Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Actuator Solenoid Circuit Open - Bank 1	P0010	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	P0010 is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft System Performance - Bank 1	P0011	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive.	(Intake cam Bank 1) Cam Position Error > (**P0011_CamPosErrorLimld**) deg	**Intake Cam Phsr Enable** System Voltage Engine Running Power Take Off (PTO) active Desired cam position Desired AND Measured cam position Desired cam position variation No Active DTCs	= TRUE > 11.00 Volts = TRUE = FALSE > 0 deg > (**P0011_CamPosErrorLimIc1**) deg AND < **(CalculatedPerfMaxld)** deg < 7.50 deg for (**P0011_P05CC_StablePositionTimeld**) seconds P0010 P2088 P2089	100.00 failures out of 300.00 samples 100 ms /sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor A	P0016	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	Out of range cam edge measurements in one engine cycle Out of range values are: cam edge measurement OR cam edge measurement from the expeced nominal cam position	>= 2 cam edges < -11.0 Crank Degrees >11.0 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser control indcates the phaser is 'parked' No Active DTCs: Time since last execution of a test IntCamECC_OilPresLow	Test is Enabled CrankSensor_FA P0340, P0341 > 1.0 sec = FALSE	4 cam edge measurements and 1 test sample per engine cycle Test failure is 4 fails in 5 samples Diagnostic failure is 2 failed tests out of 3 If the first test fails, the next test is delayed to confirm the phaser 'parked' This delay time is defined by **P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold** For mid-park phasers, an additional delay **P0016-0019 Mid-Park Phaser Delay** is applied	Type A, 1 Trips

Component/ System	**Fault Code**	**Monitor Strategy Description**	**Malfunction Criteria**	**Threshold Value**	**Secondary Parameters**	**Enable Conditions**	**Time Required**	**MIL Ilium.**
O2S Heater Control Circuit Bank 1 Sensor 1	P0030	Controller specific output driver circuit diagnoses the heater output low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	 > 200 K Q impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0031 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bankl Sensori	P0031	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 Q impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0030 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bankl Sensori	P0032	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 Q impedance between output and controller power.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bank 1 Sensor 2	P0036	Controller specific output driver circuit diagnoses the heater output low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0037 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bankl Sensor2	P0037	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 Q impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controlle rs P0036 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bankl Sensor2	P0038	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 Q impedance between output and controller power.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bank 2 Sensor 1	P0050	Controller specific output driver circuit diagnoses the heater output low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0051 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bank2 Sensori	P0051	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 Q impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0050 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bank2 Sensori	P0052	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 Q impedance between output and controller power.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
HO2S Heater Resistance Bank 1 Sensor 1	P0053	Detects an oxygen sensor heater having an incorrect or out of range resistance value. This test calculates the heater's resistance (using voltage and current) at engine start after a longer soak condition and compares it to the expected values for the released sensor. This fault is set if the heater resistance is outside the expected range.	Heater Resistance outside of the expected range of	3.1 < ohms < 8.4	No Active DTC's Coolant - IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA <8.0 °C >28,800 seconds > -30.0 °C < 32.0 volts <0.04 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
HO2S Heater Resistance Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0054	Detects an oxygen sensor heater having an incorrect or out of range resistance value. This test calculates the heater's resistance (using voltage and current) at engine start after a soak condition and compares it to the expected values for the released sensor. This fault is set if the heater resistance is outside the expected range.	Heater Resistance outside of the expected range of	3.1 < ohms < 8.4	No Active DTC's Coolant - IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA < 8.0 °C >28,800 seconds > -30.0 °C < 32.0 volts < 0.04 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bank 2 Sensor 2	P0056	Controller specific output driver circuit diagnoses the heater output low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run >11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0057 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bank2 Sensor2	P0057	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 Q impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0056 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Control Circuit Bank2 Sensor2	P0058	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 Q impedance between output and controller power.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
HO2S Heater Resistance Bank 2 Sensor 1	P0059	Detects an oxygen sensor heater having an incorrect or out of range resistance value.. This test calculates the heater's resistance (using voltage and current) at engine start after a soak condition and compares it to the expected values for the released sensor. This fault is set if the heater resistance is outside the expected range.	Heater Resistance outside of the expected range of	3.4 < ohms < 8.6	No Active DTC's Coolant - IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA <8.0 °C >28,800 seconds > -30.0 °C < 32.0 volts <0.09 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
HO2S Heater Resistance Bank 2 Sensor 2	P0060	Detects an oxygen sensor heater having an incorrect or out of range resistance value. This test calculates the heater's resistance (using voltage and current) at engine start after a soak condition and compares it to the expected values for the released sensor. This fault is set if the heater resistance is outside the expected range.	Heater Resistance outside of the expected range of	3.4 < ohms < 8.6	No Active DTC's Coolant - IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA <8.0 °C >28,800 seconds > -30.0 °C <32.0 volts <0.09 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
MAP / MAF / Throttle Position Correlation	P0068	Detect when MAP and MAF do not match estimated engine airflow as established by the TPS	Difference between MAP and estimated MAP exceeds threshold (kPa), or P0651 (5 Volt Ref), or P0107 (MAP circuit low), or P0108 (MAP circuit high) have failed this key cycle, then MAP portion of diagnostic fails	Table, f(TPS). See supporting tables: **P0068_Delta MAP Threshold f(TPS)**	Engine Speed	> 800 RPM	Continuously fail MAP and MAF portions of diagnostic for 0.1875 s Continuous in MAIN processor	Type A, 1 Trips
					Run/Crank voltage	>6.41 Volts		
			Absolute difference between MAF and estimated MAF exceed threshold (grams/sec), or P0102 (MAF circuit low), orP0103 (MAF circuit hi) have failed this key cycle, or maximum MAF versus RPM (Table) is greater than or equal to maximum MAF versus battery voltage, then MAF portion of diagnostic fails	Table, f(TPS). See supporting tables: **P0068_Delta MAF Threshold f(TPS)** Table, f(RPM). See supporting tables: **P0068_Maximum MAF f(RPM)** Table, f(Volts). See supporting tables: **P0068_Maximum MAF f(Volts)**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Outside Air Temperature (OAT) Sensor Circuit Performance (OAT wired to ECM)	P0071	Detects an Outside Air Temperature (OAT) sensorthat is stuck in range. There are two components to the test: an engine off component, and an engine running component. If the engine has been off for a long enough period of time, and the coolant temperature and Intake Air Temperature (IAT) values are similar, then the air temperature values in the engine compartment of the vehicle are considered to have equalized. In this case, the engine off component of the diagnostic can be enabled. If the IAT and the OAT values are similar, then the OAT Performance Diagnostic passes. If the IAT and OAT values are not similar, the diagnostic will continue to monitor the IAT and the OAT as the vehicle starts to move. For applications that have ability to move without engaging the internal combustion	**Engine Off:** If IAT >= OAT: IAT - OAT If IAT < OAT: OAT - IAT If either of the following conditions are met, this diagnostic will pass: If IAT >= OAT: IAT - OAT If IAT < OAT: OAT - IAT	> 15.0 deg C > 15.0 deg C <= 15.0 deg C <= 15.0 deg C	Time between current ignition cycle and the last time the engine was running Engine is not running Vehicle Speed Coolant Temperature - IAT IAT - Coolant Temperature OAT-to-IAT engine off equilibrium counter The "OAT-to-IAT engine off equilibrium counter" is a counter that is incremented or decremented based on vehicle speed when the engine is off. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. The value that is added or subtracted to the counter every 100 msec is contained in table **P0071: OAT Performance Drive Equilibrium Engine Off** No Active DTCs:	>= 28,800.0 seconds >= 15.5 MPH < 15.0 deg C < 15.0 deg C >= 300.0 counts VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngineModeNotRunTimer Error	Executed every 100 msec until a pass or fail decision is made	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		engine, the engine off test will continue. If the vehicle has been moving quickly enough for a long enough period of time, the IAT and OAT values should have reached an equilibrium. This period of time is defined by the "OAT-to-IAT engine off equilibrium counter".	**Engine Running:**		Time between current ignition cycle and the last time the engine was running	>= 28,800.0 seconds	Executed every 100 msec until a pass or fail decision is made	
			If IAT >= OAT: IAT - OAT	> 15.0 deg C	Engine is running			
			If IAT < OAT: OAT - IAT	> 15.0 deg C	Vehicle Speed	>= 15.5 MPH		
			If either of the following conditions are met, this diagnostic will pass:		Engine airflow	>= 10.0 grams/second		
		The "OAT-to-IAT engine off equilibrium counter" is a counter that is incremented or decremented based on vehicle speed when the engine is off. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. While the "OAT-to-IAT engine off equilibrium counter" is counting, IAT and OAT are monitored for similarity. If they are similar, the OAT Performance Diagnostic passes. If the counter reaches an equilibrium and the IAT and OAT values are not similar, the OAT Performance Diagnostic will fail.	If IAT >= OAT: IAT - OAT	<= 15.0 deg C	OAT-to-IAT engine running equilibrium counter	>= 300.0 counts		
			If IAT < OAT: OAT - IAT	<= 15.0 deg C	The "OAT-to-IAT engine running equilibrium counter" is a counter that is incremented or decremented based on vehicle speed and engine air flow when the engine is running. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. The value that is added or subtracted to the counter every 100 msec is contained in table **P0071: OAT Performance Drive Equilibrium Engine Running**			
					No Active DTCs:	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngineModeNotRunTimer Error		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		If the engine off component of the diagnostic was enabled, but did not make a pass or fail decision, the engine running component will begin executing when the internal combustion engine starts to run. If the vehicle has been moving quickly enough for a long enough period of time, the IAT and OAT values should have reached an equilibrium. This period of time is defined by the "OAT-to-IAT engine running equilibrium counter". The "OAT-to-IAT engine running equilibrium counter" is a counter that is incremented or decremented based on vehicle speed when the engine is running. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. While the "OAT-to-IAT engine running equilibrium counter" is counting, IAT and OAT are monitored for						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		similarity. If they are similar, the OAT Performance Diagnostic passes. If the counter reaches an equilibrium and the IAT and OAT values are not similar, the OAT Performance Diagnostic will fail.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Outside Air Temperature (OAT) Sensor Circuit Low	P0072	Detects a continuous short to ground in the Outside Air Temperature (OAT) signal circuit by monitoring the OAT sensor output resistance and failing the diagnostic when the OAT resistance is too low. The OAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A lower resistance is equivalent to a higher temperature.	Raw OAT Input	<= 46 Ohms (-150 deg C)	None		40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Outside Air Temperature (OAT) Sensor Circuit High	P0073	Detects a continuous open circuit in the Outside Air Temperature (OAT) signal circuit by monitoring the OAT sensor output resistance and failing the diagnostic when the OAT resistance is too high. The OAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A higher resistance is equivalent to a lower temperature.	Raw OAT Input	>= 427,757 Ohms (~-60 deg C)	None		40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Outside Air Temperature (OAT) Sensor Intermittent In-Range	P0074	Detects a noisy or erratic signal in the OAT circuit by monitoring the OAT sensor and failing the diagnostic when the OAT signal has a noisier output than is expected. When the value of the OAT signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of OAT readings. The result of this summation is called a “string length”. Since the OAT signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic OAT signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current OAT reading - OAT reading from 100 milliseconds previous)	> 100 deg C 10 consecutive OAT readings	None		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module SIDI High Pressure Pump min/ max authority	P0089	This DTC determines when the high pressure pump control has reached to its max or min authority	High Pressure Fuel Pump Delivery Angle OR High Pressure Fuel Pump Delivery Angle	>= 124° <= 0°	High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Barometric Pressure Inlet Air Temp Fuel Temp Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP orTFTKO)and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In	True >=11 Volts > 0.275 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking >= 70.0 KPA >= -40.0 degC -40 <= Temp degC <= 132	Windup High/ Low 10.00 seconds failures out of 12.50 Seconds samples	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
High Pressure Pump Control Solenoid Enable Low Side Open Circuit	P0090	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground	Engine Speed Battery Voltage	>= 50 RPM >=11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
High Pressure Pump Control Solenoid Enable Low Side Short to Ground	P0091	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 0.1 Amps between signal and controller ground	Engine Speed Battery Voltage	>=50 RPM >=11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
High Pressure Pump Cntrl Solenoid Enable Low Side Short to Power	P0092	Controller specific output driver circuit diagnoses diagnoses High Pressure pump Control Solenoid low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 <= 1.1 or 15 Amps selectable thershold based on High pressure Pump .	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor 2 Circuit Performance (applications with humidity sensor, but no manifold temperature sensor)	P0096	Detects an Intake Air Temperature 2 (IAT2) sensor value that is stuck in range by comparing the IAT2 sensor value against the IAT and coolant temperature sensor values and failing the diagnostic if the IAT2 value is more different than the IAT and coolant temperature values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled. The diagnostic will fail if the IAT and coolant temperature values are similar, and the IAT2 value is not similar to the IAT and coolant temperature values. This diagnostic is executed once per ignition cycle if the enable conditions are met.	ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up E C T - Power Up IAT2) >= ABS(Power Up ECT - Power Up IAT)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor Circuit 2 Low (applications with LIN MAF)	P0097	Detects an erroneously low value being reported over the LIN serial connection from the Intake Air Temperature 2 (IAT2) sensor. The diagnostic monitors the IAT2 sensor output temperature and fails the diagnostic when the IAT2 temperature is too low. The IAT2 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	IAT 2 Temperature	< -60 degrees C	Powertrain Relay Voltage for a time LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor Circuit 2 High (applications with LIN MAF)	P0098	Detects an erroneously high value being reported over the LIN serial connection from the Intake Air Temperature 2 (IAT2) sensor. The diagnostic monitors the IAT2 sensor output temperature and fails the diagnostic when the IAT2 temperature is too high. The IAT2 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	IAT 2 Temperature	> 150 degrees C	Powertrain Relay Voltage for a time LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor 2 Intermittent In-Range (applications with humidity)	P0099	Detects a noisy or erratic signal in the Intake Air Temperature 2 (IAT2) circuit by monitoring the IAT2 sensor and failing the diagnostic when the IAT2 signal has a noisier output than is expected. When the value of the IAT2 signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of IAT2 readings. The result of this summation is called a “string length”. Since the IAT2 signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT2 signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT 2 reading - IAT 2 reading from 100 milliseconds previous)	> 100.00 deg C 10 consecutive IAT 2 readings	Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
High Pressure Start Diagnostic	P00C6	The DTC Diagnoses the high side fuel pressure during engine cranking.	The ECM detects that the fuel pressure is not rising or has fallen beyond acceptable limits during engine cranking Pressure Rise Test: Sensed High Pressure Fuel Rail Pressure value Pressure Fall Test: Sensed High Pressure Fuel Rail Pressure value	< **P00C6 - Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery** (see Supporting Table) <= **P00C6 - Minimum acceptable value of fuel rail pressure after High Pressure Start** (see Supporting Table)	High Pressure Rise Diagnostic During Start High Pressure Fall Diagnostic During Start Low side feed fuel pressure Engine Run Time Run/Crank Voltage Engine Coolant For each engine start, only 1 diagnostic is performed. The pressure rise test will run if High side fuel pressure is less than KtFHPC_p_HighPressStart, otherwise, the pressure fall diagnostic will run The pressure fall runs when the engine is cranking.	Enabled Disabled >= 0 KPA < = 0 sec > 8 Volts -100 <= °C <= 132 All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP orTFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT, IAT2 and ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control	Pressure Rise Test: Crank Time >= **P00C6 - High Pressure Pump Control Mode timeout** (see Supporting Table) 6.25 ms per sample Pressure Fall Test: Injected cylinder events >= **P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start** (see Supporting Table) 8 samples per engine rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Barometric Pressure Inlet Air Temp	commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active >= 70.0 KPA >= -40.0 DegC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Pressure Measurement System - Multiple Sensor Correlation (naturally aspirated with TIAPZ Baro sensor)	P00C7	Detects an inconsistency between pressure sensors in the induction system in which a particular sensor cannot be identified as the failed sensor. If the engine has been off for a sufficient amount of time, the pressure values in the induction system will have equalized. The Manifold Pressure (MAP) and Barometric Pressure (BARO) sensors values are checked to see if they are within the normal expected atmospheric pressure range. If they are, then MAP and BARO are compared to see if their values are similar. If the MAP and BARO values are not similar, there are no other pressure sensors to compare against to identify which sensor is not rational. The Multiple Pressure Sensor Correlation Diagnostic will fail in this case.	ABS(Manifold Pressure - Baro Pressure)	> 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating Manifold Pressure Manifold Pressure Baro Pressure Baro Pressure If application has a LIN MAF: LIN Communications established with MAF No Active DTCs: No Pending DTCs:	> 5.0 seconds >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa EngineModeNotRunTimer Error MAP_SensorFA AAP_SnsrFA AAP_LIN1_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP_LIN1_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec for applications without LIN MAF 1 sample every 25 msec for applications with LIN MAF	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Press Regulator Solenoid Supply Voltage Control High Side Circuit Short to ground	P00C9	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 <= 1.1 or 15 Amps selectable thershold based on High pressure Pump.	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Press Regulator Solenoid Supply Voltage Control High Side Circuit Short to power	POOCA	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 0.1 Amps between signal and controller power	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Humidity Sensor Circuit Low (applications with LIN MAF)	P00F4	Detects an eroneously low value being reported over the LIN serial connection from the humidity sensor. The diagnostic monitors the humidity sensor relative humidity output and fails the diagnostic when the humidity percentage is too low. The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity percentage value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	Relative Humidity	<= -6.25 %	Powertrain Relay Voltage for a time LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Humidity Sensor Circuit High (applications with LIN MAF)	P00F5	Detects an eroneously high value being reported over the LIN serial connection from the humidity sensor. The diagnostic monitors the humidity sensor relative humidity output and fails the diagnostic when the humidity percentage is too high. The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity percentage value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	Relative Humidity	>= 106.25 %	Powertrain Relay Voltage for a time LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Humidity Sensor Circuit Intermittent	P00F6	Detects a noisy or erratic signal in the humidity circuit by monitoring the humidity sensor and failing the diagnostic when the humidity signal has a noisier output than is expected. When the value of relative humidity in % is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of humidity readings. The result of this summation is called a “string length”. Since the humidity signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic humidity signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current Humidity reading - Humidity reading from 100 milliseconds previous)	> 80 % 10 consecutive Humidity readings	Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Mass Air Flow System Performance (naturally aspirated)	P0101	Detects a performance failure in the Mass Air Flow (MAF) sensor, such as when a MAF value is stuck in range. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Manifold Pressure (MAP) sensor and Throttle Position sensor (TPS). These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the MAF sensor. In this case, the MAF Performance diagnostic will fail.	Filtered Throttle Model Error AND ABS(Measured Flow-Modeled Air Flow) Filtered AND ABS(Measured MAP - MAP Model 2) Filtered	<= 300 kPa*(g/s) >25.0 grams/sec > 22.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 4,230 RPM >= -9 Deg C = TRUE) <= 130 Deg C = FALSE) >= -20 Deg C <= 129 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** Modeled Air Flow Error multiplied by **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM** and **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est**	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM**		
					No Active DTCs:	MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA		
					No Pending DTCs:	EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Mass Air Flow Sensor Circuit Low Frequency (Continental MAF)	P0102	Detects a continuous short to ground in the MAF sensor circuit or a MAF sensor that is outputting a frequency that is too low. The diagnostic monitors the MAF sensor frequency output and fails the diagnostic when the MAF frequency is too low. A low MAF frequency is associated with a high engine air flow. The MAF sensor monitors the temperature of a circuit in the airflow of the engine. The temperature of this circuit is related to the mass airflow across the sensor. The mass airflow value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a mass air flow value in grams/second through a transfer function.	MAF Output	<= 850 Hertz (>= 393.7 gm/sec)	Engine Run Time Engine Speed Powertrain Relay Voltage Above criteria present for a period of time	> 0.0 seconds >= 300 RPM >=9.1 Volts >= 0.5 seconds	400 failures out of 500 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Mass Air Flow Sensor Circuit High Frequency (Continental MAF)	P0103	Detects a MAF sensor that is outputting a frequency signal that is too high. The diagnostic monitors the MAF sensor frequency output and fails the diagnostic when the MAF frequency is too high. A high MAF frequency is associated with a low engine air flow. The MAF sensor monitors the temperature of a circuit in the airflow of the engine. The temperature of this circuit is related to the mass air flow across the sensor. The mass airflow value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a mass air flow value in grams/second through a transfer function.	MAF Output	>= 14,500 Hertz (<= 0.00 gm/sec)	Engine Run Time Engine Speed Powertrain Relay Voltage Above criteria present for a period of time	> 0.0 seconds >= 300 RPM >=9.1 Volts >= 0.5 seconds	400 failures out of 500 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Manifold Absolute Pressure Sensor Performance (naturally aspirated)	P0106	Detects a performance failure in the Manifold Pressure (MAP) sensor, such as when a MAP value is stuck in range. If the engine has been off for a sufficient amount of time, the pressure values in the induction system will have equalized. The MAP sensor value is checked to see if it is within the normal expected atmospheric pressure range. If it is not, then the MAP performance diagnostic will fail. The engine running portion of this diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Mass Air Flow (MAF) sensor and Throttle Position sensor (TPS). These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model	**Engine Running:** Filtered Throttle Model Error AND ABS(Measured MAP - MAP Model 1) Filtered AND ABS(Measured MAP - MAP Model 2) Filtered	<= 300 kPa*(g/s) > 22.0 kPa > 22.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. No Active DTCs:	>= 400 RPM <= 4,230 RPM >= -9 Deg C = TRUE) <= 130 Deg C = FALSE) >= -20 Deg C <= 129 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAPI Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP_SensorCircuitFA	Continuous Calculations are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Regulred	MIL Ilium.
		passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the MAP sensor. In this case, the MAP Performance diagnostic will fail.			No Pending DTCs:	EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		
			Engine Not Rotating: Manifold Pressure OR Manifold Pressure	 < 50.0 kPa > 115.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating If application has a LIN MAF: LIN Communications established with MAF No Active DTCs: No Pending DTCs:	> 5.0 seconds EngineModeNotRunTimerError MAP_SensorCircuitFA AAP_SnsrCktFA AAP_LIN1_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP_LIN1_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec for applications without LIN MAF 1 sample every 25 msec for applications with LIN MAF	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Manifold Absolute Pressure Sensor Circuit Low	P0107	Detects a continuous short to ground in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too low. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	< 3.0 % of 5 Volt Range (This is equal to 6.1 kPa)	None		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Manifold Absolute Pressure Sensor Circuit High	P0108	Detects a continuous short to power or open circuit in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too high. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	> 90.0 % of 5 Volt Range (This is equal to 115.1 kPa)	None		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor Circuit Performance (applications with humidity sensor, but no manifold temperature sensor)	P0111	Detects an Intake Air Temperature (IAT) sensor value that is stuck in range by comparing the IAT sensor value against the IAT2 and coolant temperature sensor values and failing the diagnostic if the IAT value is more different than the IAT2 and coolant temperature values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled. The diagnostic will fail if the IAT2 and coolant temperature values are similar, and the IAT value is not similar to the IAT2 and coolant temperature values. This diagnostic is executed once per ignition cycle if the enable conditions are met.	ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up E C T - Power Up IAT) > ABS(Power Up ECT - Power Up IAT2)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor Circuit Low (applications with LIN MAF)	P0112	Detects an erroneously low value being reported over the LIN serial connection from the Intake Air Temperature (IAT) sensor. The diagnostic monitors the IAT sensor output temperature and fails the diagnostic when the IAT temperature is too low. The IAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	IAT Temperature	< -60 degrees C	LIN Communications established with MAF		40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor Circuit High (applications with LIN MAF)	P0113	Detects an erroneously high value being reported over the LIN serial connection from the Intake Air Temperature (IAT) sensor. The diagnostic monitors the IAT sensor output temperature and fails the diagnostic when the IAT temperature is too high. The IAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	IAT Temperature	> 150 degrees C	LIN Communications established with MAF		40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor Intermittent In-Range	P0114	Detects a noisy or erratic signal in the Intake Air Temperature (IAT) circuit by monitoring the IAT sensor and failing the diagnostic when the IAT signal has a noisier output than is expected. When the value of the IAT signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of IAT readings. The result of this summation is called a “string length”. Since the IAT signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous)	> 80.00 deg C 10 consecutive IAT readings	If application has a LIN MAF: LIN Communications established with MAF		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature (ECT) Sensor Performance	P0116	This DTC detects an ECT (Engine Coolant temperature) sensor that is biased high or stuck above the thermostat monitoring diagnostic. This check is performed after a soak condition.	A failure will be reported if any of the following occur: 1) ECT at power up > IAT at power up by an IAT based table lookup value after a minimum 28,800 second soak (fast fail). 2) ECT at power up > IAT at power up by 19.3 °C after a minimum 28,800 second soak and a block heater has not been detected. 3) ECT at power up > IAT at power up by 19.3 C after a minimum 28,800 seconds soak and the time spent cranking the engine without starting is greater than 10.0 seconds with the LowFuelConditionDiag	See **P0116_Fail if power up ECT exceeds IAT by these values** in the Supporting tables section = False	No Active DTC's Non-volatile memory initization Test complete this trip Test aborted this trip IAT is IAT LowFuelCondition Diag	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunning Valid = Not occurred = False = False = Availible >-9 °C = False	1 failure 500 msec/ sample Once per valid cold start	Type B, 2 Trips
					Block Heater detection is enabled when either of the following occurs: 1) ECT at power up > IAT at power up by 2) Cranking time	>19.3 °C < 10.0 seconds		
					Block Heater is detected and diagnostic is aborted when 1) or 2) occurs: Ia) Vehicle drive time Ib) Vehicle speed Ic) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows: Id) IAT drops from power	>400 seconds with > 15MPH 0.00 times the seconds with vehicle speed below 1b		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					up IAT 2a) ECT drops from power up ECT 2b) Engine run time =================== Diagnostic is aborted when 3) or 4) occurs: 3) Engine run time with vehicle speed below 1b 4) Minimum IAT during test	>3.3 °C > 1 °C Within < 30 seconds ================== > 1800 seconds <-9 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temp Sensor Circuit Low	P0117	Circuit Continuity This DTC detects a short to ground in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150°C)	< 55 Ohms			5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temp Sensor Circuit High	P0118	Circuit Continuity This DTC detects a short to high or open in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C)	> 134,000 Ohms	Engine run time OR IAT min	> 10.0 seconds > -9.0 °C	5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	P0119	Circuit Erratic This DTC detects large step changes in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	ECT temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. The calculated high and low limits for the next reading use the following calibrations: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last ECT reading was 90 Deg C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 Deg C and the high limit was calibrated to 200 Deg C the calculated limits are 101 Deg C and 73 Deg C. The next reading (after the 90 Deg C reading) must be between 73 Deg C and 101 Deg C to be valid. ****************************	 7.4 seconds -60.0 Deg C 200.0 Deg C	No Active DTC's	ECT_Sensor_Ckt_FP	3 failures out of 4 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Throttle Position Sensor Performance (naturally aspirated)	P0121	Detects a performance failure in the Throttle Position sensor (TPS) sensor, such as when a TPS value is stuck in range. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Manifold Pressure (MAP) sensor and Mass Air Flow (MAF) sensor. These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the TPS sensor. In this case, the TPS Performance diagnostic will fail.	Filtered Throttle Model Error AND ABS(Measured MAP - MAP Model 2) Filtered	> 300 kPa*(g/s) <= 22.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. No Active DTCs:	>= 400 RPM <= 4,230 RPM >= -9 Deg C = TRUE) <= 130 Deg C = FALSE) >= -20 Deg C <= 129 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					No Pending DTCs:	EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
TPS1 Circuit Low	P0122	Detects a continuous or intermittent short low or open in TPS1 circuit by monitoring the TPS 1 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too low. This diagnostic only runs when battery voltage is high enough.	TPS1 % Vref<	0.3250 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	>6.41 Volts P06A3	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
TPS1 Circuit High	P0123	Detects a continuous or intermittent short high inTPSI circuit by monitoring the TPS 1 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too high. This diagnostic only runs when battery voltage is high enough.	TPS1 % Vref>	4.750 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	>6.41 Volts P06A3	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Below Stat Regulating Temperature	P0128	This DTC detects if the ECT (EngineCoolant temperature) does not achieve the required target temperature after an allowed energy accumulation by the engine. This can be caused by an ECT sensor biased low or a cooling system that is not warming up correctly because of a stuck open thermostat or other fault.	Energy is accumulated after the first conbustion event using Range #1 or #2 below: Thermostat type is divided into normal (non-heated) and electrically heated. For this application the "type" cal (KeTHMG_b_TMS_ElecThstEquipped) = 0 If the type cal is equal to one, the application has an electrically heated t-stat, if equal to zero the the application has an non heated t-stat. See appropiate section below. **************************** Type cal above = 1 (Electrically heated t-stat) == == == == Range #1 (Primary) ECT reaches Commanded temperature minus 11 °C when Ambient min is < 52 °C and >10 °C. Note: Warm up target for range #1 will be at least 75 °C == == == == Range #2 (Alternate) ECT reaches Commanded temperature minus 11 °C when Ambient min is < 10 °C and >-9 °C. Note: Warm up target for range #2 will be at least	See the two tables named: **P0128_Maximum Accumulated Energy for Start-up ECT conditions - Primary** and **P0128_Maximum Accumulated Energy for Start-up ECT conditions - Alternate** in the Supporting tables section. This diagnostic models the net energy into and out of the cooling	No Active DTC's Engine not run time (soaking time before current trip) Engine run time Fuel Condition Distance traveled *************************** If Engine RPM is continuously greater than for this time period The diagnostic test for this key cycle will abort *************************** *************************** If T-Stat Heater commanded duty cycle for this time period	ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA VehicleSpeedSensor_FA OAT_PtEstFiltFA IAT_SensorCircuitFA MAF_SensorFA THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA THMR_SWP_NoFlow_FA THMR_SWP_FlowStuckOn_FA EngineTorqueEstInaccurate >1,800 seconds 30 < Eng Run Tme < 1,470 seconds Ethanol < 87 % > 0.50 miles *************************** 8,200 rpm 5.0 seconds *************************** *************************** > 20.0 % duty cycle > 5.0 seconds	1 failure to set DTC 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			55 °C ***************************** Type cal above = 0 (non - heated t-stat) == == == == Range #1 (Primary) ECT reaches 75 °C when Ambient min is < 52 °C and >10 °C. == == == == Range #2 (Alternate) ECT reaches 55 °C when Ambient min is < 10 °C and >-9°C. *****************************	system during the warm-up process. The five energy terms are: heat from combustion (with AFM correction), heat from after-run, heat loss to enviroment, heat loss to cabin and heat loss to DFCO.	The diagnostic test for this key cycle will abort *************************** ECT at start run	*************************** -60 < ECT < 56 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit Low Voltage Bank 1 Sensor 1	P0131	This DTC determines if the 02 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is below the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	<40.0 mVolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	285 failures out of 350 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips
					AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control	= Not active = Not active = Not active = Not active 10.0 < Volts = Not active = Not active = Not active = Not active		
					Low Fuel Condition Only when FuelLevelDataFault	= False = False		
					Commanded Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active	0.9922 < ratio < 1.0137 150< mgram <700 = Closed Loop = TRUE (Please see **"Closed Loop Enable Clarification"** in Supporting Tables).		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					All Fuel Injectors for active Cylinders Fuel Condition Ethanol Estimation in Progress Fuel State All of the above met for	Enabled (On) Ethanol < 87 % = Not Active (Please see **"Ethanol Estimation in Progress"** in Supporting Tables). DFCO not active > 5.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit High Voltage Bank 1 Sensor 1	P0132	This DTC determines if the 02 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is above the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	> 1,050 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Low Fuel Condition Diag Only when FuelLevelDataFault ********************** Secondary delay after above conditions are complete (cold start condition) Secondary delay after above conditions are complete (not cold start condition) Commanded Equivalence Ratio ********************** All of the above met for	TPS_ThrottleAuthorityDefaulted MAF_SensorFA MAP_SensorFA EvapExcessPurgePsbl_FA FuelInjectorCircuit_FA Ethanol Composition Sensor FA AIR System FA 10.0 < Volts = All Cylinders active = Complete > 5.0 seconds > 30.0 seconds = False = False ********************** > 235.0 seconds when engine soak time > 28,800 seconds > 235.0 seconds when engine soak time < 28,800 seconds < 1.014 EQR ********************** > 2.0 seconds	100 failures out of 125 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the 02 sensor heater is functioning properly by monitoring the current through the heater circuit. This test compares the measured heater current (monitored thru the low side driver) and compares it to the expected values (over the voltage range provided) for the released sensor. The diagnostic failure counter is incremented if the heater current is outside the expected range. This DTC is set based on the fail and sample counters.	Heater Current outside of the expected range of	0.3 < Amps < 3.1	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA >10.0 Volts = Complete = Not active > zero >120 seconds	/failures out of 9 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit Low Voltage Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0137	This DTC determines if the 02 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is below the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	< 50 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault Commanded Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts = Not active = Not active = Not active = Not active = False = False 0.992 < ratio <1.014 150< mgrams <700 = Closed Loop = TRUE (Please see **"Closed Loop Enable Clarification"** in Supporting Tables).	320 failures out of 400 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					All Fuel Injectors for active Cylinders Fuel Condition Ethanol Estimation in Progress Fuel State All of the above met for	Enabled (On) Ethanol < 87 % = Not Active (Please see **"Ethanol Estimation in Progress"** in Supporting Tables). DFCO not active >5.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit High Voltage Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0138	This DTC determines if the 02 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is above the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	> 1,050 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Low Fuel Condition Only when FuelLevelDataFault ********************** Secondary delay after above conditions are complete (cold start condition) Secondary delay after above conditions are complete (not cold start condition) Commanded Equivalence Ratio ********************** All of the above met for	TPS_ThrottleAuthorityDefaulted MAF_SensorFA MAP_SensorFA EvapExcessPurgePsbl_FA FuelInjectorCircuit_FA Ethanol Composition Sensor FA AIR System FA 10.0 < Volts = All Cylinders active = Complete > 5.0 seconds > 30.0 seconds = False = False ********************** > 235.0 seconds when engine soak time > 28,800 seconds > 235.0 seconds when engine soak time < 28,800 seconds < 1.014 EQR ********************** > 2.0 seconds	100 failures out of 125 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	P013A	The P013A diagnostic is the third in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor has an slow response to an A/F change from Rich to Lean and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. Note: The Primary method is used when the secondary 02 sensor signal transitions from above the upper threshold to below the lower threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P013A diagnostic measures the secondary 02 sensor voltage response rate	Primary Method: The EWMA of the Post 02 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient. OR Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units < 7.0 units > 75.0 grams (upper voltage threshold is 500 mvolts and lower voltage threshold is 200 mvolts)	No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013B, P013E, P013F, P2270 or P2271 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		between an upper and lower voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized intregral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTCP013Ais set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. Secondary method:			Low Fuel Condition Only when FuelLevelDataFault Post fuel cell Crankshaft Torque DTC's Passed =================== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	= False = False = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. < 125.0 Nm P2270 (and P2272 if applicable) P013E (and P014Aif applicable) ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		This fault is set if the secondary 02 sensor does not achieve the required lower voltage threshold before the accumulated mass air flow threshold is reached.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Slow Response Lean to Rich Bank 1 Sensor 2	P013B	The P013B diagnostic is the sixth in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor has an slow response to an A/F change from Lean to Rich and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. Note: The Primary method is used when the secondary 02 sensor signal transitions from below the lower threshold to above the upper threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P013B diagnostic measures the secondary 02 sensor voltage response rate	Primary Method: The EWMA of the Post 02 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient. OR Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units < 7.0 units > 250 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 600 mvolts)	No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013A, P013E, P013F, P2270 or P2271 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		between an lower and upper voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized intregral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTCP013Bis set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. Secondary method:				is above 22.0 grams/sec.		
					Green Cat System Condition	= Not Valid, Green Cat System condition is considered valid until accumulated airflow is greater than 720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 22.0 grams/ sec. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					DTC's Passed	P2270 P013E P013A P2271 P013F		
					After above conditions are met: Fuel Enrich mode continued.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		This fault is set if the secondary 02 sensor does not achieve the required upper voltage threshold before the accumulated mass air flow threshold is reached.			During this test the following must stay TRUE or the test will abort: 0.950 < Base Commanded EQR < 1.100 ================= During this test: Engine Airflow must stay below: and the delta Engine Airflow over 12.5 msec must be:	 ================== 150gps < 100.0 gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Slow Response Rich to Lean Bank 2 Sensor 2	P013C	The P013C diagnostic is the third in a sequence of six intrusive secondary 02 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary 02 sensor has an slow response to an A/F change from Rich to Lean and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. Note: The Primary method is used when the secondary 02 sensor signal transitions from above the upper threshold to below the lower threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P013C diagnostic measures the secondary 02 sensor voltage response rate	Primary Method: The EWMA of the Post 02 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient. OR Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units < 7.0 units >75.0 grams (upper voltage threshold is 500 mvolts and lower voltage threshold is 200 mvolts)	No Active DTCs B2S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013D, P014A, P014B, P2272 or P2273 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		between an upper and lower voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized intregral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTCP013Cis set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. Secondary method:			 Low Fuel Condition Only when FuelLevelDataFault Post fuel cell Crankshaft Torque DTC's Passed ================== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	is above 22.0 grams/sec. = False = False = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. <125.ONm P2272 P014A ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		This fault is set if the secondary 02 sensor does not achieve the required lower voltage threshold before the accumulated mass air flow threshold is reached.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Slow Response Lean to Rich Bank 2 Sensor 2	P013D	The P013D diagnostic is the sixth in a sequence of six intrusive secondary 02 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary 02 sensor has an slow response to an A/F change from Lean to Rich and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. Note: The Primary method is used when the secondary 02 sensor signal transitions from below the lower threshold to above the upper threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P013D diagnostic measures the secondary 02 sensor voltage response rate	Primary Method: The EWMA of the Post 02 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient. OR Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units < 7.0 units > 250 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 600 mvolts)	No Active DTCs B2S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013C, P014A, P014B, P2272 or P2273 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		between an lower and upper voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized intregral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTCP013Dis set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. Secondary method:			Green Cat System Condition Low Fuel Condition Only when FuelLevelDataFault Post fuel cell DTC's Passed	is above 22.0 grams/sec. = Not Valid, Green Cat System condition is considered valid until accumulated airflow is greater than 720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 22.0 grams/ sec. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service). = False = False = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. P2272 P014A P013C P2273 P014B		
					After above conditions are met: Fuel Enrich mode continued.			
					------------------	------------------		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		This fault is set if the secondary 02 sensor does not achieve the required upper voltage threshold before the accumulated mass air flow threshold is reached.			During this test the following must stay TRUE or the test will abort: 0.950 < Base Commanded EQR < 1.100 ================= During this test: Engine Airflow must stay below: and the delta Engine Airflow over 12.5 msec must be:	 ================== 150gps < 100.0 gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	The P013E diagnostic is the second in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor has an initial delayed response to an A/F change from Rich to Lean and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required voltage before the accumulated mass airflow threshold is reached.	Post 02 sensor voltage AND The Accumulated mass airflow monitored during the Delayed Response Test under DFCO DFCO begins after: 1) Catalyst has been rich for a minimum of AND 2) Catalyst Rich Accumulation Air Flow is	> 500 mvolts > 150 grams > 1 secs > 3.0 grams	No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTKO 02S_Bank_ 2_TFTKO P013A, P013B, P013F, P2270 or P2271 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					 Low Fuel Condition Only when FuelLevelDataFault Post fuel cell Crankshaft Torque DTC's Passed Number of fueled cylinders	is above 22.0 grams/sec. = False = False = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. <125.ONm P2270 < 7 cylinders		
					After above conditions are met: DFCO mode entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2	P013F	The P013F diagnostic is the fifth in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor has an initial delayed response to an A/F change from Lean to Rich and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required voltage before the accumulated mass airflow threshold is reached.	Post 02 sensor voltage AND The Accumulated mass airflow monitored during the Delayed Response Test	< 350 mvolts >500 grams	No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTK0 02S_Bank_ 2_TFTK0 P013A, P013B, P013E, P2270 or P2271 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						is above 22.0 grams/sec.		
					Green Cat System Condition	= Not Valid, Green Cat System condition is considered valid until accumulated airflow is greater than 720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 22.0 grams/ sec. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition Only when FuelLevelDataFault	= False = False		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					DTC's Passed	P2270 P013E P013A P2271		
					Number of fueled cylinders	> 1 cylinders		
					=================== After above conditions are met: Fuel Enrich mode entered.	==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					================= During this test the following must stay TRUE or the test will abort: 0.950 < Base Commanded EQR < 1.100	==================		
					================= During this test: Engine Airflow must stay below:	================== 150gps		
					and the delta Engine Airflow over 12.5msec must be :	< 100.0gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Performance Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0141	This DTC determines if the 02 sensor heater is functioning properly by monitoring the current through the heater circuit. This test compares the measured heater current (monitored thru the low side driver) and compares it to the expected values (over the voltage range provided) for the released sensor. The diagnostic failure counter is incremented if the heater current is outside the expected range. This DTC is set based on the fail and sample counters.	Heater Current outside of the expected range of	0.3 > amps > 2.9	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA >10.0 Volts = Complete = Not active > zero >120 seconds	/failures out of 9 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Rich to Lean Bank 2 Sensor 2	P014A	The POMA diagnostic is the second in a sequence of six intrusive secondary 02 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary 02 sensor has an initial delayed response to an A/F change from Rich to Lean and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required voltage before the accumulated mass airflow threshold is reached.	Post 02 sensor voltage AND The Accumulated mass airflow monitored during the Delayed Response Test under DFCO DFCO begins after: 1) Catalyst has been rich for a minimum of AND 2) Catalyst Rich Accumulation Air Flow is	> 500 mvolts > 150 grams > 1 secs > 3.0 grams	No Active DTCs B2S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTKO 02S_Bank_ 2_TFTKO P013C, P013D, P014B, P2272 or P2273 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						is above 22.0 grams/sec.		
					Low Fuel Condition Only when FuelLevelDataFault	= False = False		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					Crankshaft Torque	<125.ONm		
					DTC's Passed	P2272		
					Number of fueled cylinders	< 7 cylinders		
					After above conditions are met: DFCO mode entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Lean to Rich Bank 2 Sensor 2	P014B	The P014B diagnostic is the fifth in a sequence of six intrusive secondary 02 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary 02 sensor has an initial delayed response to an A/F change from Lean to Rich and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required voltage before the accumulated mass airflow threshold is reached.	Post 02 sensor AND The Accumulated mass airflow monitored during the Delayed Response Test	< 350mvolts > 500 grams.	No Active DTCs B2S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTK0 02S_Bank_ 2_TFTK0 P013C, P013D, P014A, P2272 or P2273 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						is above 22.0 grams/sec.		
					Green Cat System Condition	= Not Valid, Green Cat System condition is considered valid until accumulated airflow is greater than 720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 22.0 grams/ sec. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition Only when FuelLevelDataFault	= False = False		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					DTC's Passed	P2272 P014A P013C P2273		
					Number of fueled cylinders	> 1 cylinders		
					After above conditions are met: Fuel Enrich mode entered.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					================= During this test the following must stay TRUE or the test will abort: 0.950 < Base Commanded EQR < 1.100 ================= During this test: Engine Airflow must stay below: and the delta Engine Airflow over 12.5msec must be :	================== ================== 150gps < 100.0gps		

Component/ System	**Fault Code**	**Monitor Strategy Description**	**Malfunction Criteria**	**Threshold Value**	**Secondary Parameters**	**Enable Conditions**	**Time Required**	**MIL Ilium.**
O2S Circuit Low Voltage Bank 2 Sensor 1	P0151	This DTC determines if the 02 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is below the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	< 40 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault Commanded Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts = Not active = Not active = Not active = Not active = False = False 0.992 < ratio < 1.014 150 < APC < 700 mgrams = Closed Loop = TRUE (Please see **"Closed Loop Enable**	285 failures out of 350 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						Clarification" in Supporting Tables).		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	< 87 % Ethanol		
					Ethanol Estimation in Progress	= Not Active (Please see **"Ethanol Estimation in Progress"** in Supporting Tables).		
					Fuel State	DFCO not active		
					All of the above met for	> 5.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit High Voltage Bank 2 Sensor 1	P0152	This DTC determines if the 02 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is above the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	> 1,050 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Low Fuel Condition Only when FuelLevelDataFault *********************** Secondary delay after above conditions are complete (cold start condition) Secondary delay after above conditions are complete (not cold start condition) Commanded Equivalence Ratio *********************** All of the above met for	TPS_ThrottleAuthorityDefaulted MAF_SensorFA MAP_SensorFA EvapExcessPurgePsbl_FA FuelInjectorCircuit_FA Ethanol Composition Sensor FA AIR System FA 10.0 < Volts = All Cylinders active = Complete > 5.0 seconds > 30.0 seconds = False = False *********************** > 280.0 seconds when engine soak time > 28,800 seconds > 280.0 seconds when engine soak time < 28,800 seconds < 1.014 EQR *********************** > 2 seconds	100 failures out of 125 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Performance Bank 2 Sensor 1	P0155	This DTC determines if the 02 sensor heater is functioning properly by monitoring the current through the heater circuit. This test compares the measured heater current (monitored thru the low side driver) and compares it to the expected values (over the voltage range provided) for the released sensor. The diagnostic failure counter is incremented if the heater current is outside the expected range. This DTC is set based on the fail and sample counters.	Heater Current outside of the expected range of	0.3> amps > 3.1	No Active DTC's System Voltage Heater Warm-up delay 02S Heater device control B1S1 02S Heater Duty Cycle All of the above met for	ECT_Sensor_FA >10.0 Volts = Complete = Not active > zero > 120 seconds	/failures out of 9 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit Low Voltage Bank 2 Sensor 2	P0157	This DTC determines if the 02 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is below the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	< 50 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault Commanded Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts = Not active = Not active = Not active = Not active = False = False 0.992 < ratio < 1.014 150< mgrams < 700 = Closed Loop = TRUE (Please see **"Closed Loop Enable Clarification"** in Supporting Tables).	320 failures out of 400 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					All Fuel Injectors for active Cylinders Fuel Condition Ethanol Estimation in Progress Fuel State All of the above met for	Enabled (On) < 87% Ethanol = Not Active (Please see **“Ethanol Estimation in Progress”** in Supporting Tables). DFCO not active > 5.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit High Voltage Bank 2 Sensor 2	P0158	This DTC determines if the 02 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is above the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	> 1,050 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Low Fuel Condition Only when FuelLevelDataFault *********************** Secondary delay after above conditions are complete (cold start condition) Secondary delay after above conditions are complete (not cold start condition) Commanded Equivalence Ratio *********************** All of the above met for	TPS_ThrottleAuthorityDefaulted MAF_SensorFA MAP_SensorFA EvapExcessPurgePsbl_FA FuelInjectorCircuit_FA Ethanol Composition Sensor FA AIR System FA 10.0 < Volts = All Cylinders active = Complete > 5.0 seconds > 30.0 seconds = False = False *********************** > 280.0 seconds when engine soak time > 28,800 seconds > 280.0 seconds when engine soak time < 28,800 seconds < 1.014 EQR *********************** > 2 seconds	100 failures out of 125 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Rich to Lean Bank 1 Sensor 1) (For use with WRAF	P015A	DTC P015A detects that the primary WRAF oxygen sensor for Bank 1 has delayed response when the air fuel ratio transitions from rich to lean condition. This diagnostic runs simultaneously with the intrusive secondary 02 monitor rich to lean tests (P013E / P013A/ P2271), which commands fuel cut off. Note: The Primary method is used when the primary WRAF 02 sensor signal transitions from above to below the 02 measured EQR threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P015A diagnostic measures the primary WRAF 02 sensor response time between a rich condition above a starting measured EQR threshold and a lower measured EQR threshold. The response time is then scaled and normalized to mass airflow rate, engine speed, Baro,	Primary method: The EWMA of the Pre 02 sensor normalized R2L time delay value. The EWMA repass limit is The EWMA calculation uses a 0.20 coefficient. This method calculates the result when the WRAF 02 sensor measured EQR is OR Secondary Method: The Accumulated time monitored during the R2L Delayed Response Test. AND Pre WRAF 02 sensor measured EQR is	> 0.68 EWMA (sec) < 0.60 EWMA (sec) < 0.900 EQR > 3.2 Seconds > 0.500 EQR	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA WRAF_Bank_1_FA P0131, P0132, P013A, P013B, P013E, P013F, P2270, P2271 >10.0 Volts = Not active = Not active = Not active = Not active = False = False = Not Valid,	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		and intake air temperature resulting in a normalized delay value. The normalized delay is fed into a 1st order lag filter to update the final EWMA result. DTC P015A is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. <u>Secondary method:</u> This fault is set if the primary WRAF 02 sensor does not achieve the required lower measured EQR			 02 Heater (pre sensor) on for Engine Coolant (Or OBD Coolant Enable Criteria IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) Closed loop integral Closed Loop Active	Green 02S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. > 30 seconds > 50 °C = TRUE) > -40 °C > 30 seconds 800 < RPM < 3,000 750 < RPM < 3,200 4.0 < gps < 35.0 31.1 < MPH < 82.0 27.3 < MPH < 87.0 0.75 < C/LInt < 1.12 = TRUE (Please see **"Closed Loop Enable Clarification"** in SuoDortina Tables).		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		threshold before a delay time threshold is reached.			Evap Ethanol Estimation in Progress Baro Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State	not in control of purge = Not Active (Please see **“Ethanol Estimation in Progress”** in Supporting Tables). > 70kpa = enabled = not active = not active > 60.0 sec 475 < °C < 1,000 = DFCO possible		
					All of the above met for at least 0.5 seconds, and then the Force Cat Rich intrusive stage is requested.			
					Pre O2S EQRB1S1 at end of Cat Rich stage Fuel State Number of fueled cylinders	 > 1.085 EQR = DFCO active < 7 cylinders		
					After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1) (For use w/o WRAF	P015B	DTC P015B detects that the primary oxygen sensor for Bank 1 has delayed response when the air fuel ratio transitions from lean to rich condition. This diagnostic runs simultaneously with the intrusive secondary 02 monitor lean to rich tests (P013F / P013B), which commands fuel enrichment. Note: The Primary method is used when the primary 02 sensor signal transitions from lean condition to above the 02 voltage threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P015B diagnostic measures the primary 02 sensor response time between a lean condition and a higher voltage threshold. The response time is then scaled and normalized to mass airflow rate, engine speed, Baro, and intake air temperature resulting in a normalized delay value. The normalized delay is fed into a 1st	Primary method: The EWMA of the Pre 02 sensor normalized L2R time delay value. The EWMA repass limit is The EWMA calculation uses a 0.20 coefficient. OR Secondary method: The Accumulated time monitored during the L2R Delayed Response Test. AND Pre 02 sensor voltage is OR At end of Cat Rich stage the Pre 02 sensor output is	> 0.68 EWMA (sec) < 0.60 EWMA (sec) > 2.5 Seconds < 450mvolts < 750mvolts	No Active DTC's P015Atest is complete and System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P013A, P013B, P013E, P013F, P015A, P2270, P2271 = Passed >10.0 Volts = Not active = Not active = Not active = Not active = False = False	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		order lag filter to update the final EWMA result. DTC P015B is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. <u>Secondary method:</u> This fault is set if the primary 02 sensor does not achieve the required higher voltage threshold before a delay time threshold is reached.			Green 02S Condition 02 Heater (pre sensor) on for Learned Htr resistance Engine Coolant (Or OBD Coolant Enable Criteria IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after	= Not Valid, Green 02S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. > 30 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 50 °C = TRUE) > -40 °C > 30 seconds 800 < RPM < 3,000 750 < RPM < 3,200 4.0 < gps < 35.0 31.1 < MPH < 82.0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					initially enabled) Closed loop integral Closed Loop Active Evap Ethanol Estimation in Progress Baro Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State Number of fueled cylinders	27.3 < MPH < 87.0 0.75 < C/L Int < 1.12 = TRUE (Please see **"Closed Loop Enable Clarification"** in Supporting Tables). not in control of purge = Not Active (Please see **"Ethanol Estimation in Progress"** in Supporting Tables). > 70kpa = enabled = not active = not active > 60.0 sec 475 < °C < 1,000 = DFCO inhibit > 1 cylinders		
					When above conditions are met: Fuel Enrich mode is entered.			
					———————————— During this test: Engine Airflow must stay between: and the delta Engine Airflow over 12.5msec	———————————— 4 < gps < 20		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					must be :	< 50.0 gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Rich to Lean Bank 2 Sensor 1) (For use w/o WRAF	P015C	DTC P015C detects that the primary oxygen sensor for Bank 2 has delayed response when the air fuel ratio transitions from rich to lean condition. This diagnostic runs simultaneously with the intrusive secondary 02 monitor rich to lean tests (P014AZ P013C / P2273), which commands fuel cut off. Note: The Primary method is used when the primary 02 sensor signal transitions from above to below the 02 voltage threshold, otherwise the Secondary method is used. Primary method: The P015C diagnostic measures the primary 02 sensor response time between a rich condition above a starting voltage threshold and a lower voltage threshold. The response time is then scaled and normalized to mass airflow rate, engine speed, Baro, and intake air temperature resulting in a normalized delay	Primary method: The EWMA of the Pre 02 sensor normalized R2L time delay value. The EWMA repass limit is The EWMA calculation uses a 0.20 coefficient. This method calculates the result when the Pre 02 sensor voltage is OR Secondary method: The Accumulated time monitored during the R2L Delayed Response Test. AND Pre 02 sensor voltage is above	> 0.68 EWMA (sec) < 0.60 EWMA (sec) < 450mvolts > 3.2 Seconds > WOmvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0151, P0152, P013C, P013D, POMA, P014B, P2272, P2273 >10.0 Volts = Not active = Not active = Not active = Not active = False = False = Not Valid, Green O2S condition is	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		value. The normalized delay is fed into a 1st order lag filter to update the final EWMA result. DTC P015C is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. <u>Secondary method:</u> This fault is set if the primary 02 sensor does not achieve the required lower voltage threshold before a delay time threshold is reached.			 02 Heater (pre sensor) on for Learned Htr resistance Engine Coolant (Or OBD Coolant Enable Criteria IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled)	considered valid until the accumulated airflow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. > 30 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 50 °C = TRUE) > -40 °C > 30 seconds 800 < RPM < 3,000 750 < RPM < 3,200 4.0 < gps < 35.0 31.1 < MPH < 82.0 27.3 < MPH < 87.0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Closed loop integral	0.75 < C/L Int < 1.12		
					Closed Loop Active	= TRUE (Please see **“Closed Loop Enable Clarification”** in Supporting Tables).		
					Evap	not in control of purge		
					Ethanol Estimation in Progress	= Not Active (Please see **“Ethanol Estimation in Progress”** in Supporting Tables).		
					Baro	> 70kpa		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	> 60.0 sec		
					Predicted Catalyst temp	475 < °C < 1,000		
					Fuel State	= DFCO possible		
					All of the above met for at least 0.5 seconds, and then the Force Cat Rich intrusive stage is requested.			
					Pre O2S voltage B1S1 at end of Cat Rich stage	> 750mvolts		
					Fuel State	= DFCO active		
					Number of fueled cylinders	<= 7 cylinders		
					After above conditions are			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					met: DFCO Mode is entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Lean to Rich Bank 2 Sensor 1) (For use w/o WRAF	P015D	DTC P015D detects that the primary oxygen sensor for Bank 2 has delayed response when the air fuel ratio transitions from lean to rich condition. This diagnostic runs simultaneously with the intrusive secondary 02 monitor lean to rich tests (P014B / P013D), which commands fuel enrichment. Note: The Primary method is used when the primary 02 sensor signal transitions from lean condition to above the 02 voltage threshold, otherwise the Secondary method is used. Primary method: The P015D diagnostic measures the primary 02 sensor response time between a lean condition and a higher voltage threshold. The response time is then scaled and normalized to mass airflow rate, engine speed, Baro, and intake air temperature resulting in a normalized delay value. The normalized delay is fed into a 1st	Primary method: The EWMA of the Pre 02 sensor normalized L2R time delay value. The EWMA repass limit is The EWMA calculation uses a 0.20 coefficient. OR Secondary method: The Accumulated time monitored during the L2R Delayed Response Test. AND Pre 02 sensor voltage is below OR At end of Cat Rich stage the Pre 02 sensor output is	> 0.68 EWMA (sec) < 0.60 EWMA (sec) > 2.5 Seconds < 450 mvolts <750 mvolts	No Active DTC's P015C test is complete and System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0151, P0152, P013C, P013D, POMA, P014B, P015C, P2272, P2273 = Passed >10.0 Volts = Not active = Not active = Not active = Not active = False = False	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		order lag filter to update the final EWMA result. DTC P015D is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. <u>Secondary method:</u> This fault is set if the primary 02 sensor does not achieve the required higher voltage threshold before a delay time threshold is reached.			Green 02S Condition 02 Heater (pre sensor) on for Learned Htr resistance Engine Coolant (Or OBD Coolant Enable Criteria IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled)	= Not Valid, Green 02S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. > 30 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 50 °C = TRUE) > -40 °C > 30 seconds 800 < RPM < 3,000 750 < RPM < 3,200 4.0 < gps < 35.0 31.1 < MPH < 82.0 27.3 < MPH < 87.0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Closed loop integral Closed Loop Active Evap Ethanol Estimation in Progress Baro Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State Number of fueled cylinders	0.75 < C/L Int < 1.12 = TRUE (Please see **"Closed Loop Enable Clarification"** in Supporting Tables). not in control of purge = Not Active (Please see **"Ethanol Estimation in Progress"** in Supporting Tables). > 70kpa = enabled = not active = not active > 60.0 sec 475 < °C < 1,000 = DFCO inhibit > 1 cylinders		
					When above conditions are met: Fuel Enrich mode is entered.			
					During this test: Engine Airflow must stay between: and the delta Engine Airflow over 12.5msec must be :	4 < gps < 20 < 50.0 aos		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Performance Bank 2 Sensor 2	P0161	This DTC determines if the 02 sensor heater is functioning properly by monitoring the current through the heater circuit. This test compares the measured heater current (monitored thru the low side driver) and compares it to the expected values (over the voltage range provided) for the released sensor. The diagnostic failure counter is incremented if the heater current is outside the expected range. This DTC is set based on the fail and sample counters.	Heater Current outside of the expected range of	0.3 > amps > 2.9	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA >10.0 Volts = Complete = Not active > zero > 120 seconds	/failures out of 9 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel System Too Lean Bank 1	P0171	Determines if the primary fuel control system for Bank 1 is in a lean condition, based on the filtered long-term and short-term fuel trim. A normally operating system operates centered around long-term fuel trim metric of 1.0. For lean conditions extra fuel trim is required therefor values >1.0 indicate a Lean condition. A fault is determined, when the long term fuel metric exceeds the threshold value. In addition to the long-term fuel trim limit, the short-term fuel trim metric can be monitored and the fault sets once both threshold values are exceeded. The short-term fuel trim metric is only monitored on programs that have acceptable emissions when the long-term fuel metric reaches its full authority.	The filtered long-term fuel trim metric AND The filtered short-term fuel trim metric (Note: any value below 0.95 effectively nullifies the short-term fuel trim criteria)	>= 1.270 >= 0.100 If a fault has been detected the long-term fuel trim metric must be < 1.130 and the short-term fuel trim metric must be < 1.150 to repass the diagnostic.	The primary fuel trim diagnostic is enabled Engine speed BARO Coolant Temp Coolant Temp MAP Inlet Air Temp MAF Fuel Level Long Term Fuel Trim data accumulation: Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis	 400 <rpm< 7,000 > 70 kPa > -40 °C (or OBD Coolant Enable Criteria = TRUE) < 150 °C 10 <kPa< 255 -40 <°C< 150 1 <g/s< 1,000 > 10 % or if fuel sender is faulty the diagnostic will bypass the fuel level criteria. > 25.00 seconds of data must accumulate on each trip, with at least 15.00 seconds of data in the current fuel trim cell before a pass or fail decision can be made. Additional time can be required for cold ambient starts to accommodate larger minimum LTM's for startability reasons. See **Startup Engine Coolant adjusmentto Minimum accumulation time** . (Please see **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage** in Supporting Tables for a list of cells utilized for diagnosis)	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Closed Loop Long Term FT	Enabled Enabled (Please see **"Closed Loop Enable Clarification"** and **"Long Term FT Enable Criteria"** in Supporting Tables.)		
					EGR Diag. Catalyst Diag. Post 02 Diag. Device Control EVAP Diag.	Intrusive Test Not Active Intrusive Test Not Active Intrusive Test Not Active Not Active Large Leak Diagnostic (P0455) Not Active		
					No active DTC:	IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPurgePsbl_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbPresDfltdStatus TC_BoostPresSnsrFA O2S_Bank_1_Sensor_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel System Too Rich Bank 1	P0172	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric.A normally operating system operates centered around long-term fuel trim metric of 1.0. For rich conditions less fuel trim is required therefor values < 1.0 indicate a rich condition. There are two methods to determine a Rich fault. They are Passive and Intrusive. A Passive Test decision can be made up until the time that purge is first enabled. From that point forward, rich faults can only be detected by turning purge off intrusively. If during this period of time the filtered long-term fuel trim metric exceeds the threshold a fault will be set. In addition to the long-term fuel trim limit, the short-term fuel trim metric can be monitored and the fault sets once both threshold values are exceeded. The short-	**Passive Test:** The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria) ***************************** **Intrusive Test:** For 3 out of 5 intrusive segments The filtered Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria)	<= 0.705 <= 2.000 ************************** <= 0.710 <= 0.705 <= 2.000 If a fault has been detected (by the passive or intrusive test) the long-term fuel trim metric must be > 0.745 and the short-	****************************** Purge Vapor Fuel	Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered. ****************************** <= 20.00 % Intrusive Test is inhibited when Purge Vapor percentage is greater than this threshold. (Note: values greater than 50% indicate the Purge Vapor Fuel requirement is not being used) A minimum number of accumlated Fuel Trim Data samples are required to adequately learn a correct Purge Vapor Fuel value. See the table **Minimum Non-Purge Samples for Purge (Vapor Fuel)** for the Purge Off cells used to validate the Purge Vapor Fuel parameter.	Frequency: 100 ms Continuous Loop ******************* **Segment Definition:** Segments can last up to 60 seconds and are separated by the lesser of 20.00 seconds of purge-on time or enough time to purge 36 grams of vapor. A maximum of 5 completed segments or 20 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		term fuel trim metric is only monitored on programs that have acceptable emissions when the long-term fuel metric reaches its full authority. Once purge is enabled if the filtered Purge Long Term Fuel Trim metric > 0.710 , the test passes without intrusively checking the filtered Non-Purge Long Term Fuel Trim metric. However if the filtered Purge Long Term Fuel Trim metric is <= 0.710 , the Intrusive test is invoked. The purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If during 3 out of 5 intrusive segments, the filtered Purge Long Term Fuel Trim metric <= 0.705 the fault will set. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics. This is why the intrusive test is operated over several		term fuel trim metric must be > 0.850 to repass the diagnostic. The intrusive test will be enabled at long-term fuel metric values < 0.75 until the diagnostic repasses after a failure.		If the accumulated purge volume is > 4,250.0 grams, the intrusive test will not be inhibited even if Purge Vapor Fuel is > 20.0 %.	time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge Long Term Fuel Trim metric > 0.710 for at least 200.00 seconds, indicating that the canister has been purged.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		segments allowing Purge to renable between segments. Likewise, for these reasons, if after the 5 intrusive segments the diagnostic continues to pass, there is a delay period of 300 seconds to allow sufficient time to purge excess vapors from the canister, before re-evaluating a Rich condition if it still exists.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel System Too Lean Bank 2	P0174	Determines if the primary fuel control system for Bank 2 is in a lean condition, based on the filtered long-term and short-term fuel trim. A normally operating system operates centered around long-term fuel trim metric of 1.0. For lean conditions extra fuel trim is required therefor values >1.0 indicate a Lean condition. A fault is determined, when the long term fuel metric exceeds the threshold value. In addition to the long-term fuel trim limit, the short-term fuel trim metric can be monitored and the fault sets once both threshold values are exceeded. The short-term fuel trim metric is only monitored on programs that have acceptable emissions when the long-term fuel metric reaches its full authority.	The filtered long-term fuel trim metric AND The filtered short-term fuel trim metric (Note: any value below 0.95 effectively nullifies the short-term fuel trim criteria)	>= 1.270 >= 0.100 If a fault has been detected the long-term fuel trim metric must be < 1.130 and the short-term fuel trim metric must be < 1.150 to repass the diagnostic.	The primary fuel trim diagnostic is enabled Engine speed BARO Coolant Temp Coolant Temp MAP Inlet Air Temp MAF Fuel Level Long Term Fuel Trim data accumulation: Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis	 400 <rpm< 7,000 > 70 kPa > -40 °C (or OBD Coolant Enable Criteria = TRUE) < 150 °C 10 <kPa< 255 -40 <°C< 150 1 <g/s< 1,000 > 10 % or if fuel sender is faulty the diagnostic will bypass the fuel level criteria. > 25.00 seconds of data must accumulate on each trip, with at least 15.00 seconds of data in the current fuel trim cell before a pass or fail decision can be made.Additional time can be required for cold ambient starts to accommodate larger minimum LTM's for startability reasons. See **Startup Engine Coolant adjusmentto Minimum accumulation time** . (Please see **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage** in Supporting Tables for a list of cells utilized for diagnosis)	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Closed Loop Long Term FT	Enabled Enabled (Please see **"Closed Loop Enable Clarification"** and **"Long Term FT Enable Criteria"** in Supporting Tables.)		
					EGR Diag. Catalyst Diag. Post 02 Diag. Device Control EVAP Diag.	Intrusive Test Not Active Intrusive Test Not Active Intrusive Test Not Active Not Active Large Leak Diagnostic (P0455) Not Active		
					No active DTC:	IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPurgePsbl_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbPresDfltdStatus TC_BoostPresSnsrFA O2S_Bank_2_Sensor_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel System Too Rich Bank 2	P0175	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric.A normally operating system operates centered around long-term fuel trim metric of 1.0. For rich conditions less fuel trim is required therefor values < 1.0 indicate a rich condition. There are two methods to determine a Rich fault. They are Passive and Intrusive. A Passive Test decision can be made up until the time that purge is first enabled. From that point forward, rich faults can only be detected by turning purge off intrusively. If during this period of time the filtered long-term fuel trim metric exceeds the threshold a fault will be set. In addition to the long-term fuel trim limit, the short-term fuel trim metric can be monitored and the fault sets once both threshold values are exceeded. The short-	**Passive Test:** The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria) ***************************** **Intrusive Test:** For 3 out of 5 intrusive segments, the filtered Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above1.05 effectively nullifies the short-term fuel trim criteria)	<= 0.705 <= 2.000 ************************** <= 0.710 <= 0.705 <= 2.000 If a fault has been detected (by the passive or intrusive test) the long-term fuel trim metric must be >	 ****************************** Purge Vapor Fuel	Secondary Parameters and Enable Conditions are identical to those for P0174, with the exception that fuel level is not considered. ***************************** <= 20.00 % Intrusive Test is inhibited when Purge Vapor percentage is greater than this threshold. (Note: values greater than 50% indicate the Purge Vapor Fuel requirement is not being used) A minimum number of accumlated Fuel Trim Data samples are required to adequately learn a correct Purge Vapor Fuel value. See the table **Minimum Non-Purge Samples for Purge (Vapor Fuel)** for the Purge Off cells used to validate the Purge Vapor Fuel parameter. If the accumulated purge volume is > 4,250.0	Frequency: 100 ms Continuous Loop ******************* **Segment Definition:** Segments can last up to 60 seconds and are separated by the lesser of 20.00 seconds of purge-on time or enough time to purge 36 grams of vapor. A maximum of 5 completed segments or 20 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient time to	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		term fuel trim metric is only monitored on programs that have acceptable emissions when the long-term fuel metric reaches its full authority. Once purge is enabled if the filtered Purge Long Term Fuel Trim metric > 0.710 , the test passes without intrusively checking the filtered Non-Purge Long Term Fuel Trim metric. However if the filtered Purge Long Term Fuel Trim metric is <= 0.710 , the Intrusive test is invoked. The purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If during 3 out of 5 intrusive segments, the filtered Purge Long Term Fuel Trim metric <= 0.705 the fault will set. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics. This is why the intrusive test is operated over several		0.745 and the short-term fuel trim metric must be > 0.850 to repass the diagnostic. The intrusive test will be enabled at long-term fuel metric values < 0.75 until the diagnostic repasses after a failure.		grams, the intrusive test will not be inhibited even if Purge Vapor Fuel is > 20.0 %. (Note: values greater than 50% indicate the Purge Vapor Fuel requirement is not being used)	purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge Long Term Fuel Trim metric > 0.710 for at least 200.00 seconds, indicating that the canister has been purged.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		segments allowing Purge to renable between segments. Likewise, for these reasons, if after the 5 intrusive segments the diagnostic continues to pass, there is a delay period of 300 seconds to allow sufficient time to purge excess vapors from the canister, before re-evaluating a Rich condition if it still exists.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pressure Sensor "B" Circuit Range/ Performance	P018B	This DTC detects a fuel pressure sensor response stuck within the normal operating range using an intrusive test (as follows) a] Intrusive Test Trigger: 1] Fuel Pump Duty Cycle Clamped Time (min or max duty cycle) >= 5 sec Or 2] Fuel Pres Err Variance <= calibration value KeFDBR_cmp_FPSS_ MinPres Variance ; Otherwise, Report status as Pass b] Intrusive test freq limit: 60 sec between intrusive tests that pass, c] Intrusive test Fuel Flow limit: Fuel Flow Actual < Max allowed Fuel Flow rate	Sensed fuel pressure change [absolute value, during intrusive test]	<= 30 kPa	a) Diagnostic enabled [FDBR b FPSS DiagEnb ld] b) Timer Engine Running [FDBR_t_EngModeRunC oarse] c1) Fuel Flow Rate Valid c2) FDB_FuelPresSnsrCktFA c3) Reference Voltage Fault Status [DTC P0641] c4) FAB_FuelPmpCktFA c5) Fuel Control Enable Fault Active [DTCP12A6] c6) Fuel Pump Driver Module OverTemp Fault Active [DTC P1255] c7) Fuel Pump Speed Fault Active [DTCP129F] c8) CAN Sensor Bus message $0C3 Comm Fault [CFMR_b_FTZM_lnfo1_U codeCmFADTC P165C] c9) CAN Sensor Bus Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_ UcodeCmFA DTC]	a) == TRUE b) >= 5.00 seconds c1)== TRUE c2) <> TRUE c3) <> TRUE c4] <> TRUE c5) <> TRUE c6) <> TRUE c7) <> TRUE c8) <> TRUE c9] <> TRUE	1 sample / 12.5 millisec Intrusive Test Duration: Fuel Flow - related (5 to 12 sec)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					c10) Fuel Pump Duty Cycle Fault Active c11) Sensor Configuration [FDBR_e_FuelPresSnsrConfig] c12) Sensor Bus Relay On d) Emissions Fuel Level Low [Message $3FB] e) Fuel Control Enable f) Fuel Pump Control State g) Instantaneous Fuel Flow [FCBR_dm_InstFuelFlow] h) Diagnostic System Disabled [DRER_b_DiagSysDsb] j1) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B $0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr DTC] j2) CAN Sensor Bus message $0C3_Available j3) Fuel Pres Sensor Ref Voltage Status Message Counter Incorrect Alive Rollino Count and	c10) <>TRUE c11) == CeFDBR_e_WiredTo_FTZM c12) == TRUE d)<> TRUE e) == TRUE f) == Normal Control OR == Fuel Pres Sensor Stuck Control g) >= 0.05 gm/sec h)<> TRUE j1)<> TRUE j2) == TRUE j3) <> TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_lnfo1_ARC_ChkErr DTC]			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pressure Sensor "B" Circuit Low	P018C	This DTC detects if the fuel pressure sensor circuit is shorted low Values are analyzed as percent of sensor reference voltage [[Abs [5.0V - SensorVoltsActual] / 5.0V] *100%]	Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	< 4.00 % or [0 kPa gauge]	a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl] b) Run_Crank Active [PMDR_b_RunCrankActive c) Diagnostic System Disabled [DRER_b_DiagSysDsbl] d) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig]	a) == TRUE b) == TRUE c) <> TRUE d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo ECM d2) IF NOT, then see Case2	64.00 failures / 80.00 samples 1 sample/12.5 ms	Type B, 2 Trips
			Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	< 4.00 % or [0 kPa gauge]	a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl] b) Run_Crank Active [PMDR_b_RunCrankActive c) Diagnostic System Disabled [DRER_b_DiagSysDsbl] d1) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig] d2) Sensor Bus Relay On d3) CAN Sensor Bus message $0C3_Available d4) Fuel Pres Sensor Ref	a) == TRUE b) == TRUE c) <> TRUE d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo FTZM d2) == TRUE d3) == TRUE d4)<> TRUE	64.00 failures / 80.00 samples 1 sample/12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_lnfo1_ARC ChkErr DTC]	d2) IF calibration CeFDBR_e_WiredTo_FTZM <> WiredTo FTZM, then see CaseI		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pressure Sensor "B" Circuit High	P018D	This DTC detects if the fuel pressure sensor circuit is shorted High Values are analyzed as percent of sensor reference voltage [[Abs [5.0V - SensorVoltsActual] / 5.0V] *100%]	Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	> 96.00 % or [743 kPa ga]	a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl] b) Run_Crank Active [PMDR_b_RunCrankActive c) Diagnostic System Disabled [DRER_b_DiagSysDsbl] d) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig]	a) == TRUE b) == TRUE c) <> TRUE d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo ECM d2) IF NOT, then see Case2	64.00 failures / 80.00 samples 1 sample/12.5 ms	Type B, 2 Trips
			Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	> 96.00 % or [743 kPa ga]	a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl] b) Run_Crank Active [PMDR_b_RunCrankActive c) Diagnostic System Disabled [DRER_b_DiagSysDsbl] d1) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig] d2) Sensor Bus Relay On d3) CAN Sensor Bus message $0C3_Available d4) Fuel Pres Sensor Ref	a) == TRUE b) == TRUE c) <> TRUE d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo FTZM d2) == TRUE d3) == TRUE d4)<> TRUE	64.00 failures / 80.00 samples 1 sample/12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_Info1_ARC ChkErr DTC]	d2) IF calibration CeFDBR_e_WiredTo_FTZM <> WiredTo FTZM, then see Casel		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENTSIDI High Pressure Sensor Performance	P0191	The DTC determines if there is a skewed control fuel rail sensor (Sensori) via a comparison to diagnostic sensor (sensor2) continuously when the engine is running and the commanded pressure is steady.	Primary sensor (P1) vs. Secondary sensor (P2) performance rationality ((Low Limit fail Filtered Fuel Control Error) OR (High Limit Fail: Filtered Fuel Control Error)) AND (Filtered Absolute delta between sensori and sensor2	<= **P0191 - Low fail limit of fuel control due to pressure sensor skewed low** (See supporting table) >= **P0191 - High fail limit of fuel control due to high pressure sensor skewed High** (see Supporting table) >= I.OOmpa Note: fuel control error is calcuated based on the squreroot of senorl divided by sensor2, this value is filter to ensure proper failure detection. Absolute delta between sensori and sensor2 value is filter to ensure proper failure detection.	Commanded Pressure rate of change (increasing or dercresing) for a period of time	<0.70 mpa >= 1.25 seconds Enabled when a code clear is not active or not exiting device control	Filter Fuel Control Error term and Absolute delta between sensori and sensor2 exceed Low or High Fail limit for a duration >= 1.50 seconds This is diagnostic runs Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure Sensor 1 Out of Range	P0192	This DTC diagnose SENT high pressure sensor 1 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	High Pressure Rail Sensor 1 SENT digital read value	=< 94			Time Based: 400 Failuerout of 500 Samples 6.25 ms per Sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Coolant Temperature Dropped Below Diagnostic Monitoring Temperature	P01F0	This DTC detects an unexplained cooling system cool down below the OBD monitoring threshold during normal operating conditions. This check is run throughout the key cycle.	For this application the "type" cal (KeTHMG_b_TMS_ElecThstEquipped) = 0 If the type cal is equal to one, the application has an electrically heated t-stat, if equal to zero the the application has an non heated t-stat. See appropiate section below. ******************************		No Active DTC's	ECT_Sensor_Ckt_FA VehicleSpeedSensor_FA OAT_PtEstFiltFA THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA EngineTorqueEstInaccurate ECT_Sensor_Perf_FA THMR_SWP_NoFlow_FA THMR_SWP_FlowStuckOn_FA	48 seconds out of a 60 seconds window	Type B, 2 Trips
			Type cal above = 0 (non - heated t-stat) == == == ==		Engine Runtime	>30.0 seconds		
			Engine coolant temperature	< 73.9 Deg C	Distance traveled this key cycle	>0.8 km		
			******************************		Ambient air pressure	> 55.0 kPa		
			Type cal above = 1 (Electrically heated t-stat) == == == ==		Ambient air temperature	>-9.0 Deg C		
					***************************			
			Engine coolant temperature	< 87.9 Deg C	Engine coolant temperature At least once during the key cycle			
					Type 0 (non-heated t-stat)	> 75 Deg C		
					Type 1 (Electrically heated T-stat)	>93.9 to 93.9 Deg C		
					***************************			
					Heat to coolant	≥ **P01F0 - Heat To Coolant Min 2D**		
					DFCO time	< 75.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Thermostat duty cycle RPM Active Fuel Management is not in	< 101.0% < 8,192 Half Cylinder Mode		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 1 Open Circuit - (SIDI)	P0201	Controller specific output driver circuit diagnoses Injector 1 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 1 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >= 0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 2 Open Circuit - (SIDI)	P0202	Controller specific output driver circuit diagnoses Injector 2 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 2 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >= 0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 3 Open Circuit - (SIDI)	P0203	Controller specific output driver circuit diagnoses Injector 3 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 3 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >= 0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 4 Open Circuit - (SIDI)	P0204	Controller specific output driver circuit diagnoses Injector 4 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 4 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >= 0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 5 Open Circuit - (SIDI)	P0205	Controller specific output driver circuit diagnoses Injector 5 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 5 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >= 0 Sec P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 6 Open Circuit - (SIDI)	P0206	Controller specific output driver circuit diagnoses Injector 6 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 6 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >= 0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 7 Open Circuit - (SIDI)	P0207	Controller specific output driver circuit diagnoses Injector 7 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 7 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 8 Open Circuit - (SIDI)	P0208	Controller specific output driver circuit diagnoses Injector 7 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 7 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short low or open in TPS2 circuit by monitoring the TPS 2 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too low. This diagnostic only runs when battery voltage is high enough.	TPS2 % Vref <	0.250 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
TPS2 Circuit High	P0223	Detects a continuous or intermittent short high in TPS2 circuit by monitoring the TPS 2 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too high. This diagnostic only runs when battery voltage is high enough.	TPS2 % Vref >	4.590 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	>6.41 Volts P06A3	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 1 Low side circuit shorted to ground (SIDI)	P0261	Controller specific output driver circuit diagnoses Injector 1 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 1 Low side circuit shorted to power (SIDI)	P0262	Controller specific output driver circuit diagnoses Injector 1 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 2 Low side circuit shorted to ground (SIDI)	P0264	Controller specific output driver circuit diagnoses Injector 2 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 <= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 2 Low side circuit shorted to power (SIDI)	P0265	Controller specific output driver circuit diagnoses Injector 2 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 3 Low side circuit shorted to ground (SIDI)	P0267	Controller specific output driver circuit diagnoses Injector 3 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 3 Low side circuit shorted to power (SIDI)	P0268	Controller specific output driver circuit diagnoses Injector 3 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 4 Low side circuit shorted to ground (SIDI)	P0270	Controller specific output driver circuit diagnoses Injector 4 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 <= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 4 Low side circuit shorted to power (SIDI)	P0271	Controller specific output driver circuit diagnoses Injector 4 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 5 Low side circuit shorted to ground (SIDI)	P0273	Controller specific output driver circuit diagnoses Injector 5 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 5 Low side circuit shorted to power (SIDI)	P0274	Controller specific output driver circuit diagnoses Injector 5 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 6 Low side circuit shorted to ground (SIDI)	P0276	Controller specific output driver circuit diagnoses Injector 6 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 6 Low side circuit shorted to power (SIDI)	P0277	Controller specific output driver circuit diagnoses Injector 6 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 7 Low side circuit shorted to ground (SIDI)	P0279	Controller specific output driver circuit diagnoses Injector 7 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 7 Low side circuit shorted to power (SIDI)	P0280	Controller specific output driver circuit diagnoses Injector 7 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 8 Low side circuit shorted to ground (SIDI)	P0282	Controller specific output driver circuit diagnoses Injector 8 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 8 Low side circuit shorted to power (SIDI)	P0283	Controller specific output driver circuit diagnoses Injector 8 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 to 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected Cylinder 5 Misfire Detected Cylinder 6 Misfire Detected Cylinder 7 Misfire Detected Cylinder 8 Misfire Detected	P0300 P0301 P0302 P0303 P0304 P0305 P0306 P0307 P0308	These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring various terms derived from crankshaft velocity. The rate of misfire over an interval is compared to both emissions and catalyst damaging thresholds. The pattern of crankshaft acceleration after the misfire is checked to differentiate between real misfire and other sources of crank shaft noise. Emissions Neutral Default Action: If consumed Emissions Neutral Default DTCs from other subsystems are set: Ignore Rough Road, Traction, Stability, and Antilock brake signals. If default action not activated, Misfire Monitor could complete less frequently or inaccurately. Default Action Latched for duration of Trip Default Action: If Misfire P030x sets on some hybrid applications, the isolation damper	Crankshaft Deceleration Value(s) vs. Engine Speed and Engine load The equation used to calculate deceleration value is tailored to specific vehicle operating conditions. The selection of the equation used is based on the 1st single cylinder continuous misfire threshold tables encountered that are not max of range. If all tables are max of range at a given speed/load, that speed load region is an ***Undetectable region*** see Algorithm Description Document for additional details. SINGLE CYLINDER CONTINUOUS MISFIRE((Medres_Decel Medres_Jerk OR (Medres_Decel Medres_Jerk OR (LoresJDecel LoresJerk OR (LoresJDecel LoresJerk OR RevBalanceTime)	- see details of thresholds on Supporting Tables Tab **> RufSCD_Decel** AND **> RufSCD_Jerk)** **>SCD_Decel** AND **> SCD_Jerk)** **> RufCyl_Decel** AND **> RufCyl_Jerk)** **> CylModeDecel** AND **> CylModeJerk)** **>RevMode_Decel**	Engine Run Time Engine Coolant Temp Or If ECT at startup Then System Voltage + Throttle delta - Throttle delta Early Termination option: (used on plug ins that may not have enough engine run time at end of trip for normal interval to complete.)	> 2 crankshaft revolution "ECT" If OBD Max Coolant Achieved = FALSE -9 °C < ECT Or if OBD Max Coolant Achieved = TRUE -9 °C < ECT < 130 °C < -9 °C If OBD Max Coolant Achieved = FALSE 21 °C < ECT If OBD Max Coolant Achieved = TRUE 21 °C < ECT < 130°C 9.00 < volts < 32.00 < 95.00 % per 25 ms < 95.00 % per 25 ms Not Enabled	Emission Exceedence = any (5) failed 200 rev blocks out of (16) 200 rev block tests Failure reported for (1) Exceedence in 1st (16) 200 rev block tests, or (4) Exceedences thereafter. OR when Early Termination Reporting = Enabled and engine rev > 1,000 revs and < 3,200 revs at end of trip	Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		between engine and transmission can go into extreme resonance. Default action is to move rpm out of the resonance zone. If default action not activated, significant hardware damage could occur rendering vehicle inoperable.	****************************** **This Feature not used on Gasoline engines** Combustion Modes that force selection of Idle Tables ******************************	************************** **This Feature not used on Gasoline engines** **CombustModeIdleTbl** in Supporting Tables **************************			any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage. Catalyst Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP. Continuous	
			Other patterns of misfire use adjustments to the single cylinder continuous misfire threshold tables:					
			RANDOM MISFIRE Use random misfire thresholds If no misfire for	> 3 Engine Cycles				
			(Medres_Decel	**> RufSCD_Decel * Random_SCD_Decel**				
			AND Medres_Jerk)	**>RufSCD_Jerk * Random_SCD_Jerk**				
			OR (Medres_Decel	**> SCD_Decel * Random_SCD_Decel**				
			AND Medres_Jerk)	**> SCD_Jerk * Random_SCD_Jerk**				
			OR (Lores_Decel	**> RufCyl_Decel * RandomCylModDecel**				
			AND Lores_Jerk)	**> RufCyl_Jerk * RandomCylModJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			OR (Lores_Decel	**> CylModeDecel * RandomCylModDecel**				
			AND Lores_Jerk)	**> CylModeJerk * RandomCylModJerk**				
			OR RevBalanceTime	**> RevMode_Decel * RandomRevModDecl**				
			PAIRED CYLINDER MISFIRE If a cylinder & it's pair are above PAIR thresholds (Medres_Decel	**> RufSCD_Decel * Pair_SCD_Decel**				
			AND Medres_Jerk)	**> RufSCD_Jerk * Pair_SCD_Jerk**				
			OR (Medres_Decel	**> SCD_Decel * Pair_SCD_Decel**				
			AND Medres_Jerk)	**>SCD_Jerk * Pair_SCD_Jerk**				
			OR (Lores_Decel	**> RufCyl_Decel * PairCylModeDecel**				
			AND Lores_Jerk)	**> RufCylJerk * PairCylModeJerk**				
			OR (Lores_Decel	**> CylModeDecel * PairCylModeDecel**				
			AND Lores_Jerk)	**> CylModeJerk * PairCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			OR (Revmode Active AND (within one engine cycle: 2nd largest Lores_Decel)	**> CylModeDecel * PairCylModeDecel**				
			BANK MISFIRE					
			Cylinders above Bank Thresholds	>= 2 cylinders				
			(Medres_Decel	**> RufSCD_Decel * Bank_SCD_Decel**				
			AND Medres_Jerk)	**> RufSCD_Jerk * Bank_SCD_Jerk**				
			OR (Medres_Decel	**> SCD_Decel * Bank_SCD_Decel**				
			AND Medres_Jerk)	**>SCD_Jerk * Bank_SCD_Jerk**				
			OR (Lores_Decel	**> RufCyl_Decel * BankCylModeDecel**				
			AND Lores_Jerk)	**> RufCylJerk * BankCylModeJerk**				
			OR (Lores_Decel	**> CylModeDecel * BankCylModeDecel**				
			AND Lores_Jerk)	**> CylModeJerk * BankCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CONSECUTIVE CYLINDER MISFIRE 1st cylinder uses single cyl continuous misfire thresholds; 2nd Cylinder uses: (Medres_Decel AND Medres_Jerk) OR (Medres_Decel AND Medres_Jerk) OR (Lores_Decel AND Lores_Jerk) OR (Lores_Decel AND Lores_Jerk)	**> RufSCD_Decel * ConsecSCD_Decel** **> RufSCD_Jerk * ConsecSCD_Jerk** **> SCD_Decel * ConsecSCD_Decel** **> SCD_Jerk * ConsecSCD_Jerk** **> RufCyl_Decel * ConsecCylModDecel** **> RufCylJerk * ConsecCylModeJerk** **> CylModeDecel * ConsecCylModDecel** **> CylModeJerk * ConsecCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CYLINDER DEACTIVATION MODE (Active Fuel Managment) AFM: SINGLE CYLINDER CONTINUOUS MISFIRE (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) OR (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk) AFM: RANDOM MISFIRE Use random misfire thresholds If no misfire for (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) (CylBeforeDeacCylDecel AND	**> CylModeDecel * ClyAfterAFM_Decel** **> CylModeJerk * CylAfterAFM_Jerk** **> CylModeDecel * CylBeforeAFM_Decel** **> CylModeJerk * ClyBeforeAFM_Jerk** > 3 Engine Cycles **> CylModeDecel * ClyAfterAFM_Decel * RandomAFM_Decl** **> CylModeJerk * CylAfterAFM_Jerk * RandomAFM_Jerk** **> CylModeDecel * CylBeforeAFM_Decel * RandomAFM_Decl**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CylBeforeDeacCyl_Jerk)	**> CylModeJerk * ClyBeforeAFM_Jerk * RandomAFM_Jerk**				
			OR IF option Crank based IMEP estimate is Enabled and CrankBasedJMEP is	Not Enabled < **Misfire_IMEP_Thresh _vs_BinID** (Note: Thresholds uses following tables to pick threshold vs BinID. See supporting tables for more information on how BinID works to select appropriate calibration threshold) **Misfire_IMEP_BinID_ vs_RPM_Load Misfire_IMEP_BinID_ RPM_Axis Misfire_IMEP_BinID_ Load_Axis** - see details on Supporting Tables Tab				
			Misfire Percent Emission Failure Threshold	>2.10% P0300				
			Misfire Percent Catalvst	>				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Damage	**Catalyst_Damage_Misfire_Percentage** in Supporting Tables whenever secondary conditions are met.	(at low speed/loads, one cylinder may not cause cat damage)			
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	< 1,500 FTP rpm AND < 15 FTP % load	Engine Speed Engine Load Misfire counts	> 1,500 rpm AND > 20 % load AND <180 counts on one cylinder		
					Engine Speed	400 < rpm < ((Engine Over Speed Limit) - 400) OR 8,191) Engine speed limit is a function of inputs like Gear and temperature see **EngineOverSpeedLimit** in supporting tables	4 cycle delay	
					No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensor_TFTKO CrankSensor_FA CamLctnlntFA	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						CamLctnExhFA CamSensorAnyLctnTFTK 0 AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus		
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnos tic	500 cycle delay	
					Cam and Crank Sensors	in sync with each other	4 cycle delay	
					Misfire requests TCC unlock	Not honored because Transmission in hot mode or POPD intrusive diagnostic running	4 cycle delay	
					Fuel System Status	# Fuel Cut	4 cycle delay	
					Active FuelManagement	Transition in progress	0 cycle delay	
					Undetectable engine speed and engine load region	***Undetectable region*** from Malfunction Criteria	4 cycle delay	
					Abusive Engine Over Speed	> 8,192 rpm	0 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	**< ZeroTorqueEngLoad** or **<ZeroTorqueAFM** if AFM is active in Supporting Tables	4 cycle delay	
					Below zero torque: TPS Vehicle Speed	< 0.8 % (< 0.8 % in AFM) > 30 mph (> 30 mph AFM)	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					NEGATIVE TORQAFM If deactivated cylinders appear to make power, torque is negative:			
					DeactivatedCylJDecel	**<DeacCylInversionDecel**	0 cycle delay	
					AND			
					DeactivatedCyl_Jerk	**<DeacCylInversionJerk**		
					AND			
					# of Deact Cyls Inverted	> 4 cylinders		
					If EGR Valve present and EGR Intrusive test	Not Present is Active	0 cycle delay	
					Manual Trans	Clutch shift	4 cycle delay	
					Accel Pedal Position AND Automatic transmission shift	> 95.00 %	7 cycle delay	
					After Fuel resumes on Automatic shift containing Fuel Cut		2 Cylinder delay	
					Delay if PTO engaged	Enabled	4 cycle delay	
					Delay if error in indices of buffered data is detected and delay is enabled	Delay Enabled	3 cycle delay	
					Delay if IMEP calculation	initializing on startup or running resets (expires before rpm enablement)	4 cycle delay	
					******************************	******************************	*******************	
					This Feature not used on Gasoline enaines			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Combustion Mode	**= InfrequentRegen** value in Supporting Tables	0 cycle delay	
					Driver cranks before Wait to Start lamp extinguishes	IF TRUE	**WaitToStart** cycle delay	
					Brake Torque ******************************	> 199.99 % Max Torque ******************************	0 cycle delay ******************	
					DRIVELINE RING FILTER After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.			
					Filter Driveline ring:	**> "Ring Filter"** # of engine cycles after misfire in Supporting Tables		
					Stop filter early:	**> "Number of Normals"** # of engine cycles after misfire in Supporting Tables tab		
					ABNORMAL ENGINE SPEED OSCILLATION: (checks each "misfire" candidate in 100 engine Cycle test to see if it looks like some disturbance like rough road (abnormal).)			
					Used Off Idle, and while not shifting,			
					TPS	> 3 %		
					Engine Speed	> 950 rpm		
					Veh Speed	> 3 mph		
					Auto Transmission	not shifting		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					indivdual candidate deemed abnormal if number of consecutive decelerating cylinders after "misfire": (Number of decels can vary with misfire detection equation) Consecutive decels while in SCD Mode Cyl Mode Rev Mode	**> Abnormal SCD Mode** **> Abnormal Cyl Mode** **> Abnormal Rev Mode** in Supporting Tables		
					At the end of 100 engine cycle test, the ratio of abnormal/candidate is checked to confirm if real misfire is present within the 100 engine cycles, abnormal candidates/ total candidates	>0.50 ratio	discard 100 engine cycle test	
					MISFIRE CRANKSHAFT PATTERN RECOGNITION checks each "misfire" candidate in 100 engine Cycle test to see if overall crankshaft pattern looks like real misfire (recognized), or some disturbance like rough road (unrecognized). At the end of 100 engine cvcle test, the ratio of			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					unrecog/recognized is checked to confirm if real misfire is present within the 100 engine cycles. Typically used for checking a single misfire per engine cycle but can support some other patterns on some packages			
					Pattern Recog Enabled:	Enabled		
					Pattern Recog Enabled during Cylinder Deac	Not Enabled		
					Pattern Recog Enabled consecutive cyl pattrn	Enabled		
					Engine Speed Veh Speed	1,000 < rpm < 4,530 > 5.0 mph		
					The 1st check for "recognized" is the 1st fired cylinder after the misfire candidate should both accelerate and jerk an amount based acceleration and jerk of Single Cylinder Misfire thresholds in effect at that speed and load.			
					(CylAfter_Accel AND	> Misfire_decel * **1st_FireAftrMisfr_Acel**		
					CylAfter_Jerk)	> MisfireJerk * **1st_FireAftrMisfr_Jerk** Or if AFM mode is active: > Misfire_decel * **1stFireAftrMisAcelAFM** > Misfire Jerk *		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						IstFireAfterMisJerkAFM		
					Addtionally, the crankhaft is checked again a small calibratible number of cylinders later to see if the distrubance is still large like rough road, or has calmed down like real misfire. The size of disturbance is compared to a multiplier times the ddtjerk value used to detect misfire at that speed and load. If there is repetitive misfire on consecutive engine cycles, the expected snap is adjusted due to the higher expected disturbance.			
					Num of Cylinders after misfire to start check of crankshaft snap	3 Cylinders		
					"misfire" recognized if: Crankshaft snap after: isolated "misfire"	< Misfire_Jerk * **SnapDecayAfterMisfire**		
					repetative "misfire"	< Misfire_Jerk * **SnapDecayAfterMisfire * RepetSnapDecayAdjst** in Supporting Tables		
					At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present.		discard 100	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Ratio of Unrecog/Recog	>0.60	engine cycle test	
					*****************************	*****************************	******************	
					NON-CRANKSHAFT BASED ROUGH ROAD:	Disabled		
					Rough Road Source	CeRRDR_e_None		
					*****************************	*****************************	******************	
					IF Rough Road Source = WheelSpeedInECM			
					(Wheel speed noise GRABS = OR Traction = OR Vehicle Stability) =	**> WSSRoughRoadThres** active active active	discard 100 engine cycle test	
					AND No Emission Neutral Default Action DTCs	ABS Failed Vehicle Dynamics Control System Status Driven Wheel Rotation Status Non Driven Wheel Rotation Status		
					*****************************	*****************************	******************	
					IF Rough Road Source = "FromABS"			
					(RoughRoad = OR ABS = OR Traction = OR Vehicle Stability) =	detected active active active	discard 100 engine cycle test	
					AND No Emission Neutral Default Action DTCs	ABS Failed Vehicle Dynamics Control System Status		
					*****************************	*****************************	******************	
					IF Rough Road Source	**>TOSSRoughRoadThres**	discard 100	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					= "TOSS" TOSS dispersion AND No Active DTCs ****************************** Default Action Isolator Resonance Default Action Option ****************************** If Isolator Resonance Option Enabled AND Misfire P030x TFTKO	in supporting tables Transmission Output Shaft Angular Velocity Validity TransmissionEngagedState_FA (Auto Trans only) ClutchPstnSnsr FA (Manual Trans only) ****************************** Not Enabled ****************************** Set engine speed limits: 0 < Eng RPM < 9,000	engine cycle test 4 cycle delay ******************* *******************	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position System Variation Not Learned	P0315	This DTC determines if the crankshaft sensor learn values that are stored in memory are valid. The angle between each tooth of the reluctor wheel is learned, and the sum of all angles together should sum to 360° (one revolution of the reluctor wheel). Default values, or corrupted values will not sum to 360°.	The Crankshaft target wheel should be 360 degrees around in circumferance. Loss or controller non-volitile memory or an error in memory will cause the values of individual teeth learn to be defaulted or incorrect. Set the DTC if the Difference between the sum of the reluctor wheel's teeth and 360 degrees is greater than:	> 0.001 degrees	OBD Manufacturer Enable Counter	MEC = 0	0.50 seconds Frequency Continuous100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Performance Per Cylinder	P0324	This diagnostic checks for knock sensor performance out of the normal expected range on a per cylinder basis due to Excessive Knock (either real or false knock). In the knock detection algorithm, the term “Knock Intensity” (KI) is used to define the relative size of a knock event, and is calculated as (KI = current knock event - knock threshold). This results in a KI amplitude that is proportional to the size of the knock event (as seen by the knock sensor). In addition, Knock Intensity cannot be less than zero as it is forced/limited to be = 0 with no knock detected (i.e. whenever the current knock event < knock threshold, KI = 0). This diagnostic calculates a first-order lag filter version of the Knock Intensity and sets a fault when: (Filtered KI) > (Excessive Knock Diagnostic Threshold)	Filtered Knock Intensity (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	**> P0324_PerCyl_ExcessiveKnock_Threshold** (no units)	Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes > 2.0 seconds > 400 RPM AND < 8,500 RPM >200 mg/cylinder AND < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C > 42 revs	First Order Lag Filters with Weight Coefficient = 0.0234 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit Sensor 1/Bank 1. There are two possible methods used: 1. **20 kHz Method:** This method injects a 20 kHz signal (internal to the ECU) onto one of the Knock Sensor inputs. For a normal/ good circuit the 20 kHz signal will propogate through the Knock sensor and back to the ECU through the sensor return circuit. The 20 kHz signal is processed through the Fast Fourier Transform (FFT) and then filtered with a first-order lag filter. Since the Knock Detection algorithm uses a Differential Op-Amp to compare the input from the two knock sensor wires, the FFT 20 kHz diagnostic signal will have either: A. Low output with a good circuit (because the 20 kHz injected signal is detected on both of the sensor inputs) or B, High output for an Open Circuit (because	Open Circuit Method chosen (2 possible methods: 20 kHz or Normal Noise): Filtered FFT Output Filtered FFT Output	= **P0325_P0330_OpenMethod_2** **<u>Case 1 (20 kHz Method):</u>** **> P0325_P0330_OpenCktThrshMin (20 kHz) AND < P0325_P0330_OpenCktThrshMax (20 kHz)** **<u>Case 2 (Normal Noise Method):</u>** **> P0325_P0330_OpenCktThrshMin (Normal Noise) AND < P0325_P0330_OpenCktThrshMax (Normal Noise)**	Diagnostic Enabled? Engine Run Time Engine Speed Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature	Yes > 2.0 seconds > 400 RPM and < 8,500 RPM > 100 revs > 50 mg/cylinder and < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		the 20 kHz injected signal is detected only on one of the sensor inputs). The 20 kHz method is typically used for the entire operating region of the engine. However, some engines may not have adequate separation between good and bad circuits at high engine speed. In these cases the 20 kHz method is used at low and medium engine speeds, and the "Normal Noise" method is used at high engine speed only. 2. **Normal Noise:** The Normal Noise method monitors the background engine noise level for a selected frequency range output of the knock detection FFT. The background noise (i.e. Normal Noise) is filtered with a first-order lag filter. A good circuit is determined when the filtered Normal Noise signal is greater than the threshold. See Supporting Tables for method definition: **P0325_P0330_OpenM**						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		ethod defines which of the two diagnostic methods is used as a fucntion of engine speed (RPM). Typical implementations: A. Use 20 kHz method at allengine RPM (used when acceptable separation achieved at all RPM) or B. Use 20 kHz method at low/medium RPM and Normal Noise at high RPM						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Performance Bank 1	P0326	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis. This diagnostic is specifically designed to identify the fault condition where the knock sensor is properly attached electrically, but produces an abnormally low output due to being unattached (or loosely attached) with the mounting bolt (and thus unable to properly transfer the engine vibration energy from the engine block to the knock sensor). The term "Abnormal (engine) Noise" is used to define this diagnostic method. A fault condition is identified when a first-order lag filtered version of the Abnormal Noise signal falls below the diagnostic threshold.	Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background engine noise for a selected frequency) Filtered FFT Intensity	**Case 1: Engine not in AFM mode** < **P0326_P0331_AbnormalNoise_Threshold** (Supporting Table) OR **Case 2: Engine is in AFM mode** < **P0326_P0331_AbnormalNoise_Thresh_AFM** (Supporting Table; Engine is in AFM mode)	Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature Individual Cylinders enabled for Abnormal Noise Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes > 2.0 seconds > 2,000 RPM (not in AFM mode) OR > 2,000 (in AFM mode) AND < 8,500 RPM > 300 mg/cylinder AND < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C **P0326_P0331_AbnormalNoise_CylsEnabled** (Supporting Table) > 158 Revs	First Order Lag Filters with Weight Coefficient = 0.0043 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Circuit Low Bank 1	P0327	This diagnostic checks for an out of range low knock sensor signal. A 3-resistor bias network at each sensor input to the ECM provides a DC diagnostic voltage that will remain within a normal range when the external knock sensor circuit is free of short circuit faults. The diagnostic output is reported as a percentage (0 to 100%) when compared to the 5.0 volt reference voltage.	Sensor Input or Return Signal Line	< 8.0 Percent (of 5.0 Volt reference)	Diagnostic Enabled? Engine Speed	Yes > 400 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Circuit High Bank 1	P0328	This diagnostic checks for an out of range high knock sensor signal. A 3-resistor bias network at each sensor input to the ECM provides a DC diagnostic voltage that will remain within a normal range when the external knock sensor circuit is free of short circuit faults. The diagnostic output is reported as a percentage (0 to 100%) when compared to the 5.0 volt reference voltage.	Sensor Input or Return Signal Line	> 39.0 Percent (of 5 Volt Reference)	Diagnostic Enabled? Engine Speed	Yes > 400 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Circuit Bank 2	P0330	This diagnostic checks for an open in the knock sensor circuit Sensor 2/Bank 2 There are two possible methods used: 1. **20 kHz Method:** This method injects a 20 kHz signal (internal to the ECU) onto one of the Knock Sensor inputs. For a normal/ good circuit the 20 kHz signal will propogate through the Knock sensor and back to the ECU through the sensor return circuit. The 20 kHz signal is processed through the Fast Fourier Transform (FFT) and then filtered with a first-order lag filter. Since the Knock Detection algorithm uses a Differential Op-Amp to compare the input from the two knock sensor wires, the FFT 20 kHz diagnostic signal will have either: A. Low output with a good circuit (because the 20 kHz injected signal is detected on both of the sensor inputs) or B, High output for an	**Individual Sensor Thresholds Enabled?** **Open Circuit Method chosen** (2 possible methods: 20 kHz or Normal Noise): Filtered FFT Output Filtered FFT Output	= o, Use Case 1 and 2 = **P0325_P0330_OpenMethod_2** (supporting table) **<u>Case 1 (20 kHz Method):</u>** **>** **P0325_P0330_OpenCktThrshMin (20 kHz)** **AND** **<** **P0325_P0330_OpenCktThrshMax (20 kHz)** **<u>Case 2 (Normal Noise Method):</u>** > **P0325_P0330_OpenCktThrshMin (Normal Noise)** **AND** **<** **P0325_P0330_OpenCktThrshMax (Normal Noise)** **Case 3 (20 kHz Method):**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature	Yes > 2.0 seconds > 400 RPM and < 8,500 RPM ≥ 100 revs > 50 mg/cylinder and < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C	First Order Lag Filter with Weight Coefficient **Case 1 & 2:** Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		Open Circuit (because the 20 kHz injected signal is detected only on one of the sensor inputs). The 20 kHz method is typically used for the entire operating region of the engine. However, some engines may not have adequate separation between good and bad circuits at high engine speed. In these cases the 20 kHz method is used at low and medium engine speeds, and the "Normal Noise" method is used at high engine speed only. 2. **Normal Noise:** The Normal Noise method monitors the background engine noise level for a selected frequency range output of the knock detection FFT. The background noise (i.e. Normal Noise) is filtered with a first-order lag filter. A good circuit is determined when the filtered Normal Noise signal is greater than the threshold. See Supporting Tables	Filtered FFT Output Filtered FFT Output	> **P0330_OpenCktThrshMin2 (20 kHz)** AND < **P0330_OpenCktThrshMax2 (20kHz)** **Case 4 (Normal Noise Method):** > **P0330_OpenCktThrshMin2 (NN)** AND < **P0330_OpenCktThrshMax2 (NN)**			**Case 3 & 4** Weight Coefficient = 0.01 Updated each engine event	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		for method definition: **P0325_P0330_OpenMethod** defines which of the two diagnostic methods is used as a fucntion of engine speed (RPM). Typical implementations: A. Use 20 kHz method at allengine RPM (used when acceptable separation achieved at all RPM) or B. Use 20 kHz method at low/medium RPM and Normal Noise at high RPM For each method the failure thresholds can be the same for both sensors (in a 2 sensor application), or the failure thresholds can be unique to each sensor.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Performance Bank 2	P0331	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis. This diagnostic is specifically designed to identify the fault condition where the knock sensor is properly attached electrically, but produces an Abnormally low output due to being unattached (or loosely attached) with the the mounting bolt (and thus unable to properly transfer the engine vibration energy from the engine block to the knock sensor). The term "Abnormal (engine) Noise" is used to define this diagnostic method. A fault condition is identified when a first-order lag filtered version of the Abnormal Noise signal falls below the diagnostic threshold. The failure thresholds can be the same for both sensors (in a 2 sensor application), or the failure thresholds can be unique to each sensor.	Individual Sensor Thresholds Enabled? Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background engine noise) Filtered FFT Intensity	= o, Use Case 1 and 2 **Case 1: Engine not in AFM mode** < **P0326_P0331_AbnormalNoise_Threshold** (Supporting Table) OR **Case 2: Engine is in AFM mode** < **P0326_P0331_AbnormalNoise_Thresh_AFM** (Supporting Table) **Case 3: Engine not in AFM mode** < **P0331_Abnormall_o2** (Supporting Table) OR **Case 4: Engine is in AFM mode** < **P0331_AbnormalLoAFM_2** (Supporting Table)	Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature Individual Cylinders enabled for Abnormal Noise Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes > 2.0 seconds > 2,000 RPM (not in AFM mode) OR > 2,000 (in AFM mode) AND < 8,500 RPM > 300 mg/cylinder AND < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C **P0326_P0331_AbnormalNoise_CylsEnabled** (Supporting Table) >158 Revs	First Order Lag Filter with Weight Coefficient **Case 1 & 2:** Weight Coefficient = 0.0100 Updated each engine event **Case 3 & 4:** Weight Coefficient = 0.01 Updated each engine eventFirst	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Circuit Low Bank 2	P0332	This diagnostic checks for an out of range low knock sensor signal. A 3-resistor bias network at each sensor input to the ECM provides a DC diagnostic voltage that will remain within a normal range when the external knock sensor circuit is free of short circuit faults. The diagnostic output is reported as a percentage (0 to 100%) when compared to the 5.0 volt reference voltage.	Sensor Input or Return Signal Line	< 8.0 Percent (of 5 Volt Reference)	Diagnostic Enabled? Engine Speed	Yes > 400 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Circuit High Bank 2	P0333	This diagnostic checks for an out of range high knock sensor signal. A 3-resistor bias network at each sensor input to the ECM provides a DC diagnostic voltage that will remain within a normal range when the external knock sensor circuit is free of short circuit faults. The diagnostic output is reported as a percentage (0 to 100%) when compared to the 5.0 volt reference voltage.	Sensor Input or Return Signal Line	> 39.00 Percent (of 5 Volt Reference)	Diagnostic Enabled? Engine Speed	Yes > 400 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position (CKP) Sensor A Circuit	P0335	Diagnostic will fail if a crank sensor pulse was not received during a period of time; if crank sensor pulses are received the diagnostic will pass.	Time since last crankshaft position sensor pulse received	>= 4.0 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			No crankshaft pulses received	>= 0.1 seconds	Engine is Running Starter is not engaged	Test is Enabled	Continuous every 12.5 msec	
			No crankshaft pulses received		Engine is Running OR Starter is engaged No DTC Active:	Test is Enabled P0340 P0341	2 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position (CKP) Sensor A Performance	P0336	1. Fail counts will occur if the engine goes out of synchronization repeatedly over a period of time and will pass if the engine stays in synchronization. 2. Diagnostic will fail if synchronization gap is not found in a specified period of time and will pass if the synchronization gap is found. 3. Diagnostic will fail if the incorrect number of crank sensor teeth are detected in-between detecting the synchronization gap and will pass if the correct number of teeth are seen.	Time in which 10 or more crank re-synchronizations occur	< 10.0 seconds	Engine Air Flow Cam-based engine speed No DTC Active:	Test is Enabled >= 3.0 grams/second > 450 RPM P0335	Continuous every 250 msec	Type B, 2 Trips
			No crankshaft synchronization gap found	>= 0.4 seconds	Engine is Running Starter is not engaged	Test is Enabled	Continuous every 12.5 msec	
			Time since starter engaged without detecting crankshaft synchronization gap	>= 3.3 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 3.0 grams/second))	Continuous every 100 msec	
			Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution	< 1 pulses > 65,535 pulses	Engine is Running OR Starter is engaged No DTC Active:	Test is Enabled P0340 P0341	8 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A	P0340	Diagnostic will fail if a cam sensor pulse was not received during a period of time; if cam sensor pulses are received the diagnostic will pass.	Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse	>= 5.5 seconds >= 4.0 seconds	Starter engaged AND (crank pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged	Test is Enabled	Continuous every 100 msec	
			No camshaft pulses received during 24 MEDRES events (There are 24 MEDRES events per engine cycle) Test begins when MEDRES region AND accumulated number of MEDRES events	= region 5 >= 0 counts	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	Test is Enabled CrankSensor_FA	Continuous, every MEDRES event unitl test completes, one test at every start attempt	
			The number of camshaft pulses received during 100 engine cycles	= 0 pulses	Crankshaft is synchronized No DTC Active:	Test is Enabled CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Diagnostic will fail if an incorrect number of cam sensor pulses are detected over a number of engine cycles and will pass if the number of cam pulses is correct.	The number of camshaft pulses received during 24 MEDRES events is OR (There are 24 MEDRES events per engine cycle) Test begins when MEDRES region AND accumulated number of MEDRES events	< 4 pulses > 8 pulses = region 5 >= 0 counts	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	Test is Enabled CrankSensor_FA	Continuous, every MEDRES event unitl test completes, one test at every start attempt	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 pulses > 402 pulses	Crankshaft is synchronized No DTC Active:	Test is Enabled CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #1 CIRCUIT	P0351	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #2 CIRCUIT	P0352	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #3 CIRCUIT	P0353	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	>11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #4 CIRCUIT	P0354	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	>11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #5 CIRCUIT	P0355	Diagnoses Cylinder #5 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	>11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #6 CIRCUIT	P0356	Diagnoses Cylinder #6 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	>11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #7 CIRCUIT	P0357	Diagnoses Cylinder #7 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	 > 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	 >11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #8 CIRCUIT	P0358	Diagnoses Cylinder #8 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	>11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Catalyst System Low Efficiency Bank 1	P0420	NOTE: The information below applies to applications that use the Decel Catalyst Monitor Algorithm Oxygen Storage. The catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Rich (intrusive rich) and Lean (decel fuel cutoff) A/F excursions Normalized Ratio OSC Value Calculation Information and Definitions = 1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time) 2. BestFailing OSC value from a calibration	Normalized Ratio OSC Value The EWMA calculation uses a 0.11 coefficient.	< 0.35	All enable criteria associated with P0420 can be found under P2270 - (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2) Rapid Step Response (RSR) feature will initiate multiple tests: If the difference between current EWMA value and the current OSC Normalized Ratio value is and the current OSC Normalized Ratio value is Maximum number of RSR tests to detect failure when RSR is enabled. MAF Predicted catalyst temperature Front O2 Sensor or Front WRAF Rear O2 Sensor General Enable Criteria In addition to the p-codes listed under P2270, the following DTC's shall also	>0.54 <0.10 12 > 3.00 g/s < 24.00 g/s <900 °C >675.00 mV or >1.25 EQR >825.00 mV	1 test attempted per valid decel period Minimum of 1 test per trip Maximum of 4 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 12.5ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow) Normalized Ratio Calculation = (1-2) / (3-2) A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part. Refer to the **P0420_WorstPassing OSCTableBI** and **P0420_BestFailingOS CTableBI** in Supporting Tables tab for details The Catalyst Monitoring Test is completed during a decel fuel cutoff event. This fuel cutoff event occurs following a rich instrusive fueling event initiated by the 02 Sensor Signal Stuck Lean Bank 1 Sensor 2 test (P2270). Several conditions must be met in order to execute this test. Additional conditions and their related values			not be set: For switching 02 sensors: For WRAF 02 sensors:	 O2S_Bank_1_Sensor_1_FA 02S _Bank_1_Sensor_2_FA 02S _Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA WRAF_Bank_1_FA WRAF_Bank_2_FA **P0420_WorstPassingOSCTableBI** **P0420_BestFailingOSCTableBI**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		are listed in the "Secondary Parameters" and "Enable Conditions" section of this document for P2270 (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Catalyst System Low Efficiency Bank 2	P0430	Note: The information below applies to applications that use the Decel Catalyst Monitor Algorithm Oxygen Storage. The catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and 02 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon’s strategy is to “measure” the OSC of the catalyst through forced Rich (intrusive rich) and Lean (decel fuel cutoff) A/F excursions Normalized Ratio OSC Value Calculation Information and Definitions = 1. Raw OSC Calculation = (post cat 02 Resp time - pre cat 02 Resp time) 2. BestFailing OSC value from a calibration	Normalized Ratio OSC Value The EWMA calculation uses a 0.11 coefficient.	< 0.35	All enable criteria associated with P0430 can be found under P2272 - (02 Sensor Signal Stuck Lean Bank 2 Sensor 2) Rapid Step Response (RSR) feature will initiate multiple tests: If the difference between current EWMA value and the current OSC Normalized Ratio value is and the current OSC Normalized Ratio value is Maximum number of RSR tests to detect failure when RSR is enabled. MAF Predicted catalyst temperature Front 02 Sensor or Front WRAF Rear 02 Sensor General Enable Criteria In addition to the p-codes listed under P2272, the following DTC's shall also	>0.54 <0.10 12 > 3.00 g/s < 24.00 g/s <900 °C >675.00 mV or >1.25 EQR > 825.00 mV	1 test attempted per valid decel period Minimum of 1 test per trip Maximum of 4 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 12.5ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow) Normalized Ratio Calculation = (1-2) / (3-2) A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part. Refer to the **P0430_WorstPassingOSCTableB2** and **P0430_BestFailingOSCTableB2** in Supporting Tables tab for details The Catalyst Monitoring Test is completed during a decel fuel cutoff event. This fuel cutoff event occurs following a rich instrusive fueling event initiated by the 02 Sensor Signal Stuck Lean Bank 2 Sensor 2 test (P2272). Several conditions must be met in order to execute this test. Additional conditions and their related values			not be set: For switching 02 sensors: For WRAF 02 sensors:	 O2S_Bank_1_Sensor_1_FA 02S _Bank_1_Sensor_2_FA 02S _Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA WRAF_Bank_1_FA WRAF_Bank_2_FA **P0430_WorstPassingOSCTableB2** **P0430_BestFailingOSCTableB2**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		are listed in the "Secondary Parameters" and "Enable Conditions" section of this document for P2272 (O2 Sensor Signal Stuck Lean Bank 2 Sensor 2)						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) System Small Leak Detected (No ELCP - Conventional EVAP Diagnostic - with EAT using OAT Sensor - with Fuel Tank Zone Module (FTZM))	P0442	This DTC will detect a small leak (> 0.020") in the EVAP system between the fuel fill cap and the purge solenoid. On some applications a small leak is defined as > 0.025", 0.030", or 0.150". The engine off natural vacuum method (EONV) is used. EONV is an evaporative system leak detection diagnostic that runs when the vehicle is shut off when enable conditions are met. Prior to sealing the system and performing the diagnostic, the fuel volatility is analyzed. In an open system (Canister Vent Solenoid [CVS] open) high volatility fuel creates enough flow to generate a measurable pressure differential relative to atmospheric.After the volatility check, the vent solenoid will close. After the vent is closed, typically a build up of pressure from the hot soak begins (phase-1). The pressure typically will peak and then begin to decrease as the fuel cools. When	The total delta from peak pressure to peak vacuum during the test is normalized against a calibration pressure threshold table that is based upon fuel level and ambient temperature. (Please see **P0442 EONV Pressure Threshold (Pascals)** in Supporting Tables). The normalized value is calculated by the following equation: 1 - (peak pressure - peak vacuum) / pressure threshold. The normalized value is entered into EWMA(with 0= perfect pass and 1= perfect fail). When EWMA is the DTC light is illuminated. The EWMA calculation uses a 0.13 weighting coefficient. The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 3 additional consecutive trips.	> 0.64 (EWMA Fail Threshold), < 0.35 (EWMA Re-Pass Threshold)	Fuel Level Drive Time Drive length (ECT OR OBD Coolant Enable Criteria Baro Distance since assembly plant Engine not run time before key off must be Time since last complete test if normalized result and EWMA is passing OR Time since last complete test if normalized result or EWMA is failing Estimated Ambient Temperature (EAT) using OAT sensor at end of drive Conditions for Estimated Ambient Temperature Using OAT Sensor to be	10 % < Percent < 90 % > 600 seconds > 5.0 miles > 63 °C = TRUE) > 70 kPa > 10.0 miles < refer to **P0442 Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature** in Supporting Tables. > 8 hours > 8 hours 0 °C<Temperature<35 °C	Once per trip, during hot soak (up to 2,400 sec.). No more than 2 unsuccessful attempts between completed tests.	Type A, 1 Trips EWMA Average run length is 8 to 12 trips under normal conditions Run length is 3 to 6 trips after code clear or non-volatile reset

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		the pressure drops (-62) Pa from peak pressure, the vent is then opened for 60 seconds to normalize the system pressure. The vent is again closed to begin the vacuum portion of the test (phase-2). As the fuel temperature continues to fall, a vacuum will begin forming. The vacuum will continue until it reaches a vacuum peak. When the pressure rises 62 Pa from vacuum peak, the test then completes. If the key is turned on while the diagnostic test is in progress, the test will abort.			Valid *****************************	*****************************		
					1. Startup OAT is less than previous trip EAT			
					OR 2. Startup ECT - previous trip EAT	<0°C		
					OR 3. Engine off time	> 9,000 seconds		
					OR 4. At startup, time since previous EAT valid and able to learn	< 3,600 seconds		
					OR 5. EAT - current OAT	0 °C < difference < 2 °C		
					OR 6. EAT < current OAT and speed timer	> 240 seconds		
					and current OAT - EAT	< 2 °C		
					Speed timer increments at 100 msec rate and increments vary based on vehicle speed as follows:			
					vehicle speed < 10 mph	-0.2 seconds		
					10 mph<speed< 35 mph	0.10 seconds		
					35 mph<speed< 124	0.20 seconds		
					124 mph<speed< 124	0.20 seconds		
					Speed timer can never be less than 0 seconds			
					*****************************	*****************************		
					1. High Fuel Volatility			
					Durino the volatility			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					phase, pressure in the fuel tank is integrated vs. volatility time. If the integrated pressure is then test aborts and unsuccessful attempts is incremented. This value equates to an average integrated fuel tank pressure > 1,245 Pa. Please see **P0442 Volatility Time as a Function of Estimate of Ambient Temperature** in Supporting Tables. OR 2. Vacuum Refueling Detected See P0454 Fault Code for information on vacuum refueling algorithm. OR 3. Fuel Level Refueling Detected See P0464 Fault Code for information on fuel level refueling. OR 4. Vacuum Out of Range and No Refueling See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refuelino.	< -5		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					OR 5. Vacuum Out of Range and Refueling Detected See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling. OR 6. Vent Valve Override Failed Device control using an off-board tool to control the vent solenoid, cannot exceed during the EONV test	0.50 seconds		
					OR 7. Key up during EONV test			
					No active DTCs:	MAF_SensorFA ECT_Sensor_FA IAT_SensorFA VehicleSpeedSensor_FA IgnitionOffTimeValid AmbientAirDefault FuelLevelDataFault		
					No Active DTC's TFTKO	P0443 P0446 P0449 P0452 P0453 P0455 P0458 P0459		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P0498 P0499 P0496 P1001 P1005 P11FF P130F U18A2		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) Canister Purge Solenoid Valve Circuit (ODM) (No ELCP - Conventional EVAP Diagnostic)	P0443	Controller specific output driver circuit diagnoses the canister purge solenoid low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between output and controller ground.	Powertrain relay voltage	Voltage > 11.0 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0458 may also set (Canister Purge Solenoid Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) Vent System Performance (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0446	This DTC will determine if a restriction is present in the vent solenoid, vent filler, vent hose or EVAP canister. This diagnostic runs with normal purge control and canister vent solenoid commanded open. The diagnostic fails when the FTP sensor vacuum measurement is above a vacuum threshold before it accumulates purge volume above a threshold. The diagnostic passes when it accumulates purge volume above a threshold before the FTP sensor vacuum measurement is above a vacuum threshold.	Vent Restriction Prep Test: Vented Vacuum for OR Vented Vacuum for Vent Restriction Test: Tank Vacuum for before Purge Volume After setting the DTC for the first time, 0 liters of fuel must be consumed before setting the DTC for the second time.	 < -623 Pa 60 seconds > 1,245 Pa 60 seconds > 2,989 Pa 5 seconds >12 liters	Fuel Level System Voltage Startup IAT Startup ECT BARO No active DTCs: No Active DTC's TFTKO	10 % < Percent < 90 % > 10.0 volts 4 °C<Temperature<35 °C <35 °C >70 kPa MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited FuelLevelDataFault P0443 P0449 P0452 P0453 P0454 P0458 P0459 P0498 P0499 P1001 P1005 P11FF P130F U18A2	Once per Cold Start Time is dependent on driving conditions Maximum time before test abort is 1,400 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) Vent Solenoid Control Circuit (ODM) (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0449	Controller specific output driver circuit diagnoses the vent solenoid low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedence between output and controller ground	No active DTCs:	P1005 P130F U18A2	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P0498 may also set (Vent Solenoid Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Tank Pressure (FTP) Sensor Circuit Performance (No ELCP - Conventional EVAP Diagnostic)	P0451	The DTC will be set if the fuel tank vacuum sensor is out of range when it tries to re-zero prior to the phase-1 or phase-2 portions of the engine-off natural vacuum small leak test. During the EONV test, the fuel tank vacuum sensor is re-zeroed. A re-zero occurs: 1) At the transition from the volatility phase to the pressure phase. 2) At the transition from the pressure phase to the vacuum phase. The re-zero test determines if the tank vacuum signal falls within a calibratable window about atmospheric pressure. If after some time, the tank vacuum signal does not fall to within the window, the re-zero test exits to the refueling rationality test. The refueling rationality test determines if a refueling event caused the re-zero problem. If so, the re-zero problem is ignored. If a refueling event is not	The tank vacuum sensor voltage is compared to a window about the nominal sensor voltage offset (~1.5 volts) Upper voltage threshold (voltage addition above the nominal voltage) Lower voltage threshold (voltage subtraction below the nominal voltage) The difference between tank vacuum sensor voltage and the nominal offset voltage is then normalized against the appropriate threshold listed above to produce a ratio between 0.0 and 1.0. This normalized re-zero ratio is then filtered with a EWMA (with 0= perfect pass and 1=perfect fail). When EWMA is the DTC light is illuminated. The EWMA calculation uses a 0.20 weighting coefficient. The DTC light can be turned off if the EWMA is and stays below the	0.2 volts 0.2 volts > 0.73 (EWMA Fail Threshold), < 0.40 (EWMA Re-Pass Threshold)	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The number of times that it executes can range from zero to two per engine-off period.The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.	Type A, 1 Trips EWMA Average run length: 6 Run length is 2 trips after code clear or non-volatile reset

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		detected, then the results of the re-zero test are used to determine if there is a re-zero problem. 1) An individual re-zero test generates a re-zero ratio. The ratio goes from 0.0 to 1.0. 2) A 0.0 means that the re-zero pressure signal achieved exactly atmospheric pressure. 3) A ratio of 1.0 means that the re-zero pressure did not get within the window. 4) Re-zero pressure within the window generates values between 0.0 and 1.0. If a refueling event is not detected, then the resulting re-zero ratio is filtered using an exponentially weighted moving average (EWMA). When the EWMA exceeds a fail threshold, the vacuum re-zero test reports a failure. Once the vacuum re-zero test fails, the EWMA fall below a lower re-pass threshold before it can pass the vacuum re-zero test again.	EWMA fail threshold for 3 additional consecutive trips.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0452	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too low out of range. The FTP sensor circuit out of range diagnostic compares the raw sensor voltage to a lower voltage threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the sensor voltage is below the lower voltage threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported for P0452 DTC. A pass is reported for P0452 DTC if the low sample counter reaches its threshold.	FTP sensor signal The normal operating range of the FTP sensor is 0.5 volts (-1245 Pa) to 4.5 volts (~ -3736 Pa).	< 0.15 volts (3.0 % of Vref or - 1,495 Pa)	No active DTC's:	P1001 P1005 U18A2	640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0453	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too high out of range. The FTP sensor circuit out of range diagnostic compares the raw sensor voltage to an upper voltage threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the sensor voltage is above the upper voltage threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported for P0453 DTC. A pass is reported for P0453 DTC if the high sample counter reaches its threshold.	FTP sensor signal The normal operating range of the FTP sensor is 0.5 volts (-1245 Pa) to 4.5 volts (~ -3736 Pa).	> 4.85 volts (97.0 % of Vref or - -3,985 Pa)	No active DTCs:	P1001 P1005 U18A2	640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Tank Pressure (FTP) Sensor Circuit Intermittent (No ELCP - Conventional EVAP Diagnostic)	P0454	This DTC will detect intermittent tank vacuum sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event. During the EONV test, an abrupt change in fuel tank vacuum is identified as a possible refueling event. If the abrupt change occurs while the vent valve is closed, the EONV small-leak test aborts and the refueling rationality test starts. If the refueling rationality test detects a refueling event, then the vacuum change is considered “rational.” If the refueling rationality test does not detect a refueling event, then the vacuum change is considered “irrational.” The vacuum change rationality diagnostic is an “X out of Y” test. 1) Each time the EONV test completes, the (Y) sample counter is incremented. 2) Each time the	If an abrupt change in tank vacuum is detected the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that a refueling event occurred. If a refueling is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem. An abrupt change is defined as a change in vacuum in the span of 1.0 seconds. But in 12.5 msec. A refueling event is confirmed if the fuel level has a persistent change of for 30 seconds during a 600 second refueling rationality test.	> 112 Pa < 249 Pa >10 %	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes and the canister vent solenoid is closed		This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period.The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.The test will report a failure if 2 out of 3 samples are failures. 12.5 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		rationality test has an irrational result; the (X) fail counter is incremented. 3) If the (X) fail counter reaches the fail limit before the (Y) sample counter reaches the sample limit, the vacuum change rationality test fails. 4) If the (Y) sample counter reaches the limit before the (X) fail counter fails, the vacuum change rationality test passes.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) System Large Leak Detected (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0455	This DTC will detect a weak vacuum condition (large leak or purge blockage) in the EVAP system. This mode checks for large leaks and blockages when proper driving conditions are met. If these conditions are met, the diagnostic commands the vent valve closed and controls the purge duty cycle to allow purge flow to purge the fuel tank and canister system while monitoring the fuel tank vacuum level. The algorithm accumulates purge flow during the test to determine a displaced purge volume as the test proceeds. If the displaced purge volume reaches a threshold before the fuel tank vacuum level reaches its passing threshold, then a large leak failure is detected. On fuel systems with fuel caps If the first failure of	Purge volume while Tank vacuum After setting the DTC for the first time, 0 liters of fuel must be consumed before setting the DTC for the second time. Weak Vacuum Follow-up Test (fuel cap replacement test) Weak Vacuum Test failed. Passes if tank vacuum Note: Weak Vacuum Follow-up Test can only report a pass.	>60 liters < 2,740 Pa > 2,740 Pa	Fuel Level System Voltage BARO Purge Flow No active DTCs: No Active DTC's TFTKO If ECT > IAT, Startup temperature delta (ECT-IAT): Startup IAT Startup ECT Weak Vacuum Follow-up Test This test can run following a weak vacuum failure or on a hot restart.	10 % < Percent < 90 % > 10.0 volts >70 kPa >2.50% MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited FuelLevelDataFault P0443 P0449 P0452 P0453 P0454 P0458 P0459 P0498 P0499 P1001 P1005 P11FF P130F U18A2 <8 °C 4 °C<Temperature<35 °C <35 °C	Once per cold start Time is dependent on driving conditions Maximum time before test abort is 1,400 seconds Weak Vacuum Follow-up Test With large leak detected, the follow-up test is limited to 1,300 seconds. Once the MIL is on, the follow-up test runs indefinitely.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		P0455 occurred after a refueling event was detected and the MIL is off for P0455, the MIL will be commanded off after the first pass of P0455 is reported. If the first failure of P0455 did not occur after a refueling event was detected, the MIL will be commanded off on the ignition cycle after the third consecutive pass of P0455 is reported.the MIL will be commanded off on the ignition cycle after the third consecutive pass of P0455 is reported. On fuel systems without fuel caps The P0455 MIL will be commanded off on the ignition cycle after the third consecutive pass of P0455 is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission System Purge Control Valve Circuit Low (No ELCP - Conventional EVAP Diagnostic)	P0458	Controller specific output driver circuit diagnoses the canister purge solenoid low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 Q impedence between output and controller ground	Powertrain relay voltage	Voltage > 11.0 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controlle rs P0443 may also set (Caniste r Purge Solenoid Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission System Purge Control Valve Circuit High (No ELCP - Conventional EVAP Diagnostic)	P0459	Controller specific output driver circuit diagnoses the canister purge solenoid low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 Q impedence between output and controller power	Powertrain relay voltage	Voltage > 11.0 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 1 Performance (For use on vehicles with a single fuel tank)	P0461	This DTC will detect a primary fuel tank level sensor stuck in-range.	a) Sensed fuel volume change is b) while engine fuel consumption is	a) < 5 liters b) > 35.69 liters	1. Diagnostic Enabled 2. Engine Operational State	1. == True 2. == Running	250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 1 Circuit Low Voltage (For use on vehicles with a fuel float connected to an FTZM)	P0462	This DTC will detect a primary fuel tank sensor out-of-range low.	Fuel level Sender % of 5V range	< 10 %	a) Diagnostic enabled status b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	a) == True b) == True c) == True d) <> True	40 failures out of 50 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 1 Circuit High Voltage (For use on vehicles with a fuel float connected to an FTZM)	P0463	This DTC will detect a primary fuel tank level sensor out-of-range high.	Fuel level Sender % of 5V range	> 60 %	a) Diagnostic enabled status b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	a) == True b) == True c) == True d) <> True	40 failures out of 50 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 1 Circuit Intermittent (No ELCP - Conventional EVAP Diagnostic)	P0464	This DTC will detect intermittent fuel level sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event. During the EONV test, a change in fuel level is identified as a possible refueling event. If the change occurs while the vent valve is closed, the EONV small-leak test aborts and the refueling rationality test starts. If the refueling rationality test detects a refueling event, the fuel level change is considered “rational.” If the refueling rationality test does not detect refueling, the fuel level change is considered “irrational.” The fuel level change rationality diagnostic is an “X out of Y” test. 1) Each time the EONV test completes, the (Y) sample counter is incremented. 2) Each time the rationality test has an	If a change in fuel level is detected, the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that an actual refueling event occurred. If a refueling event is confirmed, then the test sample is considered passing. Otherwise, if a refueling event is not confirmed, then the test sample is considered failing which indicates an intermittent signal problem. An intermittent fuel level signal problem is defined as: The fuel level changes by and does not remain for 30 seconds during a 600 second refueling rationality test.	 >10% >10%	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period.The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.The test will report a failure if 2 out of 3 samples are failures. 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		irrational result; the (X) fail counter is incremented. 3) If the (X) fail counter reaches the fail limit before the (Y) sample counter reaches the sample limit, the fuel level change rationality test fails. 4) If the (Y) sample counter reaches the limit before the (X) fail counter fails, the fuel level change rationality test passes.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) System Flow During Non-Purge (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0496	This DTC will determine if the purge solenoid is leaking to engine manifold vacuum. This test checks for purge valve leaks to intake manifold vacuum such that there would always be a small amount of purge flow present. It does this by sealing the EVAP system (purge and vent valve closed) and then monitors fuel tank vacuum level. The fuel tank vacuum level should not increase. If tank vacuum increases above a threshold, a malfunction is indicated. Additional Information This diagnostic test detects purge valve leaks to intake manifold vacuum. It is not intended to detect purge valve leaks to the atmosphere which are monitored by the EONV small leak diagnostic (P0442). The purge valve leak diagnostic exists to helps service replace	Tank Vacuum for Test time	> 2,491 Pa 5 seconds < refer to **P0496 Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level** in Supporting Tables. Test time only increments when engine vacuum > 10.0 kPa.	Fuel Level System Voltage BARO Startup IAT Startup ECT Engine Off Time No active DTCs: No Active DTC's TFTKO	10 % < Percent < 90 % > 10.0 volts >70 kPa 4 °C<Temperature<35 °C <35 °C >28,800.0 seconds MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited FuelLevelDataFault P0443 P0449 P0452 P0453 P0454 P0458 P0459 P0498 P0499 P1001 P1005 P11FF P130F U18A2	Once per cold start Cold start: max time is 1,400 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		leaking purge valves that could otherwise be detected with the EONV small leak diagnostic (P0442).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission System Vent Solenoid Control Circuit Low (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0498	Controller specific output driver circuit diagnoses the vent solenoid low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 < 0.5 Q impedence between output and controller ground	No active DTC's:	P1005 P130F U18A2	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P0449 may also set (Vent Solenoid Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission System Vent Solenoid Control Circuit High (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0499	Controller specific output driver circuit diagnoses the vent solenoid low sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. If the P0499 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 Q impedence between output and controller power	No active DTC's:	P1005 P130F U18A2	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Low Engine Speed Idle System	P0506	This DTC indicates that actual engine speed is lower than desired engine speed at idle so that it is out of speed control capability. Testing is performed when basic conditions are met. If filtered engine speed error exceeds a calibrated threshold for a calibrated duration, code is set. This testing is performed continuously per trip if basic conditions are met	Filtered Engine Speed Error. It is calculated with a calibrated filter coefficient	> 91.00 rpm	Baro	> 70 kPa	Diagnostic runs in every 12.5 ms loop	Type B, 2 Trips
			Filter coefficient	0.00300	Coolant Temp	> 60 °C	Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	
					Engine run time	> 30 sec		
					Ignition voltage	32 > volts > 11		
					Time since gear change	> 3 sec		
					Time since a TCC mode change	> 3 sec		
					IAT	> -20 °C		
					Vehicle speed	< 1.24 mph, 2kph		
					Commanded RPM delta	< 25 rpm		
					Idle time	>10 sec		
					For manual transmissions: Clutch Pedal Position	> 88.00 pct		
					or Clutch Pedal Position	< 75.00 pct		
						PTO not active		
						Transfer Case not in 4WD LowState		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						Off-vehicle device control (service bay control) must not be active.		
						following conditions not TRUE: (VeTESR_e_EngSpdReqlntvType = CeTESR_e_EngSpdMinLimitAND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion)		
						Clutch is not depressed		
					No active DTCs	TCJBoostPresSnsrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorCircuitFA EvapFlowDuringNonPurge_FA FuelTrimSystemBI FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver_FA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFault LowFuelConditionDiagnostic Clutch Sensor FA AmbPresDfltdStatus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P2771		
					All of the above met for Idle time	> 10 sec		
						The diagnostic does not run during autostop as engine is shutdown during that time (occurs in a hybrid or 12v start stop vehicle)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
High Engine Speed Idle System	P0507	This DTC indicates that actual engine speed is higher than desired engine speed at idle so that it is out of speed control capability. Testing is performed when basic conditions are met. If filtered engine speed error exceeds a calibrated threshold for a calibrated duration, code is set. This testing is performed continuously per trip if basic conditions are met	Filtered Engine Speed Error. It is calculated with a calibrated filter coefficient	< -182.00 rpm	Baro	> 70 kPa	Diagnostic runs in every 12.5 ms loop	Type B, 2 Trips
					Coolant Temp	> 60 °C	Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	
			Filter coefficient	0.00300				
					Engine run time	> 30 sec		
					Ignition voltage	32 > volts > 11		
					Time since gear change	> 3 sec		
					Time since a TCC mode change	> 3 sec		
					IAT	> -20 °C		
					Vehicle speed	< 1.24 mph, 2kph		
					Commanded RPM delta	< 25 rpm		
					For manual transmissions: Clutch Pedal Position	> 88.00 pct		
					or Clutch Pedal Position	< 75.00 pct		
						PTC not active		
						Transfer Case not in 4WD LowState		
						Off-vehicle device control (service bay control) must not be active.		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimitAND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion)		
						Clutch is not depressed		
					No active DTCs	TCJBoostPresSnsrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorCircuitFA EvapFlowDuringNonPurge_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver_FA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFaultLow FuelConditionDiagnostic Clutch SensorFA AmbPresDfltdStatus P2771		
					All of the above met	>10 sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					for Idle time	The diagnostic does not run during autostop as engine is shutdown during that time (occurs in a hybrid or 12v start stop vehicle)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure (EOP) Sensor Performance - Two Stage Oil Pump	P0521	Determines if the Engine Oil Pressure (EOP) Sensor is stuck or biased in range. The engine oil pressure is compared against thresholds when engine is running and when engine is off.The engine oil pressure rationality diagnostic has two parts: engine runing test and engine off test. The engine running test compares the measured oil pressure to threshold. If the measured oil pressure is out of the thresholds, then the error counter increments. The engine off test compares the measured oil pressure against thresholds after the engine has stopped rotating. If the measured oil pressure is out of the thresholds, then the error counter increments.	**Two Stage Oil Pump EOP Sensor Test with Engine Running, High Pressure State** To Fail when previously passing with the engine running: Filtered Engine Oil Pressure below expected threshold OR Filtered Engine Oil Pressure above expected threshold To pass when previously failing: Filtered Engine Oil Pressure above low threshold plus an offset OR	Filtered Oil Pressure < (**P0521_P06DD_P06DE_OP_HiStatePressure** * 1.00 - 133.0 kPa) OR Filtered Oil Pressure > (**P0521_P06DD_P06DE_OP_HiStatePressure** * 1.00 + 180.0 kPa) Filtered Oil Pressure > **P0521_P06DD_P06DE_OP_HiStatePressu(re** * 1.00 - 133.0 kPa + 10.0 kPa) OR Filtered Oil Pressure <(	Two Stage Oil Pump is Present = TRUE Pump is in high pressure state Engine Running Diagnostic Status Engine Off Rationality Test Diagnostic Reporting Status Oil Pressure Sensor In Use Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 8,000 RPM for longer than 30.0 seconds) Filtered Engine Speed within range Modelled Oil Temperature within range Pump state change complete No active DTC's	TRUE Enabled Test not report a fail state Yes >30.0 seconds >70.0 kPa FALSE 1,000 RPM < Filtered Engine Speed < 4,500 RPM 40.0 deg C < Modelled Oil Temperature <100.0 deg C Time since state change > 0.50 s Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA	> 40 errors out of 50 samples. Performed every 100 msec > 10passes out of 50 samples. Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Filtered Engine Oil Pressure below high threshold minus an offset	**P0521_P06DD_P06DE_OP_HiStatePressure** * 1.00 + 180.0 kPa - 10.0 kPa) (Details on Supporting Tables Tab: **P0521_P06DD_P06DE_OP_HiStatePressure**)		EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA CrankSensor_FA		
			Two Stage Oil Pump EOP Sensor Test with Engine Running, Low Pressure State		Two Stage Oil Pump is Present = TRUE	TRUE		
					Pump is in low pressure state	Enabled		
			To Fail when previously passing with the engine running:	Filtered Oil Pressure < (**P0521_P06DD_P06DE_OP_LoStatePressure** * 1.00 - 133.0 kPa)	Engine Running Diagnostic Status	Test not report a fail state		
			Filtered Engine Oil Pressure below expected threshold		Engine Off Rationality Test Diagnostic Reporting Status	Yes	> 40 errors out of 50 samples.	
					Oil Pressure Sensor In Use	>30.0 seconds		
			OR	OR	Engine Running		Performed every 100 msec	
			Filtered Engine Oil Pressure above expected threshold	Filtered Oil Pressure > (**P0521_P06DD_P06DE_OP_LoStatePressure** * 1.00 + 180.0 kPa)	Ambient Air Pressure	>70.0 kPa		
					Oil Aeration (= TRUE if engine speed > 8,000 RPM for longer than 30.0 seconds)	FALSE		
					Filtered Engine Speed within range	1,000 RPM < Filtered Engine Speed < 4,500 RPM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			To pass when previously failing: Filtered Engine Oil Pressure above low threshold plus an offset OR Filtered Engine Oil Pressure below high threshold minus an offset	Filtered Oil Pressure > (**P0521_P06DD_P06DE_OP_LoStatePressure** * 1.00 - 133.0 kPa + 10.0 kPa) OR Filtered Oil Pressure < (**P0521_P06DD_P06DE_OP_LoStatePressure** * 1.00 + 180.0 kPa - 10.0 kPa) (Details on Supporting Tables Tab: **P0521_P06DD_P06DE_OP_LoStatePressure**)	Modelled Oil Temperature within range Pump state change complete No active DTC's	40.0 deg C < Modelled Oil Temperature <100.0 deg C Time since state change > 0.50 s Time since state change > Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA CrankSensor_FA	> 10 passes out of 50 samples. Performed every 100 msec	
			Two Stage Oil Pump EOP Sensor Test with Engine Off If enabled: To Fail when previously passing with the engine off: Filtered Engine Oil Pressure greater than threshold	Filtered Oil Pressure > 40.0 kPa	Two Stage Oil Pump is Present = TRUE Engine Off Rationality Test Diagnostic Status Engine Running Rationality Test Diagnostic Status Modelled Oil Temperature No Engine Movement No active DTC's	TRUE Enabled Test not report a fail state > 40.0 deg C > 10.0 seconds EngineModeNotRunTimer_FA EngOilTempFA	> 20 errors out of 40 samples. Run once per trip	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						EngOilPressureSensorCkt FA CrankSensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure (EOP) Sensor Circuit Low Voltage	P0522	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too low. This diagnostic compares the EOP circuit voltage to the reference voltage.	(Engine Oil Pressure Sensor Circuit Voltage) + 5 Volts) *100	< 5.00 percent Deadband: < 5 percent or > 95 percent	Engine Speed Enable Engine Speed Disable Oil Pressure Sensor In Use Diagnostic Status	> 400 rpm < 350 rpm Yes Enabled	1,280 failures out of 1,600 samples Performed every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure (EOP) Sensor Circuit High Voltage	P0523	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too high. This diagnostic compares the EOP circuit voltage to the reference voltage.	(Engine Oil Pressure Sensor Circuit Voltage) + 5 Volts) *100	> 95.00 percent Deadband: < 5 percent or > 95 percent	Oil Pressure Sensor In Use Diagnostic Status	Yes Enabled	1,280 failures out of 1,600 samples Performed every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Resume range for too long, the code is set and cruise control is disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	Cruise Control Resume switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, 1 Trip No MIL , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Set range for too long, the code is set and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	Cruise Control Set switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, 1 Trip No MIL , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Input Circuit	P0575	Determines if cruise switch state received from the BCM is valid. "Emissions Neutral Default Action : When the ECM determines that a serial communication fault from the BCM has occurred with frame $1E1, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	If x of y rolling count/ protection value faults occur, disable cruise for duration of fault	Message <> 2's complement of message Message milling countoprevious message rolling count value plus one	Diagnostic is enabled. Cruise Control Switch Serial Data Error Diagnostic Enable Serial communication to BCM Power Mode Engine Running	1.00 No loss of communication = RUN = TRUE	9 failures out of /17 samples Performed on every received message 9 rolling count failures out of /17 samples Performed on every received messagw	Type C, 1 Trip No MIL , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Brake Pedal Position Sensor Circuit Range/ Performance	P057B	This diagnostic monitors the Brake Pedal Position Sensor for a stuck in range failure	.Brake pedal position sensor movement diagnostic cal is enabled 1.00	True	Diagnostic is enabled. Brake Pedal Position Sensor Circuit Range *1* Performance Diagnostic Enable	1.00 ignition voltage > 10.00		MIL: Type A, 1 Trips
			Calculated EWMA value must be greater than calibratable theshold after calibratable number of tests have completed to report a "test passed" for P057B	EWMA value looked up in supporting table **P057B KtBRKI_K_FastTestPointWeight** P057B as a function of calculated brake pedal position delta EWMA value is > 0.80	calculated brake pedal position delta sample counter > 50.00 for fast test OR calculated brake pedal position delta sample counter > 1,000.00 for slow test	calculated brake pedal position delta > 2.63 OR (for slow test) shift lever has been in park once this key cycle vehicle speed >= 6.00 accelerator pedal position < 5.00	total number of EWMA tests > 20.00	
			Calculated EWMA Value must be less than calibratable threshold after calibratable number of tests have completed to report a "test failed" for P057B. This test runs once per key cycle	EWMA value looked up in supporting table **P057B KtBRKI_K_CmpltTestPointWeight** P057B as a function of calculated brake pedal position delta EWMA value is less thatn 0.40	no DTC's active (P057C, P057D)	shift lever has been in park once this key cycle vehicle speed >= 6.00 accelerator pedal position < 5.00	total number of EWMA tests > 2.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Brake Pedal Position Sensor Circuit Low	P057C	detects short to ground for brake pedal position sensor	If x of y samples are observed below failure threshold, default brake pedal position to zero percent.	5.00	Diagnostic is enabled. Brake Pedal Position Sensore Low Voltage Diagnostic Enable	1.00	20 / 32.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Brake Pedal Position Sensor Circuit High	P057D	detects open circuit for brake pedal position sensor	If x of y samples are observed above failure threshold, default brake pedal position to zero percent and set DTC	95.00	Diagnostic is enabled. Brake Pedal Position Sensore High Voltage Diagnostic Enable	1.00	20.00/ 32.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Brake Pedal Position Sensor Circuit Intermittent/ Erratic	P057E	detects noisy / erratic ouput for brake pedal position sensor	If x of y samples are observed above failure threshold, default brake pedal position to zero percent and set DTC	25.00	Diagnostic is enabled. Brake Pedal Position Sensor Circuit Intermittent / Erratic Diagnostic Enable	1.00	5.00/ 20.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect or the flash memory detects an uncorrectable error via the Error Correcting Code.	The Primary Processor's calculated checksum does not match the stored checksum value. Covers all software and calibrations.	1 failure if the fault is detected during the first pass. 5.00 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	Type A, 1 Trips
			The Primary Processor's Error Correcting Code hardware in the flash memory detects an error. Covers all software and calibrations.	254 failures detected via Error Correcting Code			Diagnostic runs continuously via the flash hardware.	
				In all cases, the failure count is cleared when controller shuts down				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Not Programmed	P0602	This DTC will be stored if the ECU is a service part that has not been programmed.	Service (reflash) controller calibration present	= 1		none	Diagnostic runs at powerup and once per second continuously after that	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
ECM Long Term Memory Reset	P0603	This DTC detects an invalid NVM which includes a Static NVM, Perserved NVM, ECC ROM in NVM Flash Region, and Perserved NVM during shut down.	Static NVM region error detected during initialization				Diagnostic runs at controller power up.	Type A, 1 Trips
			Perserved NVM region error detected during initialization				Diagnostic runs at controller power up.	
			Perserved NVM region error detected during shut down.				Diagnostic runs at controller power down.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
ECM RAM Failure	P0604	Indicates that the ECM has detected a RAM fault. This includes Primary Processor System RAM Fault, Primary Processor Cache RAM Fault, Primary Processor TPU RAM Fault, Primary Processor Update Dual Store RAM Fault, Primary Processor Write Protected RAM Fault, and Secondary Processor RAM Fault. This diagnostic runs continuously.	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	Type A, 1 Trips
			Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written >=	5 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor detects a mismatch between the data and dual data is found during RAM updates. Detects a mismatch in data and dual data updates >	0.47369 s			When dual store updates occur.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Indicates that the primary processor detects an illegal write attempt to protected RAM. Number of illegal writes are >	65,534 counts			Diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal ECM Processor Integrity Fault	P0606	Indicates that the ECM has detected an internal processor integrity fault. These include diagnostics done on the SPI Communication as well as a host of diagnostics for both the primary and secondary processsors.	Time new seed not received exceeded			always running	0.450 seconds	Type A, 1 Trips
			MAIN processor receives seed in wrong order			always running	3 / 18 counts intermittent. 50 ms/count in the ECM main processor	
			2 fails in a row in the MAIN processor's ALU check			Test is Enabled: 1 (If 0, this test is disabled)	25 ms	
			2 fails in a row in the MAIN processor's configuration register masks versus known good data			Test is Enabled: 1 (If 0, this test is disabled)	12.5 to 25 ms	
			Checks number of stack over/under flow since last powerup reset >=	3.00		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			Voltage deviation >	0.4950		Test is Enabled: 1 (If 0, this test is disabled)	5 / 10 counts or 0.150 seconds continuous; 50 ms/count in the ECM main processor	
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization.	3 (results in MIL), 5 (results in MIL and remedial action)		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Counter >=					
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM	
			MAIN processor DMA transfer from Flash to RAM has 1 failure			Test is Enabled: 0 (If 0, this test is disabled)	variable, depends on length of time to write flash to RAM	
			Safety critical software is not executed in proper order.	>= 1 incorrect sequence.		Test is Enabled: 1 (If 0, this test is disabled)	Fail Table, f(Loop Time). See supporting tables: **P0606_PSW Sequence Fail f (Loop Time)** / Sample Table, f (Loop Time)See supporting tables: **P0606.PSW Sequence Sample f(Loop Time)** counts 50 ms/count in the ECM main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			MAIN processor determines a seed has not changed within a specified time period within the 50ms task.	Previous seed value equals current seed value.		Test is Enabled: 1 (If 0, this test is disabled)	Table, f(Loop Time). See supporting tables: **P0606_Last Seed Timeout f (Loop Time)**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal ECM Processor Integrity Performance	P0607	Indicates that the ECM has detected an internal processor integrity performance.	Performs the failure diagnostic for the offline and online BIST results.			Test is enabled: 1 . (If 0, this test is disabled)	5 counts background task/ count in the ECM main processor	Type A, 1 Trips
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is enabled: 1 . (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is enabled: 1 . (If 0, this test is disabled)	variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
ANDRADC Fault	P060B	Indicates that the ECM has detected an ANDR ADC Fault.	Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	Type A, 1 Trips
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			percent >				1.75 seconds continuous; 250 ms/count in the ECM main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Fuel Injector Control Performance	P062B	This DTC determines the internal fuel injctor control module circuit is faulted. The faulted status is set on any failure that could potentially damage the drivers or injectors, or could result in uncontrolled fueling. The following general classes of failures shall be covered: Communication error with control circuit Internal corruption of control circuit values, Invalid interface values (from control circuit)	Internal ECU Boost Voltage OR Internal ECU Boost Voltage OR Driver Status OR Driver Status	>= 90 Volts <= 40 Volts = Not Ready = Uninitialized	Battery Voltage	>= 8or>= 11 Enabled when a code clear is not active or not exiting device control Engine is not cranking Powertrain Relay Voltage within range	High Voltage - 160 failures out of 200 samples Low Voltage - 160 failures out of 200 samples Driver Status Not Ready- 160 failures out of 200 samples Driver Status Uninitialized - Uninitialized state for >= 100 counts All at 12.5ms per sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powertrain Internal Control Module EEPROM Error	P062F	This DTC detects a NVM long term performance. There are two types of diagnostics that run during controller power up. One for HWIO reports that writing to NVM (at shutdown) will not succeed, and the other HWIO reports the assembly calibration integrity check has failed.	HWIO reports that writing to NVM (at shutdown) will not succeed				Diagnostic runs at controller power up.	Type B, 2 Trips
			HWIO reports the assembly calibration integrity check has failed				Diagnostic runs at controller power up.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
VIN Not Programmed or Mismatched - Engine Control Module (ECM)	P0630	This DTC checks that the VIN is correctly written	At least one of the programmed VIN digits	= 00 or FF	OBD Manufacturer Enable Counter	= 0	250 ms / test Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1 by monitoring the reference percent Vrefl and failing the diagnostic when the percent Vrefl is too low or too high or if the delta between the filtered percent Vrefl and non-filtered percent Vrefl is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vrefl < or ECM percent Vrefl > or the difference between ECM filtered percent Vrefl and percent Vrefl >	4.875 % Vrefl 5.125% Vrefl 0.0495 % Vrefl	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 >6.41 Volts = 0.02 Seconds = FALSE >8.41 Volts = TRUE	19/39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on the 5 volt reference circuit #2 by monitoring the reference percent Vref2 and failing the diagnostic when the percent Vref2 is too low or too high or if the delta between the filtered percent Vref2 and non-filtered percent Vref2 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref2 < or ECM percent Vref2 > or the difference between ECM filtered percent Vref2 and percent Vref2 >	4.875 % Vref2 5.125% Vref2 0.0495 % Vref2	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 >6.41 Volts = 0.02 Seconds = FALSE >8.41 Volts = TRUE	19/39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powertrain Relay Control (ODM) Open	P0685	Detects an open circuit in the Powertrain Relay driver. This diagnostic reports the DTC when an open circuit failure is present. Monitoring occurs when the output is powered off. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	Open Circuit: > 200 K Ω ohms impedance between output and controller ground	Run/Crank Voltage	Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0686 may also set (Powertrain Relay Control Short to Ground).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powertrain Relay Control (ODM) Low	P0686	Detects a short to ground in the Powertrain Relay low side driver. This diagnostic reports the DTC when a short to ground failure is present. Monitoring occurs when the output is powered off. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to ground: < 0.5 Q impedance between output and controller ground	Run/Crank Voltage	Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0685 may also set (Powertrain Relay Control Open Circuit).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powertrain Relay Control (ODM) High	P0687	Detects a short to power in the Powertrain Relay low side driver. This diagnostic reports the DTC when a short to power failure is present. Monitoring occurs when the output is powered off. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	Short to power: < 0.5 Q impedance between output and controller power	Run/Crank Voltage	Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Power Relay Feedback Circuit Low Voltage	P0689	Detects low voltage in the control module relay feedback circuit. This diagnostic reports the DTC when low voltage is present. Monitoring occurs when run crank voltage is above a calibrated value.	Control module relay feedback circuit low voltage	Powertrain relay voltage <=5.00	Powertrain relay short low diagnostic enable Run Crank voltage Powertrain relay state	= 1.00 >9.00 = ON	5 failures out of 6 samples 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powertrain Relay Feedback Circuit High	P0690	Detects higher than expected voltage in the powertrain relay feedback circuit. This diagnostic reports the DTC when higher than expected voltage is present. For example, the powertrain relay could be stuck on. Monitoring occurs when the relay is commanded "off for a calibrated duration.	Powertrain Relay Voltage	>= 4.00 volts will increment the fail counter	Powertrain relay commanded “OFF” No active DTCs:	>=2.00 seconds PowertrainRelayStateOn_FA	50 failures out of 63 samples 100ms / Sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
5 Volt Reference #3 Circuit	P0697	Detects a continuous or intermittent short on the 5 volt reference circuit #3 by monitoring the reference percent Vref3 and failing the diagnostic when the percent Vref3 is too low or too high or if the delta between the filtered percent Vref3 and non-filtered percent Vref3 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref3 < or ECM percent Vref3 > or the difference between ECM filtered percent Vref3 and percent Vref3 >	4.875 % Vref3 5.125% Vref3 0.0495 % Vref3	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 >6.41 Volts = 0.02 Seconds = FALSE >8.41 Volts = TRUE	19/39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
5 Volt Reference #4 Circuit	P06A3	Detects a continuous or intermittent short on the 5 volt reference circuit #4 by monitoring the reference percent Vref4 and failing the diagnostic when the percent Vref4 is too low or too high or if the delta between the filtered percent Vref4 and non-filtered percent Vref4 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref4 < or ECM percent Vref4 > or the difference between ECM filtered percent Vref4 and percent Vref4 >	4.875 % Vref4 5.125% Vref4 0.0495 % Vref4	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 >6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19/39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Knock Sensor Processor 1 Performance	P06B6	This diagnostic checks for a fault with the internal test circuit (sensor #1) used only for the '20 kHz' method of the Open Circuit Diagnostic. A fault is present when the signal level from the 20 kHz range of the FFT output falls between the Open Test Circuit thresholds.	FFT Diagnostic Output	**> P06B6_P06B7_OpenTestCktThrshMin** **AND** **< P06B6_P06B7_OpenTestCktThrshMax** **See Supporting Tables**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow	Yes > 2.0 seconds > 400 RPM and < 4,000 RPM > 200 Revs > 50 mg/cylinder and < 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Knock Sensor Processor 2 Performance	P06B7	This diagnostic checks for a fault with the internal test circuit (sensor #2) used only for the '20 kHz' method of the Open Circuit Diagnostic. A fault is present when the signal level from the 20 kHz range of the FFT output falls between the Open Test Circuit thresholds.	Individual Sensor Threshold Enabled? FFT Diagnostic Output	0.00 , Use Case 1 **Case 1:** **> P06B6_P06B7_OpenTestCktThrshMin** **AND** **< P06B6_P06B7_OpenTestCktThrshMax** **See Supporting Tables** **Case 2:** > **P06B7_OpenTestCktMin2** **AND** < **P06B7_OpenTestCktMax2** **See Supporting Tables**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow	Yes > 2.0 seconds > 400 RPM and < 4,000 RPM > 200 Revs > 50 mg/cylinder and < 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient **Case 1 Weight Coefficient =** 0.0100 Updated each engine event **Case 2 Weight Coefficient =** 0.0100 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure Control Circuit/Open	P06DA	Controller specific output driver circuit diagnoses the oil pump low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	Open Circuit > 200 k Q impedance between output and controller ground	Powertrain Relay Voltage Run/Crank Active Cranking State	> 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type B, 2 Trips Note: In certain controllers P06DB may also set (Engine Oil Pressure Control Circuit Short To Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure Control Circuit Low	P06DB	Controller specific output driver circuit diagnoses the oil pump low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to Ground Circuit < 0.5 Q impedance between output and controller ground	Powertrain Relay Voltage Run/Crank Active Cranking State	> 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type B, 2 Trips Note: In certain controllers P06DA may also set (Engine Oil Pressure Control Circuit Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure Control Circuit High	P06DC	Controller specific output driver circuit diagnoses the oil pump low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	Short to Power < 0.5 Ω impedance between output and controller power	Powertrain Relay Voltage Run/Crank Active Cranking State	> 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Two Stage Oil Pump Control Circuit Performance - One Sided	P06DD	Diagnoses the two stage oil pump is stuck. This diagnostic includes an intrusive test and a passive test. Intrusive test: The oil pump control is cycled off (high pressure) and on (low pressure) Y = 15 times at calibratable intervals. If a change in oil pressure above a calibration is not detected then the oil pressure is checked to determine if it is stuck. It takes X-out-of-Y failures to fail and set the appropriate code. Passive test: After the intrusive test passes, then a passive test will begin to run. The passive test will monitor the oil pressure changes associated with oil pump control state changes. If the passive test determines that the oil pressure change was less then desired then the intrusive test is retriggered.	<u>Fail from passing state:</u> Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is above a threshold	Oil Pressure delta = ABS [Filtered Oil Pressure at beginning of state change - filtered oil pressure after 1.5 seconds] Oil Pressure delta < **P06DD_P06DE_OP_StateChangeMin** AND Filtered Oil Pressure ≥ **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin** **P06DD_P06DE_MinOilPressThresh**)	<u>Common Criteria:</u> Two Stage Oil Pump is Present Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 8,000 RPM for longer than 30.0 seconds) No active DTC's for diagnsotic enable: Check oil pump TFTKO as a diagnostic enable when Enabled. No active DTC's for control enable: <u>Active Criteria:</u> One Sided Performance Test = Enabled	TRUE > 30.0 seconds >70.0 kPa FALSE Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensor_FA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA Enabled : OilPmpTFTKO Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensor_FA EngOilTempFA Enabled	> 12 errors out of 15 samples. Run once per trip or activiated by the Passive Test	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Oil Pump in Low State	> 1.5 seconds		
					Modelled Oil Temperature within range	40.0 deg C < Oil Temp < 100.0 deg C		
					Filtered Engine Speed within range	1,000 RPM < Filtered Engine Speed < 3,300 RPM		
					Engine Torque within range	**P06DD_P06DE_MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **P06DD_P06DE_MaxEnableTorque_OP** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinEnableTorque_OP** **P06DD_P06DE_MaxEnableTorque_OP**)		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds] < 50 RPM		
					Filtered Oil Pressure within range	Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinOilPressThresh**)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Expected Oil Pressure Delta within range	82.0 kPa <ABS[**P0521_P06DD_P06DE_ OP_HiStatePressure** **-** **P0521_P06DD_P06DE_ OP_LoStatePressure]** < 200.0 kPa		
					<u>Passive Criteria:</u>			
					Active Test Passed	TRUE		
					Filtered Engine Speed within range	1,000 RPM < Filtered Engine Speed < 4,500 RPM		
					Modelled Oil Temperature within range	40.0 deg C < Oil Temp < 100.0 deg C		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.00 seconds] < 1,000 RPM		
					Oil Pressure Delta within a range	Oil Pressure Delta < **P06DD_P06DE_OP_Stat eChangeMin** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_Stat eChangeMin**)		
			<u>Fast Pass Condition</u> Oil Pressure delta is less than a minimum delta pressure on a state	Oil Pressure delta = ABS [Filtered Oil Pressure at beginning	<u>Common Criteria:</u> Two Stage Oil Pump is Present	TRUE	0 errors out of 5 samples. Run once per trip	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			change and the measured filtered oil pressure is above a threshold	of state change - filtered oil pressure after 1.5 seconds]	Engine Running	> 30.0 seconds	or activiated by the Passive Test	
					Ambient Air Pressure	>70.0 kPa		
				Oil Pressure delta < **P06DD_P06DE_OP_StateChangeMin**	Oil Aeration (= TRUE if engine speed > 8,000 RPM for longer than 30.0 seconds)	FALSE		
				AND Filtered Oil Pressure ≥ **P06DD_P06DE_MinOilPressThresh**	No active DTC's for diagnsotic enable:	Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensor_FA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA		
				(see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin** **P06DD_P06DE_MinOilPressThresh**)	Check oil pump TFTKO as a diagnostic enable when Enabled.	Enabled : OilPmpTFTKO		
					No active DTC's for control enable:	Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensor_FA EngOilTempFA		
					<u>Active Criteria:</u> One Sided Performance Test = Enabled	Enabled		
					Oil Pump in Low State	> 1.5 seconds		
					Modelled Oil Temperature within range	40.0 deg C < Oil Temp < 100.0 deg C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Filtered Engine Speed within range	1,000 RPM < Filtered Engine Speed < 3,300 RPM		
					Engine Torque within range	**P06DD_P06DE_MinEnableTorque_OP** ≤ Indicated Requested Engine Torque < **P06DD_P06DE_MaxEnableTorque_OP** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinEnableTorque_OP P06DD_P06DE_MaxEnableTorque_OP)**		
					Expected Oil Pressure Delta within range	82.0 kPa <ABS[**P0521_P06DD_P06DE_OP_HiStatePressure - P0521_P06DD_P06DE_OP_LoStatePressure]** < 200.0 kPa		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds] < 50 RPM		
					Filtered Oil Pressure within range	Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinOilPressThresh**)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBCM is valid	Serial Communication 2's complement message - ($1C7/$1C9 for engine torque, $1CA/$1C6for axle torque) OR Serial Communication message ($1C7/$1C9 for engine torque, $1CA/ $1C6 for axle torque) rolling count index value OR Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period Torque request greater than torque request diagnostic maximum threshold	Message <> 2's complement of message Message rolling count value <> previous message rolling count value plus one Requested torque intervention type toggles from not increasing request to increasing request > 251 Nm for engine torque based traction torque system, OR > 4,000 Nm for axle torque based traction torque system	Active Communication with EBCM Power Mode Engine Running Status of traction in GMLAN message ($4E9) Run/Crank Active Ignition Voltage	Received serial data = Run = True = Traction Present > 0.50 seconds > 6.41 volts	>= 6 failures out of 10 Performed on every received message 6 rolling count failures out of 10 samples Performed on every received message >= 3 multi-transitions out of 5 samples. Performed every 200 ms >= 4 out of 10 samples Performed on every received message	Type C, 1 Trip No MIL Emissions Neutral Diagnostic - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Reset Signal Message Counter Incorrect	P1000	This DTC monitors for an error in communication with the Fuel Pump Driver Control Module Reset Signal	Communication of the Alive Rolling Count or Protection Value from the FPDCM over CAN bus is incorrect for out of total samples	 >= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) System Signals Message Counter Incorrect	P1001	This DTC monitors for an error in communication with the Evaporative Emission (EVAP) System Signal	Communication of the Alive Rolling Count or Protection Value from the EVAP System over CAN bus is incorrect for out of total samples	 >= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module System Voltage Performance (Only on applications that use an FTZM)	P1002	Detects low system voltage performance of the fuel pump driver control module system. This diagnostic reports the DTC when the absolute value of the difference between the fuel pump driver battery voltage and the fuel pump driver run/crank voltage exceeds a calibrated value.	Fuel Pump Driver Control Module Run Crank voltage low and high	ABS (Fuel Pump Driver Control Module Battery voltage - Fuel Pump Driver Control Module Run Crank voltage) > 3.00	Fuel Tank Zone Module (FTZM) is present on vehicle Fuel Pump Driver Control Module System Voltage Performance diagnostic is enabled Fuel Tank Zone Module (FTZM) serial messages are available FTZM Run Crank Active is TRUE Starter motor not engaged Sensor Bus relay is commanded ON	 = 1	50 failures out of 63 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Control System Signals Message Counter Incorrect	P1003	This DTC monitors for an error in communication with the Fuel Control System Signals	Communication of the Alive Rolling Count or Protection Value from the Fuel Control System over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Reset Error	P1005	This DTC monitors for a reset error in the Fuel Pump Driver Control Module	If the received value for the time since the last FPDCM reset has reset and the newly received value or previous value is	<=0.50 seconds	DTC is enabled	Enabled	Diagnostic runs in 50 ms loop.	Type A, 1 Trips
			for	>=2.00 counts	Sensor bus relay	On		
			out of total samples	>=400.00 counts	Battery voltage	> 11.00 Volts		
					P1000	Not active		
					U18A2	Not active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Ignition Switch Run/ Start Position Circuit High (Only on applications that use an FTZM)	P1007	Detects high voltage of the fuel pump driver control module ignition switch circuit. This diagnostic reports the DTC when the fuel pump driver control module ignition switch circuit voltage exceeds a calibrated value.	Fuel Pump Driver Control Module Ignition switch Run/Start position circuit high	FTZM Run Crank Active is TRUE	Fuel Tank Zone Module (FTZM) is present on vehicle Fuel Pump Driver Control Module Ignition Switch Run/Start Position Circuit High diagnostic is enabled Fuel Tank Zone Module (FTZM) serial messages are available Run Crank Active Sensor Bus relay is commanded ON	 = 1 = FALSE	40 failures out of 50 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Temperature (Fuel Tank Zone Module) Too High Signal Message Counter Incorrect	P1009	This DTC monitors for an error in communication with the Fuel Pump Driver Control Module (FTZM) Temperature Too High Signal Message	Communication of the Alive Rolling Count or Protection Value from the Fuel Pump Driver Control Module over CAN bus is incorrect for out of total samples	 >= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts = On (if present)	Executes in 100ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Phase U-V-W Circuit Open	P1029	This DTC detects if any of the 3phase fuel pump control circuits is Open [system configuration "Brushless"] The diagnostic can detect open circuit faults when the fuel pump is not rotating. In the "stopped" state, small currents are injected into each motor phase circuit pair by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. This process is completed in less than 1 millisecond. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are	Phased-pair circuit voltage	3V <= V [back-EMF] <= 6V	a) Sensed fuel pump speed b) Device configuration FCBR_e_ChassisFuelPressSysType c) Diagnostic Enabled - KeFABR_b_OpenCktDiagEnbl d) CAN Sensor Bus message $3EC_Avail e) Sensor Bus Relay On f) Sensor Bus B Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARCChkErr]	a) == 0 RPM b) CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys c) == TRUE d) == TRUE e) == TRUE f) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds. This open circuit diagnostic follows "smart device" Component Technical Specifications.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Phase U-V-W Circuit Low	P102A	This DTC detects if the fuel pump control circuit is shorted to low [Short to Ground] The diagnostic detects short-to-ground faults using 2 methods depending on whether the fuel pump is rotating. 1) In the "rotating" state, voltage drop across each phase-pair high-side drive is monitored, or 2) in the "stopped" state, small currents are injected into each motor phase circuit pair	Phased-pair circuit voltage Difference	Vdelta > 0.145 V	a) Device configuration FCBR_e_ChassisFuelPressSysType b) Diagnostic KeFABR_b_GshtCktDiagEnbl c) CAN Sensor Bus message $3EC_Avail d) Sensor Bus Relay On e) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZMJ nfo7_ARCChkErr]	a) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys b) == TRUE c) == TRUE d) == TRUE e) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds. This open circuit diagnostic follows "smart device" Component Technical Specifications.	Phased-pair circuit voltage	V [back-EMF] >= 6 V	a) Sensed fuel pump speed b) Device configuration FCBR_e_ChassisFuelPressSysType c) Diagnostic KeFABR_b_GshtCktDiagEnbl d) CAN Sensor Bus message $3EC_Avail e) Sensor Bus Relay On f) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZMJ nfo7_ARCChkErr]	a) == 0 RPM b) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys c) == TRUE d) == TRUE e) == TRUE f) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Phase U-V-W Circuit High	P102B	This DTC detects if the fuel pump control circuit is shorted to high voltage [Short to Battery] The diagnostic detects short-to-battery faults using 2 methods depending on whether the fuel pump is rotating. 1) In the "rotating" state, voltage drop across each phase-pair low-side current shunt is monitored, or 2) in the "stopped" state, small currents are injected	Phased-pair circuit voltage Difference	Vdelta > 0.4 V	a) Device configuration FCBR_e_ChassisFuelPressSysType b) Diagnostic KeFABR_b_PshtCktDiagEnbl c) CAN Sensor Bus message $3EC_Avail d) Sensor Bus Relay On e) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZMJ nfo7_ARCChkErr]	a) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys b) == TRUE c) == TRUE d) == TRUE e) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		into each motor phase circuit pair by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds. This open circuit diagnostic follows "smart device" Component Technical Specifications.	Phased-pair circuit voltage	V[backEMF] > 6 V	a) Sensed fuel pump speed b) Device configuration FCBR_e_ChassisFuelPressSysType b) Diagnostic KeFABR_b_PshtCktDiagEnbl c) CAN Sensor Bus message $3EC_Avail d) Sensor Bus Relay On e) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZMJ nfo7_ARCChkErr]	a) == 0 RPM b) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys b) == TRUE c) == TRUE d) == TRUE e) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Barometric Pressure Sensor A / C Correlation (applications with LIN MAF)	P10BC	Detects a performance failure in the Barometric Pressure (BARO) sensor, such as when a BARO value is stuck in range. With this monitor, the BARO sensor is compared to a redundant sensor called BARO C. If the BARO sensor value is not similar to the BARO C sensor value, then the BARO Sensor A/C Correlation diagnostic will fail.	Difference between BARO A Sensor reading and BARO C Sensor reading	> 15.0 kPa	LIN Communications established with MAF		160 failures out of 200 samples 1 sample every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Inlet Airflow System Performance (naturally aspirated)	P1101	Detects a performance failure in the Manifold Pressure (MAP) sensor, Throttle Position sensor (TPS) or Mass Air Flow (MAF) sensor that cannot be uniquely identified as a failure in one individual sensor. This diagnostic can set when more than one of these sensors has a performance concern. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from these three sensors. These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the system, but no	Filtered Throttle Model Error AND ABS(Measured Flow-Modeled Air Flow) Filtered OR ABS(Measured MAP - MAP Model 1) Filtered AND ABS(Measured MAP-MAP Model 2) Filtered	> 300 kPa*(g/s) >25.0 grams/sec > 22.0 kPa) > 22.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 4,230 RPM >= -9 Deg C = TRUE) <= 130 Deg C = FALSE) >= -20 Deg C <= 129 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** Modeled Air Flow Error multiplied by **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM** and **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est**	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		single failed sensor can uniquely be identified. In this case, the Inlet Airflow System Performance diagnostic will fail.				MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAPI Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM**		
					No Active DTCs:	MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA		
					No Pending DTCs:	EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module 5V Reference 1 Circuit	P1176	This DTC monitors for an error in the Fuel Pump Driver Control Module 5V Reference 1 Circuit	Raw Fuel Pump Driver Control Module 5V Reference 1 is or Raw Fuel Pump Driver Control Module 5V Reference 1 is or Absolute difference of the filtered Fuel Pump Driver Control Module 5V Reference 1 and Raw Fuel Pump Driver Control Module 5V Reference 1 is For a non-continuous failure of out of For a continuous failure of	> 92.25 Percent <87.75 Percent > 99.00 Percent 40.00 counts 80.00 counts 0.20 seconds	Diagnostic is enabled Run/Crank Ignition Voltage U0076 PT Sensor Bus Relay Communication with the Fuel Tank Zone Module is not lost	Enabled >=11.00 Volts Is not active Commanded on (if present)	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module 5V Reference 2 Circuit	P1177	This DTC monitors for an error in the Fuel Pump Driver Control Module 5V Reference 2 Circuit	Raw Fuel Pump Driver Control Module 5V Reference 2 is or Raw Fuel Pump Driver Control Module 5V Reference 2 is or Absolute difference of the filtered Fuel Pump Driver Control Module 5V Reference 2 and Raw Fuel Pump Driver Control Module 5V Reference 2 is For a non-continuous failure of out of For a continuous failure of	> 92.25 Percent <87.75 Percent > 99.00 Percent 40.00 counts 80.00 counts 0.20 seconds	Diagnostic is enabled Run/Crank Ignition Voltage U0076 PT Sensor Bus Relay Communication with the Fuel Tank Zone Module is not lost	Enabled >=11.00 Volts Is not active Commanded on (if present)	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit	P1178	This DTC monitors for an error in the Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit	Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is or Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is or Absolute difference of the filtered Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit and Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is For a non-continuous failure of out of For a continuous failure of	> 92.25 Percent <87.75 Percent > 99.00 Percent 40.00 counts 80.00 counts 0.20 seconds	Diagnostic is enabled Run/Crank Ignition Voltage U0076 PT Sensor Bus Relay Communication with the Fuel Tank Zone Module is not lost	Enabled >=11.00 Volts Is not active Commanded on (if present)	Executes in 50.0ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Command Signal Message Counter Incorrect	P11FF	This DTC monitors for an error in communication with the Fuel Pump Command Signals	Communication of the Alive Rolling Count or Protection Value from the Fuel Control System over CAN bus is incorrect for out of total samples	 >= 15 counts >= 16 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 1 Signal Message Counter Incorrect	P1200	This DTC monitors for an error in communication with the Fuel Pump Control Module (FTZM) Fuel Level Sensor 1 Signal Message Counter	Communication of the Fuel Level Sensor 1 Signal Message Counter from the Fuel Pump Control Module (FTZM) over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 1 low side circuit shorted to high side circuit	P1248	Controller specific output driver circuit diagnoses injector 1 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 2 low side circuit shorted to high side circuit	P1249	Controller specific output driver circuit diagnoses injector 2 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	 25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 3 low side circuit shorted to high side circuit	P124A	Controller specific output driver circuit diagnoses injector 3 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 4 low side circuit shorted to high side circuit	P124B	Controller specific output driver circuit diagnoses injector 4 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 5 low side circuit shorted to high side circuit	P124C	Controller specific output driver circuit diagnoses injector 5 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 6 low side circuit shorted to high side circuit	P124D	Controller specific output driver circuit diagnoses injector 6 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 7 low side circuit shorted to high side circuit	P124E	Controller specific output driver circuit diagnoses injector 7 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 8 low side circuit shorted to high side circuit	P124F	Controller specific output driver circuit diagnoses injector 8 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Over Temperature	P1255	To detect if an internal fuel pump driver over-temperature condition exists under normal operating conditions. The FTZM ERFS control may adjust the PWM slew rate or frequency as a self-protection method, but may not reduce pump rotational speed or impact pumping performance in any way due to an over-temperature condition.	Fuel Pump Driver Temperature	T > 160 degC	a) Diagnostic enabled [KeFABR b OvertempDiagEnbl] b) Sensor Bus Relay On c) CAN Sensor Bus message $3EC_Available d) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARCChkErr]	a) ==TRUE b) == TRUE c) == TRUE d) <> TRUE	5.00 failures / 10.00 samples 1 sample / 100 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail High Pressure Sensor 2 Out of Range	P127C	This DTC diagnose SENT high pressure sensor 2 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	High Pressure Rail Sensor 2 SENT digital read value	=< 94			Time Based: 400 Failuer out of 500 Samples 6.25 ms per Sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure Sensor 1 Internal Performance	P128A	This DTC determines if there is internal error within the SENT pressure sensor 1 (i.e. Broken wire bond internal to the SENT Sensor). Once the internal error is detected a fixed faulted digital values is communicated to the ECU.	Digital pressure sesnor 1 value	>= 4,089		Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples	Type A, 1 Trips
					SENT Fuel Rail Pressure Sensor Internal Performance Enable	True	6.25 ms per Sample Continuous	
					No Fault Pending	P16E4 P16E5 P128F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure Sensor 2 Internal Performance	P128B	This DTC determines if there is internal error within the SENT pressure sensor 2 (i.e. Broken wire bond internal to the SENT Sensor). Once the internal error is detected a fixed faulted digital values is communicated to the ECU.	Digital pressure sesnor 2 value	>= 4,089		Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples	Type A, 1 Trips
					SENT Fuel Rail Pressure Sensor Internal Performance Enable	True	6.25 ms per Sample Continuous	
					No Fault Pending	P16E4 P16E5 P128F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure & Temperature Sensor Pressure Message Incorrect	P128F	This DTC determines if there is any SENT signal waveform for discrepancies (i.e. too many pulse, too few pulse, clock shift). The SENTHWIO Determines message waveform fault (i.e.too many pulse, too few pulse, clock shift) and if the message age is too long.	SENT HWIO Determines message fault (i.e.too many pulse, too few pulse, clock shift)	= true	SENT signal Serial waveform diagnostics enable	True	400 failures out of 500 samples	Type A, 1 Trips
			Message Age	> 1.69 ms	SENT power up delay	>= 0.00 seconds	6.25 ms per sample Continuous	
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	P16E4 P16E5		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module System Ignition Switch Run/ Start Position Circuit Low (Only on applications that use an FTZM)	P129D	Detects low voltage of the fuel pump driver control module ignition switch circuit. This diagnostic reports the DTC when the fuel pump driver control module ignition switch circuit voltage is below a calibrated value.	Fuel Pump Driver Control Module Ignition switch Run/Start position circuit low	FTZM Run Crank Active is FALSE	Fuel Tank Zone Module (FTZM) is present on vehicle Fuel Pump Driver Control Module Ignition Switch Run/Start Position Circuit High diagnostic is enabled Fuel Tank Zone Module (FTZM) serial messages are available Run Crank Active Sensor Bus relay is commanded ON	 = 1 = TRUE	40 failures out of 50 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Fuel Pump Speed Signal Incorrect	P129F	FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless pump speed is inferred using rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 millisecs. Diagnostic software [FABR ring] calculates the error between the commanded, arbitrated fuel pump speed [FCBR ring] and the FTZM sensed fuel pump speed. The error is filtered and evaluated against calibratable threshold limits to determine pass/fail status. Any failure that exists on the fuel pump output circuit (3 phases) will be manifested in a Fuel Pump Speed	Sensed Filtered Fuel Pump Speed Error	> Speed Error Low Threshold [Supporting Table] **P129F Threshold Low** OR < Speed Error High Threshold [Supporting Table] **P129F Threshold High**	a) Diagnostic Enabled FABR Speed Rationality Diagnostic b) CAN Sensor Bus message $0CB_Available c) FABR Fuel Control Enable Fault Active d) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B $0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr] e) FABR Fuel Pump Ckt FA f) FABR Driver OverTemp FA g) Run_Crank input Voltage h) Sensor Bus Relay On j) CAN Sensor Bus message $0CB Data Fault [CFMR_b_FTZM_lnfo8_ARCChkErr] k) CAN Sensor Bus message $0CB Comm Fault [CFMR_b_FTZM_lnfo8_UcodeCmFA] l) Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_UcodeCmFA] m) Timer - FABR Rising Edge Diagnostic Delay n) Timer - FABR Falling Edge Diagn Delay	a) == TRUE b) == TRUE c) <> TRUE d) <> TRUE e) <> TRUE f) <> TRUE g) > 9.00 volts h) == TRUE j) <> TRUE k) <> TRUE l) <> TRUE m) > 2.20 seconds n) > 1.00 seconds	1 sample / 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		Rationality Diagnostic fault. Reported fuel pump speed data will only be consumed in this same diagnostic.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Enable Circuit Performance [FTZM Brushed Motor Fuel Pump applications only]	P12A6	The purpose of the Fuel Pump Driver Control Module Enable Circuit Performance Diagnostic is to detect if the state of the fuel control enable circuit is valid. This is accomplished by comparing the Fuel Control Enable circuit voltage state [high or low] measured by the Fuel Pump Driver Control Module to the state of Fuel Control Enable signal in the ECM. When the measured state does not match the expected state, the fail counter increments.	Fuel Control Enable Circuit Voltage State (Fuel Pump Driver Control Module)	<> Fuel Control Enable State (ECM)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Serial Data message FTZM Information 2 ($CC) Alive Rolling Count Check Error d) Diagnostic serial data available (message $CC) e) Sensor Bus Relay On f1) Run_Crank Ignition Sw Position Active OR f2) Run_Crank Ignition Sw Position Active timer [delay]	a) == FCBR ECM [Gas or Diesel] FTZM [Brushed DC or Brushless DC pump] Sys b) ==TRUE c) <> True d) ==TRUE e) == TRUE f1) <> True OR f2) >= 0.00 seconds	0 failures / 0 samples 1 sample / 12.5 millisec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Control Module (Fuel Tank Zone Module) Control Signal Message Counter Incorrect	P12A8	This DTC monitors for an error in communication with the Fuel Pump Control Module (FTZM) Control Signal Message	Communication of the Alive Rolling Count or Protection Value from the Fuel Pump Control Module (FTZM) over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Run/ Start Voltage Signal Message Counter Incorrect	P130F	This DTC monitors for an error in the Ignition Run/Start Voltage Signal Message Counter	Communication of the Alive Rolling Count or Protection Value from the Fuel Pump Control Module (FTZM)over CAN bus is incorrect for out of total samples	 >= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Coil Positive Voltage Circuit Group 1 * * SIDI ONLY * *	P135A	This diagnostic checks for minimum voltage at the fuse which supplies power to the Ignition Coils (applicable only for SIDI applications). A diagnostic failure indicates a blown fuse.	Ignition Module Supply Voltage.	<2.5 Volts	Diagnostic Enabled? Three possible Ignition Coil Power Sources (only 1 used): Ignition Coil Power Source = <u>Case 1: Battery</u> Delay starting at Key-On <u>Case 2: Ignition Run/ Crank</u> Ignition Run/Crank Voltage <u>Case 3: PT Relay</u> PT Relay Voltage	Yes PT Relay (Case 3) 5 Engine Revs > 5.0 volts >11.0 volts	50 Failures out of 63 Samples 6.25 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Coil Positive Voltage Circuit Group 2 * * SIDI ONLY * *	P135B	This diagnostic checks for minimum voltage at the fuse which supplies power to the Ignition Coils (applicable only for SIDI applications). A diagnostic failure indicates a blown fuse.	Ignition Module Supply Voltage.	<2.5 Volts	Diagnostic Enabled?	Yes	50 Failures out of 63 Samples 6.25 msec rate	Type: Type A, 1 Trips
					Three possible Ignition Coil Power Sources (only 1 used):			
					Ignition Coil Power Source =	PT Relay (Case 3)		
					<u>Case 1: Battery</u> Delay starting at Key-On	5 Engine Revs		
					<u>Case 2: Ignition Run/ Crank</u> Ignition Run/Crank Voltage	>5.0 volts		
					<u>Case 3: PT Relay</u> PT Relay Voltage	>11.0 volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor A Reference Feedback Range/ Performance [For use on vehicles with FTZM]	P1434	This DTC will detect a fault in Primary fuel tank level sensor 5V reference by comparing DEC ECU commanded signal period and pulse width values against measured period and pulse width reported by the smart device	Reference Voltage 0 Period Error Maximum [Measured Ref V Period - Commanded RefV Period]	> 25.00 millisec	a] CAN serial data available [$2D7] b] Calibration - Reference Voltage Command Source c] Timer - Reference Voltage Pulse Width Available Synchronization d] Timer - Reference Voltage Period Available Delay e] Diagnostic System Disabled f] FTZM Serial Data Info4 Rolling Counter Check Error g] Reference Voltage Performance 0 Diagnostic Enabled	a] == True b] == ECM c] > 1.25 sec d] > 0.75 sec e] <> True f] <> True g] == TRUE	250 ms / sample	Type B, 2 Trips
			Reference Voltage 0 Pulse Width Error Maximum [Measured Ref V PW - Commanded Ref V PW]	> 1.50 millisec	a] CAN serial data available [$2D7] b] Calibration - Reference Voltage Command Source c] Timer - Reference Voltage Pulse Width Available Synchronization d] Timer - Reference Voltage Period Available Delay e] Diagnostic System Disabled	a] == True b] == ECM c] > 1.25 sec d] > 0.75 sec e] <> True	250 ms / sample 16 Failures/ 20 Samples	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					f] FTZM Serial Data Info4 Rolling Counter Check Error g] Reference Voltage Performance 0 Diagnostic Enabled	f] <> True g] == TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Mass Air Flow Sensor A Signal Message Counter Incorrect	P14B6	This DTC monitors for an error in communication with the Mass Air Flow Sensor A	Communication of the Alive Rolling Count Press_2B_C03 from the Mass Air Flow Sensor A over LIN bus is incorrect for out of total samples Or Communication of the Alive Rolling Count TmpHum_2A_C03 from the Mass Air Flow Sensor A over LIN bus is incorrect for out of total samples	>=8.00 counts >= 10.00 counts >= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Engine Speed Request Circuit	P150C	This DTC monitors for an error in communication with the Transmission Engine Speed Request signal in$19D	Communication of the Alive Rolling Count or Protection Value in the Transmission Engine Speed signal over CAN bus is incorrect for out of total samples	 >= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts	Executes in 25ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Throttle Position Steady State Actuation Fault	P1516	Detect an inablity to maintain a steady state throttle position.	The absolute difference between desired and indicated throttle position is >	2.00 percent	Run/Crank voltage TPS minimum learn is not active AND Throttle is being Controlled Throttle is considered in a steady state condition when the desired throttle position over a 12.5 ms period is For a settling time period Ignition voltage failure is false	>6.41 Volts < 0.25 percent > 4.00 seconds P1682	0.49 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module SIDI High Pressure Pump current monitor	P163A	This DTC Diagnoses the current from the control area and compares it with calibrated thresholds to set current high and low flags	SIDI fuel pump High Current Test Current SIDI fuel pump Low Current Test Current	 >= 11.00 Amps <= 0.10 Amps	Battery Voltage Low Side Fuel Pressure Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA.FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false andEngine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA	>= 11 Volts > 0.275 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking	Current High/ Low 10 seconds failures out of 12.50 seconds sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Ignition voltage out of correlation error(P1682) not active and Barometric Pressure Inlet Air Temp Fuel Temp	 >= 70.0 KPA >= -40.0 degC -40 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Sensor Reference Voltage Status Message Counter Incorrect	P165C	This DTC monitors for an error in communication with the Sensor Reference Voltage Status Signals	Communication of the Alive Rolling Count or Protection Value from the Fuel Control System over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >=11.00 Volts >=11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

<table>
<tr><th>Component/ System</th><th>Fault Code</th><th>Monitor Strategy Description</th><th>Malfunction Criteria</th><th>Threshold Value</th><th>Secondary Parameters</th><th>Enable Conditions</th><th>Time Required</th><th>MIL Ilium.</th></tr>
<tr><td>Ignition Voltage Correlation</td><td>P1682</td><td>Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage and the Powertrain Relay Ignition Voltage. The diagnostic monitors the difference in voltage between Run/Crank Voltage and the Powertrain Relay Ignition Voltage and fails the diagnostic when the voltage difference is too high. This diagnostic only runs when the powertrain is commanded on and the Run/Crank Voltage is greater than a threshold based on IAT or the powertrain ignition voltage is high enough the Run/Crank voltage is high enough.</td><td>|Run/Crank - PT Relay Ignition) ></td><td>3.00 Volts</td><td></td><td>Powertrain Relay commanded on

AND

(Run/Crank voltage > Table, f(IAT). See supporting tables: P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)

OR PT Relay Ignition voltage > 5.50 Volts)

AND

Run/Crank voltage > 5.50 Volts</td><td>240/480 counts; or

0.175 sec continuous;

12.5 ms/count in main processor</td><td>Type A, 1 Trips</td></tr>
</table>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Voltage Correlation #2	P16A7	Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage and the Powertrain Relay Ignition Voltage #2. The diagnostic monitors the difference in voltage between Run/Crank Voltage and the Powertrain Relay Ignition Voltage and fails the diagnostic when the voltage difference is too high. This diagnostic only runs when the powertrain is commanded on and the Run/Crank Voltage is greater than a threshold based on IAT or the powertrain ignition voltage is high enough the Run/Crank voltage is high enough. Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage & the Powertrain Relay Ignition Voltage #2.	|Run/Crank - PT Relay Ignition) >	3.00 Volts		Powertrain commanded on AND (Run/Crank voltage > Table, f(IAT). See supporting tables: **P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)** OR PT Relay Ignition voltage > 5.50 Volts) AND Run/Crank voltage > 5.50 Volts	240/480 counts; or 0.175 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Controls Ignition Relay Feedback Circuit 2 High Voltage -(GEN III Controllers ONLY)	P16B3	Detects high voltage in the engine controls ignition relay feedback circuit 2. This diagnostic reports the DTC when high voltage is present. Monitoring occurs when the relay state is inactive.	Engine controls ignition relay feedback circuit 2 high voltage	Relay voltage >= 4.00	Powertrain relay high diag enable Powertrain relay state	= 1.00 = INACTIVE	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Sensor Bus Relay Control Circuit Open	P16D7	Detects an open circuit in the sensor bus relay circuit. This diagnostic reports the DTC when an open circuit is present. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	Open Circuit: > 200 K Q ohms impedance between output and controller ground	Run/Crank Voltage	Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P16D8 may also set (Sensor Bus Relay Control Circuit Low).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Sensor Bus Relay Control Circuit Low	P16D8	Detects a short to ground in the sensor bus relay circuit. This diagnostic reports the DTC when a short to ground is present. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to ground: < 0.5 Ω impedance between output and controller ground	Run/Crank Voltage	Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P16D7 may also set (Sensor Bus Relay Control Circuit Open).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Sensor Bus Relay Control Circuit High	P16D9	Detects a short to power in the sensor bus relay circuit. This diagnostic reports the DTC when a short to power is present. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	Short to power: < 0.5 Q impedance between output and controller power	Run/Crank Voltage	Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure & Temperature Sensor Communication Circuit 3 Low Voltage	P16E4	This DTC determines if the SENT signal shorted low, this is determined by monitoring the number pulses on the SENT signal line received at the ECU and the SENT Signal Line State always indicating low.	The number pulses on the SENT signal line SENT Signal Line State	<= 5 = Low	SENT Sensor Communication Circuit Diagnostic Enabled SENT power up delay	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure & Temperature Sensor Communication Circuit 3 High Voltage	P16E5	This DTC determines if the SENT signal shorted low, this is determined by monitoring the number pulses on the SENT signal line received at the ECU and the SENT Signal Line State always indicating high.	The number pulses on the SENT signal line SENT Signal Line State	<= 5 = High	SENT Sensor Communication Circuit Diagnostic Enabled SENT power up delay	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Redundant Memory Performance (Gasoline applications ONLY)	P16F3	Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures For all of the following cases: If the individual diagnostic threshold is equal to 2048 ms, this individual case is not applicable. If any of the following cases are X out of Y diagnostics and the fail (x) is greater than the sample (Y), this individual case is also not applicable.	Equivance Ratio torque compensation exceeds threshold	-288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	Type A, 1 Trips
			Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given by threshold	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range	104.75 mg	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference between the previous Final Advance and the current Final Advance not Adjusted for Equivalence Ratio is out of bounds given by threshold range	16.58 degrees		Engine speed >0rpm	Up/down timer 429 ms continuous, 0.5 down time multipier	
			Torque Learn offset is out of bounds given by threshold range	High Threshold 0.00 Nm Low Threshold 0.00	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
				Nm				
			One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold	80.00 mg		Engine speed > 570 rpm	Up/down timer 460 ms continuous, 0.5 down time multipier	
			Difference between Unmanaged Spark and PACS Spark is greater than threshold	16.57 degrees	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 3,154.84 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 3,154.84 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Arbitrated Air-Per-Cylinder filter coefficient is out of bounds given by threshold range	High Threshold 1.000 Low Threshold 0.074	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Launch spark is active but the launch spark redundant path indicates it should not be active	N/A		Engine speed < 7,900.00 or 8,000.00 rpm (hysteresis pair)	Up/down timer 160 ms continuous, 0.5 down time multipier	
			Rate limited vehicle speed and its dual store do not equal	N/A		Time since first CAN message with vehicle speed >= 0.500 sec	10/40 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Commanded engine torque due to fast actuators and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded engine torque due to slow actuators and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			TOS to wheel speed conversion factor is out of bounds given by threshold range	High Threshold: 1.10 T/C Range Hi 0.10 T/C Range Lo Low Threshold: 1.10 T/C Range Hi 0.10 T/C Range Lo	Ignition State	Accessory, run or crank	255/6 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Cylinders active greater than commanded	5 cylinders		Engine run flag = TRUE > 2.00 s Number of cylinder events since engine run > 24 No fuel injector faults active	Up/down timer 460 ms continuous, 0.5 down time multipier	
			Driver progression mode and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Predicted torque for uncorrected zero pedal determination is greater than calculated limit.	Table, f(Engine, Oil Temp). **P16F3_Speed Control External Load f(Oil Temp, RPM)** + 288.91	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
				Nm				
			Engine Predicted Request Without Motor is greater than its redundant calculation plus threshold	287.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Engine Immediate Request Without Motor is greater than its redundant calculation plus threshold	287.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Positive Torque Offset is greater than its redundant calculation plus threshold OR Positive Torque Offset is less than its redundant calculation minus threshold	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Request is greater than its redundant calculation plus threshold	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, down time multipier0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Commanded Hybrid Predicted Crankshaft Request is greater than its redundant calculation plus threshold	4,096.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Hybrid Immediate Crankshaft Request is less than its redundant calculation minus threshold	4,096.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Regeneration Brake Assist is not within a specified range	Brake Regen Assist < 0 Nm or Brake Regen Assist > 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta	16.57 degrees	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			1. Cylinder Torque Offset exceeds step size threshold OR 2. Sum of Cylinder Torque Offset exceeds sum threshold	1. 288.91 Nm 2. 288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Engine Capacity Minimum Immediate Without Motor is greater than its dual store plus threshold	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Engine Capacity Minimum Engine Off is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Engine Capacity Minimum Engine Immediate Without Motor is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Immediate Engine Request is greater than its redundant calculation plus threshold	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Engine Speed Lores Intake Firing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than Orpm	Up/down timer 160 ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing timing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than Orpm	Up/down timer 160 ms continuous, 0.5 down time multipier	
			Idle speed control calculated predicted minimum torque request exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: **P16F3_Speed Control External Load f(Oil Temp, RPM)** + 288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Idle speed control calculated predicted minimum torque without reserves exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: **P16F3_Speed Control External Load f(Oil Temp, RPM)** + 288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	3,154.84 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Driver Immediate Request is less than its redundant calculation minus threshold	3,154.84 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Commanded Immediate Request is greater than its redundant calculation plus threshold OR Commanded Immediate Request is less than its redundant calculation minus threshold	3,154.84 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Immediate Response Type is set to Inactive	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference between Cruise Axle Torque Arbitrated Reouest and	118.31 Nm		Cruise has been engaged for more than 4.00	Up/down timer 2,048 ms continuous.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Cruise Axle Torque Request exceeds threshold			seconds	0.5 down time multipier	
			Desired engine torque request greater than redundant calculation plus threshold	287.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Engine min capacity above threshold	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 69 ms continuous, 0.5 down time multipier	
			No fast unmanaged retarded spark above the applied spark plus the threshold	15.00 Degree		Engine speed greater than Orpm	Up/down timer 429 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Absolute difference of adjustment factor based on temperature and its dual store above threshold	2.76 m/s	Ignition State	Accessory, run or crank	Up/down timer 97 ms continuous, 0.5 down time multipier	
			1. Absolute difference of redundant calculated engine speed above threshold	500 RPM		Engine speed greater than 0 RPM	Up/down timer 160 ms continuous, 0.5 down time multipier	
			After throttle blade pressure and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Speed Control's Preditcted Torque Request and its dual store	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			do not match				0.5 down time multipier	
			Engine oil temperature and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 233 ms continuous, 0.5 down time multipier	
			Desired throttle position greater than redundant calculation plus threshold	10.00 percent	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of the rate limited pre-throttle pressure and its redundant calculation greater than threshold	0.06 kpa	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Throttle desired torque above desired torque plus threshold	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Desired filtered throttle torque exceeds the threshold plus the higher of desired throttle torque or modeled throttle torque	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Torque feedback proportional term is out of allowable range or its dual store copy does not match	High Threshold 144.46 Nm Low Threshold -144.46 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Torque feedback integral term magnitude or rate of change is out of allowable range or its dual store copy do not match	High Threshold 270.85 Nm Low Threshold -288.91 Nm Rate of change threshold 18.06 Nm/loop	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of Final Torque feedback proportional plus integral term and its redundant calculation is out of bounds given by threshold range	High Threshold 288.91 Nm Low Threshold -288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Difference of torque desired throttle area and its redundant calculation is out of bounds given by threshold range	High Threshold 3.58 % Low Threshold -3.58%	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range	High Threshold 0.0003023 Low Threshold -0.0003023	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Difference of base friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
				Low Threshold -288.91 Nm				
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 288.91 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			AC friction torque is greater than commanded by AC control software or less than threshold limit	High Threshold 60.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 288.91 Nm Low Threshold -288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Generator friction torque is out of bounds given by threshold range	High Threshold 288.91 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Absolute difference between the Supercharger friction toroue and its redundant	288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			calculation greater than threshold				down time multipier	
			Filtered Torque error magnitude or its increase rate of change is out of allowable range or its dual store copy do not match	High Threshold 288.91 Nm Low Threshold -288.91 Nm Rate of change threshold 18.06 Nm/loop		Engine speed >0rpm MAF, MAP and Baro DTCs are false	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Torque error compensation is out of bounds given by threshold range	High Threshold 288.91 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Delta Torque Baro compensation is out of bounds given by threshold range	High Threshold 13.14 Nm Low Threshold -19.80 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			1. Difference of reserve torque value and its redundant calculation exceed threshold OR 2. Reserve request does not agree with operating conditions or Difference of final predicted torque and its redundant calculation exeed threshold OR 3. Rate of change of reserve torque exceeds threshold, increasing direction only OR 4. Reserve engine torque above allowable capacity threshold	1.287.91 Nm 2. N/A 3.287.91 Nm 4.287.91 Nm	3. &4.: Ignition State	1. &2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 288.91 Nm 3. &4.: Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Engine Vacuum and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of the calculated Intake Manifold Pressure during engine event versus during time	Table, f(Desired Engine Torque). See supporting tables:		Engine speed >0rpm	Up/down timer 160 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			event is greater than threshold	**P16F3_Delta MAP Threshold f(Desired Engine Torque)**			down time multipier	
			Min. Axle Torque Capacity is greater than threshold	0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Driver Predicted Request is greater than its redundant calculation plus threshold OR Driver Predicted Request is less than its redundant calculation minus threshold	3,154.84 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Cold Delta Friction Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Predicted torque for zero pedal determination is greater than calculated limit.	Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM) +** 288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Predicted Axle Torque and its dual store do not match	1 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Steady State Estimated Engine Torque and its dual store are not equal	N/A		AFM not changing from Active to Inactive and preload torque not	Up/down timer 2,048 ms continuous,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						changing and one loop after React command Engine speed >0rpm	0.5 down time multipier	
			Difference of Weighting factor for number of cylinders fueled and its redundant calculation is above threshold	0.26		Engine run flag = TRUE > 10.00 s	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range	16.58 degrees	Ignition State	Accessory, run or crank	Up/down timer 160 ms continuous, 0.5 down time multipier	
			Difference of commanded spark advance and adjusted delivered is out of bounds given by threshold range	16.58 degrees		Engine speed >0rpm	Up/down timer 429 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Absolute difference between Estimated Engine Torque and its dual store are above a threshold	288.91 Nm		Engine speed >0rpm	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Absolute difference between Estimated Engine Torque without reductions due to torque control and its dual store are above a threshold	288.91 Nm		Engine speed >0rpm	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of desired spark advance for managed torque and its redundant calculation is out of bounds given by threshold range	16.58 degrees		Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 288.91 Nm	Up/down timer 460 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Absolute difference of Engine Capacity Minimum Running Immediate Brake Torque Excluding Cylinder Sensitivity and its redundant calculation is out of bounds given by threshold range	289 Nm		Engine speed >0rpm	Up/down timer 175 ms continuous, 0.5 down time multipier	
			One step ahead calculation of air-per-cylinder greater than two step ahead calculation by threshold for time	Threshold: Dynamically calculated based on current engine conditions Fault Pending Threshold: 100 ms		Engine speed > 570 rpm	Up/down timer 460 ms continuous, 0.5 down time multipier	
			Rate limited cruise axle torque request and its dual store do not match within a threshold	118.31 Nm	Ignition State	Accessory, run or crank	Up/down timer 163 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			1. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its redundant calculation is out of bounds given by threshold range OR 2. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its dual store do not equal OR 3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal	1. 5.00 % 2. N/A 3. N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded axle torque	3,154.84	Ignition State	Accessory, run or crank	Up/down timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			is greater than its redundant calculation by threshold	Nm			475 ms continuous, 0.5 down time multipier	
			Commanded axle torque is less than its redundant calculation by threshold	4,732.26 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Preload timer and its redundant calculation do not equal	N/A	Ignition State	Accessory, run or crank AFM apps only	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			AC friction torque is greater than commanded by AC control software	60.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Engine Speed Lores Intake Firing (time based) calculation does not equal its redundant calculation	N/A		Engine speed >0rpm	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of the calculated spark offset for equivalence ratio and its redundant cacluation is greater than a threshold	16.58 degrees		Engine speed >0rpm	Up/down timer 160 ms continuous, 0.5 down time multipier	
			Transmission Torque Request cacluations do not equal their dual stores	N/A		Run or Crank = TRUE > 0.50 s	16/32 counts; 25.0msec/count	
			Absolute difference of the predicted motor torque ACS and its redundant cacluation is greater than a threshold	0.01 Nm			Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of maximum throttle area	15 mm2			Up/down timer 97	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			and its redundant cacluation is greater than a threshold				ms continuous, 0.5 down time multipier	
			Absolute difference of Desired TIAP and its redundant cacluation is greater than a threshold	5.00 kPa			Up/down timer 475 ms continuous, 0.5 down time multipier	
			Pedal learns and their redundant calculation do not equal		Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Throttle learns and their redundant calculation do not equal		Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Desired Throttle Position and its redundant calculation do not equal		Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Calculated or Commanded Engine to Axle ratio is lower than a threshold -OR- Engine to Axle Offset is greater than a threshold	0.9 288.91 Nm	Ignition State	Accessory, run or crank	Up/down timer 175.00 ms continuous, 0.5 down time multipier	
			Difference between	118.31 Nm	Ignition State	Accessory, run or crank	Up/down timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Cruise Arbitration Request and its redundant calcultion exceeds a threshold -OR- Difference between Cruise Accleration Request and its redundant calcultion exceeds a threshold	 0.10 KPH/Second			500.00 ms continuous, 0.5 down time multipier	
			Delivered fraction does not match commanded fraction within a specified time limit	0.0100	Engine State	Running	Up/down timer 2,047.97 ms continuous, 0.5 down time multipier	
			Difference between delivered cylinder deactivation does not match commanded cylinder deactivation is greater than a threshold	64.00	Engine State	Running	Up/down timer 2,047.97 ms continuous, 0.5 down time multipier	
			Difference between commanded Axle Torque and its redundant calcultion is greater than a threshold -OR- Difference between commanded Axle Torque and its redundant calcultion is less than a threshold	3,154.84 Nm 4,732.26 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,047.97 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Actuator Solenoid Circuit Low- Bank 1	P2088	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 Q impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Actuator Solenoid Circuit High - Bank 1	P2089	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 Ω impedance between signal and controller power	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Post Catalyst Fuel Trim System Too Lean Bank 1	P2096	Determines if the post catalyst 02 sensor based fuel control system is indicating a lean exhaust gas condition. If the lean condition is such that the control system utilizes all or most of its available high limit authority (high limit = 100% authority), then P2096 will set. The monitor can be calibrated to fail based on the Average Integral Offset % Authority, the Average Total Offset % Authority or both combined. The Average Total Offset metric consists of the average of the Integral Offset+ Proportional Offset. Note: When the post catalyst 02 voltage is too lean, the post catalyst 02 integral and proportional offset control is increased (positive % authority). This applies a rich bias to fuel control in an attempt to counteract the lean condition. A perfectly balanced control system (no rich or lean bias required) is represented by integral	The Average Integral Offset % Authority AND The Average Total Offset % Authority (Note: any value greater than or equal to +100% effectively nullifies the Average Total Offset % Authority criteria) High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 35 % for >= 5.0 seconds AND the % Authority metric is approaching the failure threshold. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 30 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	>=86.0 % >=60.0 % If the P2096 is actively failing then the Average Integral Offset must be < 75.0 % and the Average Total Offset must be < 200.0 % for the diagnostic to report a pass.	The post cat fuel trim diagnostic is enabled The diagnostic is enabled during: Deceleration Idle Cruise Light Acceleration Heavy Acceleration Ambient Air Pressure Engine AirFlow Intake Manifold Pressure Induction Air Temperature Start-up Coolant Temp. PTO Intrusive diag. fuel control Ethanol Estimation in Progress 02 Heater Learned Resistance Long Term Secondary Fuel Trim Enabled for (see **"Long Term Secondary Fuel Trim Enable Criteria"** in Supporting Tables) High Vapor Conditions Green Cat System	 No No Yes Yes Yes >= 70 kPa >= 0.0 g/s <= 10,000.0 >= 0 kPa <= 256 >= -20 deg. C <= 200 >= -20 deg. C (or OBD Coolant Enable Criteria = TRUE) Not Active Not Active Not Active = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") >= 0.1 seconds Not Present = Not Valid,	Frequency: Continuous Monitoring in 100ms loop. The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 100.0 seconds (1,000 samples) before comparing to their respective failure thresholds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst 02 sensor that is within its optimal operating range (neither rich nor lean).			Condition	Green Cat System condition is considered valid until the accumulated air flow is greater than 720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is above 22grams/sec.		
					No Fault Active for:	AmbientAirDefault AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorFA CamSensorAnyLocationFA EvapEmissionSystem_FA EvapFlowDuringNonPurge_FA FuelTankPressureSnsrCkt_FA EvapPurgeSolenoidCircuit_FA EvapSmallLeak_FA EvapVentSolenoidCircuit_FA FuelInjectorCircuit_FA MAF_SensorFA MAF_SensorTFTKO MAP_SensorFA MAP_EngineVacuumStatus EngineMisfireDetected_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					For the cells identified as enabled (i.e. those containing a "Yes" at the beginning of the Enable Conditions column), the minimum accumulated samples required before the fuel control metric is considered usable for that cell (1 sample = 100ms): Deceleration Idle Cruise Light Acceleration Heavy Acceleration (Note: A value in any of the above operating "cells" that is an order of magnitude (or more) higher than other cells is an indication that the diagnostic is not capable of diagnosing in that cell).	A/F Imbalance Bankl O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA 300 300 300 300 300		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Post Catalyst Fuel Trim System Too Rich Bank 1	P2097	Determines if the post catalyst 02 sensor based fuel control system is indicating a rich exhaust gas condition. If the rich condition is such that the control system utilizes all or most of its available low limit authority (low limit = -100% authority), then P2097 will set. The monitor can be calibrated to fail based on the Average Integral Offset % Authority, the Average Total Offset % Authority or both combined. The Average Total Offset metric consists of the average of the Integral Offset+ Proportional Offset. Note: When the post catalyst 02 voltage is too rich, the post catalyst 02 integral and proportional offset control is decreased (negative % authority). This applies a lean bias to fuel control in an attempt to counteract the rich condition. A perfectly balanced control system (no rich or lean bias required) is represented by integral	The Average Integral Offset % Authority AND The Average Total Offset % Authority (Note: any value less than or equal to -100% effectively nullifies the Average Total Offset % Authority criteria) High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 35 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 30 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	<= -85.0 % <= -55.0 % If the P2097 is actively failing then the Average Integral Offset must be > -75.0 % and the Average Total Offset must be > -200.0% for the diagnostic to report a pass.	Same as P2096	Same as P2096	Frequency: Continuous Monitoring in 100ms loop. The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 100.0 seconds (1,000 samples) before comparing to their respective failure thresholds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst 02 sensor that is within its optimal operating range (neither rich nor lean).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Post Catalyst Fuel Trim System Too Lean Bank 2	P2098	Determines if the post catalyst 02 sensor based fuel control system is indicating a lean exhaust gas condition. If the lean condition is such that the control system utilizes all or most of its available high limit authority (high limit = 100% authority), then P2098 will set. The monitor can be calibrated to fail based on the Average Integral Offset % Authority, the Average Total Offset % Authority or both combined. The Average Total Offset metric consists of the average of the Integral Offset+ Proportional Offset. Note: When the post catalyst 02 voltage is too lean, the post catalyst 02 integral and proportional offset control is increased (positive % authority). This applies a rich bias to fuel control in an attempt to counteract the lean condition. A perfectly balanced control system (no rich or lean bias required) is represented by integral	The Average Integral Offset % Authority AND The Average Total Offset % Authority (Note: any value greater than or equal to +100% effectively nullifies the Average Total Offset % Authority criteria) High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 35 % for >= 5.0 seconds AND the % Authority metric is approaching the failure threshold. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 30 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	>= 87.0% >= 60.0% If the P2098 is actively failing then the Average Integral Offset must be < 75.0 % and the Average Total Offset must be < 200.0 % for the diagnostic to report a pass.	The post cat fuel trim diagnostic is enabled The diagnostic is enabled during: Deceleration Idle Cruise Light Acceleration Heavy Acceleration Ambient Air Pressure Engine AirFlow Intake Manifold Pressure Induction Air Temperature Start-up Coolant Temp. PTO Intrusive diag. fuel control Ethanol Estimation in Progress 02 Heater Learned Resistance Long Term Secondary Fuel Trim Enabled for (see "Long Term Secondary Fuel Trim Enable Criteria" in Supporting Tables) High Vapor Conditions Green Cat System	 No No Yes Yes Yes >= 70 kPa >= 0.0 g/s <= 10,000.0 >= 0 kPa <= 256 >= -20 deg. C <~— 200 >= -20 deg. C (or OBD Coolant Enable Criteria = TRUE) Not Active Not Active Not Active = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") >= 0.1 seconds Not Present = Not Valid,	Frequency: Continuous Monitoring in 100ms loop. The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 100.0 seconds (1,000 samples) before comparing to their respective failure thresholds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst 02 sensor that is within its optimal operating range (neither rich nor lean).			Condition	Green Cat System condition is considered valid until the accumulated air flow is greater than 720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is above 22grams/sec.		
					No Fault Active for:	AmbientAirDefault AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorFA CamSensorAnyLocationFA EvapEmissionSystem_FA EvapFlowDuringNonPurge_FA FuelTankPressureSnsrCkt_FA EvapPurgeSolenoidCircuit_FA EvapSmallLeak_FA EvapVentSolenoidCircuit_FA FuelInjectorCircuit_FA MAF_SensorFA MAF_SensorTFTKO MAP_SensorFA MAP_EngineVacuumStatus EngineMisfireDetected_FA A/F Imbalance Bank2		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						O2S_Bank_2_Sensor_1_ FA O2S_Bank_2_Sensor_2_ FA		
					For the cells identified as enabled (i.e. those containing a "Yes" above), the minimum accumulated samples required before the fuel control metric is considered usable for that cell (1 sample = 100ms):			
					Deceleration Idle Cruise Light Acceleration Heavy Acceleration	300 300 300 300 300		
					Note: A value in any of the above operating "cells" that is an order of magnitude (or more) higher than other cells is an indication that the diagnostic is not capable of diagnosing in that cell).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Post Catalyst Fuel Trim System Too Rich Bank 2	P2099	Determines if the post catalyst 02 sensor based fuel control system is indicating a rich exhaust gas condition. If the rich condition is such that the control system utilizes all or most of its available low limit authority (low limit = -100% authority), then P2099 will set. The monitor can be calibrated to fail based on the Average Integral Offset % Authority, the Average Total Offset % Authority or both combined. The Average Total Offset metric consists of the average of the Integral Offset+ Proportional Offset. Note: When the post catalyst 02 voltage is too rich, the post catalyst 02 integral and proportional offset control is decreased (negative % authority). This applies a lean bias to fuel control in an attempt to counteract the rich condition. A perfectly balanced control system (no rich or lean bias required) is represented by integral	The Average Integral Offset % Authority AND The Average Total Offset % Authority (Note: any value less than or equal to -100% effectively nullifies the Average Total Offset % Authority criteria) High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 35 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 30 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	>= -80.0% . >= -55.0 % If the P2099 is actively failing then the Average Integral Offset must be < -75.0 % and the Average Total Offset must be < -200.0% for the diagnostic to report a pass.	Same as P2098	Same as P2098	Frequency: Continuous Monitoring in 100ms loop. The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 100.0 seconds (1,000 samples) before comparing to their respective failure thresholds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst 02 sensor that is within its optimal operating range (neither rich nor lean).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error. This is determined if the difference between measured throttle position and modeled throttle position is greater than a threshold or less than a threshold. This diagnostic only runs when the engine is running and the voltage is high enough and there is not a voltage failure and the throttle position minimum learn is not active and the throttle is being controlled 2) Throttle control is driving the throttle in the incorrect direction. This is determined if the throttle position is greater than a threshold percent and the powertrain relay voltage is high enough and the throttle position minimum learn is active.	Difference between measured throttle position and modeled position, (modeled = MAX (Commanded vs. Commanded Filtered)) > OR Difference between modeled position (modeled = MIN (Commanded vs. Commanded Filtered)) and measured throttle position >	10.00 percent 10.00 percent	TPS minimum learn is not active AND Powertrain Relay Contactl Fault is FALSE (no P1682 fault) AND Throttle Control is not in Service or DVT control AND Throttle is being Controlled AND ((Engine Running AND Run/Crank Voltage) OR Run Crank Voltage)	> 5.50 Volts >8.41 Volts	15 counts; 12.5 ms/count in the primary processor	Type A, 1 Trips
			Throttle Position >	36.00 percent	TPS minimum learn active AND Powertrain Relay Contactl Fault is FALSE (no P1682 fault) AND Throttle Control is not in Service or DVT control	= TRUE	11 counts; 12.5 ms/count in the primary processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Throttle Return to Default Performance	P2119	Throttle unable to return to default throttle position after de-energizing ETC motor.	(Normalized TPS1 percent Vref > AND Normalized TPS2 percent Vref> On the main processor) OR (Normalized TPS1 percent Vref < AND Normalized TPS2 percent Vref< On the main processor)	1.7560 % Vref 1.7590 % Vref 1.4340 % Vref 1.4310% Vref	Throttle de-energized due to one of the following conditions: Powerup Default Learn OR Default Throttle Authority OR PT Relay Voltage OR Main System Shutdown OR Battery Saver Active OR (Powertrain Relay On AND Run/Crank Active)	= TRUE = TRUE < 5.500 Volts = TRUE = TRUE = FALSE = FALSE	0.4969 s if ETC motor command is STOP (when Default Throttle Authority or Main System Shutdown is causing Throttle de-energize) 5.0000 s if ETC motor command is not STOP	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detects a continuous or intermittent short low or open in the APP sensor #1 by monitoring the APP1 sensor percent Vref and failing the diagnostic when the APP1 percent Vref is too low. This diagnostic only runs when battery voltage is high enough. Detects a continuous or intermittent short low or open in the APP sensor #1 on the Main processor.	APP1 percent Vref	< 0.4625 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	>6.41 Volts P06A3	19/39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detects a continuous or intermittent short high in the APP sensor #1 by monitoring the APP1 sensor percent Vref and failing the diagnostic when the APP1 percent Vref is too high. This diagnostic only runs when battery voltage is high enough. Detect a continuous or intermittent short high in the APP sensor #1 on the Main processor.	APP1 percent Vref >	4.7500 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	>6.41 Volts P06A3	19/39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detects a continuous or intermittent short low or open in the APP sensor #2 by monitoring the APP2 sensor percent Vref and failing the diagnostic when the APP2 percent Vref is too low. This diagnostic only runs when battery voltage is high enough. Detects a continuous or intermittent short low or open in the APP sensor #2 on the Main processor.	APP2 percent Vref <	0.3250 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	>6.41 Volts P0697	19/39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detects a continuous or intermittent short high in the APP sensor #2 by monitoring the APP2 sensor percent Vref and failing the diagnostic when the APP2 percent Vref is too high. This diagnostic only runs when battery voltage is high enough. Detect a continuous or intermittent short high in the APP sensor #2 on the Main processor.	APP2 percent Vref >	2.6000 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P0697	19/39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Throttle Position (TP) Sensor 1-2 Correlation	P2135	Detect a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor. 1.) The diagnostic monitors the difference in position between TPS1 and the TPS2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. 2.) The diagnostic monitors the difference in reference voltage between normalized min TPS1 and the normalized min TPS2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. Detects a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor	Difference between TPS1 displaced and TPS2 displaced >	6.797 % offset at min. throttle position with a linear threshold to 9.720 % at max. throttle position	Run/Crank voltage No TPS sensor faults No 5V reference error or fault for # 4 5V reference circuit	>6.41 Volts (P0122, P0123, P0222, P0223) P06A3	79/159 counts; or 58 counts continuous; 3.125 ms/count in the main processor	Type A, 1 Trips
			Difference between (normalized min TPS1) and (normalized min TPS2) >	5.000 % Vref	Run/Crank voltage No TPS sensor faults No 5V reference error or fault for # 4 5V reference circuit	>6.41 Volts (P0122, P0123, P0222, P0223) P06A3	79/159 counts; or 58 counts continuous; 3.125 ms/count in the main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	Detect a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor. 1.) The diagnostic monitors the difference in position between APP1 and the APP2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. 2.) The diagnostic also monitors the difference in reference voltage between normalized min APP1 and the normalized min APP2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor	Difference between APP1 displaced and APP2 displaced >	5.000 % offset at min. pedal position with a linear threshold to 10.001 % at max. pedal position	Run/Crank voltage No APP sensor faults No 5V reference errors or faulst for # 3 & # 4 5V reference circuits	> 6.41 Volts (P2122, P2123,P2127, P2128) (P06A3, P0697)	19/39 counts intermittent; or 15 counts continuous, 12.5 ms/count in the main processor	Type A, 1 Trips
			Difference between (normalized min APP1) and (normalized min APP2) >	5.000 % Vref	Run/Crank voltage No APP sensor faults No 5V reference errors or faulst for # 3 & # 4 5V reference circuits	> 6.41 Volts (P2122, P2123,P2127, P2128) (P06A3, P0697)	19/39 counts intermittent; or 15 counts continuous, 12.5 ms/count in the main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 1 high side circuit shorted to ground	P2147	Controller specific output driver circuit diagnoses Injector 1 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 1 high side circuit shorted to power	P2148	Controller specific output driver circuit diagnoses Injector 1 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 <= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 2 high side circuit shorted to ground	P2150	Controller specific output driver circuit diagnoses Injector 2 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 2 high side circuit shorted to power	P2151	Controller specific output driver circuit diagnoses Injector 2 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 <= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 3 high side circuit shorted to ground	P2153	Controller specific output driver circuit diagnoses Injector 3 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 3 high side circuit shorted to power	P2154	Controller specific output driver circuit diagnoses Injector 3 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 <= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 4 high side circuit shorted to ground	P2156	Controller specific output driver circuit diagnoses Injector 4 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 4 high side circuit shorted to power	P2157	Controller specific output driver circuit diagnoses Injector 4 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 5 high side circuit shorted to ground	P216B	Controller specific output driver circuit diagnoses Injector 5 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 5 high side circuit shorted to power	P216C	Controller specific output driver circuit diagnoses Injector 5 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 6 high side circuit shorted to ground	P216E	Controller specific output driver circuit diagnoses Injector 6 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 6 high side circuit shorted to power	P216F	Controller specific output driver circuit diagnoses Injector 6 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 <= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Minimum Throttle Position Not Learned	P2176	Detect when the throttle position minimum learn on the main processor is not learned. This diagnostic detects this by monitoring if the throttle position is greater than a threshold and the number of learn attempts is greater than a threshold. This diagnostic only runs when the battery voltage is high enough and the throttle position minimum learn is active. Throttle position sensors were not in the minmum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Main processor, TPS percent Vref > AND Number of learn attempts >	0.5740 % Vref 10 counts	Run/Crank voltage TPS minimum learn is active No previous TPS min learn values stored in long term memory	>6.41 Volts = TRUE	2.0 secs	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 7 high side circuit shorted to ground	P217B	Controller specific output driver circuit diagnoses Injector 7 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 7 high side circuit shorted to power	P217C	Controller specific output driver circuit diagnoses Injector 7 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 <= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 8 high side circuit shorted to ground	P217E	Controller specific output driver circuit diagnoses Injector 8 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector 8 high side circuit shorted to power	P217F	Controller specific output driver circuit diagnoses Injector 7 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Bank 1 Air-Fuel Ratio Imbalance	P219A	This monitor determines if there is an Air Fuel Imbalance in the fueling system for a cylinder on Bank 1. Detection is based on a the pre catalyst oxygen sensor voltage. The pre catalyst 02 voltage is used to generate a variance metric that represents the statistical variation of the 02 sensor voltage over a given engine cycle. This metric is proportional to the air-fuel ratio imbalance (variance is higher with an imbalance than without). The observed Variance is dependent on engine speed and load and is normalized by comparing it to a known "good system" result for that speed and load, and generating a Ratio metric. The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table	Standard Mode Filtered Ratio The EWMA calculation uses the weighting coefficient from the following supporting table: **P219A EWMA Coefficient** For this program, the Optional Mode is NOT used Optional Mode Filtered Ratio The EWMA calculation uses the weighting coefficient from the following supporting table while in Optional Mode:	>0.43 If the diagnostic has reported a failure on the prior trip, the EWMA Filtered Ratio must fall below 0.39 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing. > 0.50 If the diagnostic has reported a failure on the prior trip, the Optional Mode Filtered Ratio must fall below 0.35 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing.	The A/F imbalance diagnostic is enabled System Voltage Fuel Level Engine Coolant Temperature Cumulative engine run time Diagnostic enabled at Idle (regardless of other operating conditions) Engine speed range Engine speed delta during a short term sample period Mass Airflow (MAF) range Cumulative delta MAF during a short term sample period Filtered MAF delta between samples Note: first order lag filter coefficient applied to MAF	 No lower than 10.0 Volts for more than 0.2 seconds > 10.0% The diagnostic will disregard the fuel level criteria if the fuel sender is faulty. > -20 deg. C (or OBD Coolant Enable Criteria = TRUE) > 0.0 seconds No 900 to 3,800 RPM <200 RPM 7 to 700 g/s <6 g/s <0.75 g/s	Minimum of 1 test per trip, up to 6 tests per trip during RSR or FIR. The front 02 sensor voltage is sampled once per cylinder event. Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 10.80 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm. This data is collected only when enable conditions are met, and as such significantly more operating time is required than is indicated above. Generally, a report will be	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		P219A Variance Threshold Bankl Table) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17x17 table (see Supporting Table **P219A Normalizer Bankl Table).** This quotient is then multiplied by a quality factor calibration from a 17x17 table (see Supporting Table **P219A Quality Factor Bankl Table)** . This result is referred to as the Ratio. Note that the quality factor ranges between 0 and 1 and represents robustness to false diagnosis in the current operating region. Regions with low quality factors are not used. Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered	**P219A EWMA Coefficient Opt Table**		= 0.050		made within 5 minutes of operation. For RSR or FIR, 12 tests must complete before the diagnostic can report.	
					Air Per Cylinder (APC)	150 to 850 mg/cylinder		
					APC delta during short term sample period	< 80 mg/cylinder		
					Filtered APC delta between samples Note: first order lag filter coefficient applied to APC = 0.100	<7.00 percent		
					Spark Advance	5 to 55 degrees		
					Throttle Area (percent of max)	2 to 100 percent		
					Intake Cam Phaser Angle	0 to 30 degrees		
					Exhaust Cam Phaser Angle	0 to 30 degrees		
					--------------------------------	--------------------------------		
					Electronic Waste Gate (eWG) present	No		
					If eWG = yes then Waste Gate Position	0.0 to 101.0		
					Intrusive eWG Feature	Disabled		
					If intrusive Waste Gate positin is enabled then the electronic Waste Gate will be commanded to the following range when the other enable conditions have been met.			
					Intrusive Waste Gate Position Min	0.0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		Ratio. The range of the Filtered Ratio metric is application specific since both the emissions sensitivity and relationship between imbalance and the Variance metric are application specific. Some applications may need to command a unique cam phaser value before performing the above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use his feature. For programs using Active Fuel Management or Multiple Cam profiles, a secondary Imbalance Ratio can be calculated while in the secondary operating modes. This secondary ratio is an optional calculation and is labeled as the "Optional Mode Ratio". The Optional Mode Ratio is calculated the same as explained above with the following supporting			Intrusive Waste Gate Position Max	101.0		
					Active Fuel Management Firing Fraction if the Optional Mode is enabled (see Malfunction Criteria) Active Fuel Management Firing fraction for Optional Mode calculations Intrusive Firing Fraction during Fast Initial Response or Rapid Step Response If the intrusive Firing Fraction feature is enabled the Active Fuel Management firing fraction will be forced to a value above this threshold when in Fast Initial Response or in Rapid Step Response.	0.99 to 1.10 0.99 to 0.01 Disabled >=0.99		
					For programs using multi-step cam profiles: High Lift Cam Profile will use: Low Lift Cam Profile will use:	Standard Mode Filtered Ratio Standard Mode Filtered Ratio		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		tables: **P219A Variance Threshold Bankl Opt Table** , **P219A Normalizer Bankl Opt Table ,** and **P219A Quality Factor Bankl Opt Table**			Quality Factor (QF) QF calibrations are located in a 17x17 lookup table versus engine speed and load (see Supporting Table **P219A Quality Factor Bankl Table).** QF values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data.	>=0.99		
					Fuel Control Status Closed Loop and Long Term FT Enabled for:	>= 1.2 seconds (Please see **"Closed Loop Enable Clarification"** and **"Long Term FT Enable Criteria"** in Supporting Tables)		
					Device Control AIR pump CASE learn EGR EVAP Engine Over Speed Protection Idle speed control PTO Injector base pulse width	Not active Not on Not active Not intrusive Not intrusive Not Active Normal Not Active Above min pulse limit		
					02 learned htr resistance	= Valid (the 02 heater resistance has learned since NVM reset)		
					Rapid Step Response (RSR):			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					RSR will trigger if the Ratio result from the last test is AND it exceeds the last Filtered ratio by Once triggered, the filtered ratio is reset to: Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to: No Fault Active for:	>= 0.42 >=0.31 0.00 0.00 EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA EvapExcessPurgePsbl_FA CamSensorAnyLocationFA FuelTrimSystemB1_FA O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA WRAF_Bank_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Bank 2 Air-Fuel Ratio Imbalance	P219B	This monitor determines if there is an Air Fuel Imbalance in the fueling system for a cylinder on a Bank 2. Detection is based on a the pre catalyst oxygen sensor voltage. The pre catalyst 02 voltage is used to generate a variance metric that represents the statistical variation of the 02 sensor voltage over a given engine cycle. This metric is proportional to the air-fuel ratio imbalance (variance is higher with an imbalance than without). The observed Variance is dependant on engine speed and load and is normalized by comparing it to a known "good system" result for that speed and load, and generating a Ratio metric. The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table	Standard Mode Filtered Ratio The EWMA calculation uses the weighting coefficient from the following supporting table: **P219B EWMA Coefficient** Optional Mode Filtered Ratio For this program the Optional Mode is NOT used The EWMA calculation uses the weighting coefficient from the following supporting table while in Optional Mode: **P219B EWMA Coefficient Opt Mode**	> 0.43 If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.38 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing. > 0.60 If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.45 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing	The A/F imbalance diagnostic is enabled System Voltage Fuel Level Engine Coolant Temperature Cumulative engine run time Diagnostic enabled at Idle (regardless of other operating conditions) Engine speed range Engine speed delta during a short term sample period Mass Airflow (MAF) range Cumulative delta MAF during a short term sample period Filtered MAF delta between samples Note: first order lag filter coefficient applied to MAF = 0.050	 No lower than 10.0 Volts for more than 0.2 seconds > 10.0% The diagnostic will disregard the fuel level criteria if the fuel sender is faulty. > -20 deg. C (or OBD Coolant Enable Criteria = TRUE) > 0.0 seconds No 900 to 3,800 RPM <200 RPM 7 to 700 g/s < 6 g/s <0.75 g/s	Minimum of 1 test per trip, up to 6 tests per trip during RSR or FIR. The front 02 sensor voltage is sampled once per cylinder event. Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 10.80 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm. This data is collected only when enable conditions are met, and as such significantly more operating time is required than is indicated above. Generally, a report will be made within 5	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		P219B Variance Threshold Bank2 Table) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17x17 table (see Supporting Table **P219B Normalizer Bank2 Table)** This quotient is then multiplied by a quality factor calibration from a 17x17 table (see Supporting Table **P219B Quality Factor Bank2 Table)** . This result is referred to as the Ratio. Note that the quality factor ranges between 0 and 1 and represents robustness to false diagnosis in the current operating region. Regions with low quality factors are not used. Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered			Air Per Cylinder (APC) APC delta during short term sample period Filtered APC delta between samples Note: first order lag filter coefficient applied to APC = 0.100 Spark Advance Throttle Area (percent of max) Intake Cam Phaser Angle Exhaust Cam Phaser Angle -------------------------------- Electronic Waste Gate (eWG) present If eWG = yes then Waste Gate Position Intrusive eWG Feature If intrusive Waste Gate positin is enabled then the electronic Waste Gate will be commanded to the following range when the other enable conditions have been met. Intrusive Waste Gate	150 to 850 mg/cylinder < 80 mg/cylinder < 7.00 percent 5 to 55 degrees 2 to 100 percent 0 to 30 degrees 0 to 30 degrees ---------------------------------- No 0.0 to 101.0 Disabled 0.0	minutes of operation. For RSRorFIR, 12 tests must complete before the diagnostic can report.See P219Ainfo	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		Ratio. The range of the Filtered Ratio metric is application specific since both the emissions sensitivity and relationship between imbalance and the Variance metric are application specific. Some applications may need to command a unique cam phaser value before performing the above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use this feature. For programs using Active Fuel Management or Multiple Cam profiles a secondary Imbalance Ratio can be calculated while in the secondary operating modes. This secondary ratio is an optional calculation and is labeled as the "Optional Mode Ratio". The Optional Mode Ratio is calculated the same as explained above with the following supporting			Position Min Intrusive Waste Gate Position Max	 101.0		
					Active Fuel Management Firing Fraction if the Optional Mode is enabled (see Malfunction Criteria) Active Fuel Management Firing fraction for Optional Mode calculations Intrusive Firing Fraction during Fast Initial Response or Rapid Step Response If the intrusive Firing Fraction feature is enabled the Active Fuel Management firing fraction will be forced to a value above this threshold when in Fast Initial Response or in Rapid Step Response.	0.99 to 1.10 0.99 to 0.01 Disabled >=0.99		
					For programs using multi-step cam profiles: High Lift Cam Profile will use: Low Lift Cam Profile will use:	 Standard Mode Filtered Ratio Standard Mode Filtered Ratio		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		tables: **P219B Variance Threshold Bank2 Opt Table** , **P219B Normalizer Bank2 Opt Table ,** and **P219B Quality Factor Bank2 Table**			Quality Factor (QF) QF calibrations are located in a 17x17 lookup table versus engine speed and load (Supporting Table **P219B Quality Factor Bank2 Table).** QF values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data. Fuel Control Status Closed Loop and Long Term FT Enabled for: Device Control AIR pump CASE learn EGR EVAP Engine Over Speed Protection Idle speed control PTO Injector base pulse width 02 learned htr resistance Rapid Step Response	>=0.99 >= 1.2 seconds (Please see "Closed Loop Enable Clarification" and "Long Term FT Enable Criteria" in Supporting Tables) Not active Not on Not active Not intrusive Not intrusive Not Active Normal Not Active Above min pulse limit = Valid (the 02 heater resistance has learned since NVM reset)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					(RSR): RSR will trigger if the Ratio result from the last test is AND it exceeds the last Filtered ratio by Once triggered, the filtered ratio is reset to: Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to: No Fault Active for:	>= 0.42 >=0.38 0.00 0.00 EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA EvapExcessPurgePsbl_FA CamSensorAnyLocationFA FuelTrimSystemB2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA WRAF_Bank_2_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Barometric Pressure (BARO) Sensor Circuit Low (applications with LIN MAF)	P2228	Detects an eroneously low value being reported over the LIN serial connection from the BARO sensor. The diagnostic monitors the BARO sensor pressure output and fails the diagnostic when the pressure is too low. The BARO sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure. The BARO pressure value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	BARO Pressure	< 50.0 kPa	LIN Communications established with MAF		160 failures out of 200 samples 1 sample every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Barometric Pressure (BARO) Sensor Circuit High (applications with LIN MAF)	P2229	Detects an eroneously high value being reported over the LIN serial connection from the BARO sensor. The diagnostic monitors the BARO sensor pressure output and fails the diagnostic when the pressure is too high. The BARO sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure. The BARO pressure value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	BARO Pressure	> 115.0 kPa	LIN Communications established with MAF		160 failures out of 200 samples 1 sample every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Barometric Pressure (BARO) Sensor Circuit Intermittent (applications with LIN MAF)	P2230	Detects a noisy or erratic signal in the barometric pressure (BARO) circuit by monitoring the BARO sensor and failing the diagnostic when the BARO signal has a noisier output than is expected. When the value of BARO in kilopascals (kPa) is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of BARO readings. The result of this summation is called a “string length”. Since the BARO signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic BARO signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current BARO reading - BARO reading from 25 milliseconds previous)	> 100 kPa 40 consecutive BARO readings	LIN Communications established with MAF		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Signal Stuck Lean Bank 1 Sensor 2	P2270	The P2270 diagnostic is the first in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor is stuck in a normal lean voltage range and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required rich voltage before the accumulated mass air flow threshold is reached.	Post 02 sensor signal AND The Accumulated mass airflow monitored during the Stuck Lean Voltage Test	< 825mvolts > 250 grams	No Active DTCs B1S2 DTCs Not active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTK0 02S_Bank_ 2_TFTK0 P013A, P013B, P013E, P013F, P2270 or P2271 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green 02S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						is above 22.0 grams/sec.		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Pedal position	< 100.0%		
					Engine Airflow	4.0 < gps < 35.0		
					Closed loop integral	0.75 < C/L Int < 1.12		
					Closed Loop Active	= TRUE (Please see **“Closed Loop Enable Clarification”** in Supporting Tables).		
					Evap	not in control of purge		
					Ethanol Estimation in Progress	= Not Active (Please see **“Ethanol Estimation in Progress”** in Supporting Tables).		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					Crankshaft Torque	< 125.0 Nm		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	> 60.0 sec		
					Transmission Temp	> -40.0 °C		
					Predicted Catalyst temp	475 < °C < 1,000		
					Fuel State	= DFCO oossible		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					All of the above met for at least 0.0 seconds, and then check the following			
					Engine Speed to initially enable test	800 < RPM < 3,000		
					Engine Speed range to keep test enabled (after initially enabled)	750 < RPM < 3,200		
					Vehicle Speed to initially enable test	31.1 < MPH < 82.0		
					Vehicle Speed range to keep test enabled (after initially enabled)	27.3 < MPH < 87.0		
					All of the above met for at least 0.5 seconds, and then the Force Cat Rich intrusive stage is requested.			
					During Stuck Lean test the following must stay TRUE or the test will abort:			
					Commanded Fuel	0.95 < EQR < 1.10		
					Crankshaft Torque	< 125.0 Nm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	The P2271 diagnostic is the fourth in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor is stuck in a normal rich voltage range and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required lean voltage before the accumulated mass air flow threshold is reached.	Post 02 sensor signal AND The Accumulated mass airflow monitored during the Stuck Rich Voltage Test	>150 mvolts > 12.0 grams	No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTK0 02S_Bank_ 2_TFTK0 P013A, P013B, P013E, P013F or P2270 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						is above 22.0 grams/sec.		
					Low Fuel Condition Only when FuelLevelDataFault	= False = False		
					Fuel State	= DFCO possible		
					DTC's Passed	= P2270 = P013E = P013A		
					After above conditions are met: DFCO mode is continued (w/o driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Signal Stuck Lean Bank 2 Sensor 2	P2272	The P2272 diagnostic is the first in a sequence of six intrusive secondary 02 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary 02 sensor is stuck in a normal lean voltage range and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required rich voltage before the accumulated mass air flow threshold is reached.	Post 02 sensor signal AND The Accumulated mass airflow monitored during the Stuck Lean Voltage Test	< 825 mvolts > 250 grams.	No Active DTCs B2S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTK0 02S_Bank_ 2_TFTK0 P013C, P013D, P014A, P014B, P2272 or P2273 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "H02S Heater Resistance DTCs") = Not Valid, Green 02S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						is above 22.0 grams/sec.		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Pedal position	< 100.0%		
					Engine Airflow	4.0 < gps < 35.0		
					Closed loop integral	0.75 < C/L Int < 1.12		
					Closed Loop Active	= TRUE (Please see **"Closed Loop Enable Clarification"** in Supporting Tables).		
					Evap	not in control of purge		
					Ethanol Estimation in Progress	= Not Active (Please see **"Ethanol Estimation in Progress"** in Supporting Tables).		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					Crankshaft Torque	< 125.0 Nm		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	>= 60.0 sec		
					Transmission Temp	> -40.0 °C		
					Predicted Catalyst temp	475 < °C < 1,000		
					Fuel State	= DFCO oossible		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					All of the above met for at least 0.0 seconds, and then check the following			
					Engine Speed to initially enable test	800 < RPM < 3,000		
					Engine Speed range to keep test enabled (after initially enabled)	750 < RPM < 3,200		
					Vehicle Speed to initially enable test	31.1 < MPH < 82.0		
					Vehicle Speed range to keep test enabled (after initially enabled)	27.3 < MPH < 87.0		
					All of the above met for at least 0.5 seconds, and then the Force Cat Rich intrusive stage is requested.			
					During Stuck Lean test the following must stay TRUE or the test will abort:			
					Commanded Fuel	0.95 < EQR < 1.10		
					Crankshaft Torque	< 125.0 Nm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Signal Stuck Rich Bank 2 Sensor 2	P2273	The P2273 diagnostic is the fourth in a sequence of six intrusive secondary 02 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary 02 sensor is stuck in a normal rich voltage range and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required lean voltage before the accumulated mass air flow threshold is reached.	Post 02 sensor signal AND The Accumulated mass airflow monitored during the Stuck Rich Voltage Test	>150 mvolts > 12.0 grams.	No Active DTCs B2S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTK0 02S_Bank_ 2_TFTK0 P013C, P013D, P014A, P014B or P2272 >10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						is above 22.0 grams/sec.		
					Low Fuel Condition Only when FuelLevelDataFault	= False = False		
					Fuel State DTC's Passed	= DFCO possible = P2272 = P014A = P013C		
					=================== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Barometric Pressure Sensor C Circuit Low (applications with LIN MAF)	P227C	Detects an eroneously low value being reported over the LIN serial connection from the BARO C sensor. The diagnostic monitors the BARO C sensor pressure output and fails the diagnostic when the pressure is too low. The BARO C sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure. The BARO C pressure value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	BARO C Pressure	< 50.0 kPa	LIN Communications established with MAF		160 failures out of 200 samples 1 sample every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Barometric Pressure Sensor C Circuit High (applications with LIN MAF)	P227D	Detects an eroneously high value being reported over the LIN serial connection from the BARO C sensor. The diagnostic monitors the BARO C sensor pressure output and fails the diagnostic when the pressure is too high. The BARO C sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure. The BARO C pressure value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	BARO C Pressure	> 115.0 kPa	LIN Communications established with MAF		160 failures out of 200 samples 1 sample every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Barometric Pressure Sensor C Circuit Intermittent/ Erratic (applications with LIN MAF)	P227E	Detects a noisy or erratic signal in the barometric pressure (BARO) C circuit by monitoring the BARO C sensor and failing the diagnostic when the BARO C signal has a noisier output than is expected. When the value of BARO C in kilopascals (kPa) is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of BARO C readings. The result of this summation is called a “string length”. Since the BARO C signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic BARO C signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current BARO C reading - BARO C reading from 25 milliseconds previous)	> 100 kPa 40 consecutive BARO C readings	LIN Communications established with MAF		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SIDI High Pressure Pump Performance	P228C	This DTC determines if the high pressure pump is not able to maintain target pressure. The fault is set if the measured fuel rail pressure is lower than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	>= **P228C P2C1F-High Pressure Pump Control (HPC) fail threshold of pressure too low** Mpa (see supporting tables)	High Pressure Pump Performance Diagnostic Enable	True	Positive Pressure Error - 10.00 second failures out of 12.50 second samples	Type A, 1 Trips
					Battery Voltage	>=11 Volts		
					Low Side Fuel Pressure	> 0.275 MPa		
					Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP orTFTKO)and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and	Enabled when a code clear is not active or not exiting device control Engine is not cranking		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	>=70.0 KPA >=-40.0 degC -40 <=Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SIDI High Pressure Pump Performance	P228D	This DTC determines if the high pressure pump is delivering high pressure that desired pressure. The fault is set if the measured fuel rail pressure is higher than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	<= **P228D P2C20 - High Pressure Pump Control (HPC) fail threshold for pressure too high** Mpa (see supporting tables)	High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP orTFTKO)and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement	True >=11 Volts >0.275 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking	Negative Pressure Error - 10.00 second failures out of 12.50 second samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	 >= 70.0 KPA >= -40.0 DegC -40 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #1 CIRCUIT LOW	P2300	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #1 CIRCUIT High	P2301	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Power fault. Controller specific output driver circuit diagnoses the low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #2 CIRCUIT Low	P2303	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #2 CIRCUIT High	P2304	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #3 CIRCUIT Low	P2306	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #3 CIRCUIT High	P2307	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #4 CIRCUIT Low	P2309	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #4 CIRCUIT High	P2310	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #5 CIRCUIT Low	P2312	Diagnoses Cylinder #5 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #5 CIRCUIT High	P2313	Diagnoses Cylinder #5 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #6 CIRCUIT Low	P2315	Diagnoses Cylinder #6 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #6 CIRCUIT High	P2316	Diagnoses Cylinder #6 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #7 CIRCUIT Low	P2318	Diagnoses Cylinder #7 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #7 CIRCUIT High	P2319	Diagnoses Cylinder #7 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #8 CIRCUIT Low	P2321	Diagnoses Cylinder #8 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #8 CIRCUIT High	P2322	Diagnoses Cylinder #8 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 < 100 Q impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Control Torque Request Circuit	P2544	Determines if the torque request from the TCM is valid	Protect error - Serial Communication message 2's complement not equal ($189/$199) OR Rolling count error - Serial Communication message ($189/$199) rolling count index value OR Range Error - Serial Communication message - ($189/$199) TCM Requested Torque Increase OR Multi-transition error - Trans torque intervention type request change	Message <> two's complement of message Message <> previous message rolling count value + one > 725 Nm Requested torque intervention type toggles from not increasing request to increasing request	Diagnostic Status Power Mode Ignition Voltage Engine Running Run/Crank Active No Serial communication loss to TCM (U0101)	Enabled = Run > 6.41 volts = True > 0.50 Sec No loss of communication	>= 16 failures out of 20 samples. Performed on every received message >= 6 Rolling count errors out of 10 samples. Performed on every received message >=6 range errors out of 10 samples. Performed on every received message >=5 multi-transitions out of 5 samples. Performed every 200 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Power Off Timer Performance	P262B	This DTC determines if the hardware timer does not initialize or count properly. There are two tests to ensure proper functioning of the timer: Count Up Test (CUT) and Range Test (RaTe). Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment. Range Test (RaTe): When the run/crank is not active both the hardware and mirror timers are started. The timers are compared when module shutdown is initiated or run/crank becomes active.	Count Up Test: Time difference between the current read and the previous read of the timer Range Test: The variation of the HWIO timer and mirror timer is	> 1.50 seconds > 0.25%.			Count Up Test: 8 failures out of 40 samples 1 sec / sample Continuous while run/crank is not active and until controller shutdown is initiated. Range Test: Once per trip when controller shutdown is initiated or run/ crank becomes active.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump "A" Low Flow / Performance	P2635	This DTC detects degradation in the performance of the electronically regulated fuel system by calculating the difference between the sensed, filtered system [line] pressure versus the ECM-commanded pressure [error calculation]. The calculated error is then compared to calibrated fault threshold tables for a fault decision.	Sensed Filtered Fuel System [line] pressure error	<= Low Threshold [Supporting Table] **P2635 Threshold Low** OR >= High Threshold [Supporting Table] **P2635 Threshold High**	a) Diagnostic enabled [FDBR_b_FSRD] b) Timer Engine Running [FDBR_t_EngModeRunCoarse] c1) Fuel Flow Rate Valid c2) Ambient Air Pressure Value Defaulted c3) FDB_FuelPresSnsrCktFA c4) Reference Voltage Fault Status [DTC P0641] c5) Exhaust AfterTreatment Fuel Injector A Control Circuit Short Low Fault [HCIR_b_GshtFA DTC P20CD] c6) Fuel Pres Sensor Performance Fault Active [DTC P018B] c7) Use Calculated Flow Performance Fault Thresholds [FDBR_b_UseCalcFSRD_FltThrshs] c8) Engine Speed Status Valid c9) FAB_FuelPmpCktFA c10) Fuel Control Enable	a) == TRUE b) >= 30.00 seconds c1)== TRUE c2) <>TRUE c3) <> TRUE c4) <> TRUE c5) <> TRUE c6) <> TRUE c7) <> TRUE c8] ==TRUE c9] <> TRUE c10) <> TRUE	1 sample / 12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Fault Active [DTCP12A6]			
					c11) Fuel Pump Driver Module OverTemp Fault Active [DTC P1255]	c11)<> TRUE		
					c12) Fuel Pump Speed Fault Active [DTCP129F]	c12) <> TRUE		
					c13) CAN Sensor Bus message $0C3 Comm Fault [CFMR_b_FTZM_lnfo1_UcodeCmFADTC P165C]	c13) <> TRUE		
					c14) CAN Sensor Bus Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_UcodeCmFA DTC]	c14] <> TRUE		
					c15) Sensor Configuration [FDBR_e_FuelPresSnsrConfig]	c15) == CeFDBR_e_WiredTo_FTZM		
					c16) Sensor Bus Relay On	c16) == TRUE		
					d) Emissions Fuel Level Low [Message $3FB]	d) <> TRUE		
					e) Fuel Control Enable	e) == TRUE		
					f) Fuel Pump Control State	f) == NORMAL		
					g) Run_Crank input circuit voltage	g) 11.00 volts <= Run_Crank_V <= 32.00 volts		
					h) High Pres Fuel Pump	h) <> TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Mode Management Enabled j) High Pres Fuel Pump Control Mode k) Instantaneous Fuel Flow [FCBR_dm_InstFuelFlow] m1) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B $0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr DTC] m2) CAN Sensor Bus message $0C3_Available m3) Fuel Pres Sensor Ref Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B $0C3] [CFMR_b FTZM Infol A RC_ChkErr DTC] n) Timer - Diagnostic Enable	j) <> Disabled Mode AND a8b) <> ZeroFlow Mode k) 0.05 grams/sec <= InstFuelFlow <= Max Allowed Flow [Supporting Table] **P2635 Max Fuel Flow** m1)<> TRUE m2) ==TRUE m3) <> TRUE n)> 2.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Serial Number Not Programmed or Incompatible	P264F	This DTC checks that the engine serial number is correctly written	At least one of the programmed engine serial number digits	=0xFF	OBD Manufacturer Enable Counter	= 0	250 ms / test Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 1	P30D6	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>=6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 2	P30D7	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>=6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 3	P30D8	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>=6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 4	P30D9	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>=6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 5	P30DA	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>=6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 1 6 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 6	P30DB	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>=6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 7	P30DC	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>=6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 8	P30DD	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>=6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Communicati on Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures equals or exceeds	5 counts (equivalent to 812.51 milliseconds)	General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					Starter motor engaged for	> 15.00 milliseconds		
					Or			
			before the sample time of is reached	812.51 milliseconds	Run/Crank ignition voltage	>8.41 Volts		
					All below criteria have been met for	>= 3,000.00 milliseconds		
					CAN channel is requesting full communications			
					Normal CAN transmission on Bus is enabled			
					Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller			
					Or			
					Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			
					If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					IfOBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>=11.00 Volts >=9.00 Volts > 15.00 milliseconds > 8.41 Volts >=6.41 Volts Enabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Communicati on Powertrain Sensor CAN Bus Off	U0076	This DTC monitors for a Powertrain Sensor Bus S off condition	Bus off failures equals or exceeds before the sample time of is reached	5 counts (equivalent to 812.51 milliseconds) 812.51 milliseconds	General Enable Criteria: Starter motor engaged for Or Run/Crank ignition voltage All below criteria have been met for CAN channel is requesting full communications Normal CAN transmission on Bus is enabled Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII	 > 15.00 milliseconds >8.41 Volts >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					IfOBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>=11.00 Volts >=9.00 Volts > 15.00 milliseconds >8.41 Volts >=6.41 Volts Enabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With TCM	U0101	This DTC monitors for a loss of communication with the Transmission Control Module.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $0BD	>10,000.00 milliseconds				
			Message $0C7	>500.00 milliseconds	If message is on Bus A: U0073 not active			
			Message $0F9	> 500.00 milliseconds	If message is on Bus B: U0074 not active			
			Message $189	> 500.00 milliseconds	If message is on Bus S: LI0076 not active			
			Message $199	> 500.00 milliseconds	CAN channel is requesting full communications			
			Message $19D	> 500.00 milliseconds	Normal CAN transmission on Bus is enabled			
			Message $1AF	> 500.00 milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
			Message $1F5	>500.00 milliseconds	Accessory mode to off mode not pending			
			Message $4C9	>10,000.00 milliseconds	Battery voltage	>11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for	> 15.00 milliseconds		
					Or			
					Run/Crank ignition voltage	>8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>=6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	Enabled		
					Or			
					Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for Message $0F1 Message $12A Message $1E1 Message $1F1 Message $1F3 Message $3C9 Message $3CB Message $3F1 Message $451 Message $4D7 Message $4E1 Message $4E9	> 500.00 milliseconds > 10,000.00 milliseconds > 500.00 milliseconds > 500.00 milliseconds > 10,000.00 milliseconds >10,000.00 milliseconds > 10,000.00 milliseconds > 10,000.00 milliseconds > 500.00 milliseconds > 10,000.00 milliseconds >10,000.00 milliseconds > 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: LI0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	>= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 12.5 ms loop	Type C, 1 Trip No MIL "Emissions Neutral Diagnostics - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					IfOBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>=6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with Throttle Position Sensor 1	U0606	Detects a continuous or intermittent short low or short high or open fault in the TPS SENT Communication Circuit 1 by monitoring the voltage and failing the diagnostic when the voltage for the wave pulse is below or above state threshold as defined by SAE J2716 SENT Protocol. Detects a message fault in the TPS SENT Communication Circuit by monitoring the message pulse time and failing the diagnostic when the time for the pulse is below a low time threshold or above a high time threshold or if the message age limit is greater than a time threshold. This diagnostic only runs when battery voltage is high enough.	Voltage for wave pulse is below state threshold as defined by SAE J2716 SENT Protocol OR Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol OR Message Pulse < Message Pulse > OR Message Age Limit >= OR Signal CRC fails	0.5 V OR 4.1 V OR 0.125977 ms 0.209991 ms OR 3.125 ms	Run/Crank voltage	>6.41 Volts	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with Throttle Position Sensor 2	U0607	Detects a continuous or intermittent short low or short high or open fault in the TPS SENT Communication Circuit 2 by monitoring the voltage and failing the diagnostic when the voltage for the wave pulse is below or above state threshold as defined by SAE J2716 SENT Protocol. Detects a message fault in the TPS SENT Communication Circuit by monitoring the message pulse time and failing the diagnostic when the time for the pulse is below a low time threshold or above a high time threshold or if the message age limit is greater than a time threshold. This diagnostic only runs when battery voltage is high enough.	Voltage for wave pulse is below state threshold as defined by SAE J2716 SENT Protocol OR Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol OR Message Pulse < Message Pulse > OR Message Age Limit >= OR Signal CRC fails	0.5 V OR 4.1 V OR 0.125977 ms 0.209991 ms OR 3.125 ms	Run/Crank voltage	>6.41 Volts	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Mass or Volume Air Flow Sensor A	U060F	This DTC monitors for a loss of communication on the LIN bus with Mass or Volume Air Flow Sensor A.	Message is not received from device for		General Enable Criteria:		LIN bus communication executes in 500ms loop.	Type B, 2 Trips
					Diagnostic is enabled	Enabled		
			MAF_Rsp_Press_2B_C03	>=62.50 milliseconds	LIN channel is enabled	Enabled		
					LIN module is initialized			
			MAF_Rsp_TmpHum_2A_C03	>= 250.00 milliseconds	Slave is calibrated as present			
					All below criteria have been met for	>= 3,000.00 milliseconds		
					Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					IfOBDII: Run/Crank ignition	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	 >=9.00 Volts > 15.00 milliseconds >8.41 Volts >=6.41 Volts Enabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Control Module LIN Bus 2	U1346	This DTC monitors for a LIN bus off condition on LIN Bus 2.	Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus 2 Or LIN channel Wakeup Method: LIN channel wakeup repetition counter	= Total number of slave nodes on LIN Bus 2 that have reported lost communications DTCs >= 10.00 counts	Loss of Communication Method: Diagnostic is enabled LIN channel is enabled LIN module is initialized The following criteria have been enabled for: LIN channel is requesting full communications Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII IfOBDII:	Enabled Enabled >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	Dependent on bus loading.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>=6.41 Volts		
					If power mode = Accessory			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		
					LIN channel Wakeup Method:			
					Diagnostic is enabled	Enabled		
					LIN channel is enabled	Enabled		
					LIN channel is reouesting			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					full communications LIN module is initialized The following criteria have been enabled for: Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage	 >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Fuel Pump Driver Control Module on Bus S	U18A2	This DTC monitors for a loss of communication with the Fuel Pump Driver Control Module on Bus S.	Message is not received from controller for Message $0D5 Message $0D7	 > 10,000.00 milliseconds > 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: LI0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	 >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					IfOBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for	> 15.00 milliseconds		
					Or Run/Crank ignition voltage	>8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>=6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Initial Supporting table - CalculatedPerfMaxId

Description: Maximum desired camshaft position for Intake CAM - BankI

Value Units: Maximum desired camshaft position (degCam)
X Unit: Engine Oil Temperature (degC)
[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]
[-40 -28 -16 -4 8 20 32 44 56 68 80 92 104 116 128 140 152]
Y Units: Engine Speed (rpm)
[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]
[400 800 1200 1600 2000 2400 2800 3200 3600 4000 4400 4800 5200 5600 6000 6400 6800]

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
3	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
4	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
5	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
6	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
7	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
8	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
9	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
10	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
11	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
12	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
13	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
14	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
15	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
16	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
17	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0

Initial Supporting table - P0521_P06DD_P06DE_OP_HiStatePressure

Description: Two Stage Oil Pump Oil Pressure in High State

Value Units: Nominal high state oil pressure (kPa)
X Unit: Engine oil temperature, °C

y/x	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0
1,000.0	435.8	418.8	398.9	371.3	358.8	340.5	314.3	297.4	277.6
1,500.0	464.1	453.8	429.1	423.1	388.2	374.3	358.9	327.9	308.1
2,000.0	509.7	488.7	442.9	453.9	409.6	411.4	377.4	352.4	332.6
2,500.0	516.6	497.7	455.1	465.3	426.5	402.4	391.6	370.9	351.0
3,000.0	522.8	491.5	485.4	455.4	443.8	416.1	403.4	383.3	363.5
3,500.0	533.1	508.9	501.6	484.1	454.7	425.6	410.2	389.8	369.9
4,000.0	535.2	515.9	503.8	492.4	452.3	422.6	413.1	390.3	370.4
4,500.0	531.3	511.9	509.3	475.4	435.7	401.8	402.2	384.7	364.9
5,000.0	518.1	497.7	480.4	451.5	430.3	405.7	389.3	373.2	353.3

Initial Supporting table - P0521_P06DD_P06DE_OP_LoStatePressure

Description: Two Stage Oil Pump Oil Pressure in Low State

Value Units: Nominal low state oil pressure (kPa)
X Unit: Engine oil temperature (deg C)

y/x	40	50	60	70	80	90	100	110	120
1,000	313	305	281	273	268	263	254	241	235
1,500	336	326	300	310	286	289	274	260	254
2,000	364	342	316	327	300	304	288	276	270
2,500	375	351	329	334	318	294	296	289	283
3,000	391	354	343	334	328	300	301	299	293
3,500	407	371	357	344	330	305	302	305	300
4,000	422	389	380	366	345	306	301	308	303
4,500	430	402	375	357	340	305	298	308	303
5,000	421	399	367	352	335	302	296	305	300

Initial Supporting table - P06DD_P06DE_MaxEnableTorque_OP

Description: Two Stage Oil Pump Rationality Test Torque Max Enable Threshold

Value Units: Maximum engine torque (Nm)
X Unit: Engine speed (RPM)

y/x	1,000.0	1,250.0	1,500.0	1,750.0	2,000.0	2,250.0	2,500.0	2,750.0	3,000.0
1.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0

Initial Supporting table - P06DD_P06DE_MinEnableTorque_OP

Description: Two Stage Oil Pump Rationality Test Torque Min Enable Threshold

Value Units: Min engine torque (Nm)
X Unit: Engine speed (RPM)

y/x	1,000.0	1,250.0	1,500.0	1,750.0	2,000.0	2,250.0	2,500.0	2,750.0	3,000.0
1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - P06DD__P06DE_MinOilPressThresh

Description: Intrusive diagnostic minimum pressure limit that is a function of Engine Speed and Oil Temperature

Value Units: Minimum engine oil pressure threshold (kPa)
X Unit: Engine oil temperature (deg C)

y/x	40	50	60	70	80	90	100	110	120
1,000	83	83	83	83	83	83	83	83	83
1,500	106	106	106	106	106	106	106	106	106
2,000	116	116	116	116	116	116	116	116	116
2,500	127	127	127	127	127	127	127	127	127
3,000	137	137	137	137	137	137	137	137	137
3,500	147	147	147	147	147	147	147	147	147
4,000	191	191	191	191	191	191	191	191	191
4,500	200	200	200	200	200	200	200	200	200
5,000	208	208	208	208	208	208	208	208	208

Initial Supporting table - P06DD P06DE_OP_StateChangeMin

Description: Minimum allowed pressure change on a Two Stage Oil Pump state change

Value Units: Min pressure change (kPa)
X Unit: Engine oil temperature (deg C)

y/x	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0
1,000.0	29.2	20.6	17.8	21.4	19.2	15.6	13.3	10.0	10.0
1,500.0	33.1	25.2	22.8	29.1	22.3	19.9	16.9	10.0	10.0
2,000.0	36.4	29.9	27.8	32.9	27.1	23.5	15.5	10.0	10.0
2,500.0	37.5	35.4	28.7	30.9	31.1	25.5	14.0	10.0	10.0
3,000.0	29.6	37.6	28.1	30.4	29.5	23.4	10.8	10.0	10.0
3,500.0	26.1	37.3	33.9	35.1	31.1	23.7	10.3	10.0	10.0
4,000.0	28.1	31.2	34.6	32.6	29.2	21.1	12.0	10.0	10.0
4,500.0	23.1	32.6	30.4	32.9	29.8	26.4	23.6	10.0	10.0
5,000.0	15.0	19.3	21.1	20.3	15.5	13.9	11.4	10.0	10.0

Initial Supporting table - P01F0 - Heat To Coolant Min 2D

Description: KtETHD_P_CDD_HeatToCoolantMin

Value Units: Indicated Power (kW)
X Unit: Firing Fraction
Y Units: Ambient temperature (°C)

y/x	0.00	0.25	0.50	0.75	1.00
-20.0	20.0	20.0	20.0	20.0	20.0
-9.0	20.0	20.0	20.0	20.0	20.0
10.0	15.0	15.0	15.0	15.0	15.0
20.0	15.0	15.0	15.0	15.0	15.0
50.0	15.0	15.0	15.0	15.0	15.0

Initial Supporting table - P219A EWMA Coefficient

Description: The bank 1 EWMA coefficient used to filter the AFIM Variance Ratio.

Value Units: Unitless Scalar
X Unit: Unitless Scalar

y/x	-1.00	-0.50	0.00	0.50	1.00
1	0.05	0.10	0.15	0.10	0.05

Initial Supporting table - P219A EWMA Coefficient Opt Table

Description: The bank 1 EWMA coefficient used to filter the AFIM Variance Ratio while in Optional Mode, if used.

Value Units: Unitless Scalar
X Unit: Unitless Scalar

y/x	-1.00	-0.50	0.00	0.50	1.00
1.0	0.10	0.20	0.50	0.20	0.10

Initial Supporting table - P219A Quality Factor Bankl Table

Description: Bank 1 lookup table of Quality Factors used in the calculation of the Ratio for the current sample period

Value Units: Unitless Scalar
X Unit: Engine Speed (RPM)
Y Units: Air Per Cylinder (APC) (mg/cylinder)

y/x	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000
120	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
200	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
240	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
360	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
400	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
440	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
480	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
520	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
560	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
600	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
640	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Initial Supporting table - P219B EWMA Coefficient

Description: The bank 2 EWMA coefficient used to filter the AFIM Variance Ratio.

Value Units: Unitless Scalar
X Unit: Unitless Scalar

y/x	-1.00	-0.50	0.00	0.50	1.00
1.0	0.05	0.10	0.15	0.10	0.05

Initial Supporting table - P219B EWMA Coefficient Opt Mode

Description: The bank 2 EWMA coefficient used to filter the AFIM Variance Ratio while in Optional Mode, if used.

Value Units: Unitless Scalar
X Unit: Unitless Scalar

y/x	-1.00	-0.50	0.00	0.50	1.00
1.0	0.10	0.20	0.50	0.20	0.10

Initial Supporting table - P219B Quality Factor Bank2 Table

Description: Bank 2 lookup table of Quality Factors used in the calculation of the Ratio for the current sample period

Value Units: Unitless Scalar
X Unit: Engine Speed (RPM)
Y Units: Air Per Cylinder (APC) (mg/cylinder)

y/x	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
240	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
280	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
320	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
360	0.00	0.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
440	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
520	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
560	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
600	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
640	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Initial Supporting table - Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests

Description: This table describes the adaptive (Block Learn) cells in which to enable the Post (Secondary) Oxygen sensor response tests.
Note: When the table column heading matches the calibration value below it, that individual cell is enabled.

The cell numbers in the table are defined as:
CeFADR_e_CellOO_PurgOnAirMode5 = 0,
CeFADR_e_Cell01_PurgOnAirMode4 = 1,
CeFADR_e_Cell02_PurgOnAirMode3 = 2,
CeFADR_e_Cell03_PurgOnAirMode2 = 3,
CeFADR_e_Cell04_PurgOnAirMode1 = 4,
CeFADR_e_Cell05_PurgOnAirModeO = 5,
CeFADR_e_Cell06_PurgOnIdle = 6,
CeFADR_e_Cell07_PurgOnDecel = 7,
CeFADR_e_Cell08_PurgOffAirMode5 = 8,
CeFADR_e_Cell09_PurgOffAirMode4 = 9,
CeFADR_e_Cell10_PurgOffAirMode3 = 10,
CeFADR_e_Cell11_PurgOffAirMode2 = 11,
CeFADR_e_Cell12_PurgOffAirMode1 = 12,
CeFADR_e_Cell13_PurgOffAirModeO = 13,
CeFADR_e_Cell14_PurgOffIdle = 14,
CeFADR_e_Cell15_PurgOffDecel = 15

Value Units: Block Learn cell number
X Unit: Block Learn cell number

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	7	7	7	7	7	7	7	7	15	15	15	15	15	15	15	15

Initial Supporting table - Multiple DTC Use Green Sensor Delay Criteria - Limit

Description: This Calibration is the acculmulated airflow limit above which the Green condition is expired
Used for: P0133, P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P0153, P015A, P015B, P015C, P015D, P1133, P1153, P2270, P2271, P2272 and P2273.
Note: This feature is only enabled when the vehicle is new and cannot be enabled in service.

Value Units: Grams
X Unit: Acculmulated Engine Airflow

y/x	CiOXYR_O2_Bank1_Sensor1	CiOXYR_O2_Bank1_Sensor2	CiOXYR_O2_Bank2_Sensor1	CiOXYR_O2_Bank2_Sensor2
1	120,000	120,000	120,000	120,000

Initial Supporting table - POO11_CamPosErrorLimIc1

Description: Maximum Intake Cam 1 phase error as a function of engine speed and engine oil temperature.

Value Units: Maximum Intake Cam 1 phase error (degCAM)
X Unit: Engine Oil Temperature (degC)
Y Units: Engine Speed (rpm)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
800	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
1,200	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
1,600	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
2,000	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
2,400	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
2,800	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
3,200	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
3,600	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
4,000	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
4,400	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
4,800	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
5,200	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
5,600	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
6,000	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
6,400	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
6,800	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0

Initial Supporting table - P0011_P0021_P05CC_P05CD_EngOilPressEnbllc

Description: Delay time before the oil pressure enable flag is set assuming all the oil pressure enable criteria are met

Value Units: Time (sec)
X Unit: Engine Coolant Temperature (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdHiDsbllc

Description: Minimum engine speed to disable Intake cam

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000

Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdLoEnblIc

Description: Maximum engine speed to enable Intake cam - works as hysteresis.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresHiEnbllc

Description: Intake cam is enabled when oil pressure exceeds this value

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresLoDsbllc

Description: Intake cam is disabled when oil pressure falls below this value

Value Units: Engine Oil Pressure (kPa)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	170	170	170	170	160	150	150	150	150	150	150	150	150	150	160	170	170

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmHiEnbllc

Description: Intake cam is enabled when engine speed exceeds this value.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	825	825	825	825	800	800	800	800	800	800	800	800	875	925	1,175	1,325	1,825

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmLoDsbllc

Description: Intake cam is disabled when engine speed is below this value.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	800	800	800	800	750	750	750	750	750	750	750	750	750	750	800	800	800

Initial Supporting table - P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning

Description: Engine running time must be greater than this threshold during a cold start to enable cam phasing

Value Units: Time (sec)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	15	15	14	13	12	11	10	9	8	7	6	5	4	4	4	4	4

Initial Supporting table - P0011_P05CC_StablePositionTimeIc1

Description: Minimum time for Intake Cam 1 phase position to be stable to enable performance diagnostic.

Value Units: Minimum time (sec)
X Unit: Engine Oil Temperature (degC)
Y Units: Engine Speed (rpm)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
800	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
1,200	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
1,600	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
2,000	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
2,400	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
2,800	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
3,200	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
3,600	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
4,000	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
4,400	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
4,800	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
5,200	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
5,600	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
6,000	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
6,400	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
6,800	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4

Initial Supporting table - P0014_P0024_P05CE_P05CF_EngOilPressEnblEc

Description: Delay time before the oil pressure enable flag is set assuming all the oil pressure enable criteria are met

Value Units: Time (sec)
X Unit: Engine Coolant Temperature (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdHiDsblEc

Description: Exhaust cam is disabled when engine speed exceeds this value

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdLoEnblEc

Description: Exhaust cam is enabled when engine speed remains below this value

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresHiEnblEc

Description: Exhaust cam is enabled when oil pressure exceeds this value

Value Units: Engine Oil Pressure (kPa)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresLoDsblEc

Description: Exhaust cam is disabled when oil pressure falls below this value

Value Units: Engine Oil Pressure (kPa)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc

Description: Exhaust cam is enabled when engine speed exceeds this value.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	825	825	825	825	800	800	800	800	800	800	800	800	875	925	1,175	1,325	1,825

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmLoDsblEc

Description: Exhaust cam is disabled when engine speed is below this value.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750

Initial Supporting table - P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold

Description: P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold

Value Units: Engine Run Time- Seconds
X Unit: Oil Temperature- C

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	20.0	10.0	7.0	5.0	3.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0

Initial Supporting table - P0016-0019 Mid-Park Phaser Delay

Description: P0016-0019 Mid-Park Phaser Park Delay. Total delay is twice the calibration value as both 'hi' side and 'lo' side park check sequences are delayed by the stated calibration values

Value Units: Time - seconds
X Unit: Oil Temperature - degC

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	600.0	600.0	320.0	36.0	36.0	36.0	36.0	20.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Initial Supporting table - P0071: OAT Performance Drive Equilibrium Engine Off

Description: OAT Performance Diagnostic counter increment for determining OAT-IAT equilibrium for engine off (for hybrid applications)

Value Units: Counter Increment Value (Unitless)
X Unit: Vehicle Speed (KPH)

y/x	0.0	20.0	30.0	45.0	60.0	75.0	90.0	105.0	120.0
1.0	0.0	4.0	6.0	6.8	7.3	7.8	8.0	8.0	8.0

Initial Supporting table - P0071: OAT Performance Drive Equilibrium Engine Running

Description: OAT Performance Diagnostic counter increment for determining OAT-IAT equilibrium for engine running

Value Units: Counter Increment Value (Unitless)
X Unit: Vehicle Speed (KPH)
Y Units: Engine Air Flow (Grams/Second)

y/x	0.0	20.0	30.0	45.0	60.0	75.0	90.0	105.0	120.0
0.0	1.0	6.0	8.0	8.8	9.0	9.0	9.0	9.0	9.0
15.0	-3.0	1.0	3.0	3.8	4.3	4.8	5.0	5.0	5.0
25.0	-1.5	1.5	3.5	4.3	4.8	5.3	5.5	5.5	5.5
35.0	-0.5	2.0	4.0	4.8	5.3	5.8	6.0	6.0	6.0
45.0	0.0	2.5	4.5	5.3	5.8	6.3	6.5	6.5	6.5
55.0	0.0	3.5	5.5	6.3	6.8	7.3	7.5	7.5	7.5
65.0	0.5	4.5	6.5	7.3	7.8	8.3	8.5	8.5	8.5
75.0	1.0	5.5	7.5	8.3	8.7	8.9	9.0	9.0	9.0
85.0	1.0	6.5	8.0	8.4	8.7	8.9	9.0	9.0	9.0

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAPI Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAPI Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)
X Unit: Engine Speed (RPM)

y/x	0	400	750	1,100	1,450	1,800	2,150	2,500	2,850	3,200	3,550	3,900	4,250	4,600	4,950	5,300	6,000
1	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)
X Unit: Engine Speed (RPM)

y/x	0	400	750	1,100	1,450	1,800	2,150	2,500	2,850	3,200	3,550	3,900	4,250	4,600	4,950	5,300	6,000
1	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)
X Unit: Engine Speed (RPM)

y/x	0	400	750	1,100	1,450	1,800	2,150	2,500	2,850	3,200	3,550	3,900	4,250	4,600	4,950	5,300	6,000
1	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est

Description: P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 Residual Weight Factor based on MAF Est

Value Units: Weight Factor (Unitless)
X Unit: Estimated Engine Air Flow (Grams/Second)

y/x	0	50	70	73	76	79	82	85	89	95	100	110	120	150	200	280	350
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM

Description: P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)
X Unit: Engine Speed (RPM)

y/x	0	400	750	1,100	1,450	1,800	2,150	2,500	2,850	3,200	3,550	3,900	4,250	4,600	4,950	5,300	6,000
1	0.000	1.000	1.000	1.000	1.000	1.000	0.900	0.800	0.750	0.650	0.500	0.500	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - P0116_Fail if power up ECT exceeds IAT by these values

Description: KtECTD_T_HSC_FastFailTempDiff

Value Units: Fast Failure temp difference (°C)
X Unit: IAT Temperature at Power up (°C)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	80	80	80	60	60	40	40	30	30	30	30	30	30	30	30	30	30

Initial Supporting table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Alternate

Description: KtECTR_E_CTR_WrmUpEnrgyLimTest1

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum ECT for the key cycle (°C)

y/x	-20	-7	10	30	45	60	85
1	18,666	18,666	14,197	8,942	5,000	5,000	5,000

Initial Supporting table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Primary

Description: KtECTR_E_CTR_WrmUpEnrgyLimTestO

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum ECT for the key cycle (°C)

y/x	-20	-7	10	30	45	60	85
1	27,186	23,312	18,246	12,286	7,816	7,816	7,816

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1 OmsSeq	CePISR_e_1 2p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	200.000	500.000	500.000	1,000.000	1,000.000	8,191.875	8,191.875	8,191.875

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	5	3	5	3	5	3	5	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	5	3	5	3	5	5	5	5

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	4	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	4	4	4	4	4	4	4	4

Initial Supporting table - P16F3_Delta MAP Threshold f(Desired Engine Torque)

Description: Engine Sync based and Time based delta pressure threshold above which Torque Security error is reported.

y/x	0.00	50.00	100.00	150.00	200.00	300.00
1.00	34.73	34.73	34.73	34.73	34.73	34.73

Initial Supporting table - P16F3_Speed Control External Load f(Oil Temp, RPM)

Description: Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

y/x	-40.00	-15.00	5.00	32.00	55.00	90.00
350.00	439.00	439.00	439.00	434.28	412.25	256.54
450.00	439.00	439.00	439.00	353.08	333.68	210.57
570.00	439.00	388.61	349.08	248.10	230.94	154.38
650.00	422.36	370.44	335.83	240.40	224.49	136.36
750.00	400.06	351.40	323.93	250.50	234.14	118.05
850.00	398.50	356.58	332.39	271.68	255.33	138.64
950.00	400.59	359.12	332.62	287.61	265.17	145.41
1,050.00	392.72	351.60	323.18	289.73	262.24	150.96
1,150.00	349.22	309.95	282.61	238.46	213.69	126.20
1,350.00	285.43	248.11	222.07	176.68	155.25	115.00
1,600.00	198.80	166.04	141.72	97.85	80.07	87.00
2,150.00	140.94	109.38	87.12	44.66	31.23	25.00
2,400.00	120.41	89.25	67.68	26.87	14.88	3.20
3,100.00	85.47	54.94	34.45	-4.41	-14.11	-21.86
4,000.00	63.09	32.84	12.84	-24.15	-32.82	-42.54
4,900.00	48.80	18.55	-1.45	-38.44	-47.10	-56.85
5,800.00	33.49	3.24	-16.76	-53.56	-62.22	-72.79

Initial Supporting table - 1st_FireAftrMisfr_Acel

Description: Used for P0300 - P0308, Multiplier for establishing the expected acceleration of the cylinder after the misfire

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
8	0.70	0.68	0.71	0.73	0.75	0.86	0.74	0.81	0.68	0.69	0.77	0.74	0.66	0.71	0.75	0.75	0.75
12	0.61	0.56	0.64	0.68	0.67	1.03	0.80	0.93	0.79	0.77	0.87	0.85	0.88	0.85	0.92	0.92	0.92
16	0.51	0.42	0.50	0.55	0.55	0.98	0.83	0.71	0.63	0.65	0.75	0.67	0.84	0.65	0.71	0.71	0.71
20	0.43	0.35	0.40	0.48	0.47	0.78	0.58	0.52	0.49	0.57	0.62	0.61	0.69	0.52	0.56	0.56	0.56
24	0.38	0.29	0.33	0.42	0.42	0.71	0.53	0.48	0.46	0.47	0.49	0.55	0.52	0.47	0.46	0.46	0.46
30	0.31	0.23	0.27	0.35	0.36	0.80	0.52	0.47	0.39	0.40	0.40	0.44	0.47	0.46	0.50	0.33	0.42
40	0.24	0.19	0.23	0.30	0.31	0.67	0.47	0.50	0.32	0.35	0.37	0.34	0.36	0.41	0.42	0.36	0.40
60	0.16	0.14	0.18	0.24	0.27	0.56	0.40	0.44	0.31	0.29	0.36	0.31	0.31	0.40	0.42	0.44	0.52
100	0.12	0.10	0.13	0.20	0.23	0.45	0.39	0.48	0.36	0.23	0.37	0.29	0.28	0.38	0.37	0.54	0.52

Initial Supporting table - 1st_FireAftrMisfr_Jerk

Description: Used for P0300 - P0308, Multiplier for establishing the expected Jerk of the cylinder after the misfire

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
8	-1.04	-0.86	-0.86	-0.82	-0.60	-0.84	-0.85	-0.61	-0.74	-0.83	-0.84	-0.86	-0.80	-0.95	-0.77	-0.77	-0.77
12	-1.29	-1.08	-0.85	-0.79	-0.85	-1.14	-0.95	-0.66	-0.90	-0.97	-0.66	-0.97	-1.00	-1.06	-1.27	-1.27	-1.27
16	-1.45	-1.23	-1.10	-0.91	-1.04	-1.76	-0.93	-0.96	-0.97	-1.11	-1.07	-1.09	-1.31	-1.32	-1.50	-1.50	-1.50
20	-1.71	-1.32	-1.28	-1.08	-1.12	-1.67	-1.36	-1.17	-1.19	-1.23	-1.11	-1.22	-1.34	-1.48	-1.71	-1.71	-1.71
24	-1.83	-1.33	-1.44	-1.30	-1.16	-1.83	-1.67	-1.25	-1.38	-1.35	-1.22	-1.26	-1.33	-1.54	-1.67	-1.67	-1.67
30	-1.89	-1.20	-1.36	-1.35	-1.18	-2.54	-2.01	-1.29	-1.65	-1.40	-1.41	-1.31	-1.45	-1.45	-1.46	-1.17	-1.88
40	-1.97	-1.09	-1.18	-1.32	-1.26	-2.95	-1.76	-1.16	-1.59	-1.49	-1.31	-1.35	-1.48	-1.35	-1.42	-1.23	-1.29
60	-2.04	-0.98	-1.03	-1.21	-1.27	-3.10	-1.72	-0.97	-1.36	-1.16	-0.98	-1.39	-1.52	-1.24	-1.27	-1.17	-1.17
100	-2.15	-0.89	-0.93	-1.09	-1.22	-3.01	-1.99	-0.81	-1.20	-0.98	-0.86	-1.40	-1.51	-1.23	-1.14	-1.08	-0.98

Initial Supporting table - IstFireAfterMisJerkAFM

Description: Used for P0300 - P0308, Multiplier for establishing the expected jerk of the cylinder after the misfire if Active Fuel Management cylinder deact mode is active

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1

Initial Supporting table - IstFireAftrMisAcelAFM

Description: Used for P0300 - P0308, Multiplier for establishing the expected acceleration of the cylinder after the misfire if Active Fuel Management cylinder deact mode is active

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1

Initial Supporting table - Abnormal Cyl Mode

Description: Used for P0300-P0308. Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (Cylinder Mode Equation)

Value Units: Number of consecutive number of decelerating cylinders (integer)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	4	4	4	4	4	4	4	4	4

Initial Supporting table - Abnormal Rev Mode

Description: Used for P0300-P0308. Abnormal Rev Mode Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (Rev Mode Equation)

Value Units: Number of consecutive number of decelerating cylinders (integer)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Initial Supporting table - Abnormal SCD Mode

Description: Used for P0300-P0308. Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (SCD Mode Equation)

Value Units: Number of consecutive number of decelerating cylinders (integer)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	4	4	4	4	4	4	4	4	4

Initial Supporting table - Bank_SCD_Decel

Description: Used for P0300 - P0308, Mulitplier to SCD decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200
12	0.75	0.68	0.75	0.91	0.80	0.81	0.80	0.82	0.87
16	0.75	0.61	0.70	0.82	0.75	0.77	0.74	0.92	0.73
18	0.69	0.56	0.66	0.73	0.70	0.65	0.66	0.99	0.46
20	0.64	0.54	0.64	0.64	0.66	0.54	0.52	0.79	0.38
24	0.64	0.54	0.64	0.64	0.66	0.54	0.52	0.79	0.38
30	0.64	0.54	0.64	0.64	0.66	0.54	0.52	0.79	0.38
40	0.64	0.54	0.64	0.64	0.66	0.54	0.52	0.79	0.38
60	0.64	0.54	0.64	0.64	0.66	0.54	0.52	0.79	0.38
98	0.64	0.54	0.64	0.64	0.66	0.54	0.52	0.79	0.38

Initial Supporting table - Bank_SCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to Medres SCD jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: mulitplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200
12	0.81	1.14	1.71	1.65	1.39	1.26	1.22	1.26	1.51
16	0.90	1.30	1.92	1.97	1.50	1.37	1.33	1.39	1.26
18	0.72	1.28	1.90	1.97	1.94	1.65	1.28	1.55	0.78
20	0.61	1.26	1.38	1.27	1.43	1.35	1.09	1.15	0.61
24	0.61	1.26	1.38	1.27	1.43	1.35	1.09	1.15	0.61
30	0.61	1.26	1.38	1.27	1.43	1.35	1.09	1.15	0.61
40	0.61	1.26	1.38	1.27	1.43	1.35	1.09	1.15	0.61
60	0.61	1.26	1.38	1.27	1.43	1.35	1.09	1.15	0.61
98	0.61	1.26	1.38	1.27	1.43	1.35	1.09	1.15	0.61

Initial Supporting table - BankCylModeDecel

Description: Used for P0300 - P0308, Mulitplier to Lores Decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
12	0.71	0.58	0.63	0.58	0.59	0.76	0.87	1.07	0.92	0.97	0.82	0.90	0.88	0.90	1.00	1.00	1.00
16	0.56	0.44	0.48	0.39	0.50	0.72	0.79	0.79	0.79	0.80	0.80	0.81	0.87	0.75	0.71	0.71	0.71
18	0.52	0.40	0.43	0.35	0.46	0.61	0.57	0.59	0.67	0.63	0.71	0.67	0.78	0.68	0.56	0.56	0.56
20	0.50	0.38	0.39	0.34	0.43	0.61	0.46	0.48	0.65	0.54	0.61	0.57	0.61	0.64	0.50	0.50	0.50
24	0.48	0.37	0.42	0.38	0.44	0.65	0.35	0.37	0.67	0.74	0.69	0.71	0.67	0.70	0.46	0.46	0.46
30	0.45	0.37	0.43	0.41	0.44	0.72	0.30	0.46	0.65	0.76	0.71	0.67	0.64	0.68	0.50	0.61	0.58
40	0.41	0.35	0.40	0.42	0.44	0.65	0.33	0.37	0.60	0.81	0.84	0.69	0.61	0.74	0.61	0.64	0.60
60	0.36	0.33	0.37	0.42	0.44	0.60	0.39	0.78	0.86	0.92	1.12	0.91	0.60	0.97	0.98	0.78	0.48
98	0.32	0.31	0.35	0.43	0.42	0.56	0.46	0.58	0.73	0.95	1.62	1.19	0.70	1.08	1.31	1.00	0.52

Initial Supporting table - BankCylModeJerk

Description: Used for P0300 - P0308, Mulitplier to Lores Jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
12	1.48	1.33	1.46	1.43	1.46	1.90	1.59	1.76	1.54	1.46	1.36	1.87	1.93	2.17	2.36	2.36	2.36
16	1.23	1.08	1.17	1.01	1.21	2.03	1.73	1.73	1.55	1.52	1.48	1.58	1.83	1.72	1.92	1.92	1.92
18	1.20	1.02	1.13	0.98	1.08	1.77	1.71	1.73	1.39	1.45	1.39	1.53	1.64	1.74	1.83	1.83	1.83
20	1.23	0.96	1.09	0.98	1.00	1.63	1.68	1.80	1.26	1.34	1.38	1.49	1.49	1.62	1.64	1.64	1.64
24	1.21	0.89	1.04	0.94	0.88	1.65	1.80	1.69	1.54	1.46	1.50	1.60	1.31	1.60	1.56	1.56	1.56
30	1.20	0.79	0.87	0.81	0.83	1.96	1.96	1.24	2.52	1.76	1.66	1.84	1.41	1.55	1.31	1.40	1.88
40	1.18	0.72	0.76	0.68	0.82	1.92	1.22	0.35	3.89	2.55	1.75	2.75	1.46	1.41	1.66	1.45	2.75
60	1.17	0.64	0.67	0.62	0.76	1.73	1.34	1.49	2.88	2.81	1.89	4.76	1.60	1.44	1.55	3.38	2.69
98	1.16	0.58	0.62	0.59	0.71	1.50	1.42	1.15	2.66	3.00	2.19	4.11	1.73	1.27	1.67	3.14	2.55

Initial Supporting table - Catalyst_Damage_Misfire_Percentage

Description: Catalyst Damaging Misfire Percentage" Table whenever secondary conditions are met.

Value Units: percent misfire over 200 revolutions (%)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
0	11.2	11.2	11.2	11.2	9.8	4.8	4.8	4.8
10	11.2	11.2	11.2	11.2	9.8	4.8	4.8	4.8
20	11.2	11.2	11.2	9.8	8.1	4.8	4.8	4.8
30	11.2	11.2	9.8	9.8	8.1	4.8	4.8	4.8
40	11.2	11.2	9.8	8.1	5.4	4.8	4.8	4.8
50	9.8	9.8	8.1	7.0	5.4	4.8	4.8	4.8
60	9.8	9.8	8.1	7.0	4.8	4.8	4.8	4.8
70	8.1	8.1	8.1	6.1	4.8	4.8	4.8	4.8
80	6.1	6.1	6.1	4.8	4.8	4.8	4.8	4.8
90	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
100	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

Initial Supporting table - ClyAfterAFM_Decel

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of misfire after a deactivated cylider.   Similar to the second cylinder of consecutive cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - ClyBeforeAFM_Jerk

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of misfire before a deactivated cylider, but after an active cylinder that follows an deactive cylinder on engine that supports cylinder deactivation in non even fire patterns.. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - CombustModeIdleTbl

Description: Used for P0300 - P0308, Only used on Diesel engines. Combustion modes that will force use of Idle table. A value of CeCMBR_i_CombModesMax means not selected.

Value Units: Enumerated value of different combustion modes (enumeration)
X Unit: Current Combustion Mode (enumeration)

CombustModeIdleTbl - Part 1

y/x	0	1	2	3	4	5
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

CombustModeIdleTbl - Part 2

y/x	6	7	8	9	10	11
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

CombustModeIdleTbl - Part 3

y/x	12	13	14	15	16	
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	

Initial Supporting table - ConsecCylModDecel

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
8	1.26	1.43	1.28	1.16	1.23	1.22	1.24	1.24	1.22	1.27	1.18	1.28	1.17	1.21	1.56	1.56	1.56
12	1.39	1.18	1.22	1.25	1.19	1.47	1.27	1.30	1.27	1.35	1.10	1.23	1.22	1.15	1.46	1.46	1.46
16	1.47	1.09	1.18	1.17	1.19	1.88	1.44	1.10	1.19	1.09	1.02	0.98	1.03	0.90	1.00	1.00	1.00
20	1.42	1.09	1.17	1.16	1.24	1.81	1.05	1.00	1.04	0.93	0.85	0.80	0.83	0.84	0.78	0.78	0.78
24	1.42	1.07	1.14	1.13	1.28	1.89	0.98	1.06	0.89	0.95	0.76	0.82	0.79	0.87	0.79	0.79	0.79
30	1.36	1.08	1.08	1.07	1.21	2.11	1.06	1.06	0.59	0.71	0.48	0.65	0.79	0.84	0.77	0.83	1.00
40	1.32	1.08	1.03	1.04	1.17	1.95	1.13	0.97	0.42	0.62	0.39	0.47	0.63	0.78	0.81	0.77	0.67
60	1.24	1.07	0.98	1.00	1.11	1.71	1.09	0.76	0.52	0.76	0.89	0.68	0.78	0.90	0.92	0.93	1.00
98	1.19	1.07	0.96	1.00	1.05	1.53	1.17	0.75	0.75	0.97	1.60	0.76	0.80	1.07	1.08	1.06	1.00

Initial Supporting table - ConsecCylModeJerk

Description: Used for P0300 - P0308, Mulitplier to Lores Jerk to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
8	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1
16	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-2	-2	-2
20	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2
24	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
30	0	0	0	0	0	0	-1	-1	-2	-2	-2	-1	-1	-1	-1	-1	-1
40	0	0	0	0	0	0	0	-1	-3	-4	-3	-3	-1	-1	-1	-1	-4
60	0	0	0	0	0	0	0	-1	-2	-7	-3	-6	-1	-1	-1	-4	-4
98	0	0	0	0	0	0	0	-1	-1	-8	-2	-4	-1	-1	-1	-3	-3

Initial Supporting table - ConsecSCD_Decel

Description: Used for P0300 - P0308, Mulitplier to medres decel to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200
8	1.00	1.04	1.12	1.22	1.14	1.20	1.20	1.32	1.03
12	1.00	1.10	1.15	1.13	1.10	1.20	1.06	1.42	0.93
16	1.00	1.36	1.46	1.29	1.25	1.28	1.21	1.42	0.68
20	1.00	1.64	1.81	1.40	1.39	1.30	1.25	1.09	0.63
24	1.00	1.64	1.81	1.40	1.39	1.30	1.25	1.09	0.63
30	1.00	1.64	1.81	1.40	1.39	1.30	1.25	1.09	0.63
40	1.00	1.64	1.81	1.40	1.39	1.30	1.25	1.09	0.63
60	1.00	1.64	1.81	1.40	1.39	1.30	1.25	1.09	0.63
98	1.00	1.64	1.81	1.40	1.39	1.30	1.25	1.09	0.63

Initial Supporting table - ConsecSCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to medres Jerk to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200
8	-0.07	-0.09	-0.14	-0.19	-0.22	-0.29	-0.21	-0.12	-0.12
12	-0.06	-0.08	-0.14	-0.18	-0.20	-0.21	-0.16	-0.23	-0.27
16	-0.04	-0.06	-0.10	-0.12	-0.14	-0.12	-0.06	-0.28	-0.19
20	-0.02	-0.04	-0.05	-0.06	-0.06	-0.03	0.02	-0.20	-0.17
24	-0.02	-0.04	-0.05	-0.06	-0.06	-0.03	0.02	-0.20	-0.17
30	-0.02	-0.04	-0.05	-0.06	-0.06	-0.03	0.02	-0.20	-0.17
40	-0.02	-0.04	-0.05	-0.06	-0.06	-0.03	0.02	-0.20	-0.17
60	-0.02	-0.04	-0.05	-0.06	-0.06	-0.03	0.02	-0.20	-0.17
98	-0.02	-0.04	-0.05	-0.06	-0.06	-0.03	0.02	-0.20	-0.17

Initial Supporting table - CylAfterAFM_Jerk

Description: Used for P0300 - P0308, Mulitplier to Lores Jerk to account for different pattern of misfire after a deactivated cylider.   Similar to the second cylinder of consecutive cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1
98	1	1	1	1	1	1	1	1	1

Initial Supporting table - CylBeforeAFM_Decel

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of misfire before a deactivated cylider, but after an active cylinder that follows an deactive cylinder on engine that supports cylinder deactivation in non even fire patterns.. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - CylModeDecel

Description: Used for P0300-P0308. Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usee)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

CylModeDecel - Part 1

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
3	2,050	1,500	950	544	350	243	179	158	121	70	53	39	30
6	1,880	1,365	850	507	344	234	175	144	109	68	51	37	27
8	1,897	1,401	837	507	348	244	170	135	101	65	47	36	25
10	2,021	1,498	884	532	370	266	166	128	90	61	41	33	23
12	2,189	1,631	1,012	586	413	295	158	123	84	57	36	30	20
14	2,414	1,800	1,187	675	490	325	151	114	91	57	38	30	19
16	2,566	1,958	1,350	786	569	365	174	117	100	58	40	30	21
18	2,790	2,139	1,488	891	640	402	201	156	110	60	45	32	23
20	2,952	2,296	1,641	1,018	710	450	226	181	125	67	50	36	26
22	3,171	2,465	1,812	1,131	777	498	246	203	134	77	56	43	29
24	3,353	2,610	2,001	1,238	847	540	261	223	145	85	61	48	33
26	3,530	2,743	2,175	1,362	914	600	273	238	156	95	66	54	37
30	3,783	3,111	2,505	1,583	1,064	696	285	266	178	113	76	62	45
30	3,783	3,111	2,505	1,583	1,064	696	285	266	178	113	76	62	45
40	4,736	4,047	3,245	2,117	1,382	928	401	368	242	152	94	71	58
60	6,829	6,126	4,726	3,146	2,040	1,381	645	594	446	225	133	81	69
97	11,810	9,820	7,617	5,005	3,173	2,305	1,119	953	690	357	216	94	87

CylModeDecel - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,001	3,500	4,000	4,500	5,000	5,500	6,000	7,000
3	22	17	14	12	10	6	6	4	4	3	3	2	2
6	22	16	13	11	9	6	6	4	4	3	3	2	2
8	21	15	12	10	8	6	6	4	4	3	3	2	2
10	18	14	11	9	7	6	6	4	4	3	3	2	2
12	16	12	10	9	7	6	5	4	4	3	3	2	2
14	16	12	10	8	7	7	5	4	4	3	3	2	2
16	16	12	10	8	7	7	5	4	4	4	3	3	3
18	16	13	11	9	8	7	5	4	4	4	3	3	3
20	18	14	13	11	9	8	6	4	4	4	3	2	2
22	21	16	14	12	11	9	6	5	4	4	3	2	2
24	24	18	15	13	12	10	7	5	4	4	3	3	3

Initial Supporting table - CylModeDecel

26	27	20	17	14	13	11	7	5	5	4	3	3	3
30	33	24	19	16	15	14	9	6	6	4	3	3	3
30	33	24	19	16	15	15	9	6	4	4	4	4	4
40	44	33	23	19	18	18	11	8	5	5	5	5	5
60	60	50	30	25	20	20	14	11	9	9	9	9	9
97	83	77	44	35	26	26	18	16	12	12	12	12	12

Initial Supporting table - CylModeJerk

Description: Crankshaft jerk threshold. Thresholds are a function of rpm and % engine Load.

Value Units: Change in Delta time per cylinder from last cylinder (usee)
Y Units: percent load of max indicated torque (%)

CylModeJerk - Part 1

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
3	1,914	1,327	740	425	311	245	172	132	108	82	52	37	27
6	1,799	1,265	730	413	291	245	162	122	94	74	47	34	24
8	1,694	1,234	697	413	289	249	156	118	85	68	43	32	22
10	1,729	1,290	675	413	306	245	144	114	76	63	40	32	21
12	1,931	1,425	773	471	358	241	120	111	77	56	38	30	19
14	2,141	1,656	969	577	452	274	110	108	81	54	40	30	21
16	2,327	1,831	1,181	673	522	317	128	117	84	60	42	30	22
18	2,567	2,002	1,370	765	584	359	153	125	85	65	47	34	23
20	2,692	2,127	1,535	881	625	399	178	131	85	72	51	36	24
22	2,810	2,251	1,671	989	680	450	199	132	88	78	55	39	25
24	2,955	2,383	1,829	1,115	750	504	205	130	93	77	58	42	28
26	3,074	2,501	1,999	1,256	834	578	205	130	101	70	59	44	29
30	3,390	2,772	2,319	1,525	1,030	732	221	130	122	64	60	49	31
30	3,390	2,772	2,319	1,525	1,030	732	221	130	122	64	60	49	31
40	4,115	3,421	3,018	2,132	1,550	1,067	309	211	186	58	57	57	28
60	5,504	4,681	4,446	3,292	2,400	1,712	510	284	260	122	78	74	23
97	8,118	7,038	7,044	5,351	3,970	2,887	906	456	423	217	123	104	44

CylModeJerk - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,001	3,500	4,000	4,500	5,000	5,500	6,000	7,000
3	22	16	13	10	8	0	0	0	0	0	0	0	0
6	19	15	11	9	7	0	0	0	0	0	0	0	0
8	18	14	11	8	7	0	0	0	0	0	0	0	0
10	16	13	10	7	6	0	0	0	0	0	0	0	0
12	15	11	9	7	6	0	0	0	0	0	0	0	0
14	14	11	9	7	6	0	0	0	0	0	0	0	0
16	15	11	9	8	6	0	0	0	0	0	0	0	0
18	17	12	10	8	6	0	0	0	0	0	0	0	0
20	19	14	11	9	7	0	0	0	0	0	0	0	0
22	21	16	12	10	9	0	0	0	0	0	0	0	0
24	24	18	13	10	9	0	0	0	0	0	0	0	0

Initial Supporting table - CylModeJerk

26	26	20	14	11	11	0	0	0	0	0	0	0	0
30	29	23	17	14	13	0	0	0	0	0	0	0	0
30	29	23	17	14	13	13	8	4	3	3	3	3	3
40	38	29	23	20	15	15	10	4	3	3	3	3	3
60	52	41	33	30	22	22	7	7	4	4	4	4	4
97	80	69	61	58	32	32	11	11	8	8	8	8	8

Initial Supporting table - DeacCylInversionDecel

Description: Used for P0300 - P0308, Negative Torque can cause crank readings to invert (active cylinders appear weak & deactivated cylinders appear "strong" If deactivated cylinders don't decelerate at least this amount then the crank signal is inverting. Function of speed and load.

Value Units: Delta time per cylinder (usee)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
12	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
16	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
20	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
24	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
30	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
40	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
60	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
98	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384

Initial Supporting table - DeacCylInversionJerk

Description: Used for P0300 - P0308, Negative Torque can cause crank readings to invert (active cylinders appear weak & deactivated cylinders appear "strong" If deactivated cylinders don't jerk at least this amount then the crank signal is inverting. Function of speed and load.

Value Units: Change in Delta time per cylinder from last cylinder (usee)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
12	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
16	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
20	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
24	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
30	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
40	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
60	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
98	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384

Initial Supporting table - EngineOverSpeedLimit

Description: Engine OverSpeed Limit versus gear

Value Units: RPM
X Unit: Enumeration of transmission gear state (enumeration)

EngineOverSpeedLimit - Part 1

y/x	CeTGRR_e_TransGr1	CeTGRR_e_TransGr2	CeTGRR_e_TransGr3	CeTGRR_e_TransGr4	CeTGRR_e_TransGr5	CeTGRR_e_TransGr6	CeTGRR_e_TransGr9
1	4,530	4,530	4,530	4,530	4,530	4,530	4,530

EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGr10	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrRvrs	CeTGRR_e_TransGrPark	CeTGRR_e_TransGr7	CeTGRR_e_TransGr8	
1	4,530	4,000	4,530	4,000	4,530	4,530	

Initial Supporting table - Ethanol Estimation Refuel Threshold

Description: Delta Fuel Volume required to enable the Ethanol Estimation algorithm. The Delta Fuel Volume required is a function of the amount of fuel in the tank. A value of 65535 demonstrates a region that is disabled.

Value Units: Delta Fuel volume (Liters)
X Unit: Percent Fuel Volume (%)

y/x	0	10	20	30	40	50	60	70	80
1	65,535.0	65,535.0	65,535.0	65,535.0	65,535.0	65,535.0	65,535.0	65,535.0	65,535.0

Initial Supporting table - InfrequentRegen

Description: Used for P0300-P0308. Only used on Diesel engines. Initiates a misfire delay when the current combustion mode matchs a selection in the table. A value of CeCMBR_i_CombModesMax means not selected.

Value Units: Enumerated value of different combustion modes (enumeration)
X Unit: Current Combustion Mode (enumeration)

InfrequentRegen - Part 1

y/x	0	1	2	3	4	5
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

InfrequentRegen - Part 2

y/x	6	7	8	9	10	11
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

InfrequentRegen - Part 3

y/x	12	13	14	15	16	
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	

Initial Supporting table - Number of Normals

Description: Used for P0300-P0308. Number of Normals for the Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.

Value Units: Number of Engine cycles after isolated misfire (Engine cycles)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	3	3	3	3	3	3	3	3	3

Initial Supporting table - P00C6 - High Pressure Pump Control Mode timeout

Description: High Pressure Pump Control Mode timeout

Value Units: Time (Seconds)
X Unit: Coolant Temperature (Deg C)

y/x	-40	-35	-30	-25	-20	-10	0	8	16	20	24	32	40	60	80	90	112
1	10.0	10.0	10.0	10.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Initial Supporting Jable — P00C6 maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh afterHigh Pressure Start

Description: The maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start (HPS) is executed but before engine is in run mode.

Value Units: maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start (Count)
X Unit: Coolant Temperature (Deg C)
Y Units: Ethanol Precent (%)

y/x	-40	-35	-30	-25	-20	-10	0	8	16	20	24	32	40	60	80	90	112
0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
13	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
25	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
38	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
50	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
63	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
75	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
88	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
100	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Initial Supporting table - P00C6 - Minimum acceptable value of fuel rail pressure after High Pressure Start

Description: The minimum acceptable value of fuel rail pressure after High Pressure Start (HPS) is executed. This ensures the pressure does not fall off drastically after High Pressure Start (HPS) is executed, but before engine is in run mode.

Value Units: Minimum acceptable value of fuel rail pressure after High Pressure Start (Mpa)
X Unit: Coolant Temperature (Deg C)
Y Units: Ethanol Precent (%)

y/x	-40	-35	-30	-25	-20	-10	0	8	16	20	24	32	40	60	80	90	112
0	2.0	2.0	2.0	2.0	2.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
13	2.0	2.0	2.0	2.0	2.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
25	2.0	2.0	2.0	2.0	2.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
38	2.0	2.0	2.0	2.0	2.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
50	2.0	2.0	2.0	2.0	2.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
63	2.0	2.0	2.0	2.0	2.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
75	2.0	2.0	2.0	2.0	2.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
88	2.0	2.0	2.0	2.0	2.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
100	2.0	2.0	2.0	2.0	2.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

Initial Supporting table - P00C6 - Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery

Description: This calibration is the minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery

Value Units: Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery
X Unit: Coolant Temperature (Deg C)
Y Units: Ethanol Precent (%)

y/x	-40	-35	-30	-25	-20	-10	0	8	16	20	24	32	40	60	80	90	112
0	15.0	15.0	12.0	12.0	11.5	8.0	5.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
13	15.0	15.0	12.0	12.0	11.5	8.0	5.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
25	14.0	14.0	13.0	13.0	11.0	8.0	5.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
38	14.0	14.0	14.0	14.0	10.0	8.6	5.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
50	14.0	14.0	14.0	14.0	10.0	8.6	5.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
63	14.0	14.0	14.0	14.0	10.0	8.6	6.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
75	14.0	14.0	14.0	14.0	10.0	8.6	6.0	5.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
88	14.0	14.0	14.0	14.0	10.0	8.6	7.0	6.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
100	14.0	14.0	14.0	14.0	10.0	8.6	7.5	7.0	6.0	5.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0

Initial Supporting table - P0420_BestFailingOSCTableB1

Description: This table is a 9x17 table of baseline Best Failing (e.g. threshold converter) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow,the BestFailing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the WorstPassing value) to calculate the Normalized Ratio for that specific test. The values in this table are based on the measured OSC for the identified BPU converter that is used for MIL illumination across the specific temp and airflow range for a given program.

y/x	13.55	14.20	14.84	15.49	16.14	16.79	17.44	18.09	18.73	19.38	20.03	20.68	21.33	21.98	22.63	23.27	23.92
475.00	1.09	1.05	1.01	0.97	0.94	0.88	0.79	0.72	0.68	0.63	0.56	0.53	0.52	0.50	0.48	0.46	0.43
528.00	1.51	1.47	1.43	1.37	1.33	1.27	1.19	1.10	1.01	0.94	0.87	0.84	0.83	0.79	0.77	0.73	0.70
581.00	1.84	1.82	1.76	1.71	1.63	1.56	1.47	1.38	1.29	1.21	1.15	1.11	1.09	1.04	1.00	0.96	0.93
634.00	1.99	1.95	1.88	1.81	1.74	1.66	1.57	1.48	1.40	1.33	1.26	1.21	1.18	1.15	1.12	1.09	1.06
687.00	2.05	1.99	1.92	1.85	1.78	1.70	1.61	1.53	1.45	1.38	1.32	1.26	1.23	1.21	1.18	1.15	1.13
740.00	2.09	2.02	1.95	1.88	1.81	1.73	1.64	1.56	1.48	1.42	1.36	1.31	1.29	1.26	1.23	1.20	1.18
793.00	2.12	2.05	1.98	1.91	1.84	1.76	1.67	1.61	1.53	1.47	1.40	1.35	1.33	1.29	1.26	1.23	1.21
846.00	2.15	2.08	2.01	1.94	1.87	1.79	1.70	1.65	1.57	1.51	1.44	1.40	1.36	1.32	1.28	1.25	1.22
900.00	2.18	2.11	2.04	1.97	1.90	1.82	1.73	1.68	1.62	1.56	1.49	1.44	1.40	1.36	1.31	1.27	1.25

Initial Supporting table - P0420_.WorstPassingOSCTableBI

Description: This table is a 9x17 table of WorstPassing (e.g. 120k) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow, the WorstPassing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the BestFailing OSC value) to calculate the Normalized Ratio for that specific test.The values in this table are based on the measured OSC for the WPA part across the temp and airflow range.

y/x	13.55	14.20	14.84	15.49	16.14	16.79	17.44	18.09	18.73	19.38	20.03	20.68	21.33	21.98	22.63	23.27	23.92
475.00	1.39	1.35	1.31	1.27	1.24	1.18	1.09	1.02	0.98	0.93	0.86	0.83	0.82	0.80	0.78	0.76	0.73
528.00	1.81	1.77	1.73	1.67	1.63	1.57	1.49	1.40	1.31	1.24	1.17	1.14	1.13	1.09	1.07	1.03	1.00
581.00	2.14	2.12	2.06	2.01	1.92	1.86	1.77	1.68	1.58	1.51	1.45	1.42	1.39	1.34	1.30	1.26	1.23
634.00	2.29	2.25	2.18	2.11	2.04	1.96	1.87	1.78	1.70	1.63	1.56	1.51	1.48	1.46	1.42	1.39	1.37
687.00	2.35	2.29	2.22	2.15	2.08	2.00	1.91	1.83	1.75	1.68	1.62	1.56	1.53	1.51	1.48	1.45	1.43
740.00	2.39	2.32	2.25	2.18	2.11	2.03	1.94	1.86	1.78	1.72	1.66	1.61	1.59	1.56	1.53	1.50	1.48
793.00	2.42	2.35	2.28	2.21	2.14	2.06	1.97	1.90	1.83	1.77	1.70	1.65	1.63	1.59	1.56	1.53	1.51
846.00	2.45	2.38	2.31	2.24	2.17	2.09	2.00	1.95	1.87	1.81	1.75	1.70	1.66	1.62	1.58	1.55	1.52
900.00	2.48	2.41	2.34	2.27	2.20	2.12	2.03	1.98	1.92	1.86	1.79	1.74	1.70	1.66	1.61	1.57	1.55

Initial Supporting table - P0430_BestFailingOSCTableB2

Description: This table is a 9x17 table of baseline Best Failing (e.g. threshold converter) OSC times for catalyst Bank 2. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow,the BestFailing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the WorstPassing value) to calculate the Normalized Ratio for that specific test. The values in this table are based on the measured OSC for the identified BPU converter that is used for MIL illumination across the specific temp and airflow range for a given program.

y/x	13.55	14.20	14.84	15.49	16.14	16.79	17.44	18.09	18.73	19.38	20.03	20.68	21.33	21.98	22.63	23.27	23.92
475.00	1.14	1.10	1.06	1.02	0.99	0.93	0.84	0.77	0.73	0.68	0.61	0.58	0.57	0.55	0.53	0.51	0.48
528.00	1.56	1.52	1.48	1.42	1.38	1.32	1.24	1.15	1.06	0.99	0.92	0.89	0.88	0.84	0.82	0.78	0.75
581.00	1.89	1.87	1.81	1.76	1.67	1.61	1.52	1.43	1.33	1.26	1.20	1.17	1.14	1.09	1.05	1.01	0.98
634.00	2.04	2.00	1.93	1.86	1.79	1.71	1.62	1.53	1.45	1.38	1.31	1.26	1.23	1.21	1.17	1.14	1.12
687.00	2.10	2.04	1.97	1.90	1.83	1.75	1.66	1.58	1.50	1.43	1.37	1.31	1.28	1.26	1.23	1.20	1.18
740.00	2.14	2.07	2.00	1.93	1.86	1.78	1.69	1.61	1.53	1.47	1.41	1.36	1.34	1.31	1.28	1.25	1.23
793.00	2.17	2.10	2.03	1.96	1.89	1.81	1.72	1.65	1.58	1.52	1.45	1.40	1.38	1.34	1.31	1.28	1.26
846.00	2.20	2.13	2.06	1.99	1.92	1.84	1.75	1.70	1.62	1.56	1.50	1.45	1.41	1.37	1.33	1.30	1.27
900.00	2.23	2.16	2.09	2.02	1.95	1.87	1.78	1.73	1.67	1.61	1.54	1.49	1.45	1.41	1.36	1.32	1.30

Initial Supporting table - P0430_WorstPassingOSCTableB2

Description: This table is a 9x17 table of WorstPassing (e.g. 120k) OSC times for catalyst Bank 2. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow, the WorstPassing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the BestFailing OSC value) to calculate the Normalized Ratio for that specific test.The values in this table are based on the measured OSC for the WPA part across the temp and airflow range.

y/x	13.55	14.20	14.84	15.49	16.14	16.79	17.44	18.09	18.73	19.38	20.03	20.68	21.33	21.98	22.63	23.27	23.92
475.00	1.44	1.40	1.36	1.32	1.29	1.23	1.14	1.07	1.03	0.98	0.91	0.88	0.87	0.85	0.83	0.81	0.78
528.00	1.86	1.82	1.78	1.72	1.67	1.62	1.54	1.45	1.36	1.29	1.22	1.19	1.17	1.14	1.12	1.08	1.05
581.00	2.19	2.17	2.11	2.06	1.97	1.91	1.82	1.73	1.63	1.56	1.50	1.46	1.44	1.39	1.35	1.31	1.28
634.00	2.34	2.30	2.23	2.16	2.09	2.01	1.92	1.83	1.75	1.68	1.62	1.56	1.53	1.50	1.47	1.44	1.42
687.00	2.40	2.34	2.27	2.20	2.13	2.05	1.96	1.88	1.80	1.73	1.67	1.62	1.58	1.56	1.53	1.50	1.48
740.00	2.44	2.37	2.30	2.23	2.16	2.08	1.99	1.91	1.83	1.77	1.71	1.66	1.64	1.61	1.58	1.55	1.53
793.00	2.47	2.40	2.33	2.26	2.19	2.11	2.02	1.96	1.88	1.82	1.75	1.71	1.68	1.64	1.61	1.58	1.56
846.00	2.50	2.43	2.36	2.29	2.22	2.14	2.05	2.00	1.92	1.86	1.79	1.75	1.71	1.67	1.63	1.60	1.58
900.00	2.53	2.46	2.39	2.32	2.25	2.17	2.08	2.03	1.97	1.91	1.84	1.79	1.75	1.71	1.66	1.62	1.60

Initial Supporting table - Pair_SCD_Decel

Description: Used for P0300 - P0308, Mulitplier to SCD_Decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200
8	1.00	0.70	0.81	0.95	0.93	0.95	0.96	0.90	0.96
12	1.00	0.69	0.83	0.91	0.96	1.04	0.88	0.91	0.77
16	0.95	0.65	0.81	1.02	1.11	1.12	0.84	0.93	0.50
20	0.92	0.58	0.84	1.03	1.16	1.11	0.67	0.78	0.48
24	0.92	0.58	0.84	1.03	1.16	1.11	0.67	0.78	0.48
30	0.92	0.58	0.84	1.03	1.16	1.11	0.67	0.78	0.48
40	0.92	0.58	0.84	1.03	1.16	1.11	0.67	0.78	0.48
60	0.92	0.58	0.84	1.03	1.16	1.11	0.67	0.78	0.48
98	0.92	0.58	0.84	1.03	1.16	1.11	0.67	0.78	0.48

Initial Supporting table - Pair_SCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to P0300_SCD_Jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200
8	1.00	1.05	1.29	1.39	1.24	1.25	1.11	1.16	1.31
12	1.07	1.05	1.46	1.59	1.32	1.30	1.15	1.10	1.07
16	1.00	0.93	1.48	1.66	1.77	1.69	1.14	1.06	0.63
20	1.00	0.92	1.16	1.19	1.45	1.45	1.00	0.85	0.58
24	1.00	0.92	1.16	1.19	1.45	1.45	1.00	0.85	0.58
30	1.00	0.92	1.16	1.19	1.45	1.45	1.00	0.85	0.58
40	1.00	0.92	1.16	1.19	1.45	1.45	1.00	0.85	0.58
60	1.00	0.92	1.16	1.19	1.45	1.45	1.00	0.85	0.58
98	1.00	0.92	1.16	1.19	1.45	1.45	1.00	0.85	0.58

Initial Supporting table - PairCylModeDecel

Description: Used for P0300 - P0308, Mulitplier to Cyl Mode Deceleration to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: mulitplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
8	0.97	0.94	0.83	0.81	0.78	0.96	0.93	0.78	0.90	0.89	0.99	1.00	0.85	1.04	1.06	1.06	1.06
12	1.14	0.83	0.82	0.84	0.87	1.02	0.89	0.82	0.94	1.04	0.98	0.98	0.97	1.05	1.15	1.15	1.15
16	1.25	0.76	0.83	0.83	0.94	1.08	0.88	0.67	0.71	0.79	0.85	0.83	0.90	0.85	1.00	1.00	1.00
20	1.21	0.80	0.84	0.84	0.92	1.03	0.70	0.55	0.52	0.60	0.75	0.76	0.86	0.84	0.94	0.94	0.94
24	1.21	0.79	0.84	0.86	0.90	1.07	0.76	0.53	0.47	0.55	0.60	0.69	0.85	0.93	0.88	0.88	0.88
30	1.16	0.80	0.82	0.85	0.86	1.27	0.83	0.49	0.42	0.55	0.59	0.61	1.00	1.14	0.97	1.11	1.08
40	1.13	0.82	0.79	0.84	0.80	1.23	0.73	0.43	0.35	0.54	0.62	0.60	1.31	1.37	1.17	1.27	1.20
60	1.06	0.82	0.76	0.79	0.76	1.14	0.63	0.72	0.68	0.68	0.81	0.86	1.66	1.77	1.70	1.63	1.38
98	0.77	0.79	0.75	0.77	0.70	1.05	0.63	0.50	0.50	0.64	0.85	0.98	2.12	2.13	2.21	2.11	1.55

Initial Supporting table - PairCylModeJerk

Description: Used for P0300 - P0308, Mulitplier to P0300_CylModeJerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
8	1.30	1.20	1.25	1.26	1.03	1.18	1.31	1.36	1.13	1.20	1.33	1.39	1.14	1.33	1.31	1.31	1.31
12	1.33	1.15	1.16	1.04	1.23	1.72	1.31	1.16	1.21	1.25	1.24	1.26	1.24	1.28	1.45	1.45	1.45
16	1.32	1.05	1.07	0.96	1.21	2.15	1.32	1.07	0.95	1.07	1.07	0.93	0.93	1.06	1.08	1.08	1.08
20	1.37	1.02	1.05	1.04	1.22	1.89	1.48	1.11	0.65	0.80	0.83	0.85	0.81	1.14	0.93	0.93	0.93
24	1.43	1.03	1.00	1.06	1.20	2.07	1.92	1.05	0.52	0.62	0.68	0.69	0.85	1.04	1.00	1.00	1.00
30	1.45	1.01	0.91	0.97	1.06	2.51	2.26	0.87	0.50	0.51	0.55	0.60	0.98	1.09	1.04	1.20	1.50
40	1.48	1.00	0.85	0.84	0.95	2.48	1.45	0.59	0.69	0.67	0.53	0.82	1.14	1.39	1.41	1.40	2.38
60	1.54	0.99	0.77	0.81	0.89	2.28	1.90	1.51	1.30	1.39	0.82	2.22	1.45	1.68	1.68	3.69	2.54
98	1.62	0.98	0.74	0.77	0.86	2.12	2.09	1.09	1.01	1.28	0.92	1.84	1.68	1.67	2.14	3.82	2.64

Initial Supporting table - Random_SCD_Decel

Description: Used for P0300 - P0308, Mulitplier to SCD_Decel to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200
8	1.15	1.10	1.05	1.03	1.03	1.03	1.03	1.03	1.03
12	1.15	1.10	1.09	1.08	1.05	1.05	1.05	1.05	1.05
16	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.15	1.15
20	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
24	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
30	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
40	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
60	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
98	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15

Initial Supporting table - Random_SCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to Random_SCD_Jerk to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomAFM_Decl

Description: Used for P0300 - P0308, Mulitplierto Cylinder_Decel while in Cylnder Deactivation mode to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomAFM_Jerk

Description: Used for P0300 - P0308, Mulitplier to Cylinder_Jerk while in Cylnder Deactivation mode to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomCylModDecel

Description: Used for P0300 - P0308. Multiplier to CylMode_Decel. account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: Multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.08	1.09	1.06	1.00	1.10	1.02	1.04	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.21	1.14	1.38	1.13	1.35	1.16	1.15	1.23	1.23	1.23
16	1.00	1.00	1.00	1.00	1.00	1.00	1.06	1.10	1.27	1.30	1.25	1.12	1.29	1.35	1.36	1.36	1.36
20	1.00	1.00	1.00	1.00	1.00	1.08	1.00	1.20	1.41	1.39	1.28	1.25	1.50	1.32	1.33	1.33	1.33
24	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.20	1.30	1.36	1.14	1.15	1.33	1.30	1.21	1.21	1.21
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	1.20	1.40	1.23	1.18	1.24	1.32	1.20	1.33	1.33
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.16	1.18	1.55	1.50	1.29	1.22	1.41	1.33	1.50	1.53
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.19	1.67	2.03	1.65	1.34	1.67	1.80	1.89	1.71
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.21	1.68	2.90	2.15	1.59	1.92	2.29	2.57	1.97

Initial Supporting table - RandomCylModJerk

Description: Used for P0300 - P0308, Multiplier to CylMode_Jerk to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,600	3,000	3,500	4,000
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.06	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.28	1.00	1.00	1.07	1.04	1.11	1.10	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.45	1.08	1.03	1.07	1.13	1.06	1.12	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.42	1.44	1.25	1.15	1.31	1.10	1.15	1.00	1.20	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.27	2.01	1.76	1.30	2.04	1.16	1.17	1.24	1.10	1.75
60	1.00	1.00	1.00	1.00	1.00	1.00	1.23	1.39	1.57	2.32	1.49	3.87	1.30	1.32	1.27	2.77	1.85
98	1.00	1.00	1.00	1.00	1.00	1.00	1.21	1.44	1.52	2.48	1.71	3.34	1.38	1.24	1.52	2.86	2.09

Initial Supporting table - RandomRevModDecl

Description: Used for P0300 - P0308, Mulitplier to RevMode_Decel to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	3,001	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RepetSnapDecayAdjst

Description: Used for P0300 - P0308, If misfire is present in consecutive engine cycles, this multiplier is applied to the misfire jerk threshold and compared to a crankshaft snap value after the misfire has taken place.. Table lookup as a function of engine rpm.

Value Units: multiplier
X Unit: RPM

y/x	900	1,100	1,400	1,600	1,800	2,000	2,600	3,000	4,000
1	1.00	1.00	1.15	1.25	2.14	1.20	1.03	1.00	1.00

Initial Supporting table - RevMode_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time between revolutions (usee)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,001	3,500	4,000	4,500	5,000	5,500	6,000	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	90	58	47	34	28	20	20	20
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	88	56	45	32	26	20	20	20
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	86	56	44	30	26	20	20	20
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	85	57	45	30	26	20	20	20
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	86	59	45	32	27	20	20	20
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	86	63	46	34	29	21	21	21
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	94	68	47	36	33	22	22	22
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	105	72	49	39	36	25	25	25
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	115	77	52	42	40	29	29	29
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	123	82	55	45	43	32	32	32
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	132	86	60	49	47	34	34	34
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	141	91	64	51	51	37	37	37
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	155	99	74	60	60	43	42	42
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - Ring Filter

Description: Used for P0300-P0308. Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.

Value Units: Number of Engine cycles after isolated misfire (Engine cycles)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	7	4	7	7	7	7	7	7	7

Initial Supporting table - SCD_Decel

Description: Used for P0300-P0308 Crankshaft decel threshold. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usee)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
3	607	607	344	214	148	100	77	58	48	32,767	32,767	32,767	32,767
6	590	576	318	198	138	95	70	55	48	32,767	32,767	32,767	32,767
8	610	586	337	197	136	95	69	54	50	32,767	32,767	32,767	32,767
10	658	617	353	212	146	98	73	51	49	32,767	32,767	32,767	32,767
12	734	668	382	231	157	106	80	51	55	32,767	32,767	32,767	32,767
14	858	722	415	254	172	117	87	51	66	32,767	32,767	32,767	32,767
16	1,195	789	449	278	188	132	96	52	75	32,767	32,767	32,767	32,767
18	1,586	858	480	310	205	151	111	61	82	32,767	32,767	32,767	32,767
20	2,066	941	520	347	226	172	126	74	92	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - SCD_Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Value Units: Change in Delta time per cylinder from last cylinder (usee)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
3	886	554	303	185	126	95	73	54	43	32,767	32,767	32,767	32,767
6	766	520	264	160	117	84	71	50	37	32,767	32,767	32,767	32,767
8	716	508	270	160	117	82	70	50	37	32,767	32,767	32,767	32,767
10	666	506	264	159	123	88	70	52	40	32,767	32,767	32,767	32,767
12	752	518	260	156	128	94	74	55	45	32,767	32,767	32,767	32,767
14	873	574	256	149	130	94	82	58	62	32,767	32,767	32,767	32,767
16	1,278	659	328	197	132	103	90	64	80	32,767	32,767	32,767	32,767
18	1,618	740	422	265	158	129	102	82	91	32,767	32,767	32,767	32,767
20	2,032	825	538	357	212	157	123	104	110	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - SnapDecayAfterMisfire

Description: Used for P0300 - P0308, multiplier times the ddtjerk value used used to detect misfire at that speed and load to see if size of disturbance has died down as expected of real misfire. Table lookup as a function of engine rpm and trans gear ratio.

Value Units: multiplier
X Unit: RPM
Y Units: gear ratio

y/x	900	1,100	1,400	1,600	1,800	2,000	2,600	3,000	4,000
1	1.00	3.20	3.72	2.59	2.00	1.93	2.55	3.38	3.38
1	0.89	2.46	2.91	2.83	2.52	3.27	2.28	3.27	3.27
1	1.13	2.30	2.22	2.06	2.06	2.53	2.09	2.04	2.75
1	0.97	1.70	1.51	1.57	1.62	1.87	2.43	2.79	2.57
2	1.15	1.39	1.07	1.06	1.23	1.55	2.21	2.75	3.75
3	1.29	1.60	1.34	1.20	1.03	1.21	1.89	2.33	2.75
5	1.25	1.34	1.20	1.28	1.19	1.42	1.72	2.08	2.08
6	1.25	1.34	1.20	1.28	1.19	1.42	1.72	2.08	2.08
7	1.25	1.34	1.20	1.28	1.19	1.42	1.72	2.08	2.08

Initial Supporting table - T(□SSRoughRoadThres

Description: Used for P0300-P0308. Only used if Rough Road source = TOSS: dispersion Value on Transmission Output Speed Sensor above which rough road is indicated present

Value Units: change in rpm per sec (rpm)
X Unit: Engine Speed (RPM)
Y Units: Transmission Speed (RPM)

y/x	600	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000
100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
500	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
600	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
700	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
800	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
900	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - WaitToStart

Description: Used for P0300-P0308. Number of engine cycles to delay if diesel engine is cranked before wait to start lamp is extinguished. This lookup table determines the delay length by taking into account the coolant temperature.

Value Units: Number of Engine Cycles (integer)
X Unit: Engine Coolant (deg C)

y/x	-20	-10	0	10	20	30	40	50	60
1	0	0	0	0	0	0	0	0	0

Initial Supporting table - WSSRoughRoadThres

Description: Used for P0300-P0308. Only used if Wheel speed from ABS is used. If difference between wheel speed readings is larger than this limit, rough road is present

Value Units: acceleration
X Unit: Vehicle Speed (KPH)

y/x	0	12	24	36	48	60	72	85	97	109	121	133	145	157	169	181	193
1	0.40002	0.42004	0.43994	0.45996	0.47998	0.50000	0.52002	0.54004	0.56006	0.57996	0.59998	0.62000	0.64001	0.66003	0.68005	0.69995	0.71997

Initial Supporting table - ZeroTorqueAFM

Description: Used for P0300-P0308. Zero torque engine load while in Active Fuel Management. %of Max Brake Torque along the Neutral rev line, as a function of RPM and Baro

Value Units: Percent of Maximum Brake torque (%)
X Unit: RPM
Y Units: Barometric Pressure (kPa)

ZeroTorqueAFM - Part 1

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
65	-3.50	-3.50	-3.50	-2.50	-2.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
75	-3.50	-3.50	-3.50	-2.50	-2.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
85	-3.50	-3.50	-3.50	-2.50	-2.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
95	-3.50	-3.50	-3.50	-2.50	-2.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
105	-3.50	-3.50	-3.50	-2.50	-2.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00

ZeroTorqueAFM - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,001	3,500	4,000	4,500	5,000	5,500	6,000	7,000
65	-1.00	-1.00	-1.00	-1.00	-1.00	-0.15	2.35	4.85	7.35	9.85	12.35	14.85	17.35
75	-1.00	-1.00	-1.00	-1.00	-1.00	-0.15	2.35	4.85	7.35	9.85	12.35	14.85	17.35
85	-1.00	-1.00	-1.00	-1.00	-1.00	-0.15	2.35	4.85	7.35	9.85	12.35	14.85	17.35
95	-1.00	-1.00	-1.00	-1.00	-1.00	-0.15	2.35	4.85	7.35	9.85	12.35	14.85	17.35
105	-1.00	-1.00	-1.00	-1.00	-1.00	-0.15	2.35	4.85	7.35	9.85	12.35	14.85	17.35

Initial Supporting table - ZeroTorqueEngLoad

Description: Used for P0300-P0308. %of Max Brake Torque that represents Zero Brake torque along the Neutral rev line, as a function of RPM and Baro

Value Units: Percent of Maximum Brake torque (%)
X Unit: RPM
Y Units: Barometric Pressure (kPa)

ZeroTorqueEngLoad - Part 1

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
65	-2.50	-2.50	-2.50	-2.31	-2.12	-1.93	-1.75	-1.56	-1.38	0.00	-0.10	-0.55	-1.00
75	-2.25	-2.25	-2.25	-2.06	-1.87	-1.68	-1.50	-1.31	-1.13	0.25	0.15	-0.30	-0.75
85	-2.00	-2.00	-2.00	-1.81	-1.62	-1.44	-1.25	-1.06	-0.88	0.50	0.40	-0.05	-0.50
95	-1.75	-1.75	-1.75	-1.56	-1.37	-1.19	-1.00	-0.81	-0.63	0.75	0.65	0.20	-0.25
105	-1.50	-1.50	-1.50	-1.31	-1.12	-0.94	-0.75	-0.56	-0.38	1.00	0.90	0.45	0.00

ZeroTorqueEngLoad - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,001	3,500	4,000	4,500	5,000	5,500	6,000	7,000
65	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	6.57	14.13	21.70	29.26	36.83	44.39	59.52
75	-0.75	-0.75	-0.75	-0.75	-0.75	-0.75	6.82	14.38	21.95	29.51	37.08	44.64	59.77
85	-0.50	-0.50	-0.50	-0.50	-0.50	-0.50	7.07	14.63	22.20	29.76	37.33	44.89	60.02
95	-0.25	-0.25	-0.25	-0.25	-0.25	-0.25	7.32	14.88	22.45	30.01	37.58	45.14	60.27
105	0.00	0.00	0.00	0.00	0.00	0.00	7.57	15.13	22.70	30.26	37.83	45.39	60.52

Initial Supporting table - Closed Loop Enable Clarification - KaFCLP_U_SlphrIntglOfst_Thrsh

Description: Integral Offset voltage thresholds (bank and cell specific cals) used with KeFCLP_Pct_CatAccuSlphrPostDsbl to check for sulphur poisoning.

Value Units: millivolts
X Unit: Post Catalyst Number

y/x	CiOXYR_O2_PostCat1	CiOXYR_O2_PostCat2
CiFCLP_Decel	1,000	1,000
CiFCLP_Idle	1,000	1,000
CiFCLP_Cruise	1,000	1,000
CiFCLP_LightAccel	1,000	1,000
CiFCLP_HeavyAccel	1,000	1,000

Initial Supporting table - Closed Loop Enable Clarification - KcFCLP_Cnt_O2RdyCyclesThrsh

Description: Number of times a post oxygen sensor value must be in range before declaring it ready

Value Units: Time (events * 12.5 milliseconds)

y/x	1
1	10

Initial Supporting table - Closed Loop Enable Clarification - KcFULC_O2_SensorReadyEvents

Description: Number of times a pre oxygen sensor value must be in range before declaring it ready

Value Units: Time (events * 12.5 milliseconds)

y/x	1
1	10

Initial Supporting table - Closed Loop Enable Clarification - KeEOSD U RichThrsh

Description: The oxygen sensor voltage above which a sensor will be considered failing during a Rich Test.

Value Units: Volts

y/x	1
1	1,050

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_dm_IntegrationAirflowMax

Description: Maximum allowed estimated airflow for post O2 integral terms to be updated.

Value Units: Grams per Second

y/x	1
1	512

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_Pct_CatAccuSlphrPostDsbl

Description: Sulphur percent threshold above which post integral learning is disabled if the threshold criteria KaFCLP_U_SlphrIntglOfst_Thrsh is also met.

Value Units: Percent

y/x	1
1	75

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMax

Description: Maximum allowed estimated catalytic converter temperature for post O2 integral terms to be updated.

Value Units: Celcius

y/x	1
1	950

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP T IntegrationCatalystMin

Description: Minimum allowed estimated catalytic converter temperature to begin using post 02 integration correction terms. Converter temperature must remain above this threshold to ramp-in the post 02 integration adjustments. Once the ramp-in has started, a converter temperature below this threshold will freeze the ramp-in multiplier. Post 02 integration will not be allowed below this converier temperature

Value Units: Celcius

y/x	1
1	500

Initial Supporting table - Closed Loop Enable Clarification - KeFULC_T_WRAF_SensorReadyThrsh

Description: Pumping cell temperature threshold above which the wideband oxygen sensor will be considered ready for use

Value Units: Degrees Celcius

y/x	1
1	700

Initial Supporting table - Closed Loop Enable Clarification - KeWRSC_T_HtrCntrlCL

Description: WRAF heater temperature enabling threshold fortransition from Open Loop to Closed Loop

Value Units: Degrees Celcius

y/x	1
1	628

Initial Supporting table - Closed Loop Enable Clarification - KeWRSI_T_PumpCurrentEnable

Description: WRAF heater temperature threshold for enabling the sensor pump current

Value Units: Degrees Celcius

y/x	1
1	628

Initial Supporting table - Closed Loop Enable Clarification - KfFCLL T AdaptiveLoCoolant

Description: LTM learning is inhibited if the engine coolant temperature is below this calibration.

Value Units: Degrees Celcius

y/x	1
1	39

Initial Supporting table - Closed Loop Enable Clarification - KfFCLP_U_O2ReadyThrshLo

Description: Voltage limit checked against when determining if a post converter oxygen sensor is in range

Value Units: millivolts

y/x	1
1	1,100

Initial Supporting table - Closed Loop Enable Clarification - KfFULC_U_O2_SensorReadyThrshLo

Description: Voltage limit checked against when determining if a pre converter oxygen sensor is in range

Value Units: millivolts

y/x	1
1	1,795

Initial Supporting table - Closed Loop Enable Clarification - KtFCLL_p_AdaptiveLowMAP_Limit

Description: Long term fuel learning is disabled below this MAP limit as a function of barometric pressure.

Value Units: KPa
X Unit: KPa

y/x	65	70	75	80	85	90	95	100	105
1	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

Initial Supporting table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglDisableTime

Description: Disable integral offset after engine start for this amount of time as a function of start up coolant temperature.

Value Units: Time in seconds
X Unit: Degrees Celcius

y/x	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
1	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0

Initial Supporting table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglRampInTime

Description: Time required to ramp integral offset to desired value as a function of start up coolant temperature.

Value Units: Time in seconds
X Unit: Degrees Celcius

y/x	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
1	60.0	60.0	60.0	60.0	60.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

Initial Supporting table - Closed Loop Enable Clarification - KtFSTAtClosedLoopAutostart

Description: Engine run time following an autostart, as a function of begin run coolant, which must be exceeded to enable CLOSED LOOP.

Value Units: Time in seconds
X Unit: Degrees Celcius

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	360.0	300.0	240.0	180.0	130.0	55.0	45.0	35.0	20.0	10.0	8.0	5.0	10.0	10.0	10.0	10.0	10.0

Initial Supporting table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopTime

Description: Engine run time, as a function of startup coolant temperature, which must be exceeded to enable CLOSED LOOP.

Value Units: Time in seconds
X Unit: Degrees Celcius

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	360.0	300.0	240.0	180.0	130.0	55.0	45.0	35.0	20.0	10.0	8.0	5.0	10.0	10.0	10.0	10.0	10.0

Initial Supporting table - P0442 Volatility Time as a Function of Estimate of Ambient Temperature

Description: EONV volatility time as a function of estimated ambient temperature

Value Units: Volatility time (seconds)
X Unit: Estimated Ambient Temperature (Deg C)

y/x	-10	-4	1	7	13	18	24	29	35	41	46	52	58	63	69	74	80
1	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30

Initial Supporting table - P0442 Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature

Description: Maximum engine off time before vehicle off time as a function of estimated ambient temperature (EAT)

Value Units: Maximum Engine Off Time Before Vehicle Off Time (seconds)
X Unit: Estimated Ambient Temperature (Deg C)

y/x	-10	-4	1	7	13	18	24	29	35	41	46	52	58	63	69	74	80
1	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30

Initial Supporting table - P0442 EONV Pressure Threshold (Pascals)

Description: EONV pressure threshold as a function of fuel level and estimated ambient temperature (EAT)

Value Units: EONV Pressure Threshold (Pascals)
X Unit: Fuel Level (percent) from 0 to 100 with step size 6.25
Y Units: Estimated Ambient Temperature (deg C) from -10 to 80 with step size 5.625

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
2	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
3	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
4	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
6	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
7	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
8	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
9	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
10	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
11	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
12	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
13	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
14	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
15	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
16	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
17	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5

Initial Supporting table - P0496 Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level

Description: Purge valve leak test engine vacuum test time as a function of fuel level

Value Units: Purge Valve Leak Test Engine Vacuum Test Time (seconds)
X Unit: Fuel Level (percent)

y/x	0	6	12	19	25	31	37	44	50	56	62	69	75	81	87	94	100
1	75	72	70	67	65	62	59	57	54	52	49	46	44	41	39	36	33

Initial Supporting table - P057B KtBRKI_K_CmpltTestPointWeight

Description:

y/x	0.000	0.010	0.020	0.026	0.050	0.250	0.500	0.750	1.000
1	0	0	0	1	1	1	1	1	1

Initial Supporting table - P057B KtBRKI_K_FastTestPointWeight

Description:

y/x	0.000	0.010	0.020	0.026	0.050	0.250	0.500	0.750	1.000
1	0	0	0	1	1	1	1	1	1

Initial Supporting table - DFCO_CoolEnblHi_Temp

Description:

y/x	-40	0	25
1	30.0	30.0	30.0

Initial Supporting table - DFCO_DelayAfterStart_Time

Description:

y/x	-30	20	55	70	90
1	30.0	30.0	30.0	30.0	30.0

Initial Supporting table - DFCO_DsblLo_Vehicle_Speed

Description:

y/x	CeTCOR_e_NonEcoMode	CeTCOR_e_EcoMode
CeTGRR_e_TransGr1	0	0
CeTGRR_e_TransGr2	0	0
CeTGRR_e_TransGr3	0	0
CeTGRR_e_TransGr4	0	0
CeTGRR_e_TransGr5	0	0
CeTGRR_e_TransGr6	0	0
CeTGRR_e_TransGr9	0	0
CeTGRR_e_TransGr10	0	0
CeTGRR_e_TransGrNeut	0	0
CeTGRR_e_TransGrRvrs	0	0
CeTGRR_e_TransGrPark	0	0
CeTGRR_e_TransGr7	0	0
CeTGRR_e_TransGr8	0	0

Initial Supporting table - DFCO_EnblHi_Vehicle_Speed

Description:

y/x	CeTCOR_e_NonEcoMode	CeTCOR_e_EcoMode
CeTGRR_e_TransGr1	20.0	20.0
CeTGRR_e_TransGr2	28.2	28.2
CeTGRR_e_TransGr3	0.0	0.0
CeTGRR_e_TransGr4	0.0	0.0
CeTGRR_e_TransGr5	0.0	0.0
CeTGRR_e_TransGr6	0.0	0.0
CeTGRR_e_TransGr9	0.0	0.0
CeTGRR_e_TransGr10	0.0	0.0
CeTGRR_e_TransGrNeut	0.0	0.0
CeTGRR_e_TransGrRvrs	0.0	0.0
CeTGRR_e_TransGrPark	0.0	0.0
CeTGRR_e_TransGr7	0.0	0.0
CeTGRR_e_TransGr8	0.0	0.0

Initial Supporting table - DFCO EngSpdEnblOfst

Description:

y/x	-2,500	-2,150	-1,500	-500	-200	-150	-100	-8	0
1	500	100	50	0	0	0	0	0	0

Initial Supporting table - P0068_Delta MAF Threshold f(TPS)

Description: Table of delta MAF values as a function of desired throttle position. The output of this table provides a delta MAF that if the measured minus the estimated MAF exceeds, is considered a fail.

Value Units: Delta MAF Values (dm)
X Unit: Desired Throttle Position (Pct)

y/x	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	100.00
1.00	55.48	61.44	67.30	73.12	255.00	255.00	255.00	255.00	255.00

Initial Supporting table - P0068_Delta MAP Threshold f(TPS)

Description: Table of delta MAP values as a function of desired throttle position. The output of this table provides a delta MAP that if the measured minus the estimated MAP exceeds, is considered a fail.

Value Units: Delta MAP Values (kPa)
X Unit: Desired Throttle Position (Pct)

y/x	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	100.00
1.00	48.61	46.87	39.48	34.73	255.00	255.00	255.00	255.00	255.00

Initial Supporting table - P0068_Maximum MAF f(RPM)

Description: Table of maximum MAF values vs. engine speed. This is the maximum MAF the engine can see under all ambient conditions.

Value Units: Delta MAF Values (dm)
X Unit: Engine Speed (RPM)

y/x	600.00	1,400.00	2,200.00	3,000.00	3,800.00	4,600.00	5,400.00	6,200.00	7,000.00
1.00	30.00	68.00	112.00	155.00	207.00	262.00	298.00	305.00	305.00

Initial Supporting table - P0068_Maximum MAF f(Volts)

Description: Table of maximum MAF values vs. system voltage. The output of the air meter is clamped to lower values as system voltage drops off.

Value Units: Delta MAF Values (dm)
X Unit: System Voltage (V)

y/x	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00
1.00	69.70	180.36	376.20	511.99	511.99	511.99	511.99	511.99	511.99

Initial Supporting table - P0326_P0331_AbnormalNoise_Thresh_AFM

Description: Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine IS in AFM mode

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.064	0.064	0.064	0.064	0.068	0.100	0.152	0.243	0.718	0.851	1.855	1.855	1.855	1.855	1.855	1.855	1.855

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

Value Units: Max Time for Last Seed Timeout (ms)
X Unit: Operating Loop Sequence (enum)

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	200.000	500.000	500.000	1,000.000	1,000.000	8,191.875	8,191.875	8,191.875

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

Value Units: Fail threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	5	3	5	3	5	3	5	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	5	3	5	3	5	5	5	5

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

Value Units: Sample threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	4	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	4	4	4	4	4	4	4	4

Initial Supporting table - P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)

Description: The Run/Crank voltages required to pull in the PT relay as a function of induction air temperature.

Value Units: Run/Crank Voltages required to pull in PT Relay (V)
X Unit: Induction Air Temperature (deg C)

y/x	23.0	85.0	95.0	105.0	125.0
1	7.000	8.699	9.000	9.199	10.000

Initial Supporting table - P16F3_Delta MAP Threshold f(Desired Engine Torque)

Description: Engine Sync based and Time based delta pressure threshold above which Torque Security error is reported.

Value Units: Torque Security Threshold for Engine Sync and Time Based Delta Pressure (kPa)
X Unit: Desired Engine Torque (Nm)

y/x	0.00	50.00	100.00	150.00	200.00	300.00
1.00	34.73	34.73	34.73	34.73	34.73	34.73

Initial Supporting table - P16F3_Speed Control External Load f(Oil Temp, RPM)

Description: Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

Value Units: External Load Table for SPDR (Nm)
X Unit: Engine Oil Temperature (deg C)
Y Units: Engine Speed (RPM)

y/x	-40.00	-15.00	5.00	32.00	55.00	90.00
350.00	439.00	439.00	439.00	434.28	412.25	256.54
450.00	439.00	439.00	439.00	353.08	333.68	210.57
570.00	439.00	388.61	349.08	248.10	230.94	154.38
650.00	422.36	370.44	335.83	240.40	224.49	136.36
750.00	400.06	351.40	323.93	250.50	234.14	118.05
850.00	398.50	356.58	332.39	271.68	255.33	138.64
950.00	400.59	359.12	332.62	287.61	265.17	145.41
1,050.00	392.72	351.60	323.18	289.73	262.24	150.96
1,150.00	349.22	309.95	282.61	238.46	213.69	126.20
1,350.00	285.43	248.11	222.07	176.68	155.25	115.00
1,600.00	198.80	166.04	141.72	97.85	80.07	87.00
2,150.00	140.94	109.38	87.12	44.66	31.23	25.00
2,400.00	120.41	89.25	67.68	26.87	14.88	3.20
3,100.00	85.47	54.94	34.45	-4.41	-14.11	-21.86
4,000.00	63.09	32.84	12.84	-24.15	-32.82	-42.54
4,900.00	48.80	18.55	-1.45	-38.44	-47.10	-56.85
5,800.00	33.49	3.24	-16.76	-53.56	-62.22	-72.79

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

Value Units: Max Time for Last Seed Timeout (ms)
X Unit: Operating Loop Sequence (enum)

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	200.000	500.000	500.000	1,000.000	1,000.000	8,191.875	8,191.875	8,191.875

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

Value Units: Fail threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	5	3	5	3	5	3	5	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	5	3	5	3	5	5	5	5

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

Value Units: Sample threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	4	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	4	4	4	4	4	4	4	4

Initial Supporting table - P16F3_Delta MAP Threshold f(Desired Engine Torque)

Description: Engine Sync based and Time based delta pressure threshold above which Torque Security error is reported.

Value Units: Torque Security Threshold for Engine Sync and Time Based Delta Pressure (kPa)
X Unit: Desired Engine Torque (Nm)

y/x	0.00	50.00	100.00	150.00	200.00	300.00
1.00	34.73	34.73	34.73	34.73	34.73	34.73

Initial Supporting table - P16F3_Speed Control External Load f(Oil Temp, RPM)

Description: Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

Value Units: External Load Table for SPDR (Nm)
X Unit: Engine Oil Temperature (deg C)
Y Units: Engine Speed (RPM)

y/x	-40.00	-15.00	5.00	32.00	55.00	90.00
350.00	439.00	439.00	439.00	434.28	412.25	256.54
450.00	439.00	439.00	439.00	353.08	333.68	210.57
570.00	439.00	388.61	349.08	248.10	230.94	154.38
650.00	422.36	370.44	335.83	240.40	224.49	136.36
750.00	400.06	351.40	323.93	250.50	234.14	118.05
850.00	398.50	356.58	332.39	271.68	255.33	138.64
950.00	400.59	359.12	332.62	287.61	265.17	145.41
1,050.00	392.72	351.60	323.18	289.73	262.24	150.96
1,150.00	349.22	309.95	282.61	238.46	213.69	126.20
1,350.00	285.43	248.11	222.07	176.68	155.25	115.00
1,600.00	198.80	166.04	141.72	97.85	80.07	87.00
2,150.00	140.94	109.38	87.12	44.66	31.23	25.00
2,400.00	120.41	89.25	67.68	26.87	14.88	3.20
3,100.00	85.47	54.94	34.45	-4.41	-14.11	-21.86
4,000.00	63.09	32.84	12.84	-24.15	-32.82	-42.54
4,900.00	48.80	18.55	-1.45	-38.44	-47.10	-56.85
5,800.00	33.49	3.24	-16.76	-53.56	-62.22	-72.79

Initial Supporting table - P0191 - High fail limit of fuel control due to high pressure sensor skewed High

Description: High fail limit of fuel control due to high pressure sensor skewed High error as Function of desired pressure

Value Units: Ratio
X Unit: Desired Pressure (Mpa)

y/x	1.50	3.00	4.00	15.00	20.00	25.00	27.50	32.00	36.00
1.00	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.09	1.05

Initial Supporting table - P0191 - Low fail limit of fuel control due to pressure sensor skewed low

Description: Low fail limit of fuel control due to pressure sensor skewed low error as Function of desired pressure

Value Units: Ratio
X Unit: Desired Pressure (Mpa)

y/x	1.50	3.00	4.00	15.00	20.00	25.00	27.50	32.00	36.00
1.00	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.92	0.95

Initial Supporting table - P0330_OpenCktThrshMax2 (20kHz)

Description: Max threshold table for the 20 KHz portion of the open circuit diagnostic for sensor 2. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the min cal filters.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	8.949	9.000	9.029	9.020	8.988	8.920	8.828	8.699	8.549	8.359	8.148	7.898	7.629	7.318	6.988	6.619	6.229

Initial Supporting table - P0330_OpenCktThrshMax2 (NN)

Description: Max threshold table for the Normal Noise for sensor 2. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the min cal filters.

y/x	2,700	2,900	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750	5,000	5,500	6,000	6,500	7,000	7,500	8,500
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Initial Supporting table - P0330_OpenCktThrshMin2 (20 kHz)

Description: Min threshold table for the Normal Noise portion of the open circuit diagnostic. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the max cal filters.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	2.689	2.760	2.809	2.840	2.850	2.840	2.809	2.760	2.689	2.600	2.488	2.359	2.209	2.039	1.850	1.639	1.408

Initial Supporting table - P0330_OpenCktThrshMin2 (NN)

Description: Min threshold table for the Normal Noise portion of the open circuit diagnostic for sensor 2. The lookup into this table will be filtered to define the max threshold or the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the max cal filters.

y/x	2,700	2,900	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750	5,000	5,500	6,000	6,500	7,000	7,500	8,500
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Initial Supporting table - P0331_AbnormalLo2

Description: The low limit (no Hi limit, left for excessive knock) for sensor 2 for the performance diagnostic, abnormal noise; used for per sensor and per cyl performance diagnostics. The lookup in this table as a function of RPM and APC is then filtered using KeKNKD_k_PerfAbnFilter (KeKNKD_k_PerfCylAbnFilter for per cyl), and then this filtered quantity VaKNKD_k_PerfAbnFiltlLimitLo (VaKNKD_k_PerfCylAbnFiltlLimitLo for per cyl) becomes the actual limit. The code will immediately set if the filtered intensity goes below the filtered threshold

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.060	0.060	0.060	0.060	0.060	0.069	0.149	0.239	0.340	0.449	0.569	0.699	0.840	0.840	0.840	0.840	0.840

Initial Supporting table - P0331_AbnormalLoAFM_2

Description: The low limit for AFM mode (no Hi limit, left for excessive knock) for sensor 2 for the performance diagnostic, abnormal noise; used for per sensor and per cyl performance diagnostics. The lookup in this table as a function of RPM and APC is then filtered using KeKNKD_k_PerfAbnFilter (KeKNKD_k_PerfCylAbnFilter for per cyl), and then this filtered quantity VaKNKD_k_PerfAbnFiltlLimitLo (VaKNKD_k_PerfCylAbnFiltlLimitLo for per cyl) becomes the actual limit. The code will immediately set if the filtered intensity goes below the filtered threshold

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.060	0.060	0.060	0.060	0.060	0.069	0.149	0.239	0.340	0.449	0.569	0.699	0.840	0.840	0.840	0.840	0.840

Initial Supporting table - P06B7_OpenTestCktMax2

Description: Max threshold table for the 20 KHz for the test circuit diagnostic for sensor 2. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the min cal filters.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.049	0.100	0.119	0.180	0.299	0.398	0.510	0.520	0.529	0.750	1.100	1.398	1.600	1.799	2.000	2.199	2.398

Initial Supporting table - P06B7_OpenTestCktMin2

Description: Min threshold table for the 20 KHz for the test circuit diagnostic for sensor 2. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the max cal filters.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.000	0.000	0.000	0.020	0.020	0.049	0.078	0.119	0.129	0.158	0.180	0.199	0.219	0.260	0.299	0.318	0.340

Initial Supporting table - P129F Threshold High

Description: P129F Filtered Fuel Pump Speed Error High Threshold [over-performing motor]
Instantaneously calculated filtered pump speed error measured is higher than commanded

Value Units: revs / min
X Unit: revs / min [commanded pump speed]
Y Units: kiloPascals [requested fuel pressure]

y/x	200.0	300.0	400.0	500.0	600.0
1,000.0	-675.0	-675.0	-675.0	-675.0	-675.0
2,000.0	-675.0	-675.0	-675.0	-675.0	-675.0
3,000.0	-675.0	-675.0	-675.0	-675.0	-675.0
4,000.0	-675.0	-675.0	-675.0	-675.0	-675.0
5,000.0	-675.0	-675.0	-675.0	-675.0	-675.0
6,000.0	-675.0	-675.0	-675.0	-675.0	-675.0
7,000.0	-1,200.0	-1,200.0	-1,200.0	-1,200.0	-1,200.0

Initial Supporting table - P129F Threshold Low

Description: P129F Filtered Fuel Pump Speed Error Low Threshold [under-performing motor]
Instantaneously calculated filtered pump speed error measured is lower than commanded

Value Units: revs / min
X Unit: revs / min [commanded pump speed]
Y Units: kiloPascals [requested fuel pressure]

y/x	200.0	300.0	400.0	500.0	600.0
1,000.0	675.0	675.0	675.0	675.0	675.0
2,000.0	675.0	675.0	675.0	675.0	675.0
3,000.0	675.0	675.0	675.0	675.0	675.0
4,000.0	675.0	675.0	675.0	675.0	675.0
5,000.0	675.0	675.0	675.0	675.0	675.0
6,000.0	675.0	675.0	675.0	675.0	675.0
7,000.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0

Initial Supporting table - P228C P2C1F - High Pressure Pump Control (HPC) fail threshold of pressure too low

Description: The High Pressure Pump Control (HPC) fail threshold of pressure too low test as a function of desired fuel pressure.

Value Units: Pressure Error - Desired pressure - Actual Pressure (Mpa)
X Unit: Desired Pressure (Mpa)

y/x	2	3	4	15	20	25	28	32	36
1	0	2	3	3	3	3	3	3	3

Initial Supporting table - P228D P2C20 - High Pressure Pump Control (HPC) fail threshold for pressure too high

Description: The High Pressure Pump Control (HPC) fail threshold for pressure too high test as a function of desired fuel pressure.

Value Units: Pressure Error - Desired pressure - Actual Pressure (Mpa)
X Unit: Desired Pressure (Mpa)

y/x	1.50	3.00	4.00	15.00	20.00	25.00	27.50	32.00	36.00
1	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00

Initial Supporting table - P2635 Max Fuel Flow

Description: P2635 Maximum Fuel Flow Disable Criteria
Maximum allowed fuel flow values above which the diagnostic is disabled

Value Units: grams / second
X Unit: kilopascals [commanded fuel pressure]
Y Units: volts [device supply]

y/x	250	300	350	400	450	500	550	600	700
5	512	512	512	512	512	512	512	512	512
6	512	512	512	512	512	512	512	512	512
8	512	512	512	512	512	512	512	512	512
9	512	512	512	512	512	512	512	512	512
11	512	512	512	512	512	512	512	512	512
12	512	512	512	512	512	512	512	512	512
14	512	512	512	512	512	512	512	512	512
15	512	512	512	512	512	512	512	512	512
17	512	512	512	512	512	512	512	512	512
18	512	512	512	512	512	512	512	512	512
20	512	512	512	512	512	512	512	512	512
21	512	512	512	512	512	512	512	512	512
23	512	512	512	512	512	512	512	512	512
24	512	512	512	512	512	512	512	512	512
26	512	512	512	512	512	512	512	512	512
27	512	512	512	512	512	512	512	512	512
29	512	512	512	512	512	512	512	512	512

Initial Supporting table - P2635 Threshold High

Description: P2635 Filtered Fuel Pressure Error High Threshold [under-performing pump]
Instantaneously calculated filtered fuel pressure error

Value Units: kilopascals
X Unit: kilopascals [commanded fuel pressure]
Y Units: grams / sec [fuel flow]

y/x	250	300	350	400	450	500	550	600	700
0	30	38	45	53	60	68	75	100	280
2	30	38	45	53	60	68	75	100	280
3	30	38	45	53	60	68	75	100	280
5	30	38	45	53	60	68	75	100	280
6	30	38	45	53	60	68	75	100	280
8	30	38	45	53	60	68	75	100	280
9	30	38	45	53	60	68	75	100	280
11	30	38	45	53	60	68	75	100	280
12	30	38	45	53	60	68	75	100	280
14	30	38	45	53	60	68	75	100	280
15	30	38	45	53	60	68	75	100	280
17	30	38	45	53	60	68	75	100	280
18	30	38	45	53	60	68	75	100	280
20	30	38	45	53	60	68	75	100	280
21	30	38	45	53	60	68	75	100	280
23	30	38	45	53	60	68	75	100	280
24	30	38	45	53	60	68	75	100	280
26	30	38	45	53	60	68	75	100	280
27	30	38	45	53	60	68	75	100	280
29	30	38	45	53	60	68	75	100	280
30	30	38	45	53	60	68	75	100	280
32	30	38	45	53	60	68	75	100	280
33	30	38	45	53	60	68	75	100	280
35	30	38	45	53	60	68	75	100	280
36	30	38	45	53	60	68	75	100	280
38	30	38	45	53	60	68	75	100	280
39	30	38	45	53	60	68	75	100	280
41	30	38	45	53	60	68	75	100	280
42	30	38	45	53	60	68	75	100	280
44	30	38	45	53	60	68	75	100	280
45	30	38	45	53	60	68	75	100	280

Initial Supporting table - P•2635 Threshold High

47	30	38	45	53	60	68	75	100	280
48	30	38	45	53	60	68	75	100	280

Initial Supporting table - P2635 Threshold Low

Description: P2635 Filtered Pressure Error Low Threshold [over-performing pump]
Instantaneously calculated filtered fuel pressure error

Value Units: kilopascals
X Unit: kilopascals [commanded fuel pressure]
Y Units: grams / second [fuel flow]

y/x	250	300	350	400	450	500	550	600	700
0	-440	-390	-340	-290	-240	-190	-140	-90	-65
2	-440	-390	-340	-290	-240	-190	-140	-90	-65
3	-440	-390	-340	-290	-240	-190	-140	-90	-65
5	-440	-390	-340	-290	-240	-190	-140	-90	-65
6	-440	-390	-340	-290	-240	-190	-140	-90	-65
8	-440	-390	-340	-290	-240	-190	-140	-90	-65
9	-440	-390	-340	-290	-240	-190	-140	-90	-65
11	-440	-390	-340	-290	-240	-190	-140	-90	-65
12	-440	-390	-340	-290	-240	-190	-140	-90	-65
14	-440	-390	-340	-290	-240	-190	-140	-90	-65
15	-440	-390	-340	-290	-240	-190	-140	-90	-65
17	-440	-390	-340	-290	-240	-190	-140	-90	-65
18	-440	-390	-340	-290	-240	-190	-140	-90	-65
20	-440	-390	-340	-290	-240	-190	-140	-90	-65
21	-440	-390	-340	-290	-240	-190	-140	-90	-65
23	-440	-390	-340	-290	-240	-190	-140	-90	-65
24	-440	-390	-340	-290	-240	-190	-140	-90	-65
26	-440	-390	-340	-290	-240	-190	-140	-90	-65
27	-440	-390	-340	-290	-240	-190	-140	-90	-65
29	-440	-390	-340	-290	-240	-190	-140	-90	-65
30	-440	-390	-340	-290	-240	-190	-140	-90	-65
32	-440	-390	-340	-290	-240	-190	-140	-90	-65
33	-440	-390	-340	-290	-240	-190	-140	-90	-65
35	-440	-390	-340	-290	-240	-190	-140	-90	-65
36	-440	-390	-340	-290	-240	-190	-140	-90	-65
38	-440	-390	-340	-290	-240	-190	-140	-90	-65
39	-440	-390	-340	-290	-240	-190	-140	-90	-65
41	-440	-390	-340	-290	-240	-190	-140	-90	-65
42	-440	-390	-340	-290	-240	-190	-140	-90	-65
44	-440	-390	-340	-290	-240	-190	-140	-90	-65
45	-440	-390	-340	-290	-240	-190	-140	-90	-65

Initial Supporting table - P2635 Threshold Low

47	-440	-390	-340	-290	-240	-190	-140	-90	-65
48	-440	-390	-340	-290	-240	-190	-140	-90	-65

P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B9F kaFULO_n_RP

Description: Max Engine Speed to allow Multipulse function of injector energy profile

Value Units: Max Engine Speed to allow Multipulse
X Unit: Injector Energy Profile
Y Units: Multipulse Mode (0 = Double Pulse, 1 = Triple Pulse)

y/x	0	1	2	3
0	3,600	3,600	3,600	3,600
1	3,000	3,000	3,000	3,000

Initial Supporting table - Minimum Non-Purge Samples for Purge Vapor Fuel

Description: Number of Fuel Trim Monitor sample counts required to allow the Purge Vapor Fuel value to inhibit the Intrusive Rich test

Value Units: Sample Counts per loop rate of 100ms (divide by 10 to get seconds)
X Unit: Long Term Fuel Trim Cell I.D. (no units) (Only PurgeOff cells are used)

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 1

y/x	CeFADR_e_CellOO_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR_e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2
1	65,535	65,535	65,535	65,535

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode 1	CeFADR_e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	65,535	65,535	65,535	65,535

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR_e_Cell1 0_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2
1	305	305	305	305

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode 1	CeFADR_e_Cell1 3_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	305	305	70	70

Initial Supporting table - P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage

Description: Identifies which Long Term Fuel Trim Cell I.D.s are used for diagnosis. Only cells identified as "CeFADD_e_NonSelectedCell" are not used for diagnosis.

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 1

y/x	CeFADR_e_CellOO_PurgOnAirMode5	CeFADR_e_Cell01_PurgOnAirMode4	CeFADR_e_Cell02_PurgOnAirMode3	CeFADR_e_Cell03_PurgOnAirMode2
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode1	CeFADR_e_Cell05_PurgOnAirMode0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode5	CeFADR_e_Cell09_PurgOffAirMode4	CeFADR_e_Cell10_PurgOffAirMode3	CeFADR_e_Cell11_PurgOffAirMode2
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode1	CeFADR_e_Cell13_PurgOffAirMode0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell

Initial Supporting table - Startup Engine Coolant adjusment to Minimum accumulation time

Description: Time offset added to the minimum accumulation time based on Startup Coolant.

Value Units: Counts (10 counts equals 1 second)
X Unit: Degree C

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	500	500	500	500	300	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - RufCyl Decel

Description: Used for P0300-P0308. Crankshaft decel threshold during Idle or GPF regen. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usee)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufCyl_Decel - Part 1

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
3	1,650	1,500	943	575	400	282	219	189	134	93	49	28	20
6	1,650	1,500	925	575	400	260	189	175	132	93	46	28	20
8	1,760	1,600	925	600	425	292	201	166	132	95	47	30	20
10	1,980	1,800	962	635	451	320	206	157	126	85	49	35	28
12	2,200	1,986	1,033	663	472	347	217	161	116	89	50	42	33
14	2,750	2,173	1,114	699	503	366	236	188	129	92	59	53	40
16	3,025	2,326	1,256	783	546	390	262	204	137	87	69	62	46
18	3,135	2,508	1,412	915	631	423	282	223	153	103	90	73	52
20	3,245	2,665	1,568	1,030	721	468	304	250	182	115	103	86	59
22	3,410	2,837	1,700	1,136	793	497	330	275	204	125	110	97	65
24	3,575	2,985	1,800	1,237	859	518	358	294	235	139	126	108	75
26	3,740	3,142	1,900	1,332	935	549	388	316	265	164	149	118	84
28	3,850	3,284	1,994	1,429	1,002	614	419	337	298	190	174	129	90
30	3,960	3,431	2,084	1,526	1,075	680	451	357	319	215	196	138	95
32	4,228	3,568	2,183	1,632	1,152	742	482	378	337	253	225	145	101
34	4,498	3,695	2,287	1,750	1,236	811	514	403	365	291	249	154	108
36	4,765	3,822	2,412	1,875	1,326	876	548	426	390	328	271	165	114

RufCyl_Decel - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,001	3,500	4,000	4,500	5,000	5,500	6,000	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufCyl Decel

26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
28	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
32	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
34	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
36	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufCyl Jerk

Description: Crankshaft jerk threshold during Idle or GPF regen. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usee)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufCyl_Jerk - Part 1

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
3	1,650	1,500	925	575	444	292	168	143	120	98	50	40	24
6	1,650	1,500	925	575	446	288	171	126	112	91	49	39	23
8	1,760	1,600	894	600	446	290	164	114	106	84	47	39	22
10	1,980	1,800	818	587	449	292	151	83	68	62	48	39	28
12	2,200	1,961	731	538	449	292	155	92	59	56	52	45	34
14	2,522	2,129	706	527	449	300	187	116	99	73	60	54	38
16	2,796	2,267	853	612	460	337	218	115	107	88	71	63	43
18	2,983	2,406	1,003	766	534	423	250	145	131	109	92	73	52
20	3,187	2,561	1,152	897	635	475	274	168	156	136	110	83	59
22	3,410	2,716	1,333	997	727	533	297	193	184	164	130	93	65
24	3,575	2,879	1,578	1,086	779	591	325	224	215	190	152	105	74
26	3,740	3,054	1,824	1,204	830	644	353	256	245	225	170	116	82
28	3,901	3,189	2,027	1,307	899	705	383	284	275	254	190	126	88
30	4,083	3,348	2,261	1,396	967	771	416	314	299	276	205	134	95
32	4,265	3,490	2,398	1,510	1,030	834	452	342	327	303	219	142	101
34	4,497	3,617	2,540	1,617	1,093	900	490	377	352	328	236	150	108
36	4,674	3,763	2,695	1,717	1,150	963	523	415	380	356	254	160	114

RufCyl_Jerk - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,001	3,500	4,000	4,500	5,000	5,500	6,000	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufCyl Jerk

26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
28	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
32	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
34	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
36	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold while in SCD mode during idle or GPF regen. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load. Note: Misfire's Load term is %, but not PID$04. PID $04 is not robust to temperature and alititude shifts, (especially decel and jerk thresholds since they track actual air trapped in cylinder)

Value Units: Delta time per cylinder (usee)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufSCD_Decel - Part 1

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
3	607	607	344	214	148	100	77	58	48	32,767	32,767	32,767	32,767
6	590	576	318	198	138	95	70	55	48	32,767	32,767	32,767	32,767
8	610	586	337	197	136	95	69	54	50	32,767	32,767	32,767	32,767
10	658	617	353	212	146	98	73	51	49	32,767	32,767	32,767	32,767
12	734	668	382	231	157	106	80	51	55	32,767	32,767	32,767	32,767
14	858	722	415	254	172	117	87	51	66	32,767	32,767	32,767	32,767
16	1,195	789	449	278	188	132	96	52	75	32,767	32,767	32,767	32,767
18	1,586	858	480	310	205	151	111	61	82	32,767	32,767	32,767	32,767
20	2,066	941	520	347	226	172	126	74	92	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
28	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
32	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
34	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
36	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

RufSCD_Decel - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,001	3,500	4,000	4,500	5,000	5,500	6,000	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD Decel

22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
28	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
32	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
34	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
36	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold while in SCD mode during Idle or GPF regen. SCD mode uses smaller windows nearTDC. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usee)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufSCD_Jerk - Part 1

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
3	886	554	303	185	126	95	73	54	43	32,767	32,767	32,767	32,767
6	766	520	264	160	117	84	71	50	37	32,767	32,767	32,767	32,767
8	716	508	270	160	117	82	70	50	37	32,767	32,767	32,767	32,767
10	666	506	264	159	123	88	70	52	40	32,767	32,767	32,767	32,767
12	752	518	260	156	128	94	74	55	45	32,767	32,767	32,767	32,767
14	873	574	256	149	130	94	82	58	62	32,767	32,767	32,767	32,767
16	1,278	659	328	197	132	103	90	64	80	32,767	32,767	32,767	32,767
18	1,618	740	422	265	158	129	102	82	91	32,767	32,767	32,767	32,767
20	2,032	825	538	357	212	157	123	104	110	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
28	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
32	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
34	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
36	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

RufSCD_Jerk - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,001	3,500	4,000	4,500	5,000	5,500	6,000	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD Jerk

24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
28	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
32	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
34	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
36	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - Misfire IMEP BinID Load Axis

Description: Cylinder LOAD for defining Y AXIS in Misfire_IMEP_BinID_versus_Speed_and_Load

Value Units: Indicated Mean Effective Pressure
X Unit: Bin ID row number

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0	200	400	600	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200

Initial Supporting table - Misfire_IMEP_BinID_RPM_Axis

Description: Cylinder RPM for defining the X AXIS in Misfire_IMEP_BinID_versus_Speed_and_Load

Value Units: RPM
X Unit: BinID Column number

y/x	1	2	3	4	5	6	7	8	9
1	0	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000

Initial Supporting table - Misfire_IMEP_BinID_vs_RPM_Load

Description: Misfire calibrations used with Crankshaft Based IMEP (Indicated Mean Effective Pressure) estimatimation do not interpolate versus speed and load. Instead they use unique calibrations within each small speed load "bin". Each Bin has has its own "bin ID". This Bin ID keeps all the Crank Based IMEP estimate calculations and various Misfire calibrations synchronized while minimzing through put. Each speed load range defines a unique "Bin ID" in this Bin ID table. The BinID tables Y axis is cylinder load, and X axis is rpm as defined in Misfire_IMEP_BinID_Load_Axis and Misfire_IMEP_BinID_RPM_Axis tables

Value Units: Bin ID
X Unit: RPM range
Y Units: Cylinder Load Range

y/x	0	1	2	3	4	5	6	7	8
0	0	17	34	51	68	85	102	119	136
1	1	18	35	52	69	86	103	120	137
2	2	19	36	53	70	87	104	121	138
3	3	20	37	54	71	88	105	122	139
4	4	21	38	55	72	89	106	123	140
5	5	22	39	56	73	90	107	124	141
6	6	23	40	57	74	91	108	125	142
7	7	24	41	58	75	92	109	126	143
8	8	25	42	59	76	93	110	127	144
9	9	26	43	60	77	94	111	128	145
10	10	27	44	61	78	95	112	129	146
11	11	28	45	62	79	96	113	130	147
12	12	29	46	63	80	97	114	131	148
13	13	30	47	64	81	98	115	132	149
14	14	31	48	65	82	99	116	133	150
15	15	32	49	66	83	100	117	134	151
16	16	33	50	67	84	101	118	135	152

Initial Supporting table - Misfire_IMEP_Thresh_vs_BinID

Description: Crankshaft Indicated Mean Effective Pressure (IMEP) Estimate that below which will be considered misfire. Misfire calibrations used with Crankshaft Based IMEP (Indicated Mean Effective Pressure) estimatimation do not interpolate versus speed and load. Instead they use unique calibrations within each small speed load region or "bin". Each Bin has has its own "BinID". This BinID keeps all the Crank Based IMEP estimate calculations and various Misfire calibrations synchronized while minimzing through put. Each speed load range defines a unique "Bin ID" in this Bin ID table.
The BinID table's Y axis is cylinder load, and X axis is rpm as defined in Misfire_IMEP_BinID_Load_Axis and Misfire_IMEP_BinID_RPM_Axis tables

Value Units: KPa
X Unit: BinID

Misfire_IMEP_Thresh_vs_BinID - Part 1

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Misfire_IMEP_Thresh_vs_BinID - Part 2

y/x	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Misfire_IMEP_Thresh_vs_BinID - Part 3

y/x	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Misfire_IMEP_Thresh_vs_BinID - Part 4

y/x	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Misfire_IMEP_Thresh_vs_BinID - Part 5

y/x	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Misfire_IMEP_Thresh_vs_BinID - Part 6

y/x	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Misfire_IMEP_Thresh_vs_BinID - Part 7

y/x	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Misfire_IMEP_Thresh_vs_BinID - Part 8

y/x	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Misfire_IMEP_Thresh_vs_BinID - Part 9

y/x	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152

Initial Supporting table - Misfire_IMEP_Thresh_vs_BinID

1	0	0	o	o	o	o	0	o	0	0	o	0	0	o	0	0	o

Initial Supporting table - P0324_PerCyl_ExcessiveKnock_Threshold

Description: Fail threshold for the Knock Performance per-cylinder Excessive Knock Diagnostic

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19

Initial Supporting table - P0325_P0330_OpenCktThrshMax (20 kHz)

Description: Knock Open Circuit Diagnostic Maximum Threshold when using the 20 kHz method (see "OpenMethod" description)

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	5.7148	5.7148	5.6797	5.6719	5.5723	5.5879	5.5508	5.5508	5.5410	5.1797	4.6504	4.1230	4.1230	4.1230	4.1230	4.1230	4.1230

Initial Supporting table - P0325_P0330_OpenCktThrshMax (Normal Noise)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

y/x	2,700	2,900	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750	5,000	5,500	6,000	6,500	7,000	7,500	8,500
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Initial Supporting table - P0325_P0330_OpenCktThrshMin (20 kHz)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the 20 kHz method (see "OpenMethod" description)

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	2.6348	2.6211	2.6074	2.5996	2.5703	2.5605	2.5273	2.4941	2.4902	2.4219	2.2539	2.2539	2.2539	2.2539	2.2539	2.2539	2.2539

Initial Supporting table - P0325_P0330_OpenCktThrshMin (Normal Noise)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

y/x	2,700	2,900	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750	5,000	5,500	6,000	6,500	7,000	7,500	8,500
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Initial Supporting table - P0325_P0330_OpenMethod_2

Description: Defines which Knock Open Circuit Diagnostic method to use.

P0325_P0330_OpenMethod_2 - Part 1

y/x	0	1	2	3	4
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz

P0325_P0330_OpenMethod_2 - Part 2

y/x	5	6	7	8	9
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz

P0325_P0330_OpenMethod_2 - Part 3

y/x	10	11	12	13	14
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz

P0325_P0330_OpenMethod_2 - Part 4

y/x	15	16			
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz			

Initial Supporting table - P0326_P0331_AbnormalNoise_CylsEnabled

Description: Specifies which cylinders will be used for the Abnormal Noise portion of the performance diagnostics (1 = cylinder used, 0 = cylinder not used)

y/x	0	1	2	3	4	5	6	7
1	1	1	1	1	1	1	1	1

Initial Supporting table - P0326_P0331_AbnormalNoise_Threshold

Description: Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine is NOT in AFM mode

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.064	0.064	0.064	0.064	0.068	0.100	0.152	0.243	0.718	0.851	1.855	1.855	1.855	1.855	1.855	1.855	1.855

Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMax

Description: Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic. Used only when the 20 kHz method is being used (see "OpenMethod" description). The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.254	0.254	0.240	0.242	0.268	0.338	0.383	0.506	0.643	0.844	0.998	1.150	1.150	1.150	1.150	1.150	1.150

Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMin

Description: Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic. Used only when the 20 kHz method is being used (see "OpenMethod" description). The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.127	0.127	0.129	0.129	0.131	0.146	0.189	0.221	0.326	0.426	0.541	0.541	0.541	0.541	0.541	0.541	0.541

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Transmission Fluid Temperature								
Transmission Fluid Temperature Sensor Circuit Performance	P0711	TFT Performance Test The first case Startup delta test monitors the sump temperature sensor to determine if it is changing too little for the operating environment of the transmission. The diagnostic makes sure that temperature is changing and not stuck at a value. The first case runs to completion once each drive cycle. The Noise Test compares the sample to sample delta to a noise calibration and then fails if there is enough fail counts in a given sampling period.	Case 1: Stuck Sensor The test takes a sample of temperature at startup and uses that as an index into tables to set limits on how much of a change in temperature required over a period of time	 0 . uggg deg . c 100 - 1200 seconds	Not Test Failed This Key On Battery Voltage between TCM and Engine has been running for at least Engine speed Output speed	P0711 P0712 P0713 P0715 P0716 P0717 P0720 P0721 P0722 9 V and 18 V 2 seconds >= 450 RPM >=100 RPM	2.5 seconds frequency 250 ms	Two Trips
			Case 2: Noise Test Change from previous for	 >= 20 deg. C 14 events				
		TFT Performance Delta Test This diagnostic test monitors the sump temperature sensor to determine if it is changing too little for the operating environment of the transmission. The diagnostic makes sure that temperature is changing and not stuck at a value. The diagnostic test runs to completion once each drive cycle.	Case 3: Short Term Delta Temp This test samples the initial sump temperature every THEN compares the absolute value of the difference between the initial sump temperature and the value at the end of to compare the absolute value difference between the two values absolute value difference	 6 seconds 6 seconds >= 40	Not Test Failed This Key On Battery Voltage between Engine speed Output speed	P0711 P0712 P0713 9 V and 18 V >= 450 RPM >=100 RPM	6 seconds frequency 250 ms	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Transmission Fluid Temperature Sensor Circuit Low	P0712	Out of range low.	Transmission Fluid Temperature for a time	>=150 deg. C > 2.5 seconds.	Not Test Failed This Key On Battery Voltage between	P0711 P0712 P0713 9 V and 18 V	2.5 seconds frequency 250 ms	Two Trips
Transmission Fluid Temperature Sensor Circuit High	P0713	Out of range high.	Transmission Fluid Temperature for a time	<= -45 deg. C > 2.5 seconds	Not Test Failed This Key On Battery Voltage between IF Engine run time OR Engine Coolant Temperature for a time	P0711 P0712 P0713 9 V and 18 V >= 600 seconds >= 20 deg. C >= 20 seconds	2.5 seconds frequency 250 ms	Two Trips
Speed Sensors								
Turbine Speed Sensor Circuit	P0715	This test detects a Turbine Speed Sensor circuit short to battery, ground, or open.	Turbine speed sensor circuit hardware monitor state for	= Fault 100 samples	Not Test Failed This Key On	P0715	2 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	(Enable (Conditions	Time Required	MIL Ilium
Turbine Shaft Speed Sensor Circuit Performance	P0716	Turbine Speed Sensor Performance Test This test detects large changes in Turbine Speed and noisy Turbine Speed by comparing to calibration values.			Not Test Failed This Key On No Fault Pending DTCs for this drive cycle.	P0715 P0716 P0717 P0720 P0721 P0722 P0720 P0721 P0722	frequency 20 ms	One Trip
			Casel: (Unrealistically large changes in turbine speed) If Turbine Speed Change for	 >= 800 RPM >=0.15 seconds			0.15 seconds	
			Case 2: (Noisy Turbine Speed) For sample size IF the change in Turbine Speed THEN the Low Counter is incremented IF the change in Turbine Speed THEN the High Counter is incremented This test fails if both the Low Counter and the High Counter OR Low Counter OR High Counter	 80 <= -800 RPM >= 800 RPM >= 5 >= 5 >= 5			1.6 seconds	
			Case 3: (Wires to speed sensors electromagnetically coupled) Fault Pending will be set when turbine speed change AND Last Valid Speed This test fails when Fault pending is set AND turbine speed When range is attained if: Speed sensor wires electromagnetically coupled counter AND Turbine speed change	 >= 8192 >= 200 <61 >= 4 > High Limit	Turbine speed for a time AND Shift is completed	> 200 RPM >= 0.5 seconds	0.14 seconds	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
			OR	<= Low limit				
			for a time	< 2 counts				
			AND					
			Speed sensor wires electromagnetically coupled fail counter	>= 3				

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Turbine Shaft Speed Sensor Circuit No Activity	P0717	This test detects unrealistically low value of turbine speed or unrealistically large changes in turbine speed.	This test fails if turbine speed AND output speed for a time	<61 RPM > 500 RPM > 1 second.	Not Test Failed This Key On No Fault Pending DTCs No hydraulic default condition exists due to loss of ignition voltage Engine Speed between for a time Forward range attained, NOT reverse or neutral AND transmission output speed During a shift in progress, transmission output speed AND Engine speed	P0717 P0729 P0731 P0732 P0733 P0734 P0735 P0736 P0720 P0721 P0722 P0720 P0721 P0722 200 and 8500 RPM 5 seconds >= 150 RPM >= 150 RPM >= 400 RPM	1 second frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Output Shaft Speed Sensor Circuit	P0720	This test detects a Hall Effect output speed sensor short to battery, short to ground, or open circuit failure. This test verifies that the Hall Effect output speed sensor circuit current is between a low and high threshold. Tests for rapid direction change and error.	All Cases		Not Test Failed This Key On	P0720	frequency 20 ms	One Trip
			Case 1 (Circuit Test) Output speed sensor current OR Output speed sensor current for	 > 17 A <= 5 A 0.4 sec	Range Attained	= Forward, Reverse, or Neutral	0.4 seconds	
			Case 2 (Direction Change) Direction Change Mismatch Time	 > 0.1 sec	Transmission in range or Neutral Output Speed	 >= 50	0.1 second	
			Case 3 (Direction Error) HE Output Speed Sensor direction is Error for	 0.25 sec	Transmission in range or Neutral Output Speed	 >= 50	0.25 seconds	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Output Shaft Speed Sensor Circuit Performance	P0721	This test detects a noisy output speed sensor or circuit by detecting large changes in output speed.	All Cases		Not Test Failed This Key On No Fault Pending DTCs for this drive cycle Shift complete AND range attained NOT neutral	P0715 P0716 P0717 P0720 P0721 P0722 P0715 P0716 P0717	frequency 20 ms	One Trip
			Case1: (Unrealistically large change in output speed) Change in output speed for a time	 >= 500 RPM >= 0.15 seconds			0.15 seconds	
			Case 2: (Noisy output speed) For sample size IF the change in output speed THEN the Low Counter is incremented. IF the change in output speed THEN the High Counter is incremented. Test fails if both the Low Counter and the High Counter OR the Low Counter OR the High Counter	 80 <= -500 RPM >= 500 RPM >= 5 >= 5 >= 5			1.6 seconds	
			Case 3: (Wires to speed sensors electromagnetically coupled) Fault Pending will be set when output speed change AND Last Valid Speed This test fails when Fault pending is set AND output speed When range is attained if: Speed sensor swapped counter AND Output speed change OR	 >=8192 >= 200 <61 >= 4 > High Limit <= Low limit	Output Speed for a time	> 200 RPM >= 0.5 seconds	0.14 seconds	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
			for a time AND Speed sensor swapped fail counter	< 2 counts >= 3				

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Output Shaft Speed Sensor Circuit No Signal	P0722	This test detects unrealistically low value of output speed or unrealistically large change in output speed.	All Cases		Not Test Failed This Key On	P0720 P0721 P0722		One Trip
			CaseI: (Rapid Deceleration) Failure pending if change in output speed Failure sets if fail pending and range attained is Neutral	 >= 500 RPM	Transmission output speed for a time Test disabled when output speed for a time	>= 500 RPM >= 2 seconds <= 500 RPM > 1 seconds	2 seconds	
			Case 2: (No Activity or Gear Disengagement) Failure pending if output speed Failure sets if fail pending AND (net engine torque OR net engine torque) for a time	 <61 RPM >80 Nm < -50 Nm > 1 second	Not Test Failed This Key On Not Test Failed This Key On No Fault Pending DTCs for this drive cycle Engine is running Shift not in process Range attained is not Neutral Reverse to Neutral shift not in process Transmission input speed PRNDL State is in a valid forward range AND Manual Selector Valve is verified in drive	P0731 P0732 P0733 P0734 P0735 P0729 P0736 P0715 P0716 P0717 P0715 P0716 P0717 >= 1050 RPM	1 seconds	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Engine Speed Input Circuit	P0725	This test detects an engine speed sensor circuit failure.	Engine speed sensor circuit hardware monitor state for	= Fault 2 seconds	Not Test Failed This Key On	P0725	2 seconds frequency 20 ms	Two Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	(Enable (Conditions	Time Required	MIL Ilium
Engine Speed Sensor Circuit Performance	P0726	This test detects large changes in Engine Speed and noisy Engine Speed by comparing to calibration values.	All Cases		Not Test Failed This Key On	P0715 P0716 P0717 P0726 P0727	frequency 20 ms	Two Trips
					No Fault Pending this drive cycle	P0715 P0716 P0717		
			Case 1: (Large change in Engine Speed)				0.15 seconds	
			Change in engine speed	>= 600 RPM				
			for a time	>= 0.15 seconds				
			Case 2: (Noisy Engine Speed)				1.6 seconds	
			For sample size	80				
			If the change in engine speed then the Low Counter is incremented.	<= -650 RPM				
			If the change in engine speed then the High Counter is incremented.	>= 650 RPM,				
			This test fails if both the Low Counter and the High Counter	>= 5				
			OR					
			Low Counter	>= 5				
			OR					
			High Counter	>= 5				
			Case 3: (Wires to speed sensors electromagnetically coupled)		Engine speed	> 600 RPM		
			Fault Pending will be set when		for a time	>= 1 second		
			engine speed change	>= 8192				
			AND					
			Last Valid Speed	>= 600				
			This test fails when Fault pending is set					
			AND					
			engine speed	<61				
			When range is attained if:					
			Speed sensor swapped counter	>= 4				
			AND					
			Engine speed change	> High Limit				
			OR	<= Low limit				
			for a time	< 2 counts				
			AND					
			Speed sensor swapped fail counter					

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
				>= 3				

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Engine Speed Sensor Circuit No Signal	P0727	This test detects unrealistically low value of engine speed or unrealistically large change in engine speed.	All Cases:		Not Test Failed This Key On	P0726 P0727	frequency 20 ms	Two Trips
			Casel: (Unrealistically large change in engine speed) Failure pending if change in engine speed	>=1140 RPM				
			Case 2: (Unrealistically low value for engine speed) engine speed for a time	< 60 RPM >= 4 seconds	Not Test Failed This Key On OR Fault Pending Turbine speed AND Ignition Key in RUN position AND Ignition Key is not being cycled AND Vehicle is not coasting with engine off.	P0715 P0716 P0717 >= 400 RPM	4 seconds	
Output Shaft Direction Plausibility	P27B4	This test detects implausible behavior from the output speed sensor by comparing the measured output direction signal to the equivalent output shaft direction derived from solenoid and pressure switch states.	Sensed direction for	/= equivalent direction 1 second	Not Failed This Key On and No Fault Pending Not Fault Active Not Failed This Key On and No Not Failed This Key On and No Not Failed This Key On and No	Solenoid Faults (table 1) P0721 P0720 P0722 P0842 P0843 P0847 P0848 P0872 P0873 P0877 P0878 P0751 P0752 P0756 PO757 P0761 P0762 HSD Faults P0729 P0731 P0732	1 second frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
						P0733 P0734 P0735 P0736		
					Battery Voltage NOT between Output speed	9 V and 18 V > 50		
Output Shaft Speed Sensor Plausibility	P27B6	This test detects implausible behavior from the output speed sensor by comparing the measured output speed signal to the equivalent output speed derived from the turbine speed sensor and the current gear ratio.	|Raw Output Speed - Equivalent Output Speed| for a time	>= 10 >= 10 seconds	Not Failed This Key On and No Fault Pending	P0720 P0721 P0722	10 seconds frequency 20 ms	One Trip
					Not Failed This Key On	P0731 P0732 P0733 P0734 P0735 P0729 P0736		
					Not Failed This Key On and No Fault Pending	P0715 P0716 P0717		
					Battery Voltage NOT between Output speed Transmission Range NOT Neutral Transmission NOT shifting	9 V and 18 V >= 50		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Range Verification								
Gear 1 Incorrect Ratio	P0731	This test verifies the transmission is maintaining proper ratio while in First range by comparing computed gear ratio to the commanded gear ratio.	Test Error is indicated when the transmission is in first range AND output speed AND gear slip When test error is indicated the pass timer is cleared and the fail timer starts accumulating. Fault pending is set when fail timer Diagnostic code set when fail timer	 >= 100 RPM > 100 RPM >0 >= 2 seconds	Not Failed This Key On Not responding to Test Failed This Key On No Fault Pending DTC for this drive cycle. No hydraulic default Gears are commanded No range switch failure response active TCM not initializing or shutting down Output speed	P0731 P0877 P0878 P0715 P0716 P0717 P0720 P0721 P0722 P0715 P0717 P0720 P0722 >= 200 RPM	2 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Gear 2 Incorrect Ratio	P0732	This test verifies the transmission is maintaining proper ratio while in Second range by comparing computed gear ratio to the commanded gear ratio.	Test Error is indicated when the transmission is in second range AND output speed	>= 100 RPM	Not Failed This Key On	P0732 P0877 P0878	2 seconds frequency 20 ms	One Trip
			AND gear slip	> 100 RPM	Not responding to Test Failed This Key On	P0715 P0716 P0717 P0720 P0721 P0722		
			When test error is indicated the pass timer is cleared and the fail timer starts accumulating.					
			Fault pending is set when fail timer	>0	No Fault Pending DTC for this	P0715 P0717 P0720 P0722		
			Diagnostic code set when fail timer	>= 2 seconds				
					No hydraulic default Gears are commanded			
					No Range Shift is in process			
					No range switch failure response active			
					TOM not initializing or shutting down			
					Output speed	>= 200 RPM		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Gear 3 Incorrect Ratio	P0733	This test verifies the transmission is maintaining proper ratio while in Third range by comparing computed gear ratio to the commanded gear ratio.	Test Error is indicated when the transmission is in third range AND output speed AND gear slip When test error is indicated the pass timer is cleared and the fail timer starts accumulating. Fault pending is set when fail timer Diagnostic code set when fail timer	 >= 100 RPM > 100 RPM >0 >= 2 seconds	Not Failed This Key On Not responding to Test Failed This Key On No Fault Pending DTC for this No hydraulic default Gears are commanded No Range Shift is in process No range switch failure response active TOM not initializing or shutting down Output speed	P0733 P0877 P0878 P0715 P0716 P0717 P0720 P0721 P0722 P0715 P0717 P0720 P0722 >= 200 RPM	2 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Gear 4 Incorrect Ratio	P0734	This test verifies the transmission is maintaining proper ratio while in Fourth range by comparing computed gear ratio to the commanded gear ratio.	Test Error is indicated when the transmission is in fourth range AND output speed AND gear slip When test error is indicated the pass timer is cleared and the fail timer starts accumulating. Fault pending is set when fail timer Diagnostic code set when fail timer	 >= 100 RPM > 100 RPM >0 >= 2 seconds	Not Failed This Key On Not responding to Test Failed This Key On No Fault Pending DTC for this No hydraulic default Gears are commanded No Range Shift is in process No range switch failure response active TOM not initializing or shutting down Output speed	P0734 P0877 P0878 P0715 P0716 P0717 P0720 P0721 P0722 P0715 P0717 P0720 P0722 >= 200 RPM	2 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Gear 5 Incorrect Ratio	P0735	This test verifies the transmission is maintaining proper ratio while in Fifth range by comparing computed gear ratio to the commanded gear ratio.	Test Error is indicated when the transmission is in fifth range AND output speed AND gear slip When test error is indicated the pass timer is cleared and the fail timer starts accumulating. Fault pending is set when fail timer Diagnostic code set when fail timer	 >= 100 RPM > 100 RPM >0 >= 2 seconds	Not Failed This Key On Not responding to Test Failed This Key On No Fault Pending DTC for this No hydraulic default Gears are commanded No Range Shift is in process No range switch failure response active TOM not initializing or shutting down Output speed	P0735 P0877 P0878 P0715 P0716 P0717 P0720 P0721 P0722 P0715 P0717 P0720 P0722 >= 200 RPM	2 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Gear 6 Incorrect Ratio	P0729	This test verifies the transmission is maintaining proper ratio while in Sixth range by comparing computed gear ratio to the commanded gear ratio.	Test Error is indicated when the transmission is in sixth range AND output speed AND gear slip When test error is indicated the pass timer is cleared and the fail timer starts accumulating. Fault pending is set when fail timer Diagnostic code set when fail timer	 >= 100 RPM > 100 RPM >0 >= 2 seconds	Not Failed This Key On Not responding to Test Failed This Key On No Fault Pending DTC for this No hydraulic default Gears are commanded No Range Shift is in process No range switch failure response active TOM not initializing or shutting down Output speed	P0729 P0877 P0878 P0715 P0716 P0717 P0720 P0721 P0722 P0715 P0717 P0720 P0722 >= 200 RPM	2 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Reverse Incorrect Ratio	P0736	This test verifies the transmission is maintaining proper ratio while in Reverse range by comparing computed gear ratio to the commanded gear ratio.	Test Error is indicated when the transmission is in reverse range		Not Failed This Key On	P0736 P0877 P0878	2 seconds	One Trip
			AND				frequency	
			output speed	>= 100 RPM			20 ms	
			AND		Not responding to Test Failed This Key On	P0715 P0716 P0717 P0720 P0721 P0722		
			gear slip	> 100 RPM				
			When test error is indicated the pass timer is cleared and the fail timer starts accumulating.					
			Fault pending is set when fail timer	>0	No Fault Pending DTC for this	P0715 P0717 P0720 P0722		
			Diagnostic code set when fail timer	>= 2 seconds				
					No hydraulic default Gears are commanded			
					No Range Shift is in process			
					No range switch failure response active			
					TOM not initializing or shutting down			
					Output speed	>= 200 RPM		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Torque Converter								
Torque Converter Clutch (TCC) System Stuck Off	P0741	This test detects the torque converter being stuck off (unlocked) by comparing TCC slip speed to a calibration value.	TCC Slip for a time	>= 80 RPM >= 15 seconds.	Not Test Failed This Key On	P2761 P2763 P2764 P0720 P0721 P0722 P0715 P0716 P0717 P0741	15 seconds frequency 100 ms	Two Trips
					No Fault Pending DTCs for this drive cycle.	P2761 P2763 P2764 P0720 P0721 P0722 P0715 P0716 P0717		
					Battery Voltage between	9 V and 18 V		
					Engine Speed between for	200 RPM and 8500 RPM 5 seconds		
					Must be in forward range			
					Accelerator position	>= 10 % and <= 3.40282x10^38 %		
					Transmission fluid temperature	>= 5 deg. C and <= 130 deg. C		
					Time Since Range Change AND Lockup apply is in process or complete AND Commanded TCC pressure	>= 6 seconds >= 1000 kPa		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Torque Converter Clutch (TCC) System Stuck On	P0742	This test detects the torque converter being stuck on (locked) by comparing TCC slip speed to a calibration value.			Not Test Failed This Key On	P2761 P2763 P2764 P0715 P0716 P0717 P0720 P0721 P0722 U0100	frequency 100 ms	Two Trips
			Casel: (High Torque and high throttle fast fail)				Case 1: 2 Seconds	
			Accerlrator Position	>= 70 %				
			AND					
			net engine torque	>= 2200 Nm				
			for a time	>= 2 seconds				
			Case 2: (High Output Shaft Acceleration fast fail)				Case 2: 5 Seconds	
			output shaft acceleration	>= 100 RPM/second	No Fault Pending DTCs for this drive cycle.	P2761 P2763 P2764 P0715 P0716 P0717 P0720 P0721 P0722 P0725 U0100		
			for a time	>= 5 seconds				
			Case 3: (Accel/Decel/Accel condition)				Case 3: 4 Seconds	
					Battery Voltage between	9 V and 18 V		
			Report malfunction when output acceleration event is followed by output deceleration event and followed by another output acceleration event. An output acceleration event occurs when		Engine Speed between	200 RPM and 8500 RPM		
					for	5 seconds		
					Must be in forward range			
			output shaft acceleration	>= 4g RPM/second				
			for a time	>= 4 seconds	TCC is commanded off			
					Engine Speed is not defaulted			
			An output deceleration event occurs when output shaft acceleration is	<=-40 RPM/second	TCC Slip	>=-20 RPM and <= 20 RPM		
			for a time	>= 2.5 seconds.				
					Accelerator position	>= 25 %		
					Net Engine Torque	>= 175 Nm		
					Turbine speed	<= 3500 RPM		
					Engine speed	<= 3500 RPM		
					Output speed	>= 100 RPM		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Pressure Switches								
Transmission Fluid Pressure Switch 1 Circuit Low	P0842	This test compares the commanded valve position to the pressure switch PS1 feedback, (part of S1 valve integrity test)	Pending failure occurs when PS1 pressure switch indicates stroked for a time In response to the pending failure, S1 valve is retried by triggering S1 valve command to stroked and back to destroked. If PS1 pressure switch continues to indicate stroked, then one of three malfunction cases exists: For Case 1 (electrical malfunction), SS1 Circuit Low reports failure, also. For Case 2 (mechanical malfunction), Shift Solenoid 1 (SS1) Valve Performance - Stuck On reports failure, also. For Case 3 (intermittent malfunction), SS1 valve retry attempted AND PS1 pressure switch continues to indicate stroked.	>= 0.125 seconds P0973 P0752 15 times	Not Test Failed This Key On S1 valve is destroked NOT system initialization in Cold Mode where Transmission Fluid Temperature Shutdown is NOT in process	P0842 < -25 deg. C	0.125 seconds frequency 20 ms	One Trip
Shift Solenoid 1 Valve Performance - Stuck Off	P0751	This test compares the change of state of the valve command to the change of state of the PS1 pressure switch feedback, (part of the S1 valve timeout test)	S1 valve is commanded from destroked to stroked and the PS1 pressure switch indication remains destroked for a time WITH transmission fluid temperature (Time increases as temperature decreases with maximum time at transmission fluid temperature)	>= 5 seconds >= 0 deg. C 11.95 seconds <= -40 deg. C	Not Test Failed This Key On S1 valve commanded from destroked to stroked and SS1 solenoid pressurized	P0751	5 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Shift Solenoid 1 (SS1) Valve Performance - Stuck On	P0752	This test compares the change of state of the valve command to the change of state of the PS1 pressure switch feedback, (part of the S1 valve timeout test).	S1 valve commanded from stroked to destroked and the PS1 pressure switch indication remains stroked for a time WITH transmission fluid temperature (Time increases as temperature decreases with maximum time at transmission fluid temperature)	> 6.8496 seconds >= 0 deg. C. 11 seconds <= -40 deg. C	Not Test Failed This Key On S1 valve changes from stroked to destroked and the solenoid must be commanded to exhaust	P0752	6.8496 seconds frequency 20 ms	One Trip
Transmission Fluid Pressure Switch 1 Circuit High	P0843	This test compares the commanded valve position to the pressure switch PS1 feedback, (part of S1 valve integrity test)	Pending failure occurs when PS1 pressure switch indicates destroked for a time In response to the pending failure, S1 valve is retried by triggering S1 valve command to destroked and back to stroked. If the PS1 pressure switch continues to indicate destroked, then one of three malfunction cases exists. For Case 1 (electrical malfunction), SS1 Control Circuit Low reports failure, also. For Case 2 (mechanical malfunction), Shift Solenoid 1 (SS1) Valve Performance - Stuck Off reports failure, also. For Case 3 (intermittent malfunction), S1 valve retry attempted AND PS1 pressure switch continues to indicate destroked.	>= .070313 seconds P0973 P0751 15 times	Not Test Failed This Key On S1 valve is stroked NOT system initialization in Cold Mode where Transmission Fluid Temperature Shutdown NOT in process	P0843 < -25 deg. C	0.070313 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Pressure Switch Solenoid 2 Circuit Low	P0847	This test compares the commanded valve position to the PS2 pressure switch feedback (part of the S2 valve integrity test).	Pending failure occurs when PS2 pressure switch indicates stroked for a time In response to the pending failure, S2 valve is retried by triggering S2 valve command to stroked and back to destroked. If PS2 pressure switch continues to indicate stroked, then one of three malfunction cases exists. For Case 1 (electrical malfunction), SS2 Control Circuit Low reports failure, also. For Case 2 (mechanical malfunction), Shift Solenoid 2 Valve Performance - Stuck On reports failure, also. For Case 3 (intermittent malfunction), S2 valve retry attempted AND PS2 pressure switch continues to indicate stroked.	>= .039063 seconds P0976 P0757 2 times	Not Test Failed This Key On S2 valve is destroked NOT system initialization in Cold Mode where Transmission Fluid Temperature Shutdown NOT in process	P0847 < -25 deg. C	0.039063 seconds frequency 20 ms	One Trip
Shift Solenoid 2 Valve Performance - Stuck Off	P0756	This test compares the change of state of the valve command to the change of state of the PS2 pressure switch feedback (part of the S2 valve timeout test).	If the S2 valve is commanded from destroked to stroked and the PS2 pressure switch indication remains destroked for a time WITH transmission fluid temperature (Time increases as temperature decreases with maximum time at transmission fluid temperature)	>= 5 seconds >= 0 deg. C. 11.95 seconds <= -40 deg. C.	Not Test Failed This Key On S2 valve commanded from destroked to stroked and SS2 solenoid pressurized	P0756	5 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Shift Solenoid 2 Valve Performance - Stuck On	P0757	This test compares the change of state of the valve command to the change of state of the PS2 pressure switch feedback (part of the S2 valve timeout test).	S2 valve commanded from stroked to destroked and the PS2 pressure switch does not indicate destroked for a time WITH transmission fluid temperature (Time increases as temperature decreases with maximum time at transmission fluid temperature)	>= 6.4004 seconds >= 0 deg. C. 15 seconds <= -40 deg. C.	Not Test Failed This Key On S2 valve changes from stroked to destroked and the solenoid must be commanded to exhaust	P0757	6.4004 seconds frequency 20 ms	One Trip
Transmission Fluid Pressure Switch 2 Circuit High	P0848	This test compares the commanded valve position to the PS2 pressure switch feedback (part of the S2 valve integrity test).	Pending failure occurs when PS2 pressure switch indicates destroked for a time In response to the pending failure, S2 valve is retried by triggering S2 valve command to destroked and back to stroked. If PS2 pressure switch continues to indicate destroked, then one of three malfunction cases exists. For Case 1 (electrical malfunction), SS2 Control Circuit Low reports failure, also. For Case 2 (mechanical malfunction), Shift Solenoid 2 Valve Performance - Stuck Off reports failure, also. For Case 3 (intermittent malfunction), S2 valve retry attempted AND PS2 pressure switch continues to indicate destroked.	>= 0.30078 seconds P0976 P0756 2 times	Not Test Failed This Key On S2 valve is stroked NOT system initialization in Cold Mode where Transmission Fluid Temperature Shutdown NOT in process	P0848 < -25 deg. C	0.30078 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Pressure Switch Solenoid 3 Circuit Low	P0872	This test compares the commanded valve position to the pressure switch PS3 feedback, (part of S3 valve integrity test)	Pending failure occurs when PS3 pressure switch indicates stroked for a time In response to the pending failure, S3 valve is retried by triggering S3 valve command to stroked and back to destroked. If PS3 pressure switch continues to indicate stroked, then one of three malfunction cases exists. For Case 1 (electrical malfunction), SS3 Control Circuit Low reports failure, also. For Case 2 (mechanical malfunction), Shift Solenoid 3 Valve Performance - Stuck On reports failure, also. For Case 3 (intermittent malfunction), S3 valve retry attempted AND PS3 pressure switch continues to indicate stroked.	> 0.0195 seconds P0979 P0762 2 times	Not Test Failed This Key On S3 valve is destroked NOT system initialization in Cold Mode where Transmission Fluid Temperature Shutdown NOT in process	P0872 < -25 deg. C	0.0195 seconds frequency 20 ms	One Trip
Shift Solenoid 3 Valve Performance - Stuck Off	P0761	This test compares the change of state of the valve command to the change of state of the PS3 pressure switch feedback, (part of the S3 valve timeout test)	If the S3 valve is commanded from destroked to stroked and the PS3 pressure switch indication remains destroked for a time WITH transmission fluid temperature (Time increases as temperature decreases with maximum time at transmission fluid temperature)	>= 5 seconds >= 0 deg. C. 11.95 seconds <= -40 deg. C.	Not Test Failed This Key On S3 valve commanded from destroked to stroked and SS3 solenoid pressurized	P0761	5 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Shift Solenoid 3 Valve Performance - Stuck On	P0762	This test compares the commanded valve position to the PS3 pressure switch feedback (part of the S3 valve timeout test).	S3 valve commanded from stroked to destroked and the PS3 pressure switch does not indicate destroked for a time WITH transmission fluid temperature (Time increases as temperature decreases with maximum time at transmission fluid temperature)	> 6.5996 seconds >= 0 deg. C. 21.95 seconds >= -40 deg. C.	Not Test Failed This Key On S3 valve changes from stroked to destroked and the solenoid must be commanded to exhaust	P0762	6.5996 seconds frequency 20 ms	One Trip
Pressure Switch Solenoid 3 Circuit High	P0873	This test compares the commanded valve position to the pressure switch PS3 feedback, (part of S3 valve integrity test)	Pending failure occurs when PS3 pressure switch indicates destroked for a time In response to the pending failure, S3 valve is retried by triggering S3 valve command to destroked and back to stroked. If PS3 pressure switch continues to indicate destroked, then one of the three malfunction cases exists. For Case 1 (electrical malfunction), SS3 Control Circuit Low reports failure, also. For Case 2 (mechanical malfunction), Shift Solenoid 3 Valve Performance - Stuck Off reports failure, also. For Case 3 (intermittent malfunction), S3 valve retry attempted AND PS3 pressure switch continues to indicate destroked.	> 0.30078 seconds P0979 P0761 2 times	Not Test Failed This Key On S3 valve is stroked NOT system initialization in Cold Mode where Transmission Fluid Temperature Shutdown NOT in process	P0873 < -25 deg. C	0.30078 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Transmission Fluid Pressure Switch 4 Circuit Low	P0877	This test detects Reverse Pressure Switch closed indication by comparing the Reverse Pressure Switch (ps4) state to the PRNDL switch state.	Casel: (Forward range) For a sample size (if dropout suspected use sample size) PRNDL is P, D1, D2, D3, D4, D5, D6, T8, or T4 AND RPS indicates Reverse for a time (if dropout suspected use time)	 100 samples 255 samples >= 1 seconds 30 seconds	All Cases Not Test Failed This Key On No Fault Pending DTCs for this drive cycle Engine Speed between for	 P0877 P0878 P0708 P0708 200 RPM and 8500 RPM 5 seconds	1 second frequency 50 ms	One Trip
			Case 2: (Forward range indefinite) For a sample size, net engine torque AND PRNDL is indefinitely D3 or another forward range for a time	 20 samples >= 100 Nm > 1 second				

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Transmission Fluid Pressure Switch 4 Circuit High	P0878	This test detects the Reverse Pressure switch (PS4)being stuck in the open position by comparing to the PRNDL switch state and detects the Reverse Pressure switch stuck open at shutdown.	All Cases		Not Test Failed This Key On	P0878	frequency 50 ms	One Trip
			Case 1: (RPS State and PRNDL State do not agree) For sample size PRNDL is REVERSE AND RPS indicates NOT REVERSE after a time	40 samples >= 1 second	PRNDL State is in reverse		1 second	
			For Case 2: (RPS Shutdown Test) If RPS indicates for a time This time varies with transmission fluid temperature	not Reverse >= 5-30 seconds	Transmission Fluid Temperature Ignition state is OFF Engine was cranking or running this ignition cycle	>= 0 deg. C	5-30 seconds	
			For Case 3: (High Ratio Test) If current transmission ratio is within the reverse range ratio for a time AND net engine torque for a time	>= 0.5 seconds >= 100 Nm 1 second	1st range attained and RPS State in forward Output speed is	>= 100 RPM	1 second	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
On-coming/Off-going								
Pressure Control Solenoid (PCS) 1 Stuck Off	P2723	This test determines if the on-coming clutch energized by Pressure Control Solenoid 1 engages during a forward range shift.	Pending failure occurs when accumulated event timer Timer accumulates when transmission is shifting AND output speed AND commanded gear slip speed (For rough road conditions, use) In response of pending failure, a diagnostic response range is commanded. During this command, this test fails if fail timer and output speed	> 0 seconds >= 60 RPM >= 75 RPM 150 RPM. >= 2 seconds >= 300 RPM	Not Test Failed This Key On Output Speed Turbine Speed Normal powertrain shutdown not in process Normal or Cold powertrain initialization is complete No range switch failure response active No Cold Mode operation On-coming clutch control enabled Power downshift abort to previous range NOT active Range shift in process	P2723 P0720 P0721 P0722 P0715 P0716 P0717 P0708 P0877 P0878 >= 125 RPM >= 60 RPM	2 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Pressure Control Solenoid (PCS) 2 Stuck Off	P0776	This test determines if the on-coming clutch energized by Pressure Control Solenoid 2 engages during a forward range shift.	Pending failure occurs when accumulated event timer Timer accumulates when transmission is shifting, output speed AND commanded gear slip speed (For rough road conditions, use) In response of pending failure, a diagnostic response range is commanded. During this command, this test fails if fail timer and output speed	>= 0 seconds >= 60 RPM > 75 RPM 150 RPM. >= 2 seconds >= 300 RPM	Not Test Failed This Key On Output Speed Turbine Speed Normal powertrain shutdown not in process Normal or Cold powertrain initialization is complete No range switch failure response active No Cold Mode operation On-coming clutch control enabled Power downshift abort to previous range NOT active Range shift in process	P0776 P0720 P0721 P0722 P0715 P0716 P0717 P0708 P0877 P0878 >= 125 RPM >= 60 RPM	2 seconds frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control Solenoid (PCS) 1 Stuck On	P2724	This test determines if the off-going clutch energized by (PCS1) Pressure Control solenoid 1 remains engaged during a forward range shift.	Accumulated fail timer 1-to-2 upshifts; OR accumulated fail timer for other forward range upshifts; OR accumulated fail timer for forward range closed throttle downshift; OR accumulated fail timer for forward downshifts above closed throttle. Fail timer accumulates during range to range shifts when attained gear slip speed	>= 0.2998 seconds >= 0.5 seconds >= 0.5 seconds >= 1.0 second <= 25 RPM	Not Test Failed This Key On Output Speed Turbine Speed Normal powertrain shutdown not in process Normal or Cold powertrain initialization is complete No range switch failure response active No Cold Mode operation Offgoing clutch shift in progress controlled by PCS1 Range Shift in process Transmission fluid temperature	P2724 P0720 P0721 P0722 P0715 P0716 P0717 P0877 P0878 P0777 P0708 >= 200 RPM >= 200 RPM > -25 deg C	1 second frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Pressure Control Solenoid (PCS) 2 Stuck On	P0777	This test determines if the off-going clutch energized by (PCS2) Pressure Control solenoid 2 remains engaged during a forward range shift.	Accumulated fail timer 1-to-2 upshifts; OR accumulated fail timer for other forward range upshifts; OR accumulated fail timer for forward range closed throttle downshift; OR accumulated fail timer for forward downshifts above closed throttle. Fail timer accumulates during range to range shifts when attained gear slip speed	>= 0.2998 seconds >= 0.5 seconds >= 0.5 seconds >= 1.0 second <= 25 RPM	Not Test Failed This Key On Output Speed Turbine Speed Normal powertrain shutdown not in process Normal or Cold powertrain initialization is complete No range switch failure response active No Cold Mode operation No abusive garage shift to 1st range detected Offgoing clutch shift in progress controlled by PCS2 Range Shift in process Transmission fluid temperature	P2724 P0720 P0721 P0722 P0715 P0716 P0717 P0877 P0878 P0777 P0708 >= 200 RPM >= 200 RPM > -25 deg C	1 second frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
PRNDL/IMS								
Transmission Range Sensor High	P0708	Illegal Range Test This test monitors the transmission range switch for invalid input conditions and parity errors occurring over consecutive ignition cycles.	(No Information): Illegal PRNDL state for a time	>= 1 second	Not Test Failed This Key On Battery Voltage between Engine Speed between for	P0708 9 V and 18 V 200 RPM and 8500 RPM 5 seconds	Case 1: 1 second Case 2: 1.5 seconds frequency 100 ms	One Trip
		Long Term Range Switch Test The PRNDL encoding into the TCM has multiple valid and invalid states. This diagnostic checks the parity of the diagnostic to detect failures in parity over multiple drive cycles	(Long-term Parity): There are 3 counters for long-term parity. These counters are updated at the end of each drive cycle, immediately prior to TCM shutdown. For Counter 1, increment counter IF Parity Error Detected; decrement counter IF No Parity Error Detected AND No Motion Detected. IF Counter 1 THEN report failure. For Counter 2, increment counter IF Parity Error Detected AND (No Valid Drive Detected OR No Valid Park/Neutral Detected) AND Output Speed decrement counter IF No Parity Error Detected AND Valid Park/Neutral Detected AND Valid Drive Detected AND Motion Detected. IF Counter 2 THEN report failure. For Counter 3, increment Counter 3 IF Parity Error Detected while in Reverse AND No Valid Reverse Detected AND Motion Detected. Decrement Counter 3 IF No Parity Error Detected AND Valid Reverse	 >= 15 counts > 200 RPM >= 5 counts				

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
			Detected					
			AND					
			Output Speed	> 200 RPM				
			IF Counter 3	>= 5 counts				
			THEN report failure.					
			Where					
			Parity Error Detected is defined as a failure of the 4-bit PRNDL input such that the sum of those bits yields an odd result for a time;	>= 30 seconds;				
			Motion Detected is defined as					
			output speed	>= 200 RPM				
			for a time;	>= 10 seconds				
			Valid Drive Detected is defined as the 4-bit DL indicates Valid Drive for a time;	>= 3 seconds				
			Valid Park Detected is defined as the 4-bit PRNDL indicates Valid Park for a time	>= 0.2 seconds				
			and output speed;	<= 20 RPM				
			Valid Reverse Detected is defined as the 4-bit PRNDL indicates Valid Reverse					
			for a time;	>= 15 seconds;				
			Valid Neutral Detected is defined as the 4-bit PRNDL indicates Valid Neutral					
			for a time	>= 0.2 seconds				
			and output speed	<= 20 RPM				
			OR for a time.	>= 3 seconds				

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Transmission Range Sensor Circuit Performance	P0706	This test monitors the transmission range switch inputs at engine start to determine that it is indicating a valid starting position (Park or Neutral).	For sample size, PRNDL C input is closed OR PRNDL P is NOT closed.	> 11 samples	Not Test Failed This Key On Battery voltage between Powertrain State is Cranking Engine speed	P0706 9V and 18V >= 100 RPM and <= 350 RPM	220 ms frequency 20 ms	Two Trips
Solenoid Electrical								
Main Pressure Modulation Solenoid Control Circuit Open	P0960	This test detects solenoid electrical open circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver If hardware indicates open fault for a sample size THEN report malfunction	 >= 3 samples >= 3 samples	Not Test Failed This Key On Battery voltage between If Engine Cranking, then Crank Time AND Battery Voltage High Side Driver 1 Enabled	P0960 P0962 P0657 P0658 P0659 9V and 18V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Main Pressure Modulation Solenoid System Performance	P0961	This test detects unexpected slip events.	When the number of continuous main mod slip events for a range is AND gear slip is indicated A main mod slip event occurs during a forward or reverse range for output speed when Main Mode RVT Min Threshold is	>= 40 >= 100 RPM 55	Not Test Failed This Key On No Fault Pending DTCs for this drive cycle System is not in Initialization, Cold Mode or Shutdown Range Shift is Completed and debounced Output Speed Accelerator Pedal Input is Stable	P0715 P0716 P0717 P0720 P0721 P0722 P0717 P0722 >= 100 RPM	0.8 seconds frequency 20 ms	Two Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Main Pressure Modulation Solenoid Control Circuit Low	P0962	This test detects solenoid electrical ground circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver. If hardware indicates low fault for a sample size THEN report malfunction Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size	 >= 3 samples >= 3 samples	Not Test Failed This Key On Battery voltage between If Engine Cranking, then Crank Time AND Battery Voltage High Side Driver 1 Enabled	P0962 P0960 P0657 P0658 P0659 9V and 18V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip
Main Pressure Modulation Solenoid Control Circuit High	P0963	This test detects solenoid electrical short to power circuit malfunctions.	If hardware fault short to power is present for a sample size THEN report malfunction	 >= 3 consecutive samples	Not Test Failed This Key On If Engine Cranking, then Crank Time AND Battery Voltage High side driver 1 enabled	P0963 P0657 P0658 P0659 < 4 seconds > 10 V	60 ms frequency 20 ms	One Trip
Pressure Control Solenoid (PCS) 2 Control Circuit Open	P0964	This test detects solenoid electrical open circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver IF hardware indicates open fault for a sample size THEN report malfunction	 >= 3 samples >= 3 samples	Not Test Failed This Key On Battery voltage between If Engine Cranking, then Crank Time AND Battery Voltage High Side Driver 2 Enabled	P0964 P0966 P2669 P2670 P2671 9V and 18V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Pressure Control Solenoid (PCS) 2 Control Circuit Performance	P0965	This test detects the performance of the solenoid by comparing desired current to current as measured by the solenoid control integrated circuit. This test monitors if the low side switching frequencies fall within their desired range, and if they are operating properly per their commanded state.	All Cases				frequency 100 ms	One Trip
			Case 1 (Performance) If abs(Measured current - Commanded current) for a time THEN report malfunction	>= 100 milliamps >= 1 sec	Not Test Failed This Key On No Fault Pending Battery voltage between If Engine Cranking, then Crank Time AND Battery Voltage High Side Driver 2 Enabled Transmission not shifting LU clutch is not engaging or dis-engaging Neutral at Stop is not in process	P2671 P2670 P2669 P0964 P0966 P0967 P0964 P0966 P0967 9V and 18V < 4 seconds > 10 V	1 sec	
			Case 2 (Frequency) If the solenoid is energized and frequency is OR the solenoid is not energized and frequency is THEN report malfunction	< 3000 Hz OR > 5000 Hz > 3000 Hz	Not Fault Pending Not Test Failed This Key On Not Fault Pending Not Test Failed This Key On Battery voltage between Lockup Shift Complete Range Shift Complete RELS inactive, RELS override	Solenoid Faults (table 1) Solenoid Faults (table 1) HSD Faults (table 2) HSD Faults (table 2) 9V and 18V > 0.5 sec > 0.5 sec		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
					inactive, C2 backfill inactive, Neutral antidrag inactive, Device Control inactive, & EOS inactive	> 0.5 sec		
			Case 3 (Plausibility) |Adler IC commanded - TCM measured duty cycle| for THEN report malfunction	>= 10 >= 1 second	Not Fault Pending Not Test Failed This Key On Not Fault Pending Not Test Failed This Key On Battery voltage between High Side Driver 2 Enabled	Solenoid Faults (table 1) Solenoid Faults (table 1) HSD Faults (table 2) HSD Faults (table 2) 9V and 18V	1 second	
Pressure Control Solenoid (PCS) 2 Control Circuit Low	P0966	This test detects solenoid electrical ground circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver IF hardware indicates short to ground fault for a sample size THEN report malfunction.	>= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High Side Driver 2 Enabled	P0966 P0964 P2669 P2670 P2671 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Pressure Control Solenoid (PCS) 2 Control Circuit High	P0967	This test detects solenoid electrical short to power circuit malfunctions.	If hardware fault short to power is present for a sample size THEN report malfunction	>= 3 consecutive samples	Not Test Failed This Key On If Engine Cranking, then Crank Time AND Battery Voltage High Side Driver 2 Enabled	P0967 P2669 P2670 P2671 < 4 seconds > 10 V	60 ms frequency 20 ms	One Trip
Pressure Control Solenoid (PCS) 1 Control Circuit Open	P2727	This test detects solenoid electrical open circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver. IF hardware indicates open fault for a sample size THEN report malfunction	>= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 1 enabled	P2727 P2729 P0657 P0658 P0659 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Pressure Control Solenoid (PCS) 1 Control Circuit Performance	P2728	This test detects the performance of the solenoid by comparing desired current to current as measured by the solenoid control integrated circuit. This test monitors if the low side switching frequencies fall within their desired range, and if they are operating properly per their commanded state.	Case 1 (Performance)		Not Test Failed This Key On	P0659 P0658 P0657 P2727 P2729 P2730	1 sec frequency 100 ms	One Trip
			If abs(Measured current - Commanded current)	>= 100 milliamps				
			for a time	>= 1 sec				
			THEN report malfunction					
					No Fault Pending	P2727 P2729 P2730		
					Battery voltage between	9V and 18V		
					If Engine Cranking, then			
					Crank Time	< 4 seconds		
					AND			
					Battery Voltage	> 10 V		
					High Side Driver 1 Enabled			
					Transmission not shifting			
					LU clutch is not engaging or dis-engaging			
					Neutral at Stop is not in process			
			Case 2 (Frequency)					
			If the solenoid is energized and frequency is	< 3000 Hz OR > 5000 Hz	Not Fault Pending	Solenoid Faults (table 1)	frequency 20 ms	
			OR					
			the solenoid is not energized and frequency is	> 3000 Hz	Not Test Failed This Key On	Solenoid Faults (table 1)		
			THEN report malfunction		Not Fault Pending	HSD Faults (table 2)		
					Not Test Failed This Key On	HSD Faults (table 2)		
					Battery voltage between	9V and 18V		
					Lockup Shift Complete	> 0.5 sec		
					Range Shift Complete	> 0.5 sec		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
					RELS inactive, RELS override inactive, C2 backfill inactive, Neutral antidrag inactive, Device Control inactive, & EOS inactive	> 0.5 sec		
			Case 3 (Plausibility) |Adler IC commanded - TCM measured duty cycle| for THEN report malfunction	>= 10 >= 1 second	Not Fault Pending Not Test Failed This Key On Not Fault Pending Not Test Failed This Key On Battery voltage between High Side Driver 1 Enabled	Solenoid Faults (table 1) Solenoid Faults (table 1) HSD Faults (table 2) HSD Faults (table 2) 9V and 18V	1 second frequency 20 ms	
Pressure Control Solenoid (PCS) 1 Control Circuit Low	P2729	This test detects solenoid electrical ground circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver. IF hardware indicates low fault for a sample size THEN report malfunction	>= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 1 enabled	P2729 P2727 P0657 P0658 P0659 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 m	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control Solenoid (PCS) 1 Control Circuit High	P2730	This test detects solenoid electrical short to power circuit malfunctions.	If hardware fault short to power is present for a sample size THEN report malfunction	>= 3 consecutive samples	Not Test Failed This Key On If Engine Cranking, then Crank Time AND Battery Voltage High side driver 1 enabled	P2730 P0657 P0658 P0659 < 4 seconds > 10 V	60 ms frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Shift Solenoid 1 Control Circuit Open	P097A	This test detects solenoid electrical open circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver. If hardware indicates open fault for a sample size THEN report malfunction	 >= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 2 enabled	P097A P0973 P2669 P2670 P2671 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip
Shift Solenoid 1 Control Circuit Low	P0973	This test detects solenoid electrical ground circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver IF hardware indicates low fault for a sample size THEN report malfunction.	 >= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 2 enabled	P0973 P097A P2669 P2670 P2671 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Shift Solenoid 1 Control Circuit High	P0974	This test detects solenoid electrical short to power circuit malfunctions.	If hardware fault short to power is present for a sample size THEN report malfunction	 >= 3 consecutive samples	Not Test Failed This Key On If Engine Cranking, then Crank Time AND Battery Voltage High side driver 2 enabled	P0974 P2669 P2670 P2671 < 4 seconds > 10 V	60 ms frequency 20 ms	One Trip
Shift Solenoid 2 Control Circuit Open	P097B	This test detects solenoid electrical open circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver. IF hardware indicates open fault for a sample size THEN report malfunction	 >= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 2 enabled	P097B P0976 P2669 P2670 P2671 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip
Shift Solenoid 2 Control Circuit Low	P0976	This test detects solenoid electrical ground circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver. IF hardware indicates low fault for a sample size THEN report malfunction	 >= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 2 enabled	P0976 P097B P2669 P2670 P2671 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Shift Solenoid 2 Control Circuit High	P0977	This test detects solenoid electrical short to power circuit malfunctions.	If hardware fault short to power is present for a sample size THEN report malfunction	>= 3 consecutive samples	Not Test Failed This Key On If Engine Cranking, then Crank Time AND Battery Voltage High side driver 2 enabled	P0977 P2669 P2670 P2671 < 4 seconds > 10 V	60 ms frequency 20 ms	One Trip
Shift Solenoid 3 Control Circuit Open	P097C	This test detects solenoid electrical open circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver. IF hardware indicates open fault for a sample size THEN report malfunction	>= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 2 enabled	P097C P0979 P2669 P2670 P2671 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip
Shift Solenoid 3 Control Circuit Low	P0979	This test detects solenoid electrical ground circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF solenoid driver hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver. IF hardware indicates low fault for a sample size THEN report malfunction	>= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 2 enabled	P0979 P097C P2669 P2670 P2671 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Shift Solenoid 3 Control Circuit High	P0980	This test detects solenoid electrical short to power circuit malfunctions.	If hardware fault short to power is present for a sample size THEN report malfunction	>= 3 consecutive samples	Not Test Failed This Key On If Engine Cranking, then Crank Time AND Battery Voltage High side driver 2 enabled	P0980 P2669 P2670 P2671 < 4 seconds > 10 V	60 ms frequency 20 ms	One Trip
Actuator Supply Circuit Voltage 1 Open (HSD1)	P0657	This test detects if the voltage measured at the HSD1 detection circuit shows that multiple low side detection circuits indicate open, but the high side detection circuit indicates high voltage.	Report malfunction when the number of failure events A failure event occurs when the number of failed solenoids connected to HSD1 AND HSD1 voltage	>= 2 >= 2 >= 6V	Not Test Failed This Key On HSD1 is commanded ON If Engine Cranking, then Crank Time AND Battery Voltage	P0657 < 4 seconds > 10 V	40 ms frequency 20 ms	One Trip
Actuator Supply Circuit Voltage 1 Low(HSD1)	P0658	This test detects low voltage when high voltage is expected indicating a short to ground at the circuit.	Report malfunction when short to ground is detected for a number of events	>= 3 times	Not Test Failed This Key On HSD1 is commanded ON If Engine Cranking, then Crank Time AND Battery Voltage	P0658 < 4 seconds > 10 V	60 ms frequency 20 ms	One Trip
Actuator Supply Circuit Voltage 1 High (HSD1)	P0659	This test detects if the voltage measured at the HSD 1 detection circuit indicates high during initialization (when the circuit is off)	During initialization, report malfunction when the number of failure events A failure event occurs when HSD1 voltage	>= 3 times >= 6V	During initialization		60 ms frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Actuator Supply Circuit Voltage 2 Open (HSD2)	P2669	This test detects if the voltage measured at the HSD2 detection circuit shows that multiple low side detection circuits indicate open, but the high side detection circuit indicates high voltage.	Report malfunction when the number of failure events A failure event occurs when the number of failed solenoids connected to HSD2 AND HSD2 voltage	>= 2 >= 2 >= 6V	Not Test Failed This Key On HSD2 is commanded ON If Engine Cranking, then Crank Time AND Battery Voltage	P2669 < 4 seconds > 10 V	40 ms frequency 20 ms	One Trip
Actuator Supply Circuit Voltage 2 Low (HSD2)	P2670	This test detects low voltage when high voltage is expected indicating a short to ground at the circuit.	Report malfunction when short to ground is detected for a number of events	>= 3 times	Not Test Failed This Key On HSD2 is commanded ON If Engine Cranking, then Crank Time AND Battery Voltage	P2670 < 4 seconds > 10 V	60 ms	One Trip
Actuator Supply Circuit Voltage 2 High (HSD2)	P2671	This test detects if the voltage measured at the HSD 2 detection circuit indicates high during initialization (when the circuit is off)	During initialization, report malfunction when the number of failure events A failure event occurs when HSD2 voltage	>= 3 times >= 6V	During initialization		60 ms frequency 20 ms	One Trip
Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit Open	P2761	This test detects torque converter solenoid electrical open circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a THEN initiate intrusive test by IF hardware indicates open fault for THEN report malfunction	>= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 1 enabled	P2761 P2764 P0657 P0658 P0659 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	Two Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit Performance	P2762	This test detects the performance of the solenoid by comparing desired current to current as measured by the solenoid control integrated circuit. This test monitors if the low side switching frequencies fall within their desired range, and if they are operating properly per their commanded state.	Case 1 (Performance) If abs(Measured current - Commanded current) for a time THEN report malfunction	 >= 100 milliamps >= 1 sec	Not Test Failed This Key On No Fault Pending Battery voltage between If Engine Cranking, then Crank Time AND Battery Voltage High Side Driver 1 Enabled Transmission not shifting LU clutch is not engaging or dis-engaging Neutral at Stop is not in process	P0659 P0658 P0657 P2761 P2763 P2764 P2761 P2763 P2764 9V and 18V < 4 seconds > 10 V	1 sec frequency 100 ms	One Trip
			Case 2 (Frequency) If the solenoid is energized and frequency is OR the solenoid is not energized and frequency is THEN report malfunction	 < 3000 Hz OR > 5000 Hz > 3000 Hz	Not Fault Pending Not Test Failed This Key On Not Fault Pending Not Test Failed This Key On Battery voltage between Lockup Shift Complete Range Shift Complete RELS inactive, RELS override inactive, C2 backfill inactive, Neutral antidrag inactive, Device Control inactive, & EOS inactive	Solenoid Faults Solenoid Faults HSD Faults HSD Faults 9V and 18V > 0.5 sec > 0.5 sec > 0.5 sec	frequency 20 ms	
			Case 3 (Plausibility)					

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
			|Adler IC commanded - TCM measured duty cycle| for THEN report malfunction	>= 10 >= 1 second	Not Fault Pending Not Test Failed This Key On Not Fault Pending Not Test Failed This Key On Battery voltage between High Side Driver 1 Enabled	Solenoid Faults (table 1) Solenoid Faults (table 1) HSD Faults (table 2) HSD Faults (table 2) 9V and 18V	1 second frequency 20 ms	
Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit High	P2763	This test detects torque converter solenoid electrical short to power circuit malfunctions.	If hardware fault short to power is present for a sample size THEN report malfunction	>= 3 consecutive samples	Not Test Failed This Key On If Engine Cranking, then Crank Time AND Battery Voltage High side driver 1 enabled	P2763 P0657 P0658 P0659 < 4 seconds > 10 V	60 ms frequency 20 ms	Two Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit Low	P2764	This test detects torque converter solenoid electrical ground circuit malfunctions.	Fault pending is set at single solenoid driver hardware detection of a low fault IF hardware fault is present for a sample size THEN initiate intrusive test by opening low side driver IF intrusive test indicates short to ground exists for a sample size THEN report malfunction	 >= 3 samples >= 3 samples	Not Test Failed This Key On Battery Voltage between If Engine Cranking, then Crank Time AND Battery Voltage High side driver 1 enabled	P2764 P2761 P0657 P0658 P0659 9 V and 18 V < 4 seconds > 10 V	120 ms frequency 20 ms	One Trip
Miscellaneous								
CAN Communication Bus 2 Bus Off	U0074	This test detects if the GMLAN bus is off for a calibration duration.	GMLAN bus is off for a time	>= 3 seconds	Not Test Failed This Key On Ignition Voltage between Battery Voltage between	U0074 9V and 18 V 9 V and 18 V	3 seconds frequency 100 ms	Two Trips
Lost Communication with ECM "A"	U0100	This test detects GMLAN bus failures by detecting the loss of certain message information from the GMLAN Bus.	For all of the signals being monitored on the GMLAN bus, the diagnostic keeps track of the calibration number of timeout, and/or error/invalid states for each message If the number of timeout, and/or error/invalid states Report failure	 > 500 counts out of 600 samples	Ignition Voltage between Battery Voltage between The can bus is active (not failed) Enable criteria must be met for a time	9V and 18 V 9 V and 18 V > 3 seconds	0.5 seconds frequency 10 ms	Two Trips
Sensor Reference Voltage "B" Circuit Fault	P0652	Tests whether the output voltage of the associated 5 Volt (VREF) reference is enabled and within the expected output voltage range. If found to be disabled, attempts are made to re-enable it.	If Power Supply is not enabled OR Voltage OR Voltage for	 > 5.25 V <4.75 V 2 seconds	Battery Voltage between	9 V and 18 V	2 seconds frequency 50 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Brake Switch Circuit	P0703	This test counts how many acceleration events occur while the brake switch input indicates “ON”. Failure is reported when the number of events exceeds a calibration value. In some applications, in addition, this test counts how many deceleration events occur while the brake switch input indicates “OFF” and the engine running time while in range. Failure is reported when the number if events exceeds a calibration and the engine running time exceeds a calibration.	case 1 The number of vehicle accelerations with the Neutral at Stop input “ON” case 2 The number of vehicle decelerations with the Neutral at Stop input “Off” and the engine run time > 0 while in range with Neutral at Stop input “off”. Time and counts are carried to the next key cycle	>= 3 >= 20	Not Test Failed This Key On Not Test Failed This Key On Not Fault Pending Battery Voltage between Primary Input Speed between for The stuck off section of the test is enabled when Pump mode, Fire Truck pump mode, Direct hold, PTO1, PTO2 are off and NEUTRAL AT STOP: Emissions Credit is enabled.	P0703 P0720 P0721 P0722 P0720 P0721 P0722 9 V and 18 V 200 RPM and 8500 RPM 5 seconds	frequency 150 ms	No MIL
Ignition Switch Run/Start Circuit Low	P2534	This test detects circuit low and open faults associated with the Run/Crank input to the TOM	Run/Crank input is not active for THEN report malfunction	>= 5 sec	Engine Speed for Output Speed	>= 350 rpm >= 2 sec >= 0 rpm	5 sec frequency 100ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
Controller Memory								
Internal SPI Diagnostics	P0600	This test detects faults associated with the communication between the microprocessor and the solenoid control integrated circuits internal to the TCM. The diagnostic reads the SPI Range Check Status message as reported by HWIO to determine which devices are being commanded outside of a valid calibration range. The diagnostic reads the SPI Bus Status message as reported by HWIO to determine the validity of SPI data and devices.	If a static bit within SPI messages is not in the proper state for THEN report malfunction	>= 1 sec (in steady state range) OR >= 100 ms (during shift)	Battery voltage between If Engine Cranking, then Crank Time AND Battery Voltage	9V and 18V < 4 seconds > 10 V	1 sec in steady state range OR 100ms during shifts frequency 20 ms	One Trip
Internal Control Module Transmission Range Control Performance	P27B2	This test verifies the transmission is in a valid range by monitoring the states of both the solenoids and pressure switches.	Actual Solenoid or Pressure Switch State for	/= Expected State 1 second	Not Failed This Key On and No Fault Pending Not Failed This Key On and No Fault Pending Not Failed This Key On and No Fault Pending Not Failed This Key On and No Fault Pending	Solenoid Faults (table 1) P0842 P0843 P0847 P0848 P0872 P0873 P0877 P0878 P0751 P0752 P0756 PO757 P0761 P0762 HSD Faults (table 2) P0729 P0731 P0732	1 second frequency 20 ms	One Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium
						P0733 P0734 P0735 P0736		
					Battery Voltage NOT between	9 V and 18 V		
					Output speed	>50		