When the clutch pedal is depressed the voltage goes to low. If the PCM does not see this change from high to low the DTC is set.	• CPP circuit short to PWR • Damaged CPP switch • CPP circuit open in the SIGRTN • Damaged PCM	When depressing the CPP switch the voltage should cycle from 5.0V down.
P0720 - Insufficient input from Output Shaft Speed sensor	The output shaft speed sensor inputs a signal to the PCM, based on the speed of the output shaft of the transmission. The PCM compares this signal with the signal of the VSS or TCSS and determines correct tire size and axle gear ratio.	• OSS sensor circuit short to GND • OSS sensor circuit short to PWR • OSS sensor circuit open • Damaged OSS sensor • Damaged PCM	Verify sensor signal output varies with vehicle speed.
P0721 - Noise interference on Output Shaft Speed sensor signal	The output shaft speed sensor signal is very sensitive to noise. This noise distorts the input to the PCM.	• Wiring misrouted • After market add-on • Wiring damaged • Wiring insulation wear	■ Check routing of harness. ■ Check wiring and connector for damage.
P0722 - No signal from Output Shaft Speed sensor	The output shaft speed sensor failed to provide a signal to the PCM upon initial movement of vehicle.	• Damaged OSS connector • Damaged OSS sensor, or not installed properly • Harness intermittently shorted or open	

P0723 - Output Shaft Speed sensor circuit intermittent failure	The output shaft speed sensor signal to the PCM is irregular or interrupted.	• Harness connector not properly seated • Harness intermittently shorted, or open • Harness connector damaged • OSS sensor damaged, or not installed properly	■ Verify harness and connector integrity ■ Verify OSS sensor proper installation
P0812 - Reverse Switch (RS) input circuit malfunction	The DTC indicates that the voltage is high when it should be low.	• Transmission shift not indicating neutral while in KOEO Self-Test • RS circuit short to PWR • Damaged reverse switch • RS circuit open or short to SIGRTN • Damaged PCM	Check RS PID while exercising shift lever in and out of reverse.
P1000 - Monitor Testing Not Complete	The on board diagnostic II (OBD II) monitors are performed during the OBD II Drive Cycle. The DTC will be stored in continuous memory if any of the OBD II monitors do not complete.	• Vehicle is new from the factory • Battery or PCM had recently been disconnected • An OBD II monitor failure had occurred before completion of an OBD II drive cycle • PCM DTCs have recently been cleared with a scan tool • PTO circuit is shorted to VPWR or B+ or PTO is on during testing	The DTC does not need to be cleared from the PCM except to pass an inspection/maintenance test.
P1001 - KOER Not Able To Complete, KOER Aborted	This Non-MIL (Malfunction Indicator Lamp) code will be set when Key On Engine Running (KOER) Self-Test does not complete in the time intended.	• Incorrect Self-Test Procedure. • Unexpected response from Self-Test monitors. • rpm out of specification.	Rerun Self-Test following QT1 in Section 3 , Symptom Charts, STEP 1: PCM Quick Test .
P1100 - Mass Air Flow (MAF) Sensor Intermittent	The MAF sensor circuit is monitored by the PCM for sudden voltage (or air flow) input change through the comprehensive component monitor (CCM). If during the last 40 warm-up cycles in key ON engine running the PCM detects a voltage (or air flow) change beyond the minimum or maximum calibrated	• Poor continuity through the MAF sensor connectors • Poor continuity through the MAF sensor harness • Intermittent open or short inside the MAF sensor.	While accessing the MAF V PID on the scan tool, lightly tap on the MAF sensor or wiggle the MAF sensor connector and harness. If the MAF V PID suddenly changes below 0.23 volt or above 4.60 volts, an intermittent fault is indicated.

	limit, a continuous memory diagnostic trouble code (DTC) is stored.		
P1101 - Mass Air Flow (MAF) Sensor Out of Self-Test Range	The MAF sensor circuit is monitored by the PCM for an out of range air flow (or voltage) input. If during key ON engine OFF the air flow (or voltage) reading is greater than (grams/second equivalent chart in pinpoint test DC [0.27 volt]), the test fails. Likewise, if during key ON engine running an air flow (or voltage) reading is not within (gram/second equivalent chart in pinpoint test DC [0.46 volt to 2.44 volts]), the test fails.	• Low battery charge • MAF sensor partially connected • MAF sensor contamination • PWR GND open to MAF sensor • MAF RTN circuit open to PCM • Damaged MAF sensor • Damaged PCM	A MAF V PID reading greater than 0.27 volts (KOEO) or a MAF V PID reading outside the 0.46 volt to 2.44 volts range (KOER) indicates a hard fault.
P1109 - Intake Air Temperature 2 Sensor Intermittent	Indicates IAT2 circuit became intermittently open or shorted while engine was running.	• Damaged harness • Damaged sensor • Damaged harness connector • Damaged PCM	Monitor IAT2 on scan tool, look for sudden changes in reading when harness is wiggled or sensor is tapped.
P1112 - Intake Air Temperature (IAT) Sensor Intermittent	Indicates IAT sensor signal was intermittent during the comprehensive component monitor.	• Damaged harness • Damaged sensor • Damaged harness connector • Damaged PCM	Monitor IAT on scan tool, look for sudden changes in reading when harness is wiggled or sensor is tapped.
P1114 - Intake Air Temperature 2 Circuit Low Input	Indicates the sensor signal is less than Self-Test minimum. The IAT2 sensor minimum is 0.2 volts or 121°C (250°F).	• Grounded circuit in harness • Improper harness connection • Damaged sensor • Damaged PCM	Monitor IAT2 PID. Typical IAT2 temperature should be greater than IAT1. Refer to Section 6 , Reference Values for ranges.
P1115 - Intake Air Temperature 2 Circuit High Input	Indicates the sensor signal is greater than Self-Test maximum. The IAT2 sensor maximum is 4.6 volts or -50°C (-46°F).	• Open circuit in harness • Sensor signal short to power • Damaged PCM • Improper harness connection • Damaged sensor	Monitor IAT2 PID. Typical IAT2 temperature should be greater than IAT1. Refer to Section 6 , Reference Values for ranges.

P1116 - Engine Coolant Temperature (ECT) Sensor Out of Self-Test Range	Indicates the ECT sensor is out of Self-Test range. Correct range is 0.3 to 3.7 volts.	• Overheating condition • Malfunctioning thermostat • Damaged ECT sensor • Low engine coolant • Damaged harness connector • Damaged PCM	Engine coolant temperature must be greater than 10°C (50° F) to pass the KOEO Self-Test and greater than 82° C (180°F) to pass the KOER Self-Test.
P1117 - Engine Coolant Temperature (ECT) Sensor Intermittent	Indicates ECT circuit became intermittently open or shorted while engine was running.	• Damaged harness • Damaged sensor • Damaged PCM • Damaged harness connector • Low engine coolant	■ Monitor ECT on scan tool, look for sudden changes in reading when harness is wiggled or sensor is tapped. • TP circuit intermittent open • Damaged TP sensor • Damaged PCM
P1120 - Throttle Position (TP) Sensor Out of Range Low (RATCH too Low)	The TP sensor circuit is monitored by the PCM for a low TP rotation angle (or voltage) input below the closed throttle position through the comprehensive component monitor (CCM). If during key ON engine OFF or key ON engine running the TP rotation angle (or voltage) remains within the calibrated self-test range but falls between 3.42 and 9.85% (0.17 and 0.49 volt), the test fails.	• TP circuit with frayed wires • Corrosion on TP circuit connectors • VREF open to TP sensor • VREF short to SIG RTN • TP sensor loose pins	A TP PID (TP V PID) between 3.42 and 9.85% (0.17 and 0.49 volt) in key ON engine OFF, continuous memory or key ON engine running indicates a hard fault.

P1121 - Throttle Position (TP) Sensor Inconsistent with MAF Sensor	The PCM monitors a vehicle operation rationality check by comparing sensed throttle position to mass air flow readings. If during key ON engine running self-test the comparison of the TP sensor and MAF sensor readings are not consistent with calibrated load values, the test fails and a diagnostic trouble code is stored in continuous memory.	• Air leak between MAF sensor and throttle body • TP sensor not seated properly • Damaged TP sensor • Damaged MAF sensor	Drive vehicle and exercise throttle and TP sensor in all gears. A TP PID (TP V PID) less than 4.82 % (0.24 volt) with a LOAD PID greater than 55% or a TP V PID greater than 49.05% (2.44 volts) with a LOAD PID less than 30% indicates a hard fault.
P1124 - Throttle Position (TP) Sensor Out of Self-Test Range	The TP sensor circuit is monitored by the PCM for an out of range TP rotation angle (or voltage) input. If during key ON engine OFF or key ON engine running the TP rotation angle (or voltage) reading is less than 13.27% (0.66 volt) or greater than 23.52% (1.17 volts), the test fails.	• Binding or bent throttle linkage • TP sensor not seated properly • Throttle plate below closed throttle position • Throttle plate/screw misadjusted • Damaged TP sensor • Damaged PCM	A TP PID (TP V PID) reading not between 13.27 and 23.52% (0.66 and 1.17 volts) in key ON engine OFF or key ON engine running indicates a hard fault.
P1125 - Throttle Position (TP) Sensor Intermittent	The TP sensor circuit is monitored by the PCM for sudden TP rotation angle (or voltage) input change through the comprehensive component monitor (CCM). If during the last 80 warm-up cycles in key ON engine running the PCM detects a TP rotation angle (or voltage) changes	• Poor continuity through the TP sensor connectors • Poor continuity through the TP harness • Intermittent open or short inside the TP sensor	While accessing the TP V PID on the scan tool, lightly tap on the TP sensor or wiggle the TP sensor connector and harness. If the TP V PID suddenly changes below 0.49 volt or above 4.65 volts, an intermittent fault is indicated.

	beyond the minimum or maximum calibrated limit, a continuous diagnostic trouble code (DTC) is stored.		
P1127 - Exhaust Not Warm Enough, Downstream Sensor Not Tested	The HEGO monitor uses an exhaust temperature model to determine when the HO2S heaters are cycled ON. The test fails when the inferred exhaust temperature is below a minimum calibrated value.	• Engine not operating long enough prior to performing KOER self-test. • Exhaust system too cool.	Monitor HO2S Heater PIDs to determine their ON/OFF state. DTC P1127 will be present if the exhaust is not hot.
P1128 - Upstream Oxygen Sensors Swapped from Bank to Bank (HO2S-11-21)	The HEGO monitor checks and determines if the HO2S signal response for a fuel shift corresponds to the correct engine bank. The test fails when a response from the HO2S(s) being tested is not indicated.	• Crossed HO2S harness connectors (upstream). • Crossed HO2S wiring at the harness connectors (upstream). • Crossed HO2S wiring at the 104-pin harness connectors (upstream).	
P1129 - Downstream Oxygen Sensors Swapped from Bank to Bank (HO2S-12-22)	The HEGO monitor checks and determines if the HO2S signal response for a fuel shift corresponds to the correct engine bank. The test fails when a response from the HO2S(s) being tested is not indicated.	• Crossed HO2S harness connectors (downstream). • Crossed HO2S wiring at the harness connectors (downstream). • Crossed HO2S wiring at the 104-pin harness connectors (downstream).	

P1130 - Lack of HO2S-11 Switch, Fuel Trim at Limit	The HEGO Sensor is monitored for switching. The test fails when the HO2S fails to switch due to circuit or fuel at or exceeding a calibrated limit.	• Electrical:
		  • Short to VPWR in harness or HO2S
		  • Water in harness connector
		  • Open/Shorted HO2S circuit
		  • Corrosion or poor mating terminals and wiring
		  • Damaged HO2S
		  • Damaged PCM
		• Fuel System:
		  • Excessive fuel pressure
		  • Leaking/contaminated fuel injectors
		  • Leaking fuel pressure regulator
		  • Low fuel pressure or running out of fuel
		  • Vapor recovery system
		• Induction System:
		  • Air leaks after the MAF
		  • Vacuum Leaks
		  • PCV system
		  • Improperly seated engine oil dipstick
		• EGR System:
		  • Leaking gasket
		  • Stuck EGR valve
		  • Leaking diaphragm or EVR
		• Base Engine:
		  • Oil overfill
		  • Cam timing
		  • Cylinder compression
		  • Exhaust leaks before or near the HO2S(s)
			A fuel control HO2S PID switching across 0.45 volt from 0.2 to 0.9 volt indicates a normal switching HO2S.

P1131 - Lack of HO2S-11 Switch, Sensor Indicates Lean	A HEGO sensor indicating lean at the end of a test is trying to correct for an over-rich condition. The test fails when the fuel control system no longer detects switching for a calibrated amount of time.	See Possible Causes for DTC P1130	

P1132 - Lack of HO2S-11 Switch, Sensor Indicates Rich	A HEGO sensor indicating rich at the end of a test is trying to correct for an over-lean condition. The test fails when the fuel control system no longer detects switching for a calibrated amount of time.	See Possible Causes for DTC P1130	
P1137 - Lack of HO2S-12 Switch, Sensor Indicates Lean	The downstream HO2S sensors are forced rich and lean and monitored by the PCM. The test fails if the PCM does not detect the output of the HO2S in a calibrated amount of time.	• Pinched, shorted, and corroded wiring and pins • Crossed sensor wires • Exhaust leaks • Contaminated or damaged sensor	
P1138 - Lack of HO2S-12 Switch, Sensor Indicates Rich	See DTC P1137		
P1150 - Lack of HO2S-21 Switch, Fuel Trim at Limit	See DTC P1130		
P1151 - Lack of HO2S-21 Switch, Sensor Indicates Lean	A HEGO sensor indicating lean at the end of a test is trying to correct for an over-rich condition. The test fails when fuel control system no longer detects switching for a calibrated amount of time.	See Possible Causes for DTC P1130	

P1152 - Lack of HO2S-21 Switch, Sensor Indicates Rich	A HEGO sensor indicating rich at the end of a test is trying to correct for an over-lean condition. The test fails when the fuel control system no longer detects switching for a calibrated amount of time.	See Possible Causes for DTC P1130	
P1157 - Lack of HO2S-22 Switch, Sensor Indicates Lean	See DTC P1137		
P1158 - Lack of HO2S-22 Switch, Sensor Indicates Rich	See DTC P1137		
P1168 - Fuel Rail Pressure Sensor in Range But Low	The comprehensive component monitor (CCM) monitors the FRP pressure for acceptable fuel pressure. The test fails when the fuel pressure falls below a calibrated value.	• Low fuel pressure • Damaged FRP sensor • Excessive resistance in circuit • Low or no fuel	• A FRP PID value below 551 kpa (80 psi) indicates a failure • Low or no fuel • A FRP PID value greater than 896 kpa (130 psi) indicates a failure
P1169 - Fuel Rail Pressure (FRP) Sensor in Range But High	The comprehensive component monitor (CCM) monitors the FRP pressure for acceptable fuel pressure. The test fails when the fuel pressure falls below or exceeds a minimum/maximum calibrated value for a calibrated period of time.	• High fuel pressure • Low fuel pressure • Damaged FRP sensor • Excessive resistance in circuit	

P1180 - Fuel Delivery System - Low	The PCM receives fuel tank pressure (FTP) information from the natural gas module (NG), which uses the information to infer fuel rail pressure (FRP). The test fails when the inferred pressure is less than a minimum calibrated value.	• Restriction in the fuel line • Plugged fuel filter	
P1181 - Fuel Delivery System - High	The PCM receives fuel tank pressure (FTP) information from the natural gas module (NG), which uses the information to infer fuel rail pressure (FRP). The test fails when the inferred pressure is higher than a maximum calibrated value.	• Fuel pressure regulator	
P1183 - Engine Oil Temperature (EOT) Sensor Circuit Malfunction	Indicates EOT circuit became intermittently open or shorted while engine was running.	• Damaged harness • Damaged sensor • Damaged harness connector • Damaged PCM	Using signal simulation, disconnect sensor and simulate 1.0V on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM.

DTC	Description	Possible Causes	Diagnostic Aides

P1184 - Engine Oil Temperature (EOT) Sensor Out of Self-Test Range	Indicates EOT signal was out of Self-Test range. Correct range for KOER is.3-1.2 volts.	• Damaged harness • Damaged sensor • Damaged harness connector • Damaged PCM	Using signal simulation, disconnect sensor and simulate 1.0V on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM.
P1229 - Supercharger Intercooler Pump (ICP) Pump Not Operating	The ICP DTC will be set when the PCM is calling for the pump to be operating but no current is being detected.	• Pump motor open circuited • Pump relay coil open • Open circuit between relay and pump • Damaged PCM • Pump motor shorted • Open circuit between PCM and relay • Poor pump ground connection	Check for voltage at relay, check fuse in power feed, check ground connection of pump motor, PID reading is on/off.
P1232 - Low Speed Fuel Pump Primary Circuit Malfunction	Monitors the low speed fuel pump (LFP) primary circuit output from the PCM. The test fails if: When the LFP circuit is commanded on (grounded), excessive current draw is detected on the LFP circuit; or when the LFP circuit is commanded off, voltage is not detected on the LFP circuit (the PCM expects to detect VPWR voltage coming through the low speed fuel pump relay coil to the LFP circuit).	• Open or shorted low fuel pump (LFP) circuit • Open VPWR to low speed fuel pump relay • Damaged low speed fuel pump relay • Damaged PCM	■ An open circuit or short to ground can only be detected with the low speed fuel pump. ■ A short to power can only be detected with the low speed fuel pump commanded on. ■ During KOEO and KOER Self-Test, the low speed fuel pump output command will be cycled on and off.

P1233 - Fuel System Disabled or Offline	Note: For LS6/LS8, P1233 indicates the PCM is not receiving the fuel level information on SCP from the rear electronics module (REM). Refer to the Workshop Manual Section 413-01 for diagnostics. Monitors the fuel pump monitor (FPM) circuit from the fuel pump driver module (FPDM). With the key on, the FPDM continuously sends a duty cycle signal to the PCM through the FPM circuit. The test fails if the PCM stops receiving the duty cycle signal.	• Inertia fuel shutoff (IFS) switch needs to be reset
		• Open FPDM ground circuit
		• Open or shorted FPM circuit
		• Damaged IFS switch
		• Damaged FPDM
		• Damaged PCM
		• Also for Escort/Tracer and Mustang:
		  ■ Open FPDM PWR circuit
		  ■ Open B+ circuit to constant control relay module (CCRM) pin 11
		  ■ Open ground to CCRM pin 18 (Mustang)
		  ■ Damaged CCRM
		• Also for Continental:
		  ■ Open VPWR circuit to FPDM
			The PCM expects to see one of the following duty cycle signals from the FPDM on the FPM circuit: 1) 50% (500 msec on, 500 msec off), all OK. 2) 25% (250 msec on, 750 msec off), FPDM did not receive a fuel pump (FP) duty cycle command from the PCM, or the duty cycle that was received was invalid. 3) 75% (750 msec ON, 250 OFF), the FPDM has detected a fault in the circuits between the FPDM and the fuel pump.

P1234 - Fuel System Disabled or Offline	See DTC P1233. P1234 is identical to P1233 except P1234 will not illuminate the MIL.		
P1235 - Fuel Pump Control Out Of Range	Note: For LS6/LS8, the FPDM functions are incorporated in the Rear Electronics Module (REM). Also, the REM does not use a FPM circuit. Diagnostic information will be sent through SCP. Indicates that the FPDM has detected an invalid or missing FP circuit signal from the PCM. The	• FP circuit open or shorted • Damaged FPDM. • Damaged PCM	The FPDM sends a 25% duty cycle (250 msec ON, 750 msec OFF) through the FPM circuit to the PCM while the fault is being detected by the FPDM. If the fault is no longer detected, the PDM will return to sending an "all OK" (50% duty cycle) message to the PCM. The PCM will keep P1235 stored in Continuous Memory.

	FPDM will send a message to the PCM through the FPM circuit, indicating that this failure has been detected. The PCM will set the DTC when the message is received.		
P1236 - Fuel Pump Control Out Of Range	See DTC P1235. P1236 is identical to P1235 except P1236 will not illuminate the MIL.		
P1237 - Fuel Pump Secondary Circuit Malfunction	Note: For LS6/LS8, the FPDM functions are incorporated in the rear electronics module (REM). Also, the REM does not use a FPM circuit. Diagnostic information will be set through SCP. Indicates that the FPDM has detected a fuel pump secondary circuit fault. The FPDM will send a message to the PCM through the FPM circuit, indicating that this failure has been detected. The PCM will set the DTC when the message is received.	• Open or shorted FP PWR circuit • Open FP Rtn circuit to FPDM • Open or shorted circuit in the fuel pump • Locked fuel pump rotor • Damaged FPDM • For LS6/LS8, circuits associated with the Fuel Pump relay	■ The FPDM sends a 75% duty cycle (750 msec ON, 250 msec OFF) through the FPM circuit to the PCM while the fault is being detected by the FPDM. If the fault is no longer detected, the PCM will return to sending an "all OK" (50% duty cycle) message to the PCM. The PCM will keep P1237 stored in Continuous Memory. ■ The FPDM controls pump speed by supplying a "variable" ground on the RTN circuit.
P1238 - Fuel Pump Secondary Circuit Malfunction	See DTC P1237. P1238 is identical to P1237 except P1238 will not illuminate the MIL.		

P1244 - Generator Load Input Low	The PCM monitors the GLI circuit, and will set the DTC when the input is below calibrated limit for a calibrated amount of time.	• ALI circuit open or short • Damaged voltage regulator/generator • Damaged PCM	Verify operation of charging system.
P1245 - Generator Load Input High	The PCM monitors the GLI circuit, and will set the DTC when the input is above a calibrated limit for a calibrated amount of time.	• ALI circuit open or short • Damaged voltage regulator/generator • Damaged PCM	Verify operation of charging system.
P1246 - Generator Load Input (2.0L Contour/Mystique/Cougar)	The PCM monitors the GLI circuit, and will set the DTC when the input is not within a calibrated limit for a calibrated amount of time.	• ALI circuit concern. • Damaged voltage regulator/generator • Damaged PCM.	• Verify operation of charging system. • Verify battery is at proper charge.
P1246 - Generator Load Input Failed (All Others)	The PCM monitors generator load from the generator/regulator in the form of frequency. The frequency range is determined by the temperature of the voltage regulator where 97% represents full load, below 6% means no load.	• Generator circuit short to GND • Generator circuit short to PWR • Generator circuit open • Generator drive mechanism • Damaged generator/regulator assembly • Damaged PCM	■ Verify battery voltage is 14.5V. ■ Verify generator/regulator has the correct part number.
P1260 - Theft Detected - Vehicle Immobilized	Indicates the anti-theft system has determined a theft condition existed and the engine is disabled.	• Previous theft condition • Anti-Theft System failure	Using the proper key or remote or keyless entry to unlock the door will disarm the anti-theft system and enable fuel delivery to start the vehicle. Also check anti-theft system for DTCs.

P1270 - Engine RPM/Vehicle Speed Limiter	Indicates the vehicle has been operated in a manner which caused the engine or vehicle to exceed a calibration limit. The engine rpm and vehicle speed are continuously monitored by the PCM. The DTC is set when the rpm or speed fall out of calibrated range. For additional information on the engine rpm/vehicle speed limiter, refer to Section 1 , Electronic Engine Control (EC) System, Powertrain Control Software.	• Wheel slippage (water, ice, mud and snow) • Excessive engine rpm in Neutral • Vehicle drive at a high rate of speed	The DTC indicates the vehicle has been operated in a manner which caused the engine or vehicle speed to exceed a calibrated limit.
P1285 - Cylinder Head Over Temperature Sensed	Indicates an engine overheat condition was sensed by the cylinder head temperature sensor.	• Low engine coolant level • Base engine concerns • Engine cooling system concerns	On some applications when this fault occurs the Engine Temperature warning indicator will illuminate or force the temperature gauge to full H (Hot) zone by ground circuit 39.
P1288 - Cylinder Head Temperature (CHT) Sensor Circuit Out of Self-Test Range	Indicates the CHT sensor is out of Self-Test range. Engine not at operating temperature.	• Engine overheating • Damaged harness connector • Damaged PCM • Low engine coolant level • Damaged CHT sensor	Bring engine to operating temperature. If cold, re-run self-test. If engine over-heats check cooling system.

P1289 - Cylinder Head Temperature (CHT) Sensor Circuit High Input (PCM STRATEGIES UP TO AND INCLUDING 1998)	Indicates a CHT sensor circuit malfunction (shorted).	• Grounded circuit in CHT harness • Damaged CHT sensor • Improper harness connection • Damaged PCM	Using signal simulation, disconnect sensor and simulate a voltage on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM. Note DTC P0117 may also be reported, this will activate the MIL light.
P1289 - Cylinder Head Temperature (CHT) Sensor Circuit High Input (PCM STRATEGIES 1999 AND BEYOND)	Indicates a CHT sensor circuit malfunction (open).	• Open circuit in CHT harness • Damaged CHT sensor • Improper harness connection • Damaged PCM	Using signal simulation, disconnect sensor and simulate a voltage on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM. Note: DTC P0118 may also be reported, this will activate the MIL light.
P1290 - Cylinder Head Temperature (CHT) Sensor Circuit Low Input (PCM STRATEGIES UP TO AND INCLUDING 1998)	Indicates a CHT sensor circuit malfunction (open).	• Open circuit in CHT harness • Damaged CHT sensor • Improper harness connection • Damaged PCM	Using signal simulation, disconnect sensor and simulate a voltage on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM. Note DTC P0118 may also be reported, this will activate the MIL light.

P1290 - Cylinder Head Temperature (CHT) Sensor Circuit Low Input (PCM STRATEGIES 1999 AND BEYOND)	Indicates a CHT sensor circuit malfunction (shorted).	• Grounded circuit in CHT harness • Damaged CHT sensor • Improper harness connection • Damaged PCM	Using signal simulation, disconnect sensor and simulate a voltage on sensor signal circuit. Simulated 1.0V signal and scan PID voltage value should be similar. If voltage is similar check sensor, if voltage is not similar check related circuit and PCM. Note DTC P0117 may also be reported, this will activate the MIL light.
P1299 - Cylinder Head Over Temperature Protection Active	Indicates an engine overheat condition was detected by the cylinder head temperature (CHT) sensor. An FMEM Strategy called Fail-safe Cooling was activated to cool the engine.	• Engine cooling system concerns • Low engine coolant level • Base engine concerns	Refer to Section 1 , Electronic Engine Control (EC) System, for more information on Fail-safe Cooling Strategy and cylinder head temperature sensor.
P1309 - Misfire Monitor Disabled	When the misfire monitor is disabled, usually due to the input signal generated by the camshaft position (CMP) sensor, by sensing the passage of teeth from the CMP wheel.	• Camshaft position sensor • Powertrain control module • ECT, MAF, and CKP sensors	Verify the CMP is installed correctly and not out of synchronization.
P1380 - Variable Cam Timing Solenoid A Circuit Malfunction	The comprehensive component monitor(CCM) monitors the VCT circuit to the PCM for high and low voltage. If during testing voltage was to fall below a calibrated limit a calibrated amount of time the test will fail.	• Open or short VCT circuit • Open VPWR circuit • Damaged PCM • Open or short VCT solenoid valve	DTC P1380 is a VCT circuit check. Testing should include wires, solenoid coil and PCM.

P1381 - Variable Cam Timing Over-advanced (Bank 1)	The comprehensive component monitor (CCM) monitors the VCT position for an over-advanced camshaft timing. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an advanced position.	• Cam timing improperly set • No oil flow to the VCT piston chamber • Low oil pressure • VCT solenoid valve stuck closed • Camshaft advance mechanism binding (VCT unit)	P1381 DTC is a check of the VCT unit. Testing should not include electrical checks. Diagnostics and repair for the VCT unit are located in the Workshop Manual.
P1383 - Variable Cam Timing Over-retarded (Bank 1)	The comprehensive component monitor (CCM) monitors the VCT position for over-retarded camshaft timing. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an retarded position.	• Cam timing improperly set • Continuous oil flow to the VCT piston chamber • VCT solenoid valve stuck open • Camshaft advance mechanism binding (VCT unit)	DTC P1383 is a check of the VCT unit. Testing should not include electrical checks. Engine will idle rough, hard starting and may stall. Diagnostics and repair for the VCT unit are located in the Workshop Manual.
P1390 - Octane Adjust (OCTADJ)	The octane adjust is software activated in the powertrain control module, used to retard spark timing by three degrees. The hardware shorting bar has been removed.	• Powertrain control module (PCM)	Do not activate the octane adjust software unless directed by a Technical Service Bulletin.

P1400 - DPF EGR Sensor Circuit Low Voltage Detected	The EGR monitor checks the DPF EGR sensor signal to the PCM for low voltage. The test fails when the average voltage to the PCM drops to a voltage less than the minimum calibrated value.	• DPFEGR circuit short to GND • Damaged DPF EGR sensor • VREF short to GND • Damaged PCM	A DPF EGR PID reading less than 0.2 volt with the key ON and engine OFF or running, indicates a hard fault.
P1401 - DPF EGR Sensor Circuit High Voltage Detected	The EGR monitor checks the DPF EGR sensor signal to the PCM for high voltage. The test fails when the average voltage to the PCM goes to a voltage greater than the maximum calibrated value.	• DPF EGR circuit open • VREF short to PWR • Damaged DPF EGR sensor • DPFEGR circuit short to PWR • SIG RTN circuit open • Damaged PCM	A DPF EGR PID reading greater than 4.5 volts with the key ON and engine OFF or running, indicates a hard fault.
P1405 - DPF EGR Sensor Upstream Hose Off or Plugged	While driving, the EGR monitor commands the EGR valve closed and checks the differential pressure across the EGR orifice. The test fails when the signal from the DPF EGR sensor indicates EGR flow is in the negative direction.	• Upstream hose is disconnected • Upstream hose is plugged (ice) • Plugged or damaged EGR tube	■ Look for signs of water or icing in hose ■ Verify hose connection and routing (no excessive dips) ■ Verify DPF EGR sensor proper mounting and function (view DPF EGR PID while applying and releasing vacuum directly to sensor with a hand pump)
P1406 - DPF EGR Sensor Downstream Hose Off or Plugged	While driving, the EGR monitor commands the EGR valve closed and checks the differential pressure across the EGR orifice. The test fails when the signal from the DPF EGR sensor continues to indicate EGR flow even after the	• Downstream hose is disconnected • Downstream hose is plugged (ice) • Plugged or damaged EGR tube	■ Look for signs of water or icing in hose ■ Verify connection and routing (no excessive dips) ■ Verify DPF EGR sensor proper mounting and function (view DPFEGR PID while applying and releasing vacuum directly to sensor with a hand pump)

	EGR valve is commanded closed.		
P1408 - EGR Flow Out of Self-Test Range	This test is performed during the KOER on demand self-test only. The EGR system is commanded ON at a fixed engine speed. The test fails and the DTC is output when the measured EGR flow falls below the required calibrated minimum.	See Possible Causes for DTC P0401.	
P1409 - EGR Vacuum Regulator Solenoid Circuit Malfunction	This test checks the electrical function of the EGRVR. solenoid. The test fails when the EGRVR circuit voltage is either too high or too low when compared to the expected voltage range. The EGR system must be enabled for the test to be completed.	• EGRVR circuit open • VPWR open to EGRVR solenoid • EGRVR circuit short to VPWR or GND • Damaged EGRVR solenoid • Damaged PCM	The EGR vacuum regulator solenoid resistance is from 26 to 40 ohms.

DTC	Description	Possible Causes	Diagnostic Aides
P1411 - Secondary Air Injection (AIR) system downstream flow	The secondary air injection system does not detect the presence of air in the exhaust when introduced by the secondary air injection system	• Electric AIR Pump • Hose from AIR pump leak • AIR bypass solenoid leak/blocked • Hose from AIR pump blocked • AIR bypass solenoid stuck open/closed	In order to test the AIR pump, it must be capable of driving the HO2S lean.

P1413 - Secondary Air Injection system monitor circuit low	The secondary air injection system monitor circuit is low, indicating the electrical AIR pump is off although the electrical AIR pump was commanded on by the PCM.	• Open B+ circuit • Open AIR circuit • Damaged PCM • AIR circuit short to ground • Damaged AIR pump • Damaged Solid State Relay	The AIR Monitor circuit is held low by the resistance path through the AIR pump when the pump is off. Also, look for open circuit from SSR to AIR pump.
P1414 - Secondary Air Injection system monitor circuit high	The secondary air injection system monitor circuit is high, indicating the electrical AIR pump is on although the electrical AIR pump was commanded off by the PCM.	• Open AIR monitor circuit from the pump • AIR circuit short to power • Damaged Solid State relay • Open AIR pump ground • Damaged AIR pump • Damaged PCM	
P1443 - EVAP Control System Canister Purge Valve (Mechanical) Malfunction	Monitors the fuel vapor flow between the engine intake manifold and the EVAP canister. The system failure occurs when a leak or blockage between the intake manifold, the EVAP canister purge valve and the EVAP canister is detected by the PCM.	• Pinched, blocked or plugged fuel vapor tubes/hoses (except between fuel tank and EVAP canister) • Damaged EVAP canister • Disconnected, cracked or cut fuel vapor tubes/hoses (except between fuel tank and EVAP canister) • Damaged EVAP canister purge valve	Check for audible vacuum noise in the engine compartment or significant fuel odor in the engine compartment or near the EVAP canister.
P1443 - Very Small Or No Purge Flow Condition (mid-year 4.0L SOHC Explorer only)	A fuel tank pressure change greater than a minus (-) 7 inches of H2O in 30 seconds has occurred with purge (fuel vapor) flow less than 0.02 pounds per minute.	• Blocked fuel vapor hose between EVAP canister purge valve and FTP sensor. • Blocked fuel vapor hose between EVAP canister purge valve and engine intake manifold. • Blocked vacuum hose between EVAP canister purge valve-solenoid and engine intake manifold. • EVAP canister purge valve stuck closed (mechanically).	Check for blockages between the fuel tank, EVAP canister purge valve and engine intake manifold. Check obstructions in the EVAP canister purge valve diaphragm and ports.

P1450 - Unable to Bleed Up Fuel Tank Vacuum	Monitors the fuel vapor vacuum and pressure in the fuel tank. The system failure occurs when the EVAP running loss monitor detects excessive fuel tank vacuum with the engine running (but not at idle).	• Blockages or kinks in EVAP canister tube or EVAP canister purge outlet tube (between fuel tank, EVAP canister purge valve and EVAP canister) • Fuel filler cap stuck closed (no vacuum relief) • Contaminated fuel vapor elbow on EVAP canister • Restricted EVAP canister • CV solenoid stuck open (partially or fully) • Plugged CV solenoid filter • EVAP canister purge valve stuck open • VREF circuit open (harness near FTP sensor, FTP sensor or PCM) • Damaged FTP sensor	
P1451 - EVAP Control System Canister Vent Solenoid Circuit Malfunction	Monitors the canister vent (CV) solenoid circuit for an electrical failure. The test fails when the signal moves outside the minimum or maximum allowable calibrated parameters for a specified canister vent duty cycle by PCM command.	• VPWR circuit open • CV solenoid circuit shorted to PWR GND or CHASSIS GND • Damaged CV solenoid • CV solenoid circuit open • CV solenoid circuit shorted to VPWR • Damaged PCM	■ Monitor EVAPCV PID and voltage between canister vent solenoid signal and PWR GND in output test mode with key ON engine OFF (or in key ON engine RUNNING mode) ■ EVAPCV PID at 0% and voltage less than 1.0 volt (or EVAPCV PID at 100% and voltage greater than 0.5 volt) indicates a hard fault

P1460 - Wide Open Throttle A/C Cutout Primary Circuit Malfunction	NOTE: For applications that use a normally open relay to control the A/C clutch, the following description applies to the A/C clutch relay control circuit. Monitors the wide open throttle A/C cutoff (WAC) circuit output from the PCM. The test fails if: When the PCM grounds the WAC circuit, excessive current draw is detected on the WAC circuit; or with the WAC circuit not grounded by the PCM, voltage is not detected on the WAC circuit (the PCM expects to detect VPWR voltage coming through the WAC relay coil to the WAC circuit).	• Open or shorted WAC circuit • Damaged WAC relay (or CCRM) • Open VPWR circuit to WAC relay • Damaged PCM	■ When the WACF PID reads YES, a fault is currently present ■ An open circuit or short to ground can only be detected when the PCM is not grounding the circuit ■ A short to power can only be detected when the PCM is grounding the circuit ■ During KOEO and KOER self-test, the WAC circuit will be cycled ON and OFF ■ Verify A/C and defrost were OFF during KOEO and KOER self-test (Check ACCS PID to verify) ■ If vehicle is not equipped with A/C, DTC P1460 can be ignored
P1461 - Air Conditioning Pressure Sensor (ACP) Sensor High Voltage Detected	ACP inputs a voltage to the PCM. If the voltage is above a calibrated level the DTC will set.	• ACP sensor circuit short to PWR • ACP circuit open • Damaged PCM • ACP circuit short to VREF • ACP circuit short to SIGRTN • Damaged ACP sensor	Verify VREF voltage between 4.0 and 6.0V.
P1462 - Air Conditioning Pressure Sensor (ACP) Sensor Low Voltage Detected	ACP inputs a voltage to the PCM. If the voltage is below the calibrated level the DTC will set.	• ACP circuit short to GND or SIGRTN • VREF circuit open • Damaged PCM • Open ACP circuit • Damaged ACP sensor	Verify VREF voltage between 4.0 and 6.0V.

P1463 - Air Conditioning Pressure Sensor (ACP) Insufficient Pressure Change	Each time the A/C clutch engages, the PCM is looking for a pressure change in the refrigerant. If the change in pressure is outside of the calibration the DTC will set.	• A/C system mechanical failure • Open ACP or VREF circuit • A/C sensor damaged • A/C system electrical failure • A/C clutch always engaged	Verify A/C system function, including refrigerant charge.
P1464 - A/C Demand Out Of Self-Test Range	Indicates the ACCS input to the PCM was high during Self-Test.	• A/C was on during self-test • A/C Clutch PWR circuit short to power (applications with N/C WAC relay contacts) • ACCS circuit short to power • Damaged A/C demand switch • Damaged WAC relay (or CCRM) • Damaged PCM	If A/C or defrost were on during self-test, turn off and rerun test.
P1469 - Low A/C Cycling Period	Indicates frequent A/C compressor clutch cycling.	• Mechanical A/C system concern (such as low refrigerant charge, damaged A/C cycling switch) • Intermittent open between the cycling pressure switch and pin 41 (ACCS) to the PCM • Intermittent open in IGN RUN circuit to cycling pressure switch (if applicable)	■ An intermittent open circuit, although possible, is unlikely ■ This test was designed to protect the transmission. In some strategies, the PCM will unlock the torque converter during A/C clutch engagement. If a concern is present that results in frequent A/C clutch cycling, damage could occur if the torque converter was cycled at these intervals. This test will detect this condition, set the DTC and prevent the torque converter from excessive cycling.

P1474 - Low Fan Control Primary Circuit Failure	Monitors the low fan control (LFC) (fan control [FC] for one speed fan application) primary circuit output from the PCM. The test fails if: When the PCM grounds the LFC/FC circuit, excessive current draw is detected on the LFC/FC circuit; or with the LFC/FC circuit not grounded by the PCM, voltage is not detected on the LFC/FC circuit (the PCM expects to detect VPWR voltage coming through the low speed fan relay [or CCRM] coil to the LFC/FC circuit).	• Open or shorted LFC/FC circuit • Open VPWR circuit to low speed fan relay • Damaged fuel pump relay (or CCRM) • Damaged PCM	■ When the LFC PID reads YES, a fault is currently present ■ An open circuit or short to ground can only be detected when the PCM is not grounding the LFC/FC circuit ■ A short to power can only be detected when the PCM is grounding the LFC/FC circuit. During KOEO and KOER Self-Test, the LFC/FC circuit will be cycled on and off
P1474 - Hydraulic Cooling Fan Primary Circuit Failure (HCF)	This test checks the electrical function of the (HCF) primary circuit. The test fails if: the PCM detects voltage either too high or too low when compared to the expected voltage range on the (HCF) primary circuit.	• HCF circuit open • HCF circuit short to power • HCF circuit short to ground • Damaged HCF solenoid • Damaged PCM	The HCF solenoid is integrated in the HCF pump which looks like a power steering pump. The electrical resistance of the solenoid windings is nominally 10 ohms.
P1479 - High Fan Control Primary Circuit Failure	Monitors the high fan control (HFC) primary circuit output from the PCM. The test fails if: With the HFC output commanded on (grounded), excessive current draw is detected on the HFC circuit; or with the HFC circuit commanded off, voltage is not detected on the HFC circuit (the PCM expects to detect VPWR voltage coming through the high speed fan relay [or	• Open or shorted HFC circuit • Open VPWR circuit to high speed fan relay • Damaged high speed fan relay (or CCRM) • Damaged PCM	■ When the HFC PID reads YES, a fault is currently present ■ An open circuit or short to ground can only be detected when the PCM is not grounding the HFC circuit ■ A short to power can only be detected when the PCM is grounding the HFC circuit ■ During KOEO and KOER self-test, the HFC circuit will be cycled on and off

	CCRM] coil to the HFC circuit).		
P1500 - Vehicle Speed Sensor (VSS) Intermittent	Indicates the VSS input signal was intermittent. This DTC is set when a VSS fault interferes with other OBDII tests, such as Catalyst efficiency monitor, EVAP monitor, HO2S monitor, etc.	• Intermittent VSS connections • Intermittent open in VSS harness circuit(s) • Intermittent short in VSS harness circuit(s) • Damaged VSS • Damaged PCM	
P1501 - Vehicle Speed Sensor (VSS) Out of Self Test Range	Indicates the VSS input signal is out of Self Test range. If the PCM detects a VSS input signal any time during Self Test, a DTC P1501 will be set and the test will abort.	• Noisy VSS input signal from Radio Frequency Interference/ Electro-Magnetic Interference (RFI/EMI) external sources such as ignition wires, charging circuit or after market equipment.	Check for VSS input to be 0 mph when vehicle transmission is in Park.
P1502 - Vehicle Speed Sensor (VSS) Intermittent	Indicates the powertrain control module (PCM) detected an error in the vehicle speed information. Vehicle speed data is received from either the vehicle speed sensor (VSS), transfer case speed sensor (TCSS), anti-lock brake system (ABS) control module, generic electronic module (GEM), or central timer module (CTM). This DTC is set the same way as P0500. However, it is intended to flash the transmission control indicator lamp (TCIL) for first time VSS circuit error/malfunctions.	• Refer to possible causes for P0500.	Refer to diagnostic aids for P0500.

P1502 - Vehicle Speed Sensor (VSS) Intermittent (TCIL illuminates)	Indicates the powertrain control module (PCM) detected an error in the vehicle speed information. Vehicle speed data is received from either the vehicle speed sensor (VSS), anti-lock brake system (ABS) control module, generic electronic module (GEM), or central timer module (CTM). This DTC is set the same way as P0500. However, it is intended to flash the transmission control indicator lamp (TCIL) for first time VSS circuit error/malfunctions.	Refer to possible causes for P0500	Refer to diagnostic aides for P0500
P1504 - Idle Air Control (IAC) Circuit Malfunction	This DTC is set when the PCM detects an electrical load failure on the IAC output circuit.	• IAC circuit open • VPWR to IAC solenoid open • IAC circuit short to PWR • IAC circuit short to GND • Damaged IAC valve • Damaged PCM	■ The IAC solenoid resistance is from 6 to 13 ohms. • IAC valve stuck open • Vacuum leaks • Failed EVAP system • Damaged PCM ■ The IAC solenoid resistance is from 6 to 13 ohms.
P1506 - Idle Air Control (IAC) Overspeed Error	This DTC is set when the PCM detects engine idle speed that is greater than the desired rpm.	• IAC circuit short to GND • Damaged IAC valve	Disconnect IAC valve and look for little or no change in engine rpm as an indication of a stuck or damaged valve.
P1507 - Idle Air Control (IAC) Underspeed Error	This DTC is set when the PCM detects engine idle speed that is less than the desired rpm.	• IAC circuit open • IAC circuit short to PWR • VPWR to IAC solenoid open • Air inlet is plugged • Damaged IAC solenoid • Damaged PCM	■ The IAC solenoid resistance is from 6 to 13 ohms ■ Disconnect IAC valve and look for no change in engine rpm as an indication of a stuck or damaged valve

P1516 - Intake Manifold Runner Control Input Error (Bank 1)			
P1517 - Intake Manifold Runner Control Input Error (Bank 2)	The IMRC system is monitored for failure during continuous or key ON engine OFF self-test. Each DTC will distinguish the corresponding failed bank for IMRC actuator assemblies with dual monitor switches. The test fails when the signal on the monitor pin is outside an expected calibrated range.	• Mechanical concern - bind, seize, damage or obstruction of IMRC hardware	▪ An IMRCM PID reading at closed throttle that is less than VREF may indicate a fault ▪ An IMRCM PID reading near 1 volt or greater with engine rpm of at least 3000 may indicate a fault
P1518 - Intake Manifold Runner Control Malfunction (Stuck Open)	The IMRC system is monitored for failure during continuous, key ON engine OFF or key ON engine running self-test. The test fails when the signal on the monitor pin is less than an expected calibrated range at closed throttle.	• IMRC monitor signal circuit shorted to PWR GND or SIG RTN • Damaged IMRC actuator • Damaged PCM	An IMRCM PID reading approximately near 1 volt at closed throttle may indicate a fault
P1519 - Inlet Manifold Runner Control Malfunction (Stuck Closed)	The IMRC system is monitored for failure during continuous, key ON engine OFF or key ON engine running self-test. The test fails when the signal on the monitor pin is more than an expected calibrated range with IMRC activated.	• IMRC monitor circuit open • IMRC control circuit open • IMRC monitor circuit short to VREF • IMRC monitor return circuit open • Damaged IMRC actuator • IMRC VPWR circuit open • Damaged PCM	An IMRCM PID reading at VREF with engine rpm of at least 3000 may indicate a fault.

P1520 - Intake Manifold Runner Control Circuit Malfunction	The IMRC system is monitored for failure during continuous key ON engine OFF or key ON engine running self-test. The test fails when the signal on the monitor pin is outside the expected calibrated range.	• Open IMRC control circuit • Open VPWR circuit • Shorted IMRC circuit • Damaged IMRC solenoid • Damaged PCM	The use of Active Command Mode or Output State Control on a generic scan tool may indicate a fault.
P1537 - Intake Manifold Runner Control Malfunction (Bank One Stuck Open)	The IMRC system is monitored for failure during continuous key ON engine OFF or key ON engine running self-test. The test fails when the signal on the monitor pin is less than an expected calibrated range.	• Mechanical hardware concern • Shorted IMRC circuit • Damaged IMRC actuator • Damaged PCM	The use of Active Command Mode or Output State Control on a generic scan tool may indicate a fault. In IMRCM PID reading of approximately 1 volt at closed throttle may indicate a fault.
P1538 - Intake Manifold Runner Control Malfunction (Bank Two Stuck Open)	The IMRC system is monitored for failure during continuous key ON engine OFF or key ON engine running self-test. The test fails when the signal on the monitor pin is less than an expected calibrated range.	• Mechanical hardware concern • Shorted IMRC circuit • Damaged IMRC actuator • Damaged PCM	The use of Active Command Mode or Output State Control on a generic scan tool may indicate a fault. In IMRCM PID reading of approximately 1 volt at closed throttle may indicate a fault.
P1549 - Intake Manifold Communication Control Circuit Malfunction	The IMCC or intake manifold tuning (IMT) valve system is monitored for failure during continuous or key ON engine OFF self-test. The test fails when the PCM detects a concern with IMT valve output circuit.	• Open IMT valve circuit • Open VPWR circuit • Shorted IMT valve circuit • Damaged IMT valve • Damaged PCM • PSP sensor damaged • Damaged PCM	▪ An IMT valve fault PID (IMTVF) displaying YES status may indicate a fault ▪ The DTC indicates the PSP sensor is out of Self-Test range.
P1550 - Power Steering Pressure (PSP) Sensor Malfunction	The PSP sensor input signal to PCM is continuously monitored. The test fails when the signal falls out of a maximum or minimum calibrated range.		

P1605 - Keep Alive Memory Test Failure	Indicates the PCM has experienced an internal memory test failure. However there are external items that can cause this DTC.	• Reprogramming • Battery terminal corrosion • Damaged PCM • KAPWR to PCM interrupt/open • Loose battery connection	If KAPWR is interrupted to the PCM, because of a battery or PCM disconnect, DTC can be generated on the first power-up.
P1633 - Keep Alive Power Voltage Too Low	Indicates that the Keep Alive Power (KAPWR) circuit has experienced a power interrupt.	• Open KAPWR circuit • Damaged PCM • Intermittent KAPWR Circuit	
P1635 - Tire/Axle Ratio Out Of Acceptable Range	This Diagnostic Trouble Code (DTC) indicates the tire and axle information contained in Vehicle ID block (VID) does not match vehicle hardware.	• Incorrect tire size • Incorrect axle ratio • Incorrect VID configuration parameters	Using the scan tool, view the tire and axle parameters within the VID. They must match vehicle hardware.
P1636 - Inductive Signature Chip Communication Error	Indicates the PCM has lost communication with the Inductive Signature Chip.	• PCM damaged.	
P1640 - Powertrain DTC's Available in Another Module	Vehicles using a secondary Engine Control Module can request that the Powertrain Control Module illuminate the Check Engine Light when a failure occurs which affect emission.	• DTCs stored in a secondary module, which requested the MIL to be turned on.	Call-up PID address 0946 to determine secondary module requesting MIL illumination. Once secondary module is determined request DTCs from module.
P1650 - Power Steering Pressure (PSP) Switch Malfunction	The PSP switch input signal to PCM is continuously monitored. The test fails when the signal falls out of a maximum or minimum calibrated range.	• PSP switch/shorting bar damaged • SIG RTN circuit open • PSP circuit open or shorted to SIGRTN • PCM damaged	The DTC indicates the PSP switch is out of Self-Test range.
P1651 - Power Steering Pressure (PSP) Switch Signal Malfunction	The PSP switch input signal to PCM is continuously monitored. The test fails when the signal is open or shorted.	• PSP switch/shorting bar damaged • SIG RTN circuit open • PSP circuit open or shorted to SIGRTN • PCM damaged	▪ The DTC indicates the PSP switch is open or shorted ▪ Check for proper function of stoplamps. Follow correct Self-Test procedures, refer to Section 2 Quick Test

P1703 - Brake Switch Out of Self-Test Range	Indicates that during Key On Engine Off (KOEO) Self-Test, BPP signal was high. Or during Key On Engine Running (KOER) Self -Test, the BPP signal did not cycle high and low.	• Open or short in (BPP) circuit • Open or short in stoplamp circuits • Damaged PCM • Malfunction in module(s) connected to BPP circuit (Rear Electronic Module [REM] Windstar and LS6/LS8 and Lighting Control Module (LCM) Continental and Town Car) • Damaged Brake Switch • Misadjusted Brake Switch	Check for proper function of stoplamps. Follow correct Self-Test procedures, refer to Section 2 Quick Test .
P1705 - Transmission Range Sensor Out of Self-Test Range			
P1709 - Park/Neutral Position Switch Out of Self-Test Range	The DTCs indicate that the voltage is high when it should be low.	• PNP/CPP circuit short to PWR • Damaged PNP or CPP switch • PNP/CPP circuit open in the SIGRTN • Damaged PCM	When exercising either the PNP or CPP switch the voltage should cycle from 5.0V to low
P1729 - 4x4L Switch Malfunction	The 4x4L switch is an ON/OFF. If the PCM does not see low voltage when the switch is ON a DTC will set.	• 4x4L harness open or shorted • Damaged electronic shift module • Damaged PCM	Verify the 4x4L switch cycles ON/OFF.
P1780 - Transmission Control Switch Out of Self-Test Range	During KOER self-test the TCS has to be cycled, if not cycled a DTC is set.	• TCS circuit short or open • Damaged TCS switch • Damaged PCM	Verify the TCS switch cycles ON/OFF
P1781 - 4x4L Switch Out of Self-Test Range	The 4x4L switch is an ON/OFF. If the PCM does not see low voltage when the switch is on a DTC will set.	• 4x4L harness open or shorted • Damaged electronic shift module • Damaged PCM	Verify the 4x4L switch cycles ON/OFF
P1900 - Output Shaft Speed sensor circuit intermittent failure	See DTC P0723		