Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Heater Coolant Pump Control Circuit Open	B269A	Controller specific output driver circuit diagnoses the Heater Coolant Pump Control Circuit 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 Ω impedance between signal and controller ground.	Run Crank Ignition in Range Engine not cranking == Above is true and == Last Open Circuit Test	= True = True ==================== not Indeterminate	5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips Note: In certian controllers B269C may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Heater Coolant Pump Control Circuit Low	B269C	Controller specific output driver circuit diagnoses the Heater Coolant Pump Control Circuit 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 Ω impedance between signal and controller ground	Run Crank Ignition in Range Engine not cranking == Above is true and == Last Open Circuit Test	= True = True ==================== not Indeterminate	5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips Note: In certian controllers B269A may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Heater Coolant Pump Control Circuit High	B269D	Controller specific output driver circuit diagnoses the Heater Coolant Pump Control Circuit 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 Ω impedance between signal and controller power.	Run Crank Ignition in Range Engine not cranking == Above is true and == Last Open Circuit Test	= True = True ==================== not Indeterminate	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 Illum.
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.	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 Illum.
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_CamPosErrorLimIc1**) deg	**Intake Cam Phsr Enable**	= TRUE	100.00 failures out of 125.00 samples 100 ms /sample	Type A, 1 Trips
					System Voltage	> 11.00 Volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> (**P0011_CamPosErrorLimIc1**) deg AND < (**CalculatedPerfMaxIc1**) deg		
					Desired cam position variation	< 3.00 deg for (**P0011_P05CC_StablePositionTimeIc1**) seconds		
					No Active DTCs	P0010 P2088 P2089		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit Open – Bank 1	P0013	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.	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 Illum.
Exhaust Camshaft System Performance – Bank 1	P0014	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.	(Exhaust cam Bank 1) Cam Position Error > (**P0014_CamPosErrorLimEc1**) deg	**Exhaust 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 > (**P0014_CamPosErrorLimEc1**) deg AND < (**CalculatedPerfMaxEc1**) deg < 3.00 deg for (**P0014_P05CE_StablePositionTimeEc1**) seconds P0013 P2090 P2091	100.00 failures out of 125.00 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 Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor A (end-park phaser)	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	4 cam sensor pulses less than or greater than nominal position in one cam revolution.	-7.1 Crank Degrees 8.3 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	CrankSensor_FA P0340, P0341 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold** . One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 1 Sensor B (end-park phaser)	P0017	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 1 sensor B occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	4 cam sensor pulses less than or greater than nominal position in one cam revolution..	-8.4 Crank Degrees 9.2 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	CrankSensor_FA P0365, P0366 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold** . One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Ω 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 Illum.
O2S Heater Control Circuit Bank1 Sensor1	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 Ω 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 Illum.
O2S Heater Control Circuit Bank1 Sensor1	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 Ω 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 Illum.
Turbo/Super Charger Bypass Valve A Control Circuit	P0033	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'A' actuator' low sided driver for an open circuit failure, when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	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 Ω impedance between output and controller ground	Diagnostic enabled ***************************** Powertrain relay voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts *****************************	10 failures out of 20 samples PWM CRV: 100ms / sample eCRV: 12.5ms / sample	Type A, 1 Trips Note: In certain controllers P0034 may also set turbo/ super charger bypass valve control circuit low

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbo/Super Charger Bypass Valve A Control Circuit Low	P0034	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'A' actuator' 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. In series application, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	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. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	 ≤ 0.5 Ω impedance between output and controller ground	Diagnostic Enabled ***************************** Powertrain relay voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts *****************************	10 failures out of 20 samples PWM CRV: 100ms / sample eCRV: 12.5ms / sample	Type A, 1 Trips Note: In certain controllers P0033 may also set turbo/ super charger bypass balve control circuit

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbo/Super Charger Bypass Valve A Control Circuit High	P0035	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'A' actuator' 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. In series application, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	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. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	≤ 0.5 Ω impedance between output and controller power.	Diagnostic enabled ***************************** Powertrain relay voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts *****************************	10 failures out of 20 samples PWM CRV: 100ms / sample eCRV: 12.5ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Ω 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 Illum.
O2S Heater Control Circuit Bank1 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 Ω 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 P0036 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 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 Ω 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 Illum.
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	7.9 < ohms < 15.2	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA < 8.0 ºC > 28,800 seconds ≥ -30.0 ºC < 32.0 volts < 0.05 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 Illum.
HO2S Heater Resistance Bank 1 Sensor 2) (For Single 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	7.9 < ohms < 15.2	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA < 8.0 ºC > 28,800 seconds ≥ -30.0 ºC < 32.0 volts < 0.05 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 Illum.
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 Absolute difference between MAF and estimated MAF exceed threshold (grams/sec), or P0102 (MAF circuit low), or P0103 (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 MAP Threshold f(TPS)** 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)**	Engine Speed Run/Crank voltage	> 800 RPM > 6.41 Volts	Continuously fail MAP and MAF portions of diagnostic for 0.1875 s Continuous 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 Illum.
Outside Air Temperature (OAT) Sensor Circuit Performance (OAT wired to ECM)	P0071	Detects an Outside Air Temperature (OAT) sensor that 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	**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_DefaultDetected MAF_SensorFA	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 Illum.
		internal combustion 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". 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.				EngineModeNotRunTimer Error		
			Engine Running: 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 running Vehicle Speed Engine air flow 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 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:	>= 28,800.0 seconds >= 15.5 MPH >= 10.0 grams/second >= 300.0 counts VehicleSpeedSensor_FA IAT_SensorFA	Executed every 100 msec until a pass or fail decision is made	

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	<= 52 Ohms (~150 deg C)	Continuous		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 Illum.
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	>= 403,672 Ohms (~-60 deg C)	Continuous		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 Illum.
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		Continuous	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 Illum.
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	>= 92 ° <= 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 or TFTKO) 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 > 0.300 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking >= 70.0 KPA >= -10.0 degC -10 <= 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 Illum.
					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 Illum.
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 Illum.
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 Illum.
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 Illum.
Intake Air Temperature Sensor 2 Circuit Performance (applications with humidity sensor and 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 IAT3 sensor values and failing the diagnostic if the IAT2 value is more different than the IAT and IAT3 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 IAT3 values are similar, and the IAT2 value is not similar to the IAT and IAT3 values. The diagnostic will also fail if none of the three sensor values are similar to each other, and the IAT2 value is furthest from the sensor value that is in the middle of the three sensor values. This diagnostic is executed once per	**<u>Good Correlation Between IAT and IAT3:</u>** ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3)	 > 25 deg C <= 25 deg C > 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
			<u>Not Good Correlation, IAT in middle:</u> Power Up IAT is between Power Up IAT2 and Power Up IAT3 AND ABS(Power Up IAT2 - Power Up IAT3) AND ABS(Power Up IAT - Power Up IAT2) > ABS(Power Up IAT - Power Up IAT3)	 > 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	
			<u>Not Good Correlation, IAT3 in middle:</u> Power Up IAT3 is between Power Up IAT and Power Up IAT2		Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		ignition cycle if the enable conditions are met.	AND ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT3 - Power Up IAT2) > ABS(Power Up IAT3 - Power Up IAT)	> 25 deg C	No Active DTCs:	PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 2 Low (applications with humidity)	P0097	Detects a continuous short to ground in the Intake Air Temperature 2 (IAT2) signal circuit or an IAT2 sensor that is outputting a frequency signal that is too low. The diagnostic monitors the IAT2 sensor output frequency and fails the diagnostic when the IAT2 frequency 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 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 temperature value. A lower frequency is equivalent to a lower temperature. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	Raw IAT 2 Input	< 13 Hertz (~-60 deg C)	Powertrain Relay Voltage for a time 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 Illum.
Intake Air Temperature Sensor Circuit 2 High (applications with humidity)	P0098	Detects an Intake Air Temperature 2 (IAT2) sensor that is outputting a frequency signal that is too high. The diagnostic monitors the IAT2 sensor output frequency and fails the diagnostic when the IAT2 frequency 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 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 temperature value. A higher frequency is equivalent to a higher temperature. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	Raw IAT 2 Input	> 390 Hertz (~150 deg C)	Powertrain Relay Voltage for a time 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 Illum.
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. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	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 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 Illum.
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 Fail 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.	True False >= 0 KPA < = 0 sec > 8 Volts -42 <= °C <= 132 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 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) 4 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 Illum.
					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 >= -10.0 DegC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Pressure Measurement System - Multiple Sensor Correlation (single turbo)	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), Turbocharger Boost Pressure 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, Turbocharger Boost Pressure and BARO are compared to see if their values are similar. If two of these three sensors are similar, but the third is not, then a performance diagnostic for the specific sensor with the dissimilar value will fail. If there is no combination of two of	ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold	> 10.0 kPa <= 10.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa <= 10.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa > 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 Turbocharger Boost Pressure Turbocharger Boost Pressure No Active DTCs: No Pending DTCs:	> 10.0 seconds >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa EngineModeNotRunTimerError MAP_SensorFA AAP_SnsrFA AAP2_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP	4 failures out of 5 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 Illum.
		these three sensors that is similar, then the failed sensor cannot be uniquely identified. The Multiple Pressure Sensor Correlation Diagnostic will fail in this case.	Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure)	> 10.0 kPa > 10.0 kPa				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Illum.
Fuel Press Regulator Solenoid Supply Voltage Control High Side Circuit Short to power	P00CA	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 Illum.
Intake Air Temperature Sensor 3 Circuit Performance (applications with humidity sensor and manifold temperature sensor)	P00E9	Detects an Intake Air Temperature 3 (IAT3) sensor value that is stuck in range by comparing the IAT3 sensor value against the IAT and IAT2 sensor values and failing the diagnostic if the IAT3 value is more different than the IAT and IAT2 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 IAT2 values are similar, and the IAT3 value is not similar to the IAT and IAT2 values. The diagnostic will also fail if none of the three sensor values are similar to each other, and the IAT3 value is furthest from the sensor value that is in the middle of the three sensor values. This diagnostic is executed once per	**<u>Good Correlation Between IAT and IAT2:</u>** ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3)	<= 25 deg C > 25 deg C > 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
			<u>Not Good Correlation, IAT in Middle:</u> Power Up IAT is between Power Up IAT2 and Power Up IAT3 AND ABS(Power Up IAT2 - Power Up IAT3) AND ABS(Power Up IAT - Power Up IAT3) > ABS(Power Up IAT - 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 No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	
			<u>Not Good Correlation, IAT2 in Middle:</u> Power Up IAT2 is between Power Up IAT and Power Up IAT3		Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		ignition cycle if the enable conditions are met.	AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3) > ABS(Power Up IAT2 - Power Up IAT)	> 25 deg C	No Active DTCs:	PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 3 Low (applications with manifold temperature and humidity)	P00EA	Detects a continuous short to ground in the Intake Air Temperature 3 (IAT3) signal circuit by monitoring the IAT3 sensor output resistance and failing the diagnostic when the IAT3 resistance is too low. The IAT3 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 IAT 3 Input	< 56.52 Ohms (~150 deg C)	Engine Run Time	> 0.00 seconds	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 Illum.
Intake Air Temperature Sensor Circuit 3 High (applications with manifold temperature and humidity)	P00EB	Detects a continuous open circuit in the Intake Air Temperature 3 (IAT3) signal circuit by monitoring the IAT3 sensor output resistance and failing the diagnostic when the IAT3 resistance is too high. The IAT3 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 IAT 3 Input	> 162,529 Ohms (~-60 deg C)	Engine Run Time	> 0.00 seconds	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 Illum.
Intake Air Temperature Sensor 3 Intermittent In-Range	P00EC	Detects a noisy or erratic signal in the Intake Air Temperature 3 (IAT3) circuit by monitoring the IAT3 sensor and failing the diagnostic when the IAT3 signal has a noisier output than is expected. When the value of the IAT3 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 IAT3 readings. The result of this summation is called a “string length”. Since the IAT3 signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT3 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 3 reading - IAT 3 reading from 100 milliseconds previous)	> 80.00 deg C 10 consecutive IAT 3 readings	Continuous		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 Illum.
Humidity Sensor Circuit Low	P00F4	Detects a continuous short to ground in the humidity signal circuit or a humidity sensor that is outputting a duty cycle that is too low. The diagnostic monitors the humidity sensor duty cycle output and fails the diagnostic when the humidity duty cycle is too low. The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity value is converted by the sensor to a duty cycle value in %. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the duty cycle of the square wave signal and converts that duty cycle to a relative humidity value in % through a transfer function. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	Humidity Duty Cycle	<= 5.0 %	Powertrain Relay Voltage for a time 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 Illum.
Humidity Sensor Circuit High	P00F5	Detects a humidity sensor that is outputting a duty cycle signal that is too high. The diagnostic monitors the humidity sensor duty cycle output and fails the diagnostic when the humidity duty cycle is too high. The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity value is converted by the sensor to a duty cycle value in %. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the duty cycle of the square wave signal and converts that duty cycle to a relative humidity value in % through a transfer function. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	Humidity Duty Cycle	>= 95.0 %	Powertrain Relay Voltage for a time 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 Illum.
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. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	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 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 Illum.
Mass Air Flow System Performance (single turbo)	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, Turbocharger Boost Pressure 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	See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND	> 20.0 grams/sec > 23.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa > 175 kPa*(g/s)	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 <= 6,100 RPM >= -7 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM**	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 Illum.
		will fail.	Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow -	> 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm/sec as a function of engine speed. See table	No Active DTCs: No Pending DTCs:	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault 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 Illum.
			AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure AND Mass Air Flow - Filtered Mass Air Flow	**P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow** > a threshold in kPa as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 1.3 gm/sec < a threshold in gm/sec as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec		MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor Circuit Low Frequency	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. The MAF sensor monitors the temperature of a circuit in the air flow of the engine. The temperature of this circuit is related to the air velocity across the sensor. The MAF sensor converts this air velocity to a mass air flow value. The mass air flow 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	<= 450 Hertz (~ 0.00 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 10.0 Volts >= 1.0 seconds	200 failures out of 250 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 Illum.
Mass Air Flow Sensor Circuit High Frequency	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. The MAF sensor monitors the temperature of a circuit in the air flow of the engine. The temperature of this circuit is related to the air velocity across the sensor. The MAF sensor converts this air velocity to a mass air flow value. The mass air flow 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 (~ 41.1 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 10.0 Volts >= 1.0 seconds	200 failures out of 250 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 Illum.
Manifold Absolute Pressure Sensor Performance (single turbo)	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. If the MAP sensor value is within the normal expected atmospheric range, then MAP, Turbocharger Boost Pressure, and Barometric Pressure (BARO) are compared to see if their values are similar. If the Turbocharger Boost Pressure and BARO sensor values are similar, but the MAP value is not similar, then a MAP performance diagnostic will fail.	**Engine Running:** See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE	> 20.0 grams/sec > 23.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa > 175 kPa*(g/s)	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 <= 6,100 RPM >= -7 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** MAP Model 2 Error	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 Illum.
		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, Turbocharger Boost Pressure 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 MAP sensor. In this case, the MAP Performance diagnostic will fail.	AND Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow -	 > 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm/sec as a function of engine speed See table	 No Active DTCs: No Pending DTCs:	multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault 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 Illum.
			AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure AND Mass Air Flow - Filtered Mass Air Flow	**P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow** > a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 1.3 gm/sec < a threshold in gm/sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec		MnfdTempSensorCktFP		
			<u>Engine Not Rotating:</u> Manifold Pressure	 < 50.0 kPa	Time between current ignition cycle and the last time the engine was		4 failures out of 5 samples	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR Manifold Pressure OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure)	 > 115.0 kPa > 10.0 kPa > 10.0 kPa <= 10.0 kPa	running Engine is not rotating No Active DTCs: No Pending DTCs:	> 10.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP	1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Circuit Low (Gen III)	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	< 3.3 % of 5 Volt Range (This is equal to 7.5 kPa)	Continuous		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 Illum.
Manifold Absolute Pressure Sensor Circuit High (Gen III)	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	> 86.0 % of 5 Volt Range (This is equal to 372.0 kPa)	Continuous		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 Illum.
Intake Air Temperature Sensor Circuit Performance (applications with humidity sensor and 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 IAT3 sensor values and failing the diagnostic if the IAT value is more different than the IAT2 and IAT3 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 IAT3 values are similar, and the IAT value is not similar to the IAT2 and IAT3 values. The diagnostic will also fail if none of the three sensor values are similar to each other, and the IAT value is furthest from the sensor value that is in the middle of the three sensor values. This diagnostic is executed once per	**<u>Good Correlation Between IAT2 and IAT3</u>** ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3)	> 25 deg C > 25 deg C <= 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
			<u>Not Good Correlation, IAT2 in Middle:</u> Power Up IAT2 is between Power Up IAT and Power Up IAT3 AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT) > ABS(Power Up IAT2 - Power Up IAT3)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	
			<u>Not Good Correlation, IAT3 in Middle:</u> Power Up IAT3 is between Power Up IAT and Power Up IAT2		Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		ignition cycle if the enable conditions are met.	AND ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT3 - Power Up IAT) > ABS(Power Up IAT3 - Power Up IAT2)	> 25 deg C	No Active DTCs:	PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit Low	P0112	Detects a continuous short to ground in the Intake Air Temperature (IAT) signal circuit by monitoring the IAT sensor output resistance and failing the diagnostic when the IAT resistance is too low. The IAT 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 IAT Input	< 58.00 Ohms (~150 deg C)	Engine Run Time	> 0.00 seconds	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 Illum.
Intake Air Temperature Sensor Circuit High	P0113	Detects a continuous open circuit in the Intake Air Temperature (IAT) signal circuit by monitoring the IAT sensor output resistance and failing the diagnostic when the IAT resistance is too high. The IAT 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 IAT Input	> 142,438 Ohms (~-60 deg C)	Engine Run Time	> 0.00 seconds	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 Illum.
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	Continuous		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 Illum.
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 (@ 150ºC)	< 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 Illum.
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 (@ -60ºC)	> 134,000 Ohms	Engine run time OR IAT min	> 15.0 seconds ≥ -7.0 °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 Illum.
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 caluculated 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 Illum.
Throttle Position Sensor Performance (single turbo)	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, Turbocharger Boost Pressure 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	See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP -	> 20.0 grams/sec > 23.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa > 175 kPa*(g/s)	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 <= 6,100 RPM >= -7 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM**	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 Illum.
		Performance diagnostic will fail.	measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow AND	> 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow**	No Active DTCs: No Pending DTCs:	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault 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 Illum.
			Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure AND Mass Air Flow - Filtered Mass Air Flow	> a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 1.3 gm/sec < a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec		MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Illum.
TPS1 Circuit High	P0123	Detects a continuous or intermittent short high in TPS1 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 Illum.
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 19 °C when Ambient min is ≤ 52 °C and > 10 °C. Note: Warm up target for range #1 will be at least 71 °C == == == == Range #2 (Alternate) ECT reaches Commanded temperature minus 50 °C when Ambient min is ≤ 10 °C and > -7 °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 ≤ 1,800 seconds Ethanol ≤ 87 % ≥ 0.62 miles *************************** 9,999 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 Illum.
			55 °C **************************** Type cal above = 0 (non - heated t-stat) == == == == Range #1 (Primary) ECT reaches 71 °C when Ambient min is ≤ 52 °C and > 10 °C. == == == == Range #2 (Alternate) ECT reaches 55 °C when Ambient min is ≤ 10 °C and > -7 °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 ≤ 66 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 1 (For use with WRAF - E80	P0131	This DTC determines if the WRAF O2 sensor signal circuit is shorted low. This DTC will detect a short to ground fault to the Pump Current, Reference Cell Voltage and Reference Ground circuits. When enabled, the diagnostic monitors the three different failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the three individual fail and sample counters.	B1S1 WRAF ASIC indicates a ground short to any of the following WRAF signals: A) Pump Current - short to ground fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to ground fail counts are accumulated to determine fault status. C) Reference Ground - short to ground fail counts are accumulated to determine fault status. Note: This ASIC is referred to as C2WRAF (Delphi). Note: A ground short on the Pump Current or Reference Voltage signal may also set a P223C DTC.	The ASIC provides a fault indication when the pump current pin is between -150 mV and +175 mV. The ASIC provides a fault indication when the Refernce Cell Voltage pin < 225 mV. The ASIC provides a fault indication when during the intrusive test the Reference Cell impedance change is ≤ 90 ohms. Note: Signal A & B faults must exist for 24 ASIC clock cycles to qualify for a fail flag. The three fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	B1S1 DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop WRAF Ref cell temperature ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) **************************	P0135, P0030, P0031 or P0032 = Valid = Ready = True ≥ 628 Deg C = Complete ≥ 30.0 seconds	Signal A: 32 failures out of 40 samples OR Signal B: 32 failures out of 40 samples OR Signal C: 32 failures out of 40 samples Frequency for Signal A & B: Continuous in 25 milli - second loop Frequency for Signal C: Tested during an intrusive event performed every 60 seconds. During each event the impedance is measured 3 times once every 12.5 msec. Note: If the fail count value is greater than the sample count value that individual	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 1 (For use with WRAF - E80	P0132	This DTC determines if the WRAF O2 sensor signal circuit is shorted high. This DTC will detect a short to power fault to the Pump Current (and Trim circuit), Reference Cell Voltage and Reference Ground circuit. When enabled, the diagnostic monitors the three different failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the three individual fail and sample counters.	B1S1 WRAF ASIC indicates a short to power on any of the following WRAF signals: A) Pump Current - short to power fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to power fail counts are accumulated to determine fault status. C) Reference Ground - short to power fail counts are accumulated to determine fault status. <u>Note</u>: This ASIC is referred to as C2WRAF (Delphi).	The ASIC provides a fault indication when the pump current pin > 2.8 V. The ASIC provides a fault indication when the Reference Cell Voltage pin > 3.3 V. The ASIC provides a fault indication when the Reference Ground pin > 225 mV. <u>Note</u>: The above faults must exist for 21 ASIC clock cycles to qualify for a fail flag. The three fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	B1S1 DTC's Not active this key cycle Measure Valid Status (ASIC) Controller status (ASIC) Engine Run or Auto stop WRAF Ref cell temperature ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) **************************	P0135, P0030, P0031 or P0032 = Valid = Ready = True ≥ 628 Deg C = Complete ≥ 30.0 seconds	Signal A: 32 failures out of 40 samples OR Signal B: 32 failures out of 40 samples OR Signal C: 32 failures out of 40 samples Frequency: Continuous in 25 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 Illum.
O2S Slow Response Bank 1 Sensor 1) (For use with ESPD and w/o WRAF	P0133	This DTC determines if the Bank 1 primary O2 sensor has a slow response (in the Rich to Lean (R2L) or Lean to Rich (L2R) direction) and thereby can no longer be used for closed loop fuel control based on emission correlation testing. This diagnostic runs passively (see enable conditions) and monitors the time the O2 sensor signal is between an upper and lower voltage thresholds over the sample period. The diagnostic also monitors the O2 sensor signal for the number of Slope Time (ST) switches in each direction between the same upper and lower voltage thresholds over the sample period. When the required data is collected, an average R2L and L2R response time and individual R2L and L2R Slope Time (ST) switch count is calculated. This fault is set when the L2R and R2L response test results are compared to the	Fault condition present when the average response time is caluclated over the test time, and compared to the threshold. OR Slope Time L/R Switches OR Slope Time R/L Switches	Refer to **P0133_O2S Slow Response Bank 1 Sensor 1 Pass/Fail Threshold table** in the Supporting Tables tab < 5 < 5 The test averages the signal response time over 60.0 seconds when the signal is transitioning between 400 mvolts and 600 mvolts. An average rich to lean time and lean to rich time are each calculated separately. Note: the table listed above uses the following calibratable X axis: **P0133_KnEOSD_t_ST _LRC_LimRS1** and calibratable Y axis: **P0133_KnEOSD_t_ST _RLC_LimRS1**	No Active DTC's Bank 1 Sensor 1 DTC's not active 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 Ethanol Composition Sensor FA EngineMisfireDetected_FA P0131, P0132, P0134 > 10.0 Volts = Not active = Not active = Not active = Not active = False = False = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than	Sample time is 60 seconds Frequency: Once per trip	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		"P0133_O2S Slow Response Bank 1 Sensor 1 "Pass/Fail Threshold Table" and the outcome determines a response faulted condition. Additionally, this fault is set when the L2R or R2L slope time switch count test results are less than the ST individual thresholds.				**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 18.0 grams/sec.		
					O2 Heater on for	≥ 30 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 60 ºC		
					(Or OBD Coolant Enable Criteria	= TRUE)		
					IAT	> -40 ºC		
					Engine run Accum	> 30 seconds		
					Time since any AFM status change	> 1.5 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 1.5 seconds		
					Engine airflow	8 ≤ grams/sec ≤ 60		
					Engine speed	1,000 ≤ RPM ≤ 3,500		
					Fuel Condition	< 87 % Ethanol		
					Baro	> 70 kpa		
					Air Per Cylinder	≥ 100 mGrams		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE (Please see "**Closed Loop Enable**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Clarification” in Supporting Tables).		
					LTM (Block Learn) fuel cell	= Enabled, refer to **Multiple DTC Use - Response Cell Enable Table** for additional info.		
					Transient Fuel Mass	≤ 100.0 mgrams		
					Baro	= Not Defaulted		
					Fuel Control State	not = Power Enrichment		
					Fuel State	DFCO not active		
					Commanded Proportional Gain	≥ 0.0 %		
					=================	=================		
					All of the above met for	> 4.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the O2 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 < 2.5	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	8 failures out of 10 samples Frequency: 2 tests per trip 10 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 Illum.
O2S Circuit Low Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0137	This DTC determines if the O2 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S 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	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	320 failures out of 400 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	0.991 ≤ ratio ≤ 1.014 60 ≤ mgrams ≤ 500 = 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 Illum.
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol ≤ 87 %		
					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 Illum.
O2S Circuit High Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0138	This DTC determines if the O2 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S 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 ********************** > 3.0 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 Illum.
O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	P013A	The P013A diagnostic is the third in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor has an slow response to an A/F change from Rich to Lean and thereby can no longer be used for secondary O2 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 O2 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 O2 sensor voltage response rate	Primary Method: The EWMA of the Post O2 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.15 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 > 60.0 grams (upper voltage threshold is 450 mvolts and lower voltage threshold is 150 mvolts)	No Active DTC's B1S2 DTC's 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 DTC's") = 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 18.0 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 Illum.
		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. DTC P013A 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. 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 P014A if applicable) ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		This fault is set if the secondary O2 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 Illum.
O2 Sensor Slow Response Lean to Rich Bank 1 Sensor 2	P013B	The P013B diagnostic is the sixth in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor has an slow response to an A/F change from Lean to Rich and thereby can no longer be used for secondary O2 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 O2 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 O2 sensor voltage response rate	Primary Method: The EWMA of the Post O2 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.15 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 > 805 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 650 mvolts)	No Active DTC's B1S2 DTC's 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 DTC's") = 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 Illum.
		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. DTC P013B 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. Secondary method:			 Green Cat System Condition Low Fuel Condition Only when FuelLevelDataFault Post fuel cell DTC's Passed ================== After above conditions are met: Fuel Enrich mode continued. =================	is above 18.0 grams/sec. = Not Valid, Green Cat System condition is considered valid until accumulated airflow is greater than 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 18.0 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. P2270 P013E P013A P2271 P013F ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		This fault is set if the secondary O2 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: 0.960 ≤ Base Commanded EQR ≤ 1.080			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	The P013E diagnostic is the second in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor has an initial delayed response to an A/F change from Rich to Lean and thereby can no longer be used for secondary O2 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 O2 sensor does not achieve the required voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor voltage AND The Accumulated mass air flow 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	> 450 mvolts > 45 grams > 1 secs ≥ 3.0 grams	No Active DTC's B1S2 DTC's 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, P013B, P013F, P2270 or P2271 > 10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = 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 Illum.
						is above 18.0 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	< 125.0 Nm		
					DTC's Passed	P2270		
					Number of fueled cylinders	≤ 3 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 Illum.
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2	P013F	The P013F diagnostic is the fifth in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor has an initial delayed response to an A/F change from Lean to Rich and thereby can no longer be used for secondary O2 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 O2 sensor does not achieve the required voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test	< 350 mvolts > 75 grams	No Active DTC's B1S2 DTC's 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, P013B, P013E, P2270 or P2271 > 10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = 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 Illum.
						is above 18.0 grams/sec.		
					Green Cat System Condition	= Not Valid, Green Cat System condition is considered valid until accumulated airflow is greater than 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 18.0 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		
					Number of fueled cylinders	≥ 1 cylinders		
					==================	=================		
					After above conditions are met: Fuel Enrich mode entered.			
					=================			
					During this test the			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					following must stay TRUE or the test will abort: 0.960 ≤ Base Commanded EQR ≤ 1.080			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0141	This DTC determines if the O2 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 > 2.5	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	8 failures out of 10 samples Frequency: 2 tests per trip 10 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 Illum.
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 1) (For use w/o WRAF	P015A	DTC P015A detects that the primary 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 O2 monitor rich to lean tests (P013E / P013A / P2271), which commands fuel cut off. Note: The Primary method is used when the primary O2 sensor signal transitions from above to below the O2 voltage threshold, otherwise the Secondary method is used. Primary method: The P015A diagnostic measures the primary O2 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 air flow rate, engine speed, Baro, and intake air temperature resulting in a normalized delay	Primary Method: The EWMA of the Pre O2 sensor normalized R2L time delay value. The EWMA repass limit is The EWMA calculation uses a 0.15 coefficient. This method calculates the result when the Pre O2 sensor voltage is OR Secondary Method: The Accumulated time monitored during the R2L Delayed Response Test. AND Pre O2 sensor voltage is	> 0.58 EWMA (sec) ≤ 0.50 EWMA (sec) < 550 mvolts ≥ 2.5 Seconds > 100.0 mvolts	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 P0131, P0132, P013A, P013B, P013E, P013F, P2270, P2271 > 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 Illum.
		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. Secondary method: This fault is set if the primary O2 sensor does not achieve the required lower voltage threshold before a delay time threshold is reached.			O2 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) Closed loop integral	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 18.0 grams/sec. ≥ 30 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 60 ºC = TRUE) > -40 ºC > 30 seconds 1,150 ≤ RPM ≤ 3,500 1,100 ≤ RPM ≤ 3,650 2.0 ≤ gps ≤ 20.0 40.4 ≤ MPH ≤ 77.7 36.0 ≤ MPH ≤ 80.8 0.85 ≤ C/L Int ≤ 1.08		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	> 70 kpa		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 30.0 sec		
					Predicted Catalyst temp	550 ≤ ºC ≤ 910		
					Fuel State	= DFCO possible		
					==================	==================		
					All of the above met for at least 2.0 seconds, and then the Force Cat Rich intrusive stage is requested.			
					==================	==================		
					Pre O2S voltage B1S1 at end of Cat Rich stage	≥ 680 mvolts		
					Fuel State	= DFCO active		
					Number of fueled cylinders	≤ 3 cylinders		
					==================	==================		
					After above conditions are met: DFCO Mode is entered (wo driver			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 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 O2 monitor lean to rich tests (P013F / P013B), which commands fuel enrichment. Note: The Primary method is used when the primary O2 sensor signal transitions from lean condition to above the O2 voltage threshold, otherwise the Secondary method is used. Primary method: The P015B diagnostic measures the primary O2 sensor response time between a lean condition and a higher voltage threshold. The response time is then scaled and normalized to mass air flow 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 O2 sensor normalized L2R time delay value. The EWMA repass limit is The EWMA calculation uses a 0.15 coefficient. OR Secondary method: The Accumulated time monitored during the L2R Delayed Response Test. AND Pre O2 sensor voltage is OR At end of Cat Rich stage the Pre O2 sensor output is	> 0.58 EWMA (sec) ≤ 0.50 EWMA (sec) ≥ 1.9 Seconds < 350 mvolts < 680 mvolts	No Active DTC's P015A 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 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 Illum.
		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 O2 sensor does not achieve the required higher voltage threshold before a delay time threshold is reached.			Green O2S Condition O2 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 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: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 18.0 grams/sec. ≥ 30 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 60 ºC = TRUE) > -40 ºC > 30 seconds 1,150 ≤ RPM ≤ 3,500 1,100 ≤ RPM ≤ 3,650 2.0 ≤ gps ≤ 20.0 40.4 ≤ MPH ≤ 77.7		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					initially enabled)	36.0 ≤ MPH ≤ 80.8		
					Closed loop integral	0.85 ≤ C/L Int ≤ 1.08		
					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	> 70 kpa		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 30.0 sec		
					Predicted Catalyst temp	550 ≤ ºC ≤ 910		
					Fuel State	= DFCO inhibit		
					Number of fueled cylinders	≥ 1 cylinders		
					================	==================		
					When above conditions are met: Fuel Enrich mode is entered.			
					================	==================		
					During this test: Engine Airflow must stay between:	2 ≤ gps ≤ 12		
					and the delta Engine Airflow over 12.5msec			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					must be :	≤ 3.0 gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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)	>= 1.360 >= 0.102 If a fault has been detected the long-term fuel trim metric must be < 1.360 and the short-term fuel trim metric must be < 2.000 to repass the diagnostic.	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 Closed Loop Long Term FT	400 <rpm< 6,100 > 70 kPa > -20 °C (or OBD Coolant Enable Criteria = TRUE) < 150 °C 5 <kPa< 255 -20 <°C< 150 1 <g/s< 510 > 10 % or if fuel sender is faulty the diagnostic will bypass the fuel level criteria. > 34.0 seconds of data must accumulate on each trip, with at least 22.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made. (Please see **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage** in Supporting Tables for a list of cells utilized for diagnosis) Enabled Enabled (Please see "**Closed Loop Enable Clarification**" and "**Long Term FT Enable Criteria**" in Supporting Tables.)	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 Illum.
					EGR Diag. Catalyst Diag. Post O2 Diag. Device Control EVAP Diag. No active DTC:	Intrusive Test Not Active Intrusive Test Not Active Intrusive Test Not Active Not Active Large Leak Diagnostic (P0455) Not Active 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 Illum.
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)	<= 0.700 <= 1.996 ************************** <= 0.705 <= 0.700 <= 1.996 If a fault has been detected (by the passive or intrusive test) the long-term fuel trim metric must be > 0.780 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. ****************************** <= 26.00 % 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 45 seconds and are separated by the lesser of 12.0 seconds of purge-on time or enough time to purge 11 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 Illum.
		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 > 0.705 , 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 <= 0.705 , 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 <= 0.700 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 > 0.000 to repass the diagnostic. The intrusive test will be enabled at long-term fuel metric values < 0.70 until the diagnostic repasses after a failure.		 If the accumulated purge volume is > 26.0 grams, the intrusive test will not be inhibited even if Purge Vapor Fuel is > 26.0 %.	time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge Long Term Fuel Trim metric > 0.705 for at least 200.0 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 Illum.
		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 Illum.
SENT Fuel Rail Temperature Sensor 1 Circuit Low Fault	P0182	This DTC diagnose SENT fuel rail temperature 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.	Fuel Temperature Sensor 1 SENT digital read value	< 145	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (P16E4, P16E5) SENT Intenal Error Fault Active (P126E) Fuel Temperature Sensor SENT Message Error Fault Active (P128C)		
					No Fault Pending on	SENT Intenal Error Fault Pending (P126E) Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 1 Circuit High Fault	P0183	This DTC diagnose SENT fuel rail temperature sensor 1 that is too high out of range. If the sensor digital value (represnting the refernce voltage) is above the upper digital threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the high sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	> 1,865	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (P16E4, P16E5)		
						SENT Intenal Error Fault Active (P126E)		
						Fuel Temperature Sensor SENT Message Error Fault Active (P128C)		
					No Fault Pending	SENT Intenal Error Fault Pending (P126E)		
						Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 2 Circuit Low Fault	P0187	This DTC diagnose SENT fuel rail temperature sensor 2 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital read 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.	Fuel Temperature Sensor 1 SENT digital read value	< 145.00	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (P16E4, P16E5) SENT Intenal Error Fault Active (P126F) Fuel Temperature Sensor SENT Message Error Fault Active (P128D)		
					No Fault Pending	SENT Intenal Error Fault Pending (P126F) Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 2 Circuit High Fault	P0188	This DTC diagnose SENT fuel rail temperature sensor 2 that is too high out of range. If the sensor digital value (represnting the refernce voltage) is above the upper digital read threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the high sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	> 1,865.00	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (P16E4, P16E5) SENT Intenal Error Fault Active (P126F) Fuel Temperature Sensor SENT Message Error Fault Active (P128D)		
					No Fault Pending	SENT Intenal Error Fault Pending (P126F) Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 KeFRPD_cmp_FPSS_ MinPres Variance (typically 0.3 to 0.6); 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	Absolute value of fuel pressure change (as sensed during intrusive test)	<= 30 kPa	a] Diagnostic Enabled b] Engine Run Time c] Engine Fuel Flow d] Fuel Pump Control Enabled e] Fuel Pump Control State f] Emissions Fuel Level Low g] Validity status VeFRPD_b_FPSS_ DataIntegrityOK IF [1] FRP Circuit Low Fault Active (DTC P018C) [2] FRP Circuit High Fault Active (DTC P018D) [3] Fuel Pump Circuit Low Fault Active (DTC P0231) [4] Fuel Pump Circuit High Fault Active (DTC P0232) [5] Fuel Pump Circuit Open Fault Active (DTC P023F) [6] Reference Voltage Fault Status (DTC P0641) [7] Fuel Pump Control Module Driver Over-temperature Fault Active (DTC P1255) [8] Fuel Pump Driver Mod	a] == TRUE b] >= 5.00 sec c] > 0.05 g / sec d] == TRUE e] Normal OR Fuel Pres Sensor Stuck Ctrl (rationality) f] <> True g] == TRUE IF [1] <> True [2] <> True [3] <> True [4] <> True [5] <> True [6] <> Active This Key [7] <> True [8] <> 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 Illum.
					Ign Sw RunStart Pstn Ckt Low Fault Active (DTC P129D) [9] Fuel Pump Driver Control Mod Enable Ckt Perf Fault Active(DTC P12A6)	 [9] <> True		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit Low	P018C	This DTC detects if the fuel pressure sensor circuit is shorted low	Fuel Pressure Sensor Voltage Percent, 5.0V Nominal ((Abs(5.0V - SensorV_actual) /5.0V) *100)	< 4.00 % or [0 kPa ga]	Ignition circuit input state	High (Run or Crank)	64 failures / 80 samples 1 sample/12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit High	P018D	This DTC detects if the fuel pressure sensor circuit is shorted high	Fuel Pressure Sensor Voltage Percent, 5.0V Nominal ((Abs(5.0V - SensorV_actual) /5.0V) *100)	> 96.00 % or [743 kPa ga]	Ignition circuit input state	High (Run or Crank)	64 failures / 80 samples 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 Illum.
SENT SIDI High Pressure Sensor Performance	P0191	The DTC determines if there is a skewed control fuel rail sensor (Sensor1) 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 sensor1 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) >= 1.00 mpa Note: fuel control error is calcuated based on the squreroot of senor1 divided by sensor2, this value is filter to ensure proper failure detection. Absolute delta between sensor1 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 sensor1 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 Illum.
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 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 Illum.
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 Running	>= 11 Volts >= 1 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 Illum.
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 >= 1 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 Illum.
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 Running	>= 11 Volts >= 1 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 Illum.
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 >= 1 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 Illum.
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 Illum.
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 Illum.
Fuel Pump Secondary Circuit Low [FPPM applications only]	P0231	This DTC detects if the fuel pump control circuit is shorted to low. Per "smart device" design guidelines, Fuel Pump Power Driver device reports a Faulted state enumeration if current >= 18A [25A for high performance variants. FPDCM reports Not Faulted enumeration if current < 18A FPDCM reports Indeterminate state enumeration if the circuit is not being evaluated during current decision loop due to other conditions.	Power driver output current (Fuel Pump Power Module Driver Circuit Ground Short enumeration)	Current >= 18.0 A	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Fuel Pump Control Enable command d) Fuel Pump Control Enable time [FAFR FPPM GshtDlyThr] e) System Voltage f] FPDCM Driver Status Alive Rolling Count Sample Faulted g] Diagnostic feedback received	a) == FCBR Gas ECM FPPM Sys b) == TRUE c) == TRUE d) >= 0.00 seconds e) > 0.00 Volts f] <> TRUE g] == TRUE	0.00 failures / 0.00 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 Illum.
Fuel Pump Secondary Circuit High [FPPM applications only]	P0232	This DTC detects if the fuel pump control circuit is shorted to high voltage by measuring voltage offset relative to low state level of duty cycle pulse. Per "smart device" design guidelines, Fuel Pump Power device reports a Faulted state enumeration if circuit voltage >= 4V. FPPM reports Not Faulted enumeration if circuit voltage < 4V. FPPM reports Indeterminate state enumeration if the circuit is not being evaluated during current decision loop due to other conditions.	Voltage offset relative to low state level of duty cycle pulse measured at fuel pump circuit	> 4.0 V	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Diagnostic System Disabled d) Fuel Pump Control Enabled e] Arbitrated Fuel Pump Duty Cycle Rate of Change [FCBR] f] System voltage g] FPPM Driver Status Alive Rolling Count Sample Faulted h] Diagnostic serial data received	a) == FCBR Gas ECM FPPM Sys b) == TRUE c) <> True d) == TRUE e] >= 0.0 % / sec f] > 0.0 volts g] <> True h] == TRUE	0 failures / 0 samples 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 Illum.
Turbo/Super Charger Engine Overboost Turbocharger with wastegate. Not supercharger with mechanical compressor	P0234	This DTC indicates an over boost failure. Two failure paths are considered. When pressure control closed loop control being active, a negative boost pressure deviation indicates overboost conditions at constant driving conditions. In case boost pressure close loop control not being active and with desired boost pressure below basic boost pressure, overboost conditions can be detected when actual boost pressure is higher than basic boost pressure plus a diagnostic offset.	Desired boost pressure - Actual boost pressure	< refer to **P0234: Overboost pressure deviation limit as a function of engine speed and desired boost pressure** - **P0234 P0299: Ambient pressure correction as a function of engine speed and ambient pressure** in Supporting tables.	Dev. diagnostic enable **************************** Coolant temperature or OBD Coolant enable criteria and Coolant temperature Intake air temperature is in range Ambient air pressure is in range Engine speed in range Desired boost pressure in range Desired boost pressure derivative in range **************************** All conditions have to be fullfilled for: **************************** No active DTCs: **************************** Pressure control has to be in closed loop.	True **************************** > -40.0 °C = TRUE < 126.0 °C > -40.0 °C < 80.0 °C > 60.0 kPa < 120.0 kPa > 2,000 rpm < 6,500 rpm > 100.0 kPa < 280.0 kPa > -70.0 kPa/s < 55.0 kPa/s **************************** > refer to **P0234 P0299: Boost deviation diagnostic enable delay as a function of engine speed** in Supporting tables. **************************** BSTR_b_PCA_CktFA BSTR_b_TurboBypassCktFA ECT_Sensor_FA IAT_SensorFA BSTR_b_BoostSnsrFA AmbientAirDefault ****************************	24 failures out of 30 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No device control active for WG and compresseor recirculation valve.			
			Actual boost pressure	> refer to **P0234: Overboost pressure limit below basic pressure as a function of engine speed and ambient pressure** in Supporting tables. +Basic Pressure	Basic pressure diag enable and Dev. diagnostic enable **************************** Coolant temperature or OBD Coolant enable criteria and Coolant temperature Intake air temperature is in range Ambient air pressure is in range Engine speed in range All conditions haveto be fullfilled for: **************************** No active DTCs: **************************** Pressure control has to be in open loop.	False True **************************** > -40.0 °C = TRUE < 126.0 °C > -40.0 °C < 80.0 °C > 60.0 kPa < 120.0 kPa > 2,000 rpm < 3,500 rpm > 2.00 Seconds **************************** BSTR_b_PCA_CktFA BSTR_b_TurboBypassCkt FA ECT_Sensor_FA IAT_SensorFA BSTR_b_BoostSnsrFA AmbientAirDefault BSTR_b_PCA_TFTKO ****************************	20 failures out of 25 samples 100ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No device control active for WG and compresseor recirculation valve.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Boost Pressure (TIAP) Sensor Performance (single turbo)	P0236	Detects a performance failure in the Turbocharger Boost Pressure sensor, such as when a Turbocharger Boost Pressure 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 Turbocharger Boost Pressure sensor value is checked to see if it is within the normal expected atmospheric pressure range. If it is not, then the Turbocharger Boost Pressure performance diagnostic will fail. If the Turbocharger Boost Pressure sensor value is within the normal expected atmospheric range, then Manifold Pressure (MAP), Turbocharger Boost Pressure and Barometric Pressure (BARO) are compared to see if their values are similar. If the MAP and BARO sensor values are similar, but the Turbocharger Boost Pressure value is not	**Engine Running:** See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP -	> 20.0 grams/sec > 23.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa > 175 kPa*(g/s)	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 <= 6,100 RPM >= -7 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** MAP Model 2 Error	Continuous Calculation are performed every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		similar, then a Turbocharger Boost Pressure 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, 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 Turbocharger Boost Pressure sensor. In this case, the Turbocharger Boost Pressure Performance	measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow	> 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm/sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow**	No Active DTCs: No Pending DTCs:	multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		diagnostic will fail.	AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure AND Mass Air Flow - Filtered Mass Air Flow	> a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 1.3 gm/sec < a threshold in gm/ sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec				
			<u>Engine Not Rotating:</u> Turbocharger Boost Pressure OR Turbocharger Boost	< 50.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating	> 10.0 seconds	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pressure OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure)	> 115.0 kPa <= 10.0 kPa > 10.0 kPa > 10.0 kPa	No Active DTCs: No Pending DTCs:	EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Boost Pressure Sensor Circuit Low (Gen III)	P0237	Detects a continuous short to ground in the Turbocharger Boost Pressure signal circuit by monitoring the Turbocharger Boost Pressure sensor output voltage and failing the diagnostic when the Turbocharger Boost Pressure voltage is too low. The Turbocharger Boost Pressure sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	Turbocharger Boost Pressure Voltage	< 14.4 % of 5 Volt Range (This is equal to 50.0 kPa)			320 failures out of 400 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Boost Pressure Sensor Circuit High (Gen III)	P0238	Detects a continuous short to power or open circuit in the Turbocharger Boost Pressure signal circuit by monitoring the Turbocharger Boost Pressure sensor output voltage and failing the diagnostic when the Turbocharger Boost Pressure voltage is too high. The Turbocharger Boost Pressure sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	Turbocharger Boost Pressure Voltage	> 86.0 % of 5 Volt Range (This is equal to 372.0 kPa)			320 failures out of 400 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Secondary Circuit Open [FPPM applications only]	P023F	This DTC detects if the fuel pump control circuit is open Per "smart device" design guidelines, Fuel Pump Power device reports a Faulted state enumeration if current <= 1A . FPPM reports Not Faulted enumeration if current > 1A. FPPM reports Indeterminate state enumeration if the circuit is not being evaluated during current decision loop due to other conditions.	Output driver current (Fuel Pump Power Module Driver Circuit Open enumeration)	Current <= 1.0 A	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Arbitrated Fuel Pump Duty Cycle (%) d] Fuel Pump Control Enable Faulted e] FPPM Fuel Pmp Driver Over-temperature Faulted f] FPPM Driver Status Alive Rolling Count Sample Faulted g] Diagnostic feedback received h] System Voltage	a) == FCBR Gas ECM FPPM Sys b) == TRUE c) > 0.00 % d] <> TRUE e] <> TRUE f] <> TRUE g] == TRUE h] > 0.00 Volts	0 failures / 0 samples 1 sample/12.5ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit	P0243	Controller specific output driver circuit diagnostic, diagnosing the 'turbocharger boost solenoid'A' actuator' low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In a parallel application, turbocharger 'A' is associated with engine bank 1.	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 Ω impedance between output and controller ground	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts > 5.00 Volts *****************************	10 failures out of 20 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P0245 may also set turbocharger wastegate / supercharger boost solenoid A control circuit low

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit Low	P0245	Controller specific output driver circuit diagnostic, diagnosing the 'turbocharger boost solenoid 'A' actuator' 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. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In a parallel application, turbocharger 'A'is associated with engine bank 1.	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. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	≤ 0.5 Ω impedance between output and controller ground	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts > 5.00 Volts *****************************	10 failures out of 20 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P0243 may also set turbocharger wastegate / supercharger boost solenoid A control circuit

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit High	P0246	Controller specific output driver circuit diagnostic, diagnosing the 'turbocharger boost solenoid 'A' actuator' 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. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In a parallel application, turbocharger 'A'is associated with engine bank 1.	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. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	≤ 0.5 Ω impedance between output and controller power	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts > 5.00 Volts *****************************	10 failures out of 20 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
Turbo/Super Charger Engine Underboost Turbocharger with wastegate. Not supercharger with mechanical compressor	P0299	This DTC indicates an under boost failure. Two failure paths are considered. At steady state engine operating conditions with boost pressure closed loop control being active, a positive boost pressure deviation indicates underboost conditions. During transient conditions, in case the boost pressure increase gradient is below a diagnostic threshold, underboost conditions will be detected.	Desired boost pressure - Actual boost pressure	<refr to **P0299: Underboost pressure deviation limit as a function of engine speed and desired boost pressure** + **P0234 P0299: Ambient pressure correction as a function of engine speed and ambient pressure** in Supporting tables.	Dev. Diagnostic enable **************************** Coolant temperature or OBD Coolant Enable Criteria and Coolant temperature Intake air temperature is in range Ambient air pressure is in range Engine speed in range Desired boost pressure in range Desired boost pressure derivative in range **************************** All conditions haveto be fullfilled for: **************************** No active DTCs: **************************** Pressure control has to be in closed loop.	True **************************** > -40.0 °C = TRUE) < 126.0 °C > -40.0 °C < 80.0 °C > 60.0 kPa < 120.0 kPa > 2,000 rpm < 6,500 rpm > 100.0 kPa < 280.0 kPa > -70.0 kPa/s < 55.0 kPa/s **************************** >refer to **P0234 P0299: Boost deviation diagnostic enable delay as a function of engine speed** in Supporting tables. **************************** BSTR_b_PCA_CktFA BSTR_b_TurboBypassCktFA ECT_Sensor_FA IAT_SensorFA BSTR_b_BoostSnsrFA AmbientAirDefault ****************************	24 failures out of 30 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No device control active for WG and compresseor recirculation valve.			
			Actual boost pressure delta the delta is limited by these tables: refer to Max: **P0299: Underboost high rate limit as a function of engine speed** Min: **P0299: Underboost low rate limit as a function of engine speed** in supporting tables.	< 15.00	Rate base diagostic enable and Dev. Diagnostic enable **************************** Coolant temperature or OBD Coolant enable criteria and Coolant temperature Intake air temperature is in range Ambient air pressure is in range Desired boost pressure in range Desired boost pressure derivative in hysteresis range Engine speed is in range **************************** All conditions have to be fullfilled for: **************************** No active DTCs:	False True **************************** > -40.0 °C = TRUE) < 126.0 °C > -40.0 °C < 80.0 °C > 60.0 kPa < 120.0 kPa > 100.0 kPa < 280.0 kPa Enable Limit: 20.0 Disable Limit: -20.0 > 2,000 rpm < 3,500 rpm **************************** > 0.20 Seconds **************************** BSTR_b_PCA_CktFA BSTR_b_TurboBypassCktFA ECT_Sensor_FA IAT_SensorFA BSTR_b_BoostSnsrFA	20 failures out of 25 samples 100ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					***************************** Pressure control has to be in closed loop. No device control active for WG and compresseor recirculation valve.	AmbientAirDefault *****************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Injector Circuit Range/ Performance	P02EE	Diagnostic to determine if Cylinder 1 injector voltage feedback measured from the analog to digital converter is rational. The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltage	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			feedback converted to Injector closing time	**P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Closing Time** (See supporting table)				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Injector Circuit Range/ Performance	P02EF	Diagnostic to determine if Cylinder 2 injector voltage feedback measured from the analog to digital converter is rational. The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltage	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			feedback converted to Injector closing time	**P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Closing Time** (See supporting table)				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Injector Circuit Range/ Performance	P02F0	Diagnostic to determine if Cylinder 3 injector voltage feedback measured from the analog to digital converter is rational. The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltage	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			feedback converted to Injector closing time	**P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Closing Time** (See supporting table)				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Injector Circuit Range/ Performance	P02F1	Diagnostic to determine if Cylinder 4 injector voltage feedback measured from the analog to digital converter is rational. The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltage	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			feedback converted to Injector closing time	**P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Closing Time** (See supporting table)				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected	P0300 P0301 P0302 P0303 P0304	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.	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 (Lores_Decel Lores_Jerk OR (Lores_Decel Lores_Jerk OR RevBalanceTime)	- see details of thresholds on Supporting Tables Tab > **IdleSCD_Decel** AND > **IdleSCD_Jerk)** > **SCD_Decel** AND > **SCD_Jerk)** > **IdleCyl_Decel** AND > **IdleCyl_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 -10 ºC < ECT Or if OBD Max Coolant Achieved = TRUE -10 ºC < ECT < 127 ºC < -10 ºC If OBD Max Coolant Achieved = FALSE 21 ºC < ECT If OBD Max Coolant Achieved = TRUE 21 ºC < ECT < 127 ºC 9.00 < volts < 32.00 < 60.00 % per 25 ms < 60.00 % 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 Illum.
			****************************** **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 AND Medres_Jerk)	> **IdleSCD_Decel** * **Random_SCD_Decel** > **IdleSCD_Jerk** * **Random_SCD_Jerk**				
			OR (Medres_Decel AND Medres_Jerk)	> **SCD_Decel** * **Random_SCD_Decel** > **SCD_Jerk** * **Random_SCD_Jerk**				
			OR (Lores_Decel AND Lores_Jerk)	> **IdleCyl_Decel** * **RandomCylModDecel** > **IdleCyl_Jerk** * **RandomCylModJerk**				

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR (Revmode Active AND (within one engine cycle: 2nd largest Lores_Decel)	> **CylModeDecel * PairCylModeDecel**				
			AND Above TRUE for))	> 35 engine cycles out of 100 engine cycles				
			BANK MISFIRE Cylinders above Bank Thresholds	>= 3 cylinders				
			(Medres_Decel	> **IdleSCD_Decel** * **Bank_SCD_Decel**				
			AND Medres_Jerk)	> **IdleSCD_Jerk** * **Bank_SCD_Jerk**				
			OR (Medres_Decel	> **SCD_Decel * Bank_SCD_Decel**				
			AND Medres_Jerk)	> **SCD_Jerk * Bank_SCD_Jerk**				
			OR (Lores_Decel	> **IdleCyl_Decel** * **BankCylModeDecel**				
			AND Lores_Jerk)	>**IdleCyl_Jerk * 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 Illum.
			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) CYLINDER DEACTIVATION MODE (Active Fuel Managment)	> **IdleSCD_Decel** * **ConsecSCD_Decel** > **IdleSCD_Jerk** * **ConsecSCD_Jerk** > **SCD_Decel** * **ConsecSCD_Decel** > **SCD_Jerk** * **ConsecSCD_Jerk** > **IdleCyl_Decel** * **ConsecCylModDecel** > **IdleSCD_Jerk** * **ConsecCylModeJerk** > **CylModeDecel** * **ConsecCylModDecel** > **CylModeJerk** * **ConsecCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AFM: SINGLE CYLINDER CONTINUOUS MISFIRE (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) OR (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk)	 > **CylModeDecel** * **ClyAfterAFM_Decel** > **CylModeJerk** * **CylAfterAFM_Jerk** > **CylModeDecel** * **CylBeforeAFM_Decel** > **CylModeJerk** * **ClyBeforeAFM_Jerk**				
			AFM: RANDOM MISFIRE Use random misfire thresholds If no misfire for (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk)	> 3 Engine Cycles > **CylModeDecel** * **ClyAfterAFM_Decel** * **RandomAFM_Decl** > **CylModeJerk** * **CylAfterAFM_Jerk** * **RandomAFM_Jerk** > **CylModeDecel** * **CylBeforeAFM_Decel** * **RandomAFM_Decl** > **CylModeJerk** * **ClyBeforeAFM_Jerk** * **RandomAFM_Jerk** - see details on Supporting Tables Tab				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Misfire Percent Emission Failure Threshold	≥ 3.00 % P0300				
			Misfire Percent Catalyst Damage	> **Catalyst_Damage_Misfire_Percentage** in Supporting Tables whenever secondary conditions are met.				
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	≤ 1,350 FTP rpm AND ≤ 20 FTP % load	(at low speed/loads, one cylinder may not cause cat damage) Engine Speed Engine Load Misfire counts	> 1,400 rpm AND > 15 % load AND < 180 counts on one cylinder		
					Engine Speed	530 < rpm < ((Engine Over Speed Limit) - 400) OR 8,191) Engine speed limit is a function of inputs like Gear and temperature	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						see **EngineOverSpeedLimit** in supporting tables		
					No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensor_TFTKO CrankSensor_FA CamLctnIntFA CamLctnExhFA CamSensorAnyLctnTFTKO AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus	4 cycle delay	
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnostic	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	***Undetectable region***	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					speed and engine load region	from Malfunction Criteria		
					Abusive Engine Over Speed	> 7,000 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	≤ 1.4 % (≤ 1.4 % in AFM) > 19 mph (> 19 mph AFM)	4 cycle delay	
					NEGATIVE TORQ AFM If deactivated cylinders appear to make power, torque is negative: DeactivatedCyl_Decel AND DeactivatedCyl_Jerk AND # of Deact Cyls Inverted	 <**DeacCylInversionDecel** <**DeacCylInversionJerk** > 4 cylinders	0 cycle delay	
					EGR Intrusive test	if Active	0 cycle delay	
					Manual Trans	Clutch shift	4 cycle delay	
					Accel Pedal Position AND Automatic transmission shift	> 98.00 %	7 cycle delay	
					After Fuel resumes on Automatic shift containing Fuel Cut		2 Cylinder delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Delay if PTO engaged	Enabled	4 cycle delay	
					******************************	******************************	******************	
					This Feature not used on Gasoline engines			
					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			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Cycle test to see if it looks like some disturbance like rough road (abnormal).) Used Off Idle, and while not shifting, TPS Engine Speed Veh Speed Auto Transmission 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 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 MISFIRE CRANKSHAFT	 > 3 % > 1,000 rpm > 3 mph not shifting > **Abnormal SCD Mode** > **Abnormal Cyl Mode** > **Abnormal Rev Mode** in Supporting Tables > 0.50 ratio	discard 100 engine cycle test	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 cycle test, the ratio of 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	900 < rpm < 6,100		
					Veh Speed	> 1.6 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			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					thresholds in effect at that speed and load.			
					(CylAfter_Accel AND	> Misfire_ decel * **1st_FireAftrMisfr_Acel**		
					CylAfter_Jerk)	> Misfire_Jerk * **1st_FireAftrMisfr_Jerk** Or if AFM mode is active: > Misfire_ decel * **1stFireAftrMisAcelAFM** > Misfire_Jerk * **1stFireAfterMisJerkAFM**		
					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 ddt_jerk 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	2 Cylinders		
					"misfire" recognized if: Crankshaft snap after: isolated "misfire"	< Misfire_Jerk * **SnapDecayAfterMisfire**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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.			
					Ratio of Unrecog/Recog	> 0.60	discard 100 engine cycle test	
					:			
					NON-CRANKSHAFT BASED ROUGH ROAD:	Disabled		
					Rough Road Source	CeRRDR_e_None		
					IF Rough Road Source = WheelSpeedInECM			
					ABS/TCS	active		
					Wheel speed noise	> **WSSRoughRoadThres**	discard 100 engine cycle test	
					VSES	active		
					IF Rough Road Source = "FromABS"			
					ABS/TCS	active	discard 100 engine cycle test	
					RoughRoad	detected		
					VSES	active		
					IF Rough Road Source = "TOSS"			
					TOSS dispersion	>**TOSSRoughRoadThres** in supporting tables	discard 100 engine cycle test	
					AND No Active DTCs			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Transmission Output Shaft Angular Velocity Validity TransmissionEngagedState_FA (Auto Trans only) ClutchPstnSnsr FA (Manual Trans only)	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Differance 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 Illum.
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 ≥ 400 mg/cylinder AND ≤ 2,000 mg/cylinder ≥ -40 deg's C = TRUE ≥ -40 deg's C ≥ 500 revs	First Order Lag Filters with Weight Coefficient = 0.0400 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 ≥ 125 revs ≥ 20 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 = 0.0200 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 Illum.
		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 Illum.
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 ≥ 2,250 RPM (not in AFM mode) OR ≥ 2,250 (in AFM mode) AND ≤ 8,500 RPM ≥ 30 mg/cylinder AND ≤ 2,000 mg/cylinder ≥ -40 deg's C = TRUE ≥ -40 deg's C **P0326_P0331_AbnormalNoise_CylsEnabled** (Supporting Table) ≥ 125 Revs	First Order Lag Filters with Weight Coefficient = 0.0200 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	 = FALSE > 1.5 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			No crankshaft pulses received	>= 0.3 seconds	Engine is Running Starter is not engaged		Continuous every 12.5 msec	
			No crankshaft pulses received		Engine is Running OR Starter is engaged No DTC Active:	 P0365 P0366	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 Illum.
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 4 or more crank re-synchronizations occur	< 5.0 seconds	Engine Air Flow Cam-based engine speed No DTC Active:	>= 1.5 grams/second > 100 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		Continuous every 12.5 msec	
			Time since starter engaged without detecting crankshaft synchronization gap	>= 1.5 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	= FALSE > 1.5 grams/second))	Continuous every 100 msec	
			Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution	< 0 > 65,535	Engine is Running OR Starter is engaged No DTC Active:	P0365 P0366	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 Illum.
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	= FALSE > 1.5 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		Continuous every 100 msec	
			No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle		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:	CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	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 Illum.
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 first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle)	< 4 > 6	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:	CrankSensor_FA	Continuous every MEDRES event	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	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 Illum.
Crankshaft Position Sensor - Crankshaft Start Position Incorrect	P034A	Monitors the position of the crankshaft during auto-start's to verify that the crankshaft is in the expected position- diagnostic will fail if the crankshaft is not in the expected range otherwise the diagnostic will pass	Crankshaft position is in error by a number of crankshaft wheel teeth	> 2 crankshaft teeth	Engine has started rotating during a hybrid auto-start Crankshaft position is being verified No Active DTCs:	 CrankSensor_FA	2 failures out of 3 samples a sample occurs each time the engine is started	Type B, 2 Trips
			Crankshaft position is in error by at least one crankshaft wheel tooth		Engine has started rotating during a hybrid auto-start Crankshaft position is being verified No Active DTCs:	 CrankSensor_FA	4 failures out of 5 samples a sample occurs each time the engine is started	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position Sensor - Crankshaft Direction Incorrect	P034B	Detects if the crankshaft is not rotating in the correct direction- will fail if the engine is reported to be spinning backwards while the engine is running otherwise the diagnostic will pass.	Number of crankshaft sensor reversals within a period of time	>= 3 <= 10.0 seconds	Engine Speed Engine Speed Engine Air Flow Engine Movement Detected No Active DTCs:	> 400 RPM < 2,000 RPM >= 1.5 grams/second CrankSensor_FA	Continuous Every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	$\geq$ 30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	$\geq$ 30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B	P0365	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	= FALSE > 1.5 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		Continuous every 100 msec	
			No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle		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:	CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	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 Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B	P0366	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 first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle)	< 4 > 6	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:	CrankSensor_FA	Continuous every MEDRES event	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	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 Illum.
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 (EWMA filtered)	< 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:		1 test attempted per valid decel period Minimum of 1 test per trip Maximum of 3 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 12.5ms	Type A, 1 Trips
					If the difference between current EWMA value and the current OSC Normalized Ratio value is	> 0.66		
					and the current OSC Normalized Ratio value is	< 0.10		
					Maximum number of RSR tests to detect failure when RSR is enabled.	8		
					MAF	> 1.70 g/s < 20.00 g/s		
					Predicted catalyst temperature	< 910 ° C		
					Front O2 Sensor or Front WRAF	> 680.00 mV or > 1.25 EQR		
					Rear O2 Sensor	> 750.00 mV		
					General Enable Criteria			
					In addition to the p-codes listed under P2270, the following DTC's shall also			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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_WorstPassingOSCTableB1** and **P0420_BestFailingOSCTableB1** 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 O2 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 O2 sensors: For WRAF O2 sensors:	 O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA WRAF_Bank_1_FA WRAF_Bank_2_FA **P0420_WorstPassingOSCTableB1** **P0420_BestFailingOSCTableB1**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 Illum.
Evaporative Emission (EVAP) System Small Leak Detected (No ELCP - Conventional EVAP Diagnostic - with EAT using IAT 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 DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 3 additional consecutive trips.	> 0.59 (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 at end of drive Estimate of Ambient Air Temperature Valid ****************************** Conditions for Estimate of	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. ≥ 17 hours ≥ 10 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 Illum.
		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.			Ambient Air Temperature to be valid: 1. Cold Start Startup delta deg C (ECT-IAT) OR 2. Short Soak and Previous EAT Valid Previous time since engine off OR 3. Less than a short soak and Previous EAT Not Valid Previous time since engine off AND Vehicle Speed AND Mass Air Flow Must expire Estimate of Ambient Temperature Valid Conditioning Time. **P0442 Estimate of Ambient Temperature Valid Conditioning Time as a Function of Ign Off Time** in Supporting Tables. OR 4. Not a Cold Start and greater than a Short Soak Previous time since	 ≤ 8 °C ≤ 7,200 seconds ≤ 7,200 seconds ≥ 24 mph ≥ 10 g/sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					engine off AND Vehicle Speed AND Mass Air Flow Must expire maximum value in Estimate of Ambient Temperature Valid Conditioning Time. Please see **P0442 Estimate of Ambient Temperature Valid Conditioning Time as a Function of Ign Off Time** in Supporting Tables. ***************************** 1. High Fuel Volatility During the volatility 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	> 7,200 seconds ≥ 24 mph ≥ 10 g/sec ***************************** < -5		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 refueling. 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	0.50 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					during the EONV test 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 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 Illum.
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 Ω 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 Illum.
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 ≥ 4 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 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 Illum.
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 Ω impedence between output and controller ground	No active DTCs:	P1005 P130F U18A2	20 failures out of 25 samples 250 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 Illum.
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 DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 3 additional consecutive trips.	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 Illum.
		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.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage (No ELCP - Conventional EVAP Diagnostic - without 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)			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 Illum.
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage (No ELCP - Conventional EVAP Diagnostic - without 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)			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 Illum.
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 Illum.
		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 Illum.
Evaporative Emission (EVAP) System Large Leak Detected (No ELCP - Conventional EVAP Diagnostic - without 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.	> 20 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 ≥ 1.50 % MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited P0443 P0449 P0452 P0453 P0454 P0458 P0459 P0498 P0499 ≤ 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 0 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 Illum.
		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 Illum.
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 Ω 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 controllers P0443 may also set (Canister Purge Solenoid Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Ω 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 Illum.
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) < 3 liters b) >= 22.00 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 Illum.
Fuel Level Sensor 1 Circuit Low Voltage	P0462	This DTC will detect a primary fuel tank sensor stuck out-of-range low.	Fuel level Sender % of 5V range	< 10 % or 46.53 liters	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	100 failures out of 125 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 Illum.
Fuel Level Sensor 1 Circuit High Voltage	P0463	This DTC will detect a primary fuel tank level sensor stuck out-of-range high.	Fuel level Sender % of 5V range	> 60 % or 3.09 liters	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	100 failures out of 125 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 Illum.
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 refueilng 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 Illum.
		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 Illum.
Cooling Fan 1 Relay Control Circuit Open (Output Driver Monitor) (Not used on EREV)	P0480	Diagnoses the cooling fan 1 relay control low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage	Voltage ≥ 11.00 volts	50.00 failures out of 63.00 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P0691 may also set (Fan 1 Short to Ground).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) System Flow During Non-Purge (No ELCP - Conventional EVAP Diagnostic - without 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 P0443 P0449 P0452 P0453 P0454 P0458 P0459 P0498 P0499	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 Illum.
		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 Illum.
Evaporative Emission System Vent Solenoid Control Circuit Low (No ELCP - Conventional EVAP Diagnostic - without 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 Ω impedence between output and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controlle rs 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 Illum.
Evaporative Emission System Vent Solenoid Control Circuit High (No ELCP - Conventional EVAP Diagnostic - without 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 Ω impedence between output and controller power			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 Illum.
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
					Coolant Temp	> 60 °C and < 125 °C	Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	
			Filter coefficient	0.00300				
					Engine run time	≥ 60 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	> 5 sec		
					For manual transmissions: Clutch Pedal Position	> 75.00 pct		
					or Clutch Pedal Position	< 12.00 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 Illum.
						Off-vehicle device control (service bay control) must not be active. following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimit AND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion) Clutch is not depressed		
					No active DTCs	TC_BoostPresSnsrFA 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 FuelLevelDataFault LowFuelConditionDiagnostic Clutch Sensor FA AmbPresDfltdStatus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P2771		
					All of the above met for Idle time	> 5 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 Illum.
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 and < 125 °C Must verify	Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	
			Filter coefficient	0.00300				
					Engine run time	≥ 60 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	> 75.00 pct		
					or Clutch Pedal Position	< 12.00 pct		
						PTO 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 Illum.
						following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimit AND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion)		
						Clutch is not depressed		
					No active DTCs	TC_BoostPresSnsrFA 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	> 5 sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Cold Start Rough Idle	P050D	Monitors the combustion performance when the cold start emission reduction strategy is active by accumulating and determining the percentage of engine cycles that have less than complete combustion relative to the total number of engine cycles in which Dual Pulse is active.	Deceleration index vs. Engine Speed Vs Engine load Deceleration index calculation is tailored to specific vehicle. Tables used are 1st tables encountered that are not max of range. Undetectable region at a given speed/load point is where all tables are max of range point. Incomplete combustion identified by P0300 threshold tables:	(>Idle SCD AND >Idle SCD ddt Tables) OR (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables)	Misfire Algorithm Enabled (Refer to P0300 for Enablement Requirements) OBD Manufacturer Enable Counter To enable the diagnostic, the Cold Start Emission Reduction Strategy Must Be Active per the following: Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure In addition, Dual Pulse Strategy Is Enabled and Active Per the following: Engine Speed Accel Position Engine Run Time For the engine speeds and loads in which Dual Pulse is active:	 = 0 < 350.00 degC > -10.00 degC <= 66.00 degC >= 76.00 KPa >= 450.00 RPM <= 2,500.00 RPM <= 25.00 Pct < 45 seconds	Runs once per trip when the cold start emission reduction strategy is active and Dual Pulse is enabled and active. Frequency: 100ms Test completes after Dual Pulse is no longer active OR The first 500 engine cycles have been reached	Type X, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Dual Pulse Error induced misfires percentage	>= catalyst damaging misfire		
					Dual Pulse Error induced misfires percentage	< 90% of the maximum achieveable catalyst damaging misfire.		
					Engine Cycles	>= 50 < 501		
					The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:			
					Catalyst Temperature AND Engine Run Time	>= 900.00 degC >= 45.00 seconds		
					OR			
					Engine Run Time	> **P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit table is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details.		
					OR			
					Barometric Pressure	< 76.00 KPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Dual Pulse Strategy will exit per the following:			
					Engine Speed	> 2,400.00 RPM		
					OR			
					Accel Position	> 35.00 Pct		
					Engine Run Time	>= 45 seconds		
					Dual Pulse Strategy will also exit if the any of the "Additional Dual Pulse Enabling Criteria" is not satisfied:			
					"Additional Dual Pulse Enabling Criteria":			
					Green Engine Enrichment	Not Enabled		
					Misfire Converter Protection strategy	Not being requested		
					Engine Metal Overtemp strategy	Not being requested		
					Fuel control state	Open Loop		
					Output State Control	Not being requested for fuel		
					DOD Or DFCO	Not Active		
					Power Enrichment	Not Active		
					Dynamic Power Enrichment	Not Active		
					Piston Protection	Not Active		
					Hot Coolant Enrichment	Not Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Injector Flow Test	Not Active		
					General Enable			
					DTC's Not Set:	AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFA CrankSensor_FA FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA AnyCamPhaser_TFTKO ClutchPstnSnsr FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA FuelInjectorCircuit_TFTKO FHPR_b_FRP_SnsrCkt_FA FHPR_b_FRP_SnsrCkt_TFTKO FHPR_b_PumpCkt_FA FHPR_b_PumpCkt_TFTKO TransmissionEngagedState_FA EngineTorqueEstInaccurate FuelPumpRlyCktFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Assist Vacuum Too Low	P050F	Monitors for a brake booster vacuum leak	Brake booster vacuum drift ratio (EWMA) reaches the fail threshold (based on engine running condition) before the sample count threshold is reached, a failure is reported. Engine Running Fail Threshold based on prior diagnostic state (description below) Diagnostic failed prior loop Diagnostic passed prior loop Before the sample counts Engine Stopped Fail Threshold based on prior diagnostic state (description below) Diagnostic failed prior loop Diagnostic passed prior loop Before the sample counts	>= 0.60 >= 0.65 > 0.00 counts >= 0.55 >= 0.65 > 0.00 counts	Diagnostic is enabled and the following conditions are met for engine run conditions: No brake booster vacuum sensor faults active No brake pedal position sensor faults active Brake pedal travel is No mass air flow faults No manifold air pressure faults Mass air flow estimate Manifold air pressure Engine vacuum stability time has reached Difference between brake booster vacuum and manifold air pressure is OR Diagnostic is enabled for the following engine auto off conditions: No brake booster vacuum	Enabled < 8.00 percent - 5.00 percent offset >= 6.00 grams / second <= 20.00 kPa >= 0.70 seconds > 10.00 kPa Enabled	Performed every 100 msecond Minimum time to pass: Engine Running 0.00 second Engine Stopped 0.00 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					sensor faults active			
					No brake pedal position sensor faults active			
					Brake pedal travel is	< 8.00 percent - 5.00 percent offset Disabled		
					No engine movement detected			
					Engine is in AutoStop mode			
					OR			
					Diagnostic is enabled for the following key off conditions:			
					No brake booster vacuum sensor faults active			
					No brake pedal position sensor faults active			
					Brake pedal travel is	< 8.00 percent - 5.00 percent offset		
					No engine movement detected			
					Engine is in KeyStop mode			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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** If enabled: <u>To Fail when previously passing with the engine running:</u> Filtered Engine Oil Pressure below expected threshold OR Filtered Engine Oil Pressure above expected threshold <u>To pass when previously failing:</u> Filtered Engine Oil Pressure above low threshold plus an offset OR	Filtered Oil Pressure < **P0521_LowMinOilPresFail - Two Stage Oil Pump** OR Filtered Oil Pressure > (**P0521_P06DD_P06DE_OP_HiStatePressure** ***** 1.05 + 120.0 kPa) Filtered Oil Pressure > (10.0 kPa+ **P0521_LowMinOilPresFail - Two Stage Oil Pump**) OR	Two Stage Oil Pump is Present = TRUE 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 > 10,000 RPM for longer than 30.0 seconds) Filtered Engine Speed within range Modelled Oil Temperature within range No active DTC's	TRUE Enabled Test not report a fail state Yes ≥ 10.0 seconds ≥ 70.0 kPa FALSE 1,000 RPM ≤ Filtered Engine Speed ≤ 4,500 RPM 40.0 deg C ≤ Oil Temp ≤ 120.0 deg C Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA CrankSensor_FA	≥ 40 errors out of 50 samples. Performed every 100 msec ≥ 10 passes 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 Illum.
			Filtered Engine Oil Pressure below high threshold minus an offset	Filtered Oil Pressure < (**P0521_P06DD_P06DE_OP_HiStatePressure** * 1.05 + 120.0 kPa) - 10.0 kPa (Details on Supporting Tables Tab: **P0521_LowMinOilPresFail - Two Stage Oil Pump P0521_P06DD_P06DE_OP_HiStatePressure**)				
			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 ≥ 70.0 deg C > 10.0 seconds EngineModeNotRunTimer_FA EngOilTempFA EngOilPressureSensorCktFA CrankSensor_FA	≥ 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 Illum.
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	800 failures out of 1,000 samples Performed every 6.25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	800 failures out of 1,000 samples Performed every 6.25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning High Side Pressure Sensor (HSPS) Circuit Low Voltage	P0532	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too low	(AC High Side Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	< 3 percent	AC HSP Sensor Present Diagnostic Status	Yes Enabled	80 failures out of 100 samples Performed every 25 msec	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning High Side Pressure Sensor (HSPS) Circuit High Voltage	P0533	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too high	(AC High Side Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	> 98 percent	AC HSP Sensor Present Diagnostic Status	Yes Enabled	80 failures out of 100 samples Performed every 25 msec	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Booster Pressure Sensor Performance	P0556	Determines if the Brake Booster Vacuum Sensor is stuck or skewed within the normal operating range by comparing the engine vacuum to the brake booster vacuum when the engine is producing a large amount of vacuum	Engine vs brake booster vacuum sensor values are compared when % throttle < value for a time period. When throttle once again > calibrated value, min and max vacuum sensor values are normalized and subtracted from a 1st order lag filter value of 1. A properly operating vacuum sensor would have a normalized result of 1 or greater. If the normalized result is greater than 1 it is considered 1. The 1st order lag filter value would be 0 in a passing system.		Throttle Area (with idle included) for time period of Difference in Brake Booster Vacuum For time period of AND Vacuum Delta Diagnostic enabled/ disabled No active DTC's	<= 5.0 Percent for > 3.0 seconds > 0.3 kPa >= 0.2 Seconds >= 15.0 kPa Enabled Fault bundles: MAP_SensorFA TPS_FA BrakeBoosterSensorCktFA	Pass counter incremented when enable conditions are met, pass achieved when counter >= 7 Performed every 100 msec	Type B, 2 Trips
			1st order lag fail threshold	> 0.20				
			1st order lag re-pass threshold	< 0.5				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Booster Pressure Sensor Circuit Low Voltage	P0557	Determines if the Brake Booster Pressure Sensor circuit voltage is too low	(Brake Booster Pressure Sensor Voltage) ÷ 5 Volts *100	< 5.00 percent	Brake booster diagnostic enabled/disabled Brake booster pressure sensor present	Enabled Present	320 failures out of 400 samples 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 Illum.
Brake Booster Pressure Sensor Circuit High Voltage	P0558	Determines if the Brake Booster Pressure Sensor circuit voltage is too high	(Brake Booster Pressure Sensor Voltage) ÷ 5 Volts *100	> 95.00 percent	Brake booster diagnostic enabled/disabled Brake booster pressure sensor present	Enabled Present	2,000 failures out of 2,400 samples 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 Illum.
Cruise Control Mutil-Functon Switch Circuit	P0564	Detect when cruise control multi-function switch circuit (analog) voltage is in an invalid range	Cruise Control analog circuit voltage must be "between ranges" for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "between ranges" when the ratio is measured in the following ranges: 0.28 -0.31, 0.415-0.445, 0.585 - 0.615 0.78 - 0.81, 1.005 - 1.035	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 0.500 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control On Switch Circuit	P0565	Detects a failure of the cruise on/off switch in a continously applied state	Cruise Control On switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 20.00 seconds	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continously applied state	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	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continously applied state	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	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Cancel Switch Circuit	P056C	Detects a failure of the cruise cancel switch in a continously applied state	Cruise Control Cancel switch remains applied for greater than a calibratable period of time.	fail continously in the applied state for greater than 20.00 seconds	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Input Circuit	P0575	Determines if cruise switch state received from the BCM is valid.	If x of y rolling count / protection value faults occur, disable cruise for duration of fault	Message <> 2's complement of message Message rollling count<>previous message rolling count value plus one	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, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	Brake Pedal Position Sensor Circuit Range / 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 > 2.30 OR (for slow test) shift lever has been in park once this key cycle vehicle speed >= 8.00 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 >= 8.00 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 Illum.
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	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 Illum.
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	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 Illum.
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	11.00	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 Illum.
Cruise Control Multi-function Circuit Low Voltage	P0580	detects short to ground failure for cruise multi-function switch circuit	Cruise Control analog circuit voltage must be in an "Open Short To Ground" range for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "open short to ground when the ratio is measured in the following rangs: 0 - 0.185	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-function Circuit High Voltage	P0581	detects short to power failure for cruise multi-function switch circuit	Cruise Control analog circuit voltage must be in "Short To Power" range for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considered to be "short to power" when the ratio is measured in the following range: 1.005 - 1.035	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No SVS ,Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Performance	P058A	This DTC monitors for a battery module internal fault	Battery Module signals an internal fault via LIN bus VeVITR_e_IBS_InternalFault	= CeVITR_e_DiagFailed	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	= 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current Monitoring Performance	P058B	This DTC monitors for a battery module current fault	Battery Module signals an internal fault via LIN bus VeVITR_e_BatCurrRatDiag	= CeVITR_e_DiagFailed	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	= 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Monitoring Performance	P058C	This DTC monitors for a battery module temperature fault	Difference between Battery Module raw temperature values	> 10.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Temperature Data Available over LIN bus Internal Temperature Circuit Low Fault Active (P16DE) Internal Temperature	= 1 (1 indicates enabled) = 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 = zero = True = False	8 failed samples within 10 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Circuit High Fault Active (P16DF)	= False		
					Battery Module Temperature Too High Fault Active (P058E)	= False		
					Battery Module Temperature Too Low Fault Active (P058F)	= False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Voltage Monitoring Performance	P058D	This DTC monitors for a battery module voltage fault	Difference between 12V System Reference Voltage and IBS 12V Battery Voltage values	> 5.00 Volts	The diagnostic is enabled	= 1 (1 indicates enabled)	32 failed samples within 40 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips
					System Diagnostics Disabled	= False		
					Power Mode	Not equal off		
					12V System Reference Voltage	> 9.00 Volts		
					LIN Bus Off or Battery Module Communication Faults Active	= False		
					Outside Air Temperature	> -20.00 Celsius and < 50.00 Celsius		
					Outside Air Temperature Validity Bit	= True		
					IBS Voltage and Current Data Available over LIN bus	= True		
					Battery Monitor Module Circuit Low Voltage Fault Active (P16D4)	= False		
					Battery Monitor Module Circuit High Voltage Fault Active (P16D5)	= False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Too High	P058E	This DTC monitors for a battery module temperature too high fault	Battery Module raw temperature 2 value	> 120.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Measure Temperature Data Available over LIN bus	= 1 (1 indicates enabled) = 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 = zero = True	4 failed samples within 5 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Too Low	P058F	This DTC monitors for a battery module temperature too low fault	Battery Module raw temperature 2 value	< -43.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Measure Temperature Data Available over LIN bus	= 1 (1 indicates enabled) = 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 = zero = True	4 failed samples within 5 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	
			The Primary Processor's calculated checksum does not match the stored checksum value for a selected subset of the calibrations.	2 consecutive failures detected or 5 total failures detected.			Diagnostic runs continuously. Will report a detected fault within 200 ms.	
				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 Illum.
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 Illum.
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 Illum.
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 >	0.45588 s			When dual store updates occur.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Indicates that the primary processor detects an illegal write attempt to protected RAM. Number of illegal writes are >	0 counts			Diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 / 17 counts intermittent. 50 ms/count in the ECM main processor	
			2 fails in a row in the MAIN processor's ALU check			KePISD_b_ALU_TestEnbld == 1 Value of KePISD_b_ALU_TestEnbld is: 1.00 . (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			KePISD_b_ConfigRegTestEnbld == 1 Value of KePISD_b_ConfigRegTestEnbld is: 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		KeMEMD_b_StackLimitTestEnbl == 1 Value of KeMEMD_b_StackLimitTestEnbl is: 1.00 . . (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			Voltage deviation >	0.4950		KePISD_b_A2D_CnvrtrTestEnbld == 1 Value of KePISD_b_A2D_CnvrtrTestEnbld is: 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	3 (results in MIL), 5 (results in MIL and		KeMEMD_b_FlashECC_CktTestEnbl == 1 Value of	variable, depends on	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	remedial action)		KeMEMD_b_FlashECC_ CktTestEnbl is: 1 . (If 0, this test is disabled)	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)		KeMEMD_b_RAM_ECC_ CktTestEnbl == 1 Value of KeMEMD_b_RAM_ECC_ CktTestEnbl is: 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			KePISD_b_DMA_XferTest Enbld == 1 Value of KePISD_b_DMA_XferTest Enbld is: 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.		Table, f(Core, Loop Time). See supporting tables: **P0606_Program Sequence Watch Enable f(Core, Loop Time)** (If 0, this Loop Time 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:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							P0606_PSW Sequence Sample f(Loop Time) counts 50 ms/count in the ECM main processor	
			MAIN processor determines a seed has not changed within a specified time period within the 50ms task.	Previous seed value equals current seed value.		KePISD_b_SeedUpdKeyStorFltEnbl == 1 Value of KePISD_b_SeedUpdKeyStorFltEnbl is: 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 Illum.
Starter Relay Control Circuit Open (12VSS)	P0615	Controller specific output driver circuit diagnoses the Starter relay (12VSS) 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.	Starter control diag enable = TRUE Engine speed Run Crank voltage	1.00 0.00 RPM 11.00 volts	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 Illum.
Starter Relay Control Circuit Low Voltage (12VSS)	P0616	Controller specific output driver circuit diagnoses the Starter relay (12VSS) 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 Ohms impedance between signal and controller ground	Starter control diag enable = TRUE Engine speed Run Crank voltage	1.00 0.00 RPM 6.41 volts	8 failures out of 10 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 Illum.
Starter Relay Control Circuit High Voltage (12VSS)	P0617	Controller specific output driver circuit diagnoses the Starter relay 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 Ohms impedance between signal and controller power	Starter control diag enable = TRUE Engine speed Run Crank voltage	1.00 0.00 RPM 6.41 volts	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 Illum.
Fuel Pump Relay Control Circuit Open	P0627	Controller specific output driver circuit diagnoses the Feed Fuel Pump Relay 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 KOhms impedance between signal and controller ground.	Run/Crank Voltage Engine Speed	Voltage 11.00 volts 0 RPM	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0629 may also set (Fuel Pump Relay Control Short to Power)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit Low Voltage	P0628	Controller specific output driver circuit diagnoses the Feed Fuel Pump Relay 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 Ohms impedance between signal and controller ground	Run/Crank Voltage Engine Speed	Voltage 11.00 volts 0 RPM	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 Illum.
Fuel Pump Relay Control Circuit High Voltage	P0629	Controller specific output driver circuit diagnoses the Feed Fuel Pump Relay 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 Ohms impedance between signal and controller power	Run/Crank Voltage Engine Speed	Voltage 11.00 volts 0 RPM	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0627 may also set (Fuel Pump Relay Control Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	>= 8 or >= 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 Illum.
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 Illum.
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 Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Open	P0650	Detects an inoperative malfunction indicator lamp control low side driver circuit. This diagnostic reports the DTC when an open circuit is detected.	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	1 failures out of 1 samples 50 ms / sample	Type B, No MIL NO MIL Note: In certain controllers P263A may also set (MIL Control Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 = 0.03 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 Illum.
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 Illum.
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 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 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 Illum.
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 Ω 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 Illum.
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 Illum.
Cooling Fan 1 Relay Control Circuit Low Voltage (Output Driver Monitor)	P0691	Diagnoses the cooling fan 1 relay control low side driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage	Voltage ≥ 11.00 volts	50.00 failures out of 63.00 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P0480 may also set (Fan 1 Open Circuit).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Relay Control Circuit High Voltage (ODM)	P0692	Diagnoses the cooling fan 1 relay control low side driver circuit for circuit faults	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage	Voltage ≥ 11.00 volts	50.00 failures out of 63.00 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 Illum.
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 = 0.03 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 Illum.
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 = 0.03 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 Illum.
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 < 8,500 RPM ≥ 250 Revs ≥ 20 mg/cylinder and ≤ 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0200 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Two Stage Oil Pump Control Circuit Open	P06DA	Controller specific output driver circuit diagnoses the two stage 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 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Run/Crank Active Cranking State	Enabled ≥ 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 (Two Stage Oil Pump Control Circuit Short To Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Two Stage Oil Pump Control Circuit Short To Ground	P06DB	Controller specific output driver circuit diagnoses the two stage 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 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Run/Crank Active Cranking State	Enabled ≥ 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type A, 1 Trips Note: In certain controllers P06DA may also set (Two Stage Oil Pump Control Circuit Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Two Stage Oil Pump Control Circuit Short To Power	P06DC	Controller specific output driver circuit diagnoses the two stage 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	Diagnostic Status Powertrain Relay Voltage Run/Crank Active Cranking State	Enabled ≥ 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 Illum.
Two Stage Oil Pump Control Circuit Performance - Two Sided	P06DD	Diagnoses the two stage oil pump is stuck in the high pressure state. 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 ≥ (**P0521_P06DD_P06DE_OP_HiStatePressure** + **P06DD_P06DE_OP_LoStatePressure**) ÷ 2 (see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin P0521_P06DD_P06DE_OP_HiStatePressure P06DD_P06DE_OP_LoStatePressure**)	<u>Common Criteria:</u> Two Stage Oil Pump is Present Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 10,000 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 = Disabled	TRUE ≥ 10.0 seconds ≥ 70.0 kPa FALSE Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensor_FA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA OilPmpTFTKO Enabled : OilPmpTFTKO Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensor_FA EngOilTempFA Disabled	≥ 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 Illum.
					Oil Pump in Low State	> 1.5 seconds		
					Modelled Oil Temperature within range	50.0 deg C ≤ Oil Temp ≤ 110.0 deg C		
					Filtered Engine Speed within range	1,350 RPM ≤ Filtered Engine Speed ≤ 2,500 RPM		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds] ≤ 150 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**)		
					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 Illum.
					Expected Oil Pressure Delta within range	100.0 kPa < ABS [**P0521_P06DD_P06DE_OP_HiStatePressure** - **P06DD_P06DE_OP_LoStatePressure**] < 250.0 kPa		
					Passive Criteria:			
					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 ≤ 120.0 deg C		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.50 seconds] ≤ 1,000 RPM		
					Oil Pressure Delta within a range	Oil Pressure Delta < **P06DD_P06DE_OP_StateChangeMin** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin**)		
			Fast Pass Condition Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is	Oil Pressure delta = ABS [Filtered Oil Pressure at beginning of state change -	Common Criteria: Two Stage Oil Pump is Present Engine Running	 TRUE ≥ 10.0 seconds	0 errors out of 5 samples. Run once per trip or activiated by the Passive Test	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			above a threshold	filtered oil pressure after 1.5 seconds] Oil Pressure delta < **P06DD_P06DE_OP_StateChangeMin** AND Filtered Oil Pressure ≥ (**P0521_P06DD_P06DE_OP_HiStatePressure** - **P06DD_P06DE_OP_LoStatePressure**) ÷ 2 (see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin** **P0521_P06DD_P06DE_OP_HiStatePressure** **P06DD_P06DE_OP_LoStatePressure**)	Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 10,000 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: Active Criteria: One Sided Performance Test = Disabled Oil Pump in Low State Modelled Oil Temperature within range Filtered Engine Speed within range	≥ 70.0 kPa FALSE Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA OilPmpTFTKO CrankSensor_FA Enabled : OilPmpTFTKO Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensor_FA EngOilTempFA Disabled > 1.5 seconds 50.0 deg C ≤ Oil Temp ≤ 110.0 deg C 1,350 RPM ≤ Filtered Engine Speed ≤ 2,500		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						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] ≤ 150 RPM		
					Filtered Oil Pressure within range	Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinOilPressThresh**)		
					Expected Oil Pressure Delta within range	100.0 kPa < ABS [**P0521_P06DD_P06DE_OP_HiStatePressure** - **P06DD_P06DE_OP_LoStatePressure**] < 250.0 kPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Two Stage Oil Pump Control Circuit StuckOn - Two Sided	P06DE	Diagnoses the two stage oil pump is stuck in the low pressure state. 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 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 a passing state:</u> Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is below 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** (see P06DE details on Supporting Tables Tab) Filtered Oil Pressure ≤ **P0521_P06DD_P06DE_OP_HiStatePressu(re** - **P06DD_P06DE_OP_LoStatePressure** **) ÷ 2** (see P06DE details on Supporting Tables Tab)	<u>Common Criteria</u>: Two Stage Oil Pump is Present Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 10,000 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	 TRUE ≥ 10.0 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 Disabled	≥ 12 errors out of 15 samples. Run once per trip or activiated by the Passive Test	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Test = Disabled			
					Oil Pump in Low State	> 1.5 seconds		
					Modelled Oil Temperature within range	50.0 deg C ≤ Oil Temp ≤ 110.0 deg C		
					Filtered Engine Speed within range	1,350 RPM ≤ Filtered Engine Speed ≤ 2,500 RPM		
					Engine Torque within range	**P06DD_P06DE_MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **P06DD_P06DE_MaxEnableTorque_OP** (see P06DE details on Supporting Tables Tab)		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds] ≤ 150 RPM		
					Filtered Oil Pressure within range	Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab)		
					Expected Oil Pressure Delta within range	100.0 kPa < ABS [**P0521_P06DD_P06DE_OP_HiStatePressure** - **P06DD_P06DE_OP_LoStatePressure**] < 250.0 kPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Passive Criteria:			
					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 ≤ 120.0 deg C		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.50 seconds] ≤ 1,000 RPM		
					Oil Pressure Delta < **P06DD_P06DE_OP_StateChangeMin** (see P06DE details on Supporting Tables Tab)	TRUE		
			Fast Pass Condition		Common Criteria:		0 errors out of 5 samples. Run once per trip or activiated by the Passive Test	
			Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is below a threshold	Oil Pressure delta = ABS [Filtered Oil Pressure at beginning of state change - filtered oil pressure after 1.5 seconds]	Two Stage Oil Pump is Present	TRUE		
					Engine Running	≥ 10.0 seconds		
					Ambient Air Pressure	≥ 70.0 kPa		
				Oil Pressure delta <	Oil Aeration (= TRUE if engine speed	FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				P06DD_P06DE_OP_StateChangeMin (P06DD Performance Test Details on Supporting Tables Tab) Filtered Oil Pressure ≤ **P0521_P06DD_P06DE_OP_HiStatePressu (re** - **P06DD_P06DE_OP_LoStatePressure**) / 2 (P06DD Performance Test Details on Supporting Tables Tab)	> 10,000 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 : Active Criteria: One Sided Performance Test = Disabled Oil Pump in Low State Modelled Oil Temperature within range Filtered Engine Speed within range Engine Torque within range	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 Disabled > 1.5 seconds 50.0 deg C ≤ Oil Temp ≤ 110.0 deg C 1,350 RPM ≤ Filtered Engine Speed ≤ 2,500 RPM **P06DD_P06DE_MinEnableTorque_OP** ≤		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Indicated Requested Engine Torque ≤ **P06DD_P06DE_MaxEnableTorque_OP** (P06DD Performance Test Details on Supporting Tables Tab)		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds] ≤ 150 RPM		
					Filtered Oil Pressure within range	Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab)		
					Expected Oil Pressure Delta within range	100.0 kPa < ABS [**P0521_P06DD_P06DE_OP_HiStatePressure** - **P06DD_P06DE_OP_LoStatePressure**] < 250.0 kPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Control Module (TCM) Requested MIL Illumination	P0700	Monitors the TCM MIL request message to determine when the TCM has detected a MIL illuminating fault.	Transmission Control Module Emissions-Related DTC set and module is requesting MIL	Transmission Control Module Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBTCM is valid	Serial Communication 2's complement message - ($1C7/$1C9 for engine torque, $1CA/$1C6 for 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 > 280 Nm for engine torque based traction torque system, OR > 2,000 Nm for axle torque based traction torque system	Serial communication to EBTCM (U0108) Power Mode Engine Running Status of traction in GMLAN message ($4E9)	No loss of communication = Run = True = Traction Present	>= 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, No SVS Safety Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	>= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On	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 Illum.
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	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	>= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On	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 Illum.
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 Illum.
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	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	>= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On	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 Illum.
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	100 failures out of 125 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 Illum.
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	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	>= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	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 Illum.
Battery Monitor Module Temperature Erratic	P100C	This DTC monitors for an erratic Temperature signal via LIN bus from the Battery Monitor Module	Communication of the Temperature signal from the Battery Monitor Module has become erratic or is incorrect for out of total samples	>= 4 counts >= 5 counts	The diagnostic is enabled All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= 1 (1 indicates enabled) >= 3,000.00 seconds = 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 Illum.
Battery Monitor Internal Temperature Circuit Erratic	P100D	This DTC monitors for an erratic Temperature Circuit signal via LIN bus from the Battery Monitor Module	Communication of the Temperature Circuit signal from the Battery Monitor Module has become erratic or is incorrect for out of total samples	>= 4 counts >= 5 counts	The diagnostic is enabled All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= 1 (1 indicates enabled) >= 3,000.00 seconds = 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 Illum.
O2 Sensor Heater Supply Voltage Sense Circuit Range/ Performance	P103B	The P103B diagnostic determines if the heater supply circuit is rational by comparing the heater supply voltage to the run crank voltage and calculating the difference. The heater supply voltage input is connected to the O2 heater supply circuit inside the vehicle relay center. It is representative of the voltage supplied to the O2 heaters. The O2 heater voltage is used by the HWIO to calculate the O2 heater resistance on switching type O2 sensors (non-WRAF). With a fault set, the resistance calculation is performed with run crank voltage. The diagnostic failure counter is incremented if the voltage difference is greater than the threshold. This DTC is set based on the fail and sample counters.	The absolute value of Heater Supply Voltage delta from Run Crank voltage	> 2.00 volts	Powertrain relay in range (Relay in range is defined as relay voltage Run Crank signal active	= True > 11.00 volts) = True (Please see "**Run/Crank Active conditiions**" in Supporting Tables)	8 failures out of 10 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 Illum.
O2 Sensor Heater Supply Voltage Sense Circuit Low	P103C	The P103C diagnostic determines if the heater supply circuit is low by comparing the heater supply voltage to the threshold. The heater supply voltage input is connected to the O2 heater supply circuit inside the vehicle relay center. It is representative of the voltage supplied to the O2 heaters. The O2 heater voltage is used by the HWIO to calculate the O2 heater resistance on switching type O2 sensors (non-WRAF). With a fault set, the resistance calculation is performed with run crank voltage. The diagnostic failure counter is incremented if the heater supply voltage is less than the threshold. This DTC is set based on the fail and sample counters.	Heater Supply Voltage	< 2.00 volts	Powertrain relay in range (Relay in range is defined as relay voltage Run Crank signal active	= True > 11.00 volts) = True (Please see "**Run/Crank Active conditiions**" in Supporting Tables)	8 failures out of 10 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 Illum.
Cylinder 1 Injection Pulse Performance	P10A3	Diagnostic to determine if injection pulse total compensation for cylinder 1 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< **P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Injection Pulse Performance	P10A4	Diagnostic to determine if injection pulse total compensation for cylinder 1 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> **P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Injection Pulse Performance	P10A5	Diagnostic to determine if injection pulse total compensation for cylinder 2 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< **P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Injection Pulse Performance	P10A6	Diagnostic to determine if injection pulse total compensation for cylinder 2 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> **P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Injection Pulse Performance	P10A7	Diagnostic to determine if injection pulse total compensation for cylinder 3 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< **P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Injection Pulse Performance	P10A8	Diagnostic to determine if injection pulse total compensation for cylinder 3 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> **P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Injection Pulse Performance	P10A9	Diagnostic to determine if injection pulse total compensation for cylinder 4 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< **P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Injection Pulse Performance	P10AA	Diagnostic to determine if injection pulse total compensation for cylinder 4 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> **P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Inlet Airflow System Performance (single turbo)	P1101	Detects a performance failure in the Manifold Pressure (MAP) sensor, Turbocharger Boost Pressure 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 four 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	See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP -	> 20.0 grams/sec > 23.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa > 175 kPa*(g/s)	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 <= 6,100 RPM >= -7 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM**	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 Illum.
		the system, but no single failed sensor can uniquely be identified. In this case, the Inlet Airflow System Performance diagnostic will fail.	measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow	> 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow**	No Active DTCs: No Pending DTCs:	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault 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 Illum.
			AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure AND Mass Air Flow - Filtered Mass Air Flow	> a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 1.3 gm/sec < a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec		MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor Not Plausible	P111E	This DTC detects either a biased high or low ECT (Engine Coolant temperature) sensor. This is done by comparing the ECT sensor output to two other temperature sensor outputs after a soak condition.	**Sensor usage definitions:** **Sensor1 =** CeECTR_e_ECT_Snsr (Sensor1 is the temp sensor most impacted by the block heater (if equipped)) **Sensor2 =** CeECTR_e_OAT_Snsr **Sensor3 =** CeECTR_e_IAT_Snsr ================== A failure will be reported if any of the following occur: 1) Sensor1 power up absolute temp difference to Sensor2 and Sensor3 is (Sensor1 fast fail) . 2) Sensor1 power up temp is greater than Sensor2 and Sensor3 in this range: (and a block heater has not been detected) 3) Sensor1 power up temp is lower than Sensor2 and Sensor3 by this amount: 4) Sensor1 power up temp is ≥ Sensor2 and	≥ 50.0 ºC ≥ 15.8 and < 50.0 ºC ≤ 15.8 Deg ºC	No Active DTC's Engine Off Soak Time Propulsion Off Soak Time Non-volatile memory initization Test complete this trip Test aborted this trip Test disabled this trip Ambient LowFuelCondition Diag ================== Block Heater detection is **enabled** when either of the following occurs: 1) Sensor1 power up temp is greater than Sensor2 and Sensor3 in this range: 2) Cranking time ==================	VehicleSpeedSensor_FA IAT_SensorCircuitFA THMR_RCT_Sensor_Ckt_FA ECT_Sensor_Ckt_FA EngineModeNotRunTimerError EngineModeNotRunTimer_FA OAT_PtEstFiltFA OAT_PtEstRawFA PSAR_PropSysInactveCrs_FA DRER_DiagSystemDsbl > 25,200 seconds > 0 seconds = Not occurred = False = False = False ≥ -7 ºC = False ================== ≥ 15.8 ºC and < 50.0 ºC < 10.0 Seconds ==================	1 failure to set DTC 1 sec/ sample 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 Illum.
			Sensor3 by 15.8 ºC and the time spent cranking the engine without starting is ≥ 10.0 seconds with the LowFuelConditionDiag	= False	Block Heater is **detected** and diagnostic is aborted when 1) or 2) occurs. 1a) IAT monitoring is enabled after the following Vehicle drive constraints 1b) Drive time 1c) Vehicle speed 1d) Additional Vehicle drive time is provided to 1b when Vehicle speed is below 1c as follows: 1e) IAT drops from power up IAT 2a) ECT monitoring is enabled after engine start in the following engine run time window 2b) Sensor1 temp derivative during the test is: 2c) Consectutive samples of 2b) being true are: ================= Diagnostic is **aborted** when 3) or 4) occurs: 3) Engine run time with vehicle speed below 1b 4) Engine off time (i.e. auto stop) during Block heater detection	> 400 Seconds with > 14.9 MPH and 0.50 times the seconds with vehicle speed below 1b ≥ 5.0 ºC 5.0 <= seconds <= 30.0 < -0.10 ºC/sec ≥ 4 samples ================== ≥ 1,800 Seconds ≥ 180.0 Seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT SIDI High Pressure Rail Temperature Sensor Performance	P111F	This DTC Diagnoses Fuel Temperature sensors rationality by comparing Primary sensor (T1) vs. Secondary sensor (T2)	Fuel Temperature Error (Absolute delta between sensor1 and sensor2)	> 20.00 degC	Fuel Temperature Rationality Diagnostic Enabled	True	100.00 failures out of 125.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	Temperature sensors 1 out of range Low or High Fault Active (P0182, P0182) Temperature sensors 2 out of range Low or High (P0187, P0188) SENT Communication Fault Active (P16E4, P16E5) SENT Intenal Error Fault Active (P126E, P126F) Fuel Temperature Sensor SENT Message Error Fault Active (P128C, P128D)		
					No Fault Pending on	SENT Communication Fault Pending (P16E4, P16E5) Fuel Temperature Sensor SENT Message Error Fault Pending (P128C, P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	>= 8 counts >= 10 counts	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	>= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On	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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
Fuel Pump Driver Over Temperature	P1255	To detect if an internal fuel pump driver over-temperature condition exists under normal operating conditions	Fuel Pump Driver Circuit Board temperature (Fuel Pump Driver Overtemperature enumeration)	T>= 160 degC (Fuel Pump Power Module smart device reports Faulted, Not Faulted or Indeterminate)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c] FPPM Driver Status Alive Rolling Count Sample Faulted d] Diagnostic feedback received e] Run_Crank Ignition Switch Position Circuit VoltageSystem Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c] <> True d] == TRUE e] > 0.00 volts	0 failures / 0 samples 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 Illum.
SENT Fuel Rail Temperature Sensor 1 Internal Fault - Error Code	P126E	This DTC Diagnoses the SENT Fuel Temperature Sensor 1 internal failure	Fuel Temperature Sensor 1 SENT digital read value	>= 4,089.00			50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
					No Fault Active on	Enabled when a code clear is not active or not exiting device control SENT Communication Fault Active (P16E4, P16E5)		
					No Fault Pending on	Fuel Temperature Sensor SENT Message Error Fault Active (P128C) Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 2 Internal Fault - Error Code	P126F	This DTC Diagnoses the SENT Fuel Temperature Sensor 2 internal failure	Fuel Temperature Sensor 2 SENT digital read value	>= 4,089.00	No Fault Active on	Enabled when a code clear is not active or not exiting device control SENT Communication Fault Active (P16E4, P16E5)	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
					No Fault Pending on	Fuel Temperature Sensor SENT Message Error (P128D) Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Illum.
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	
					Not Fault Pending	P16E4 P16E5 P128F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	
					Not Fault Pending	P16E4 P16E5 P128F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure &Temperature Sensor Temperature 1 Message Incorrect	P128C	This DTC diagnoses the the communication errors on the temperature 1 serial data channel	Serial Message 1 Age	>= 0.04 ms	SENT signal Serial waveform diagnostics enable SENT power up delay No Fault Active	True >= 0.00 seconds P16E4 P16E5	114 failures out of 142 samples 6.25 ms per sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure & Temperature Sensor Temperature 2 Message Incorrect	P128D	This DTC diagnoses the the communication errors on the temperature 2 serial data channel	Serial Message 2 Age	>= 0.04 ms	SENT signal Serial waveform diagnostics enable SENT power up delay No Fault Active	True >= 0.00 seconds P16E4 P16E5	114 failures out of 142 samples 6.25 ms per sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 SENT HWIO 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) Message Age	= true > 1.94 ms	SENT signal Serial waveform diagnostics enable SENT power up delay No Fault Active on	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control P16E4 P16E5	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 Illum.
Fuel Pump Driver Module-Ignition Switch Run/ Start Position Circuit Low [FPPM applications only]	P129D	To detect if the Run/ Start position circuit voltage is short to low / open	FPPM Run_Crank Active status	<> ECM Run_Crank Active status	a) FPPM configuration KeFRPR_e_ChassisFuelPresSysType b) Diagnostic KeFRPR_b_FPPM_RunCrnkRatlEnbld c) FPPM Control Status Alive Rolling Count result d) Diagnostic feedback received e) System Voltage	a) == CeFRPR_e_ECM_FPPM_Sys b) == TRUE c) == Valid d) == TRUE e) >= 0.0 v	64 failures / 80 samples 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 Illum.
Fuel Pump Driver Control Module Enable Circuit Performance	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.	FPPM Fuel Control Enable Circuit Voltage State	<> Fuel Control Enable State (ECM)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Diagnostic System Disabled d) Run_Crank Ignition Sw Position Status Active Timer [expired] e) FPPM Control Data Rolling Count Faulted f) Diagnostic serial data received g) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) <> True d) >= 0.00 seconds e) <> True f) == TRUE g) > 0.00 volts	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 Illum.
Fuel Pump Control Status Signal Message Counter Incorrect [FPPM applications only]	P12A8	To detect if the control status message transmitted as serial data from the driver control module is valid. The "rolling count check" value is created by adding an appended hexadecimal calculation to each control command value. The corresponding "check" value is transmitted to the FPPM as well as the actual command. At the FPPM, the received command value is used to create an expected "rolling count" value using the same calculation method as the ECM. The expected "rolling count" value calculated at the receiving power module (smart device) is compared to the transmitted "rolling count" value. If these do not match, a fault condition is reported forward to the ECM where X/Y diagnostic counting is performed.	FPPM Control Status Alive Rolling Count	<> ECM Control Status Alive Rolling Count (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Diagnostic serial data received d) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) == TRUE d) > 0.00 Volts	0 failures / 0 samples 1 sample / 12.5 millisec	Type B, 2 Trips
			FPPM Power Consumption Alive Rolling Count	<> ECM Power Consumption Alive Rolling Count (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Diagnostic serial data received d) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) == TRUE d) > 0.00 Volts	0 failures / 0 samples 1 sample / 12.5 millisec	
			FPPM Driver Status Alive Rolling Count	<> ECM Driver Status Alive Rolling Count (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Diagnostic serial data received d) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) == TRUE d) > 0.00 Volts	0 failures / 0 samples 1 sample / 12.5 millisec	
			FPPM Hardware Status Alive Rolling Count	<> ECM Hardware Status Alive Rolling Count (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Diagnostic serial data received d) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) == TRUE d) > 0.00 Volts	0 failures / 0 samples 1 sample / 12.5 millisec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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?	Yes	50 Failures out of 63 Samples 6.25 msec rate	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 Illum.
Cold Start Emissions Reduction System Fault	P1400	Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range.	Average desired accumulated exhaust power - Average actual accumulated exhaust power (too much energy delivered to catalyst) Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst) (EWMA filtered) Average Power = output of **P1400_EngineSpeedResidual_Table** * output of **P1400_SparkResidual_Table** NOTE: Desired accumulated power would use the desired catalyst light off spark and desired engine speed and the actual accumuated power would use the final commanded spark and actual engine speed. Refer to the Supporting Tables for details	< -32.00 KJ/s (high RPM failure mode) > 29.40 KJ/s (low RPM failure mode)	To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following: Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following: Catalyst Temperature AND Engine Run Time OR Engine Run Time OR Barometric Pressure	 < 350.00 degC > -10.00 degC <= 66.00 degC >= 76.00 KPa >= 900.00 degC >= 45.00 seconds > **P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details. < 76.00 KPa	Runs once per trip when the cold start emission reduction strategy is active Frequency: 100ms Loop Test completes after 15 seconds of accumulated qualified data.	EWMA Based - Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Other Enable Criteria:			
					OBD Manufacturer Enable Counter	0		
					Vehicle Speed	< 1.24 MPH		
					Allow diagnostic to calculate residual in an off-idle state. If the value of the OffIdleEnable is equal to 1 then the "DriverOffAccelPedal" will not be checked. However, if the value of OffIdleEnable is 0 then driver must be off the accel pedal	0 (A value of 1 allows diagnostic to run and calculate the residual while off idle. A value of 0 requires calculation of the residual at idle)		
					A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. Therefore when the:			
					Pedal Close Delay Timer	> 5.00 seconds		
					the diagnostic will continue the calculation.			
					A change in gear will initiate a delay in the calculation of the average qualified residual value to			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					allow time for the actual engine speed and actual final commanded spark to achieve their desired values. Therefore, when the:			
					Gear Shift Delay Timer	> 2.00 seconds		
					the diagnostic will continue the calculation			
					For Manual Transmission vehicles:			
					Clutch Pedal Position	> 75.00 %		
					Clutch Pedal Position	< 12.00 %		
					The diagnostic will delay calculation of the residual value and potentially weight the residual calculation differently based on engine run time. This is to ensure the diagnostic is operating in idle speed control as well as during the peak catalyst light off period.			
					The time weighting factor must be :	> 0 These are scalar values that are a function of engine run time. Refer to		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P1400_ColdStartDiagnosticDelayBasedOnEngineRunTime and the cal axis, **P1400_ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis** in the "Supporting Tables" for details.		
					General Enable:			
					DTC's Not Set:			
						AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFP CrankSensor_FA FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA EngineMisfireDetected_FA ClutchPstnSnsr FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA 5VoltReferenceMAP_OOR_Flt TransmissionEngagedState_FA EngineTorqueEstInaccurate		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	>= 8 counts	All the following conditions are met for	>= 3,000.00 milliseconds	Executes in 25ms loop.	Type B, 2 Trips
					Power Mode	= Run		
					Powertrain Relay Voltage	>= 11.00 Volts		
			out of total samples	>= 10 counts	Run/Crank Ignition Voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	> 6.41 Volts	0.49 ms	Type B, 2 Trips
					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	< 0.25 percent		
					For a settling time period	> 4.00 seconds		
					Ignition voltage failure is false	P1682		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Adaptive Cruise Control Signal Circuit	P1553	Detects rolling count or protection value errors in Adaptive Cruise Control Axle Torque Command serial data signal	If x of y rolling count / protection value faults occur, disable adaptive cruise control for duration of fault		Adaptive Cruise Control Command Serial Data Error Diagnostic Enable	1.00	9 / 17 counts	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Switch State Undertermined	P155A	Detects when cruise switch state cannot be determined, such as low voltage conditions	cruise switch state is received as "undetermined" for greater than a calibratable time	fail continuously for greater than 3.0 seconds			fail continuously for greater than 3.0 seconds	Type C, No SVS, Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Signal Message Counter Incorrect	P155E	This DTC monitors for an error in communication with the DC/DC Converter Actuator Voltage Signal	Communication of the Alive Rolling Count or Protection Value from the DC/DC Converter over CAN bus is incorrect for	>= 8 counts	All the following conditions are met for	>= 3,000.00 milliseconds	Executes in 10ms loop.	Type B, 2 Trips
					Power Mode	= Run		
					Powertrain Relay Voltage	>= 11.00 Volts		
					Run/Crank Ignition Voltage	>= 11.00 Volts		
			out of total samples	>= 10 counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Performance Signal Message Counter Incorrect	P155F	This DTC monitors for an error in communication with the DC/DC Converter Internal Health Signal	Communication of the Alive Rolling Count or Protection Value from the DC/DC Converter over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	>= 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 Illum.
DC/DC Converter Ignition Switch Run/ Start Position Signal Message Counter Incorrect	P156D	This DTC monitors for an error in communication with the DC/DC Converter Run/ Crank Terminal Status Signal	Communication of the Alive Rolling Count or Protection Value from the DC/DC Converter over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	>= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	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 Illum.
DC/DC Converter Crank Control Signal Message Counter Incorrect	P156E	This DTC monitors for an error in communication with the DC/DC Converter Crank Control Terminal Signal	Communication of the Alive Rolling Count or Protection Value from the DC/DC Converter over CAN bus is incorrect for	>= 8 counts	All the following conditions are met for	>= 3,000.00 milliseconds	Executes in 10ms loop.	Type B, 2 Trips
					Power Mode	= Run		
					Powertrain Relay Voltage	>= 11.00 Volts		
					Run/Crank Ignition Voltage	>= 11.00 Volts		
			out of total samples	>= 10 counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Sensor Bus Relay Feedback Circuit High Voltage	P157A	This DTC checks that the Sensor Bus Relay output is not stuck high	The Sensor Bus Relay ouput is stuck high	>= KeSBRR_Cnt_SB_RlyStkHiFailThrsh within KeSBRR_Cnt_SB_RlyStkHiSmplThrsh samples	The Sensor Bus Relay output has been inactive	>= KeSBRR_t_SB_RelayCommandedOff		Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Calibration Incorrect	P158A	Type of cruise in Body Control Module does not match that in the Engine Control Module for 2.5 seconds	Type of cruise system in GMLAN $4E9 does not match with that in the Engine Control Module for a fix time.	2.5 seconds	DID $40 from BCM says cruise system is present (ECM recieves programmble information from Body Control Module) OR ECM will not receive Programmable information for Cruise from Body Control Module	True	fail continuously for greater than 2.5 seconds.	Type C, No SVS Emissions Neutral Diagnostics – Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Object Detection Control Module Torque Request Signal Message Counter Incorrect	P15F6	Detects rolling count or protection value errors in Collision Preparation System Axle Torque Command serial data signal	If x of y rolling count / protection value faults occur, disable collision preparation system for duration of fault		Front Object Detection Module Torque Request Serial Data Error Diagnostic Enable	1.00	4 / 10 counts	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Automatic Braking Engine Torque Request Signal Message Incorrect	P15F8	Detects rolling count or protection value errors Rear Virtual Bumper Axle Torque Command serial data signal	If x of y rolling count / protection value faults occur, disable rear virtual bumper or collision preparation system for duration of fault		Automatic Braking Engine Torque Request Serial Data Error Diagnostic Enable	1.00	4 / 10 counts	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Sensor Signal Message Counter Incorrect	P15FF	This DTC monitors for an internal error or error in communication with the Battery Monitor Signal	Communication of the Alive Rolling Count from the Battery Monitor Module over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for out of total samples	 >= 8 counts >= 10 counts	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	>= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Fastest periodic communication rate to Battery Monitor Module on LIN bus executes at 250ms.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	>= 11 Volts > 0.300 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 Illum.
					counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active and Barometric Pressure Inlet Air Temp Fuel Temp	 >= 70.0 KPA >= -10.0 degC -10 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	>= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On	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 Illum.
Ignition Voltage Correlation	P1682	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.	|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 Illum.
TPS SENT Comm Circuit Low (Gasoline applications ONLY)	P16A0	Detects a continuous or intermittent short low or open fault in the TPS SENT Communication Circuit by monitoring the voltage and failing the diagnostic when the voltage for the wave pulse is below state threshold as defined by SAE J2716 SENT Protocol. 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	0.5 V	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 Illum.
TPS SENT Comm Circuit High (Gasoline applications ONLY)	P16A1	Detects a continuous or intermittent short high fault in the TPS SENT Communication Circuit by monitoring the voltage and failing the diagnostic when the voltage for the wave pulse is above state threshold as defined by SAE J2716 SENT Protocol. This diagnostic only runs when battery voltage is high enough. Detects a High Circuit Fault in the TPS SENT Communication Circuit	Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol	4.1 V	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 Illum.
TPS SENT Comm Circuit Performance (Gasoline applications ONLY)	P16A2	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 above 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. Detects a Message Fault in the TPS SENT Communication Circuit	Message Pulse < Message Pulse > or Message Age Limit >= or Signal CRC fails	0.125977 ms 0.209991 ms 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 Illum.
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 Illum.
Engine Controls Ignition Relay Feedback Circuit 2 Low Voltage - (GEN III Controllers ONLY)	P16AF	Detects low voltage in the engine controls ignition relay feedback circuit 2. This diagnostic reports the DTC when low voltage is present. Monitoring occurs when run crank voltage is above a calibrated value.	Engine controls ignition relay feedback circuit 2 low voltage	Relay voltage <= 5.00	Powertrain relay low diag enable Powertrain relay voltage Run Crank voltage Powertrain relay state	= 1.00 >= 11.00 > 9.00 = ON	5 failures out of 6 samples 1000 ms / sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Illum.
Battery Monitor Module Circuit Low Voltage	P16D4	This DTC monitors for a battery module low voltage circuit fault	Battery Module signals a low voltage circuit fault via LIN bus VeVITR_U_12VBattVolt	< 3.00 Volts for 200 fail counts out of 250 sample counts	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	= 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Circuit High Voltage	P16D5	This DTC monitors for a battery module high voltage circuit fault	Battery Module signals a high voltage circuit fault via LIN bus VeVITR_U_12VBattVolt	> 26.00 Volts for 200 fail counts out of 250 sample counts	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	= 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current Low	P16D6	This DTC monitors for a battery module current low fault	Battery Module signals a current low fault via LIN bus VeVITR_I_12VBattCurrRaw	< -1400 Amps for 200 fail counts out of 250 sample counts	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	= 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Module Monitor Timer Performance	P16DC	This DTC monitors for a battery module timer performance fault	Battery Module shall fail when either of the following criteria are met. Case 1: Wake Up Test A: LIN Bus Off Timer / 1,800.00 seconds or B: (LIN Bus Off Timer + 1,800.00 seconds) / 1,800.00 seconds or C: (LIN Bus Off Timer - 1,800.00 seconds) / 1,800.00 seconds Case 2: Sequential Test Sequential Test is enabled	If the calculated wakeup value is smaller than 24.00 counts, then the smaller value will be outputed. If the calculated wakeup value is greater than 24.00 counts, then the calibration itself is outputed. If any outputs above are not not equal to the IBS maximum down counter counts, the diagnostic fails. This portion of the diagnostic is not used. = 0 (1 indicates enabled)	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit Historical Temperature Data Trigger Request Module Off Timer Fault Active Run Crank Low Timer Error Code Clear Request IBS Measure Temperaure Data Available	= 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True = 1 (initializes to 0 then transitions to 1 once data is available- NEED TO SEE POSITIVE RISING EDGE) = False = False = False (latched when set True) = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					TPTKO OR TFTKO	= False (when KeVITD_b_TimerPerf_DFIRDisable = 0) Calibration is set to 0		
					IBS Down Counter Value	Not equal to 25.00		
					Spurious Reset	= False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current High	P16DD	This DTC monitors for a battery module current high fault	Battery Module signals a current high fault via LIN bus VeVITR_I_12VBattCurrRaw	> +1400 Amps for 200 fail counts out of 250 sample counts	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	= 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Internal Temperature Circuit Low	P16DE	This DTC monitors for a battery module internal temperature circuit low fault	Battery Module raw temperature 1 value	> 120.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Measure Temperature Data Available over LIN bus	= 1 (1 indicates enabled) = 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 or zero = zero = True	4 failed samples within 5 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Internal Temperature Circuit High	P16DF	This DTC monitors for a battery module internal temperature circuit high fault	Battery Module raw temperature 1 value	< -43.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Measure Temperature Data Available over LIN bus	= 1 (1 indicates enabled) = 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 = zero = True	4 failed samples within 5 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Random Access Memory (RAM) Error	P16E1	This DTC monitors for a battery module RAM memory fault	Battery Module signals a RAM memory fault via LIN bus VeVITR_e_IBS_IntRAM_ Fault	= CeVITR_e_DiagFailed	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	= 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Read Only Memory (ROM) Error	P16E2	This DTC monitors for a battery module ROM memory fault	Battery Module signals a ROM memory fault via LIN bus VeVITR_e_IBS_IntROM_ Fault	= CeVITR_e_DiagFailed	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	= 1 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Data Incompatible	P16E3	This DTC monitors for a battery module data incompatible fault	Battery Module data received over LIN bus is incompatible. (Measured by any of the following) Historical Test Absolute value of IBS battery capacity C20 data (IBS Return Nominal C20 - 70.00 Ah) or IBS Returns a battery type that is not equal to or Absolute value of (IBS Return Battery Calibration#1 U40@25 C - 12.08 V) or Absolute value of (IBS Return Battery Calibration#1 U80@25 C - 12.64 V) Continuous Test	Upon IBS wakeup, if any of the below Historical Test conditions are satisfied, the diagnostic fails. > 5.00 Ah CeBSER_e_IBS_Cfg BatAGM > 0.50 Volts > 0.50 Volts If any of the below conditions are satisfied	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit IBS Configuration Data Available over LIN bus Historical Test Only Host Controller MEC Counter	= 0 (1 indicates enabled) = 0 (1 indicates enabled) = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True = True <= 0	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute value of IBS battery capacity C20 data (IBS Return Nominal C20 - 70.00 Ah) or IBS Returns a battery type that is not equal to or Absolute value of (IBS Return Battery Calibration#1 U40@25 C - 12.08 V) or Absolute value of (IBS Return Battery Calibration#1 U80@25 C - 12.64 V)	for 16.00 fail counts out of 20.00 sample counts, the diagnostic fails. > 5.00 Ah CeBSER_e_IBS_Cfg BatAGM > 0.50 Volts > 0.50 Volts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	<= 35 = 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 Illum.
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	<= 35 = 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 Illum.
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	-72.34 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	72.34 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	72.34 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 Illum.
			Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range	84.32 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	15.00 degrees		Engine speed >0rpm	Up/down timer 425 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 Illum.
				Nm				
			One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold	80.00 mg		Engine speed > 680 rpm	Up/down timer 443 ms continuous, 0.5 down time multipier	
			Difference between Unmanaged Spark and PACS Spark is greater than threshold	15.00 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 Illum.
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 1,039.55 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 1,039.55 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	72.34 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 Illum.
			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 < 7,800.00 or 7,900.00 rpm (hysteresis pair)	Up/down timer 143 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 / 20 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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 Illum.
			Cylinders active greater than commanded	2 cylinders		Engine run flag = TRUE > 2.00 s Number of cylinder events since engine run > 24 No fuel injector faults active	Up/down timer 443 ms continuous, 0.5 down time multipier	
			Transfer case neutral request from four wheel drive logic does not match with operating conditions	N/A	Ignition State	Accessory, run or crank Transfer case range valid and not over-ridden FWD Apps only	7.00 / 10.00 counts; 25.0msec/count	
			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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							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)** + 72.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Predicted Request Without Motor is greater than its redundant calculation plus threshold	71.34 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	71.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							down time multipier	
			Positive Torque Offset is greater than its redundant calculation plus threshold OR Positive Torque Offset is less than its redundant calculation minus threshold	72.34 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	72.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, down time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							multipier 0.5	
			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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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	
			Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta	15.00 degrees	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			1. Cylinder Torque Offset exceeds step size threshold OR	1. 72.34 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 Illum.
			2. Sum of Cylinder Torque Offset exceeds sum threshold	2. 72.34 Nm				
			Engine Capacity Minimum Immediate Without Motor is greater than its dual store plus threshold	72.34 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 Illum.
			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	72.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than 0rpm	Up/down timer 143 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 Illum.
			Engine Speed Lores Intake Firing timing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than 0rpm	Up/down timer 143 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)** + 72.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			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)** +	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 Illum.
				72.34 Nm				
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	1,039.55 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	1,039.55 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded Immediate Request is greater than its redundant calculation plus threshold	1,039.55 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR Commanded Immediate Request is less than its redundant calculation minus threshold				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 Request and Cruise Axle Torque Request exceeds threshold	38.98 Nm		Cruise has been engaged for more than 4.00 seconds	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 Illum.
			Desired engine torque request greater than redundant calculation plus threshold	71.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Engine min capacity above threshold	72.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 120 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 0rpm	Up/down timer 425 ms continuous, 0.5 down time multipier	
			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 164 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 Illum.
			1. Absolute difference of redundant calculated engine speed above threshold	500 RPM		Engine speed greater than 0 RPM	Up/down timer 143 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 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 Illum.
			Engine oil temperature and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 385 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	
			Throttle desired torque above desired torque plus threshold	72.34 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 Illum.
			Desired filtered throttle torque exceeds the threshold plus the higher of desired throttle torque or modeled throttle torque	72.34 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 36.17 Nm Low Threshold -36.17 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Torque feedback integral term magnitude or rate of change is out of allowable range or its dual store	High Threshold 67.82 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 Illum.
			copy do not match	Low Threshold -72.34 Nm Rate of change threshold 4.52 Nm/loop			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 72.34 Nm Low Threshold - 72.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of torque desired throttle area and	High Threshold	Ignition State	Accessory, run or crank	Up/down timer 475	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			its redundant calculation is out of bounds given by threshold range	3.59 % Low Threshold - 3.59 %			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 0.0000562 Low Threshold - 0.0000562	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 72.34 Nm Low Threshold - 72.34 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 Illum.
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 72.34 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 40.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 72.34 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 Illum.
				Low Threshold - 72.34 Nm				
			Generator friction torque is out of bounds given by threshold range	High Threshold 72.34 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 torque and its redundant calculation greater than threshold	72.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Filtered Torque error magnitude or its increase rate of change is out of	High Threshold 72.34		Engine speed >0rpm MAF, MAP and Baro DTCs are false	Up/down timer 475 ms continuous,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			allowable range or its dual store copy do not match	Nm Low Threshold -72.34 Nm Rate of change threshold 4.52 Nm/loop			0.5 down time multipier	
			Torque error compensation is out of bounds given by threshold range	High Threshold 72.34 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Delta Torque Baro compensation is out of bounds given by threshold	High Threshold 2.84	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			range	Nm Low Threshold -0.79 Nm			0.5 down time multipier	
			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. 71.34 Nm 2. N/A 3. 71.34 Nm 4. 71.34 Nm	3. & 4.: Ignition State	1. & 2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 72.34 Nm 3. & 4.: 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 Illum.
			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 event is greater than threshold	Table, f(Desired Engine Torque). See supporting tables: **P16F3_Delta MAP Threshold f(Desired Engine Torque)**		Engine speed >0rpm	Up/down timer 143 ms continuous, 0.5 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	1,039.55 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 Illum.
			Driver Predicted Request is less than its redundant calculation minus threshold					
			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)** + 72.34 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Predicted	1 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 Illum.
			Axle Torque and its dual store do not match				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 changing and one loop after React command Engine speed >0rpm	Up/down timer 1,988 ms continuous, 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	15.00 degrees	Ignition State	Accessory, run or crank	Up/down timer 143 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 Illum.
			Difference of commanded spark advance and adjusted delivered is out of bounds given by threshold range	15.00 degrees		Engine speed >0rpm	Up/down timer 425 ms continuous, 0.5 down time multipier	
			Absolute difference between Estimated Engine Torque and its dual store are above a threshold	72.34 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	72.34 Nm		Engine speed >0rpm	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 Illum.
			Difference of desired spark advance for managed torque and its redundant calculation is out of bounds given by threshold range	15.00 degrees		Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 72.34 Nm	Up/down timer 443 ms continuous, 0.5 down time multipier	
			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	72 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		Engine speed > 680 rpm	Up/down timer 443 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 Illum.
				ms				
			Rate limited cruise axle torque request and its dual store do not match within a threshold	38.98 Nm	Ignition State	Accessory, run or crank	Up/down timer 163 ms continuous, 0.5 down time multipier	
			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	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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal					
			Commanded axle torque is greater than its redundant calculation by threshold	1,039.55 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded axle torque is less than its redundant calculation by threshold	1,559.32 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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AC friction torque is greater than commanded by AC control software	40.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			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	15.00 degrees		Engine speed >0rpm	Up/down timer 143 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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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 and its redundant cacluation is greater than a threshold	15 mm2			Up/down timer 164 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	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Surge Solenoid Circuit Open	P171A	Controller specific transmission surge accumulator control circuit diagnoses the transmission surge accumulator and wiring for an open circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission surge accumulator control circuit impedance	≥ 200 K Ω impedance between signal and controller ground	battery voltage AND battery voltage update battery enable time run/crank voltage diagnostic monitor enable	≥ 7.00 volts ≤ 32.00 volts ≥ 5.00 volts = 1 Boolean	fail time ≥ 0.188 seconds out of sample time ≥ 0.250 seconds 25 milliseconds update rate battery enable time ≥ 5.00 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Surge Solenoid Circuit Low	P171B	Controller specific transmission surge accumulator control circuit diagnoses the transmission surge accumulator and wiring for a ground short circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission surge accumulator control circuit impedance	≤ 0.5 Ω impedance between signal and controller ground			fail time ≥ 0.188 seconds out of sample time ≥ 0.250 seconds 25 milliseconds update rate	Type B, 2 Trips
					battery voltage AND battery voltage update battery enable time	≥ 7.00 volts ≤ 32.00 volts	battery enable time ≥ 5.00 seconds	
					run/crank voltage	≥ 5.00 volts		
					diagnostic monitor enable	= 1 Boolean		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Surge Solenoid Circuit High	P171C	Controller specific transmission surge accumulator control circuit diagnoses the transmission surge accumulator and wiring for a short to power circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission surge accumulator control circuit impedance	≤ 0.5 Ω impedance between signal and controller voltage source	battery voltage AND battery voltage update battery enable time run/crank voltage diagnostic monitor enable	≥ 7.00 volts ≤ 32.00 volts ≥ 5.00 volts = 1 Boolean	fail time ≥ 0.069 seconds out of sample time ≥ 0.081 seconds 25 milliseconds update rate battery enable time ≥ 5.00 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Surge Accumulator System Performance	P171D	Detects when the surge accumulator system, used to provide transmission hydraulic pressure, is not capable of supplying adequate hydraulic pressure during an engine auto-start. The transmission holding clutch pressures are commanded to meet the engine crank shaft torque output, to prevent clutch slip to those holding clutches, during the engine auto-start. The diagnostic monitors transmission input shaft speed during the auto-start event as the primary malfunction criteria. Measured input shaft speed that is excessive is an indication the holding clutches are slipping due to inadequate hydraulic pressure, as a result of a failed surge accumulator system.	Transmission turbine speed is greater than predicted turbine speed during autostart event, update initial fail count	≥ **P171D predicted turbine speed error** Refer to "Transmission Supporting Tables" for details	PRNDL state defaulted Transmission shift lever position Propulsion system active Ignition voltage Ignition voltage Transmission fluid temp Transmission fluid temp Hybrid state AutoStop duration min During autostop Engine speed was **************************** If above conditions are met then the following must occur: Turbine speed Engine speed Hydraulic pressure delay time If above conditions are met then increment time-out timer. Time-out timer Note: The initial fail	= False = Forward range A = True > 9.00 volts < 31.99 volts > 0.00 °C < 110.00 °C = Engine off ≥ 1.200 seconds < 5.0 RPM ≥ 80.0 RPM ≥ 450.0 RPM ≥ **P171D hydraulic pressure delay** Refer to "Transmission Supporting Tables" for details ≤ 0.38 seconds	≥ 12 counts (initial fail count) Frequency =12.5ms Once the above counts are achieved then increment the final fail counter once. The final fail counter can only increment once per autostart event ≥ 3 counts (final fail counter) If above counter is greater than threshold then report DTC failed. Frequency = 12.5ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					counter must achieve it's fail threshold in less than the time-out time.			
					*****************************			
					If vehicle is launched then:			
					Transmission gear ratio	= 4.5600 1st gear ratio = 2.9700 2nd gear ratio = 2.0700 3rd gear ratio = 1.6800 4th gear ratio = 1.2700 5th gear ratio = 1.0000 6th gear ratio		
					Trans 1st gear ratio high	≤ 1.120 times 1st gear ratio		
					Trans 1st gear ratio low	≥ 0.880 times 1st gear ratio		
					Trans gear ratio not 1st gear high	≤ 1.070 times gear ratio		
					Trans gear ratio not 1st gear low	≥ 0.930 times gear ratio		
					Valid transmission gear ratio achieved time	≥ 0.500 seconds		
					OR			
					If vehicle is not launched but autostart occurs then:			
					Turbine speed	≤ 5.00 RPM		
					Turbine speed less then above threshold for	≥ 0.500 seconds		
					Note: During an autostart event the lack of hydraulic pressure will result in momentary clutch slip in			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					the C1234 clutch. After the clutch slip event, the main transmission pump and clutch will gain capacity, clutch slip will go to zero. If the vehicle is launching (moving) then a valid transmission ratio can be achieved. Or if the brake is continually applied and an autostart occurs naturally, then no ratio can be measured. In this case turbine speed will return to near zero rpm. ******************************			
					DTCs not fault active	CrankSensor_FA Transmission Output Shaft Angular Velocity Validity Transmission Turbine Angular Velocity Validity Transmission Oil Temperature Validity P171A P171B P171C U0101 P182E P1915		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Ω impedance between signal and controller ground	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 Illum.
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	System supply 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 Illum.
Exhaust Camshaft Actuator Solenoid Circuit Low – Bank 1	P2090	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 Ω impedance between signal and controller ground	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 Illum.
Exhaust Camshaft Actuator Solenoid Circuit High – Bank 1	P2091	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	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	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 Illum.
Post Catalyst Fuel Trim System Low Limit Bank 1 (Too Rich)	P2096	Determines if the post catalyst O2 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 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 O2 voltage is too rich, the post catalyst O2 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 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 >= 18 % 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 <= 14 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	<= -99.0 % <= -50.0 % If the P2096 is actively failing then the Average Integral Offset must be > -99.0 % and the Average Total Offset must be > -50.0 % for the diagnostic to report a pass.	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 O2 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 Condition	 Yes Yes Yes Yes Yes >= 70 kPa >= 0.0 g/s <= 10,000.0 >= 10 kPa <= 255 >= -20 deg. C <= 150 >= -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, Green Cat System condition is considered valid until the	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 Illum.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst O2 sensor that is within its optimal operating range (neither rich nor lean).				accumulated air flow is greater than 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is above 18 grams/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 Bank1 O2S_Bank_1_Sensor_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						O2S_Bank_1_Sensor_2_ FA		
					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	10,000,000,272,564,200 10,000,000,272,564,200 300 300 300		
					(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 Illum.
Post Catalyst Fuel Trim System High Limit Bank 1 (Too Lean)	P2097	Determines if the post catalyst O2 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 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 O2 voltage is too lean, the post catalyst O2 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 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 >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 14 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	>= 99.0 % >= 50.0 % If the P2097 is actively failing then the Average Integral Offset must be < 99.0 % and the Average Total Offset must be < 50.0 % 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 Illum.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst O2 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 Illum.
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 ignition voltage is high enough and there is not an ignition votage 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 3) Throttle control exceeds the reduced power limit. This is determined if the throttle position is greater and a threshold and the powertrain relay voltage is high enough and reduced power is active.	Difference between measured throttle position and modeled throttle position > OR Difference between modeled throttle position and measured throttle position >	10.00 percent 10.00 percent	Run/Crank voltage TPS minimum learn is not active and Throttle is being Controlled AND (Engine Running or Ignition Voltage) OR Ignition Voltage Ignition voltage failure is false (P1682)	> 6.41 Volts > 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	Powertrain Relay voltage TPS minimum learn active	> 6.41 Volts = 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 Illum.
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 Illum.
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 Illum.
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 Illum.
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 Illum.
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 Illum.
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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 >= 1 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 Illum.
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 Illum.
Intake Air Temperature Sensor 1 / 2 Correlation	P2199	Detects when the Intake Air Temperature (IAT) sensor and IAT2 sensor values do not correlate with each other. These two temperature sensors are both in the induction system, although they do have different sensor time constants and different positional relationships with components that produce heat. If these two temperature values differ by a large enough amount, the Intake Air Temperature 1 / 2 Correlation Diagnostic will fail. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	ABS (IAT - IAT2)	> 55.0 deg C	Powertrain Relay Voltage for a time 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 Illum.
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 a Bank 1. Detection is based on a the pre catalyst oxygen sensor voltage. The pre catalyst O2 voltage is used to generate a variance metric that represents the statistical variation of the O2 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	Filtered Ratio > The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table **P219A Variance Threshold Bank1 Table**) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table (see Supporting Table **P219A Normalizer Bank1 Table**). This quotient is then multiplied by a quality factor calibration from a 17 x 17 table (see Supporting Table **P219A Quality Factor Bank1 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.	0.36 If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.25 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing when the Filtered Ratio remains near the initial failure threshold of 0.36 .	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 Air Per Cylinder (APC) APC delta during short term sample period	no lower than 10.0 Volts for more than 0.2 seconds > 10.0 percent AND no fuel level sensor fault > -20 deg. C (or OBD Coolant Enable Criteria = TRUE) > 0.0 seconds No 1,700 to 4,279 RPM < 250 RPM 0 to 1,000 g/s < 5 g/s < 0.20 g/s 190 to 519 mg/cylinder < 100 mg/cylinder	Minimum of 1 test per trip, up to 4 tests per trip during RSR or FIR. The front O2 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, 13.44 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 Illum.
		P219A Variance Threshold Bank1 Table) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table (see Supporting Table **P219A Normalizer Bank1 Table**). This quotient is then multiplied by a quality factor calibration from a 17 x 17 table (see Supporting Table **P219A Quality Factor Bank1 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			Filtered APC delta between samples Note: first order lag filter coefficient applied to APC = 0.250 Spark Advance Throttle Area (percent of max) Intake Cam Phaser Angle Exhaust Cam Phaser Angle Quality Factor (QF) QF calibrations are located in a 17x17 lookup table versus engine speed and load (see Supporting Table **P219A Quality Factor Bank1 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:	< 9.99 percent 5 to 55 degrees 0 to 200 percent 0 to 25 degrees 0 to 25 degrees >= 0.99 >= 0.0 seconds (Please see "**Closed Loop Enable Clarification**" and "**Long Term FT Enable Criteria**" in Supporting Tables)	made within 5 minutes of operation. For RSR or FIR, 8 tests must complete before the diagnostic can report.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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.			Device Control AIR pump CASE learn EGR EVAP Engine Over Speed Protection Idle speed control PTO Injector base pulse width O2 learned htr resistance Rapid Step Response (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:	Not active Not on Not active Not intrusive Not intrusive Not Active Normal Not Active Above min pulse limit = Valid (the O2 heater resistance has learned since NVM reset) >= 0.11 >= 0.45 0.00 0.00 EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						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 Illum.
Barometric Pressure (BARO) Sensor Performance (single turbo)	P2227	Detects a performance failure in the Barometric Pressure (BARO) sensor, such as when a BARO 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 BARO sensor value is checked to see if it is within the normal expected atmospheric pressure range. If it is not, then the BARO performance diagnostic will fail. If the BARO sensor value is within the normal expected atmospheric range, then Manifold Pressure (MAP), Turbocharger Boost Pressure and BARO are compared to see if their values are similar. If the MAP and Turbocharger Boost Pressure sensor values are similar, but the BARO value is not similar, then a BARO performance diagnostic will fail. When the engine is	**Engine Running:** Difference between Baro Pressure reading and Estimated Baro when distance since last Estimated Baro update OR Difference between Baro Pressure reading and Estimated Baro when distance since last Estimated Baro update	> 15.0 kPa <= 1.06 miles > 20.0 kPa > 1.06 miles	No Active DTCs:	AmbPresSnsrCktFA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA TC_BoostPresSnsrFA	320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips
			Engine Not Rotating: Barometric Pressure OR Barometric Pressure OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure)	< 50.0 kPa > 115.0 kPa > 10.0 kPa <= 10.0 kPa > 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 10.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		running, there is an estimate of barometric pressure that is determined with the Turbocharger Boost Pressure sensor, engine air flow and engine speed. If the BARO value from the sensor is not similar to this barometric pressure estimate, then the BARO performance diagnostic will fail.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit Low (boosted applications, Gen III)	P2228	Detects a continuous short to ground in the Barometric Pressure (BARO) signal circuit by monitoring the BARO sensor output voltage and failing the diagnostic when the BARO voltage is too low. The BARO sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO Voltage	< 39.3 % of 5 Volt Range (This is equal to 50.0 kPa)			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 Illum.
Barometric Pressure (BARO) Sensor Circuit High (boosted applications, Gen III)	P2229	Detects a continuous short to power or open circuit in the Barometric Pressure (BARO) signal circuit by monitoring the BARO sensor output voltage and failing the diagnostic when the BARO voltage is too high. The BARO sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO Voltage	> 90.0 % of 5 Volt Range (This is equal to 115.0 kPa)			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 Illum.
Barometric Pressure (BARO) Sensor Circuit Intermittent	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 12.5 milliseconds previous)	> 100 kPa 80 consecutive BARO readings			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 Illum.
Turbo/Super Charger Bypass Valve - Mechanical Turbocharge r with wastegate. Not supercharge r with mechanical compressor	P2261	This DTC indicates the compressor recirculation valve being stuck closed. This diagnostic is active at coast down let off conditions, where an airflow pulsation criteria is used as basis of this diagnostic.	When measuring time accumulated air mass flow derivate boost pressure is high pass filtered with filter frequency ***************************** A failure is detected when Acc. Filtered Air Mass Flow or Acc.Der.Filtered boost pressure	< 0.80 Second, = 10.00 Hz ************************* > 30.00 g/s > 500.00 kPa/s	Diagnostic enabled ***************************** Engine speed ***************************** Bypass valve commanded open duty cycle For at least ***************************** Pressure ratio over the compressor relative limit Condition keep true for x seconds extra ***************************** Negative transient -> TRUE Relative boost and Pressure derivate Hysteresis negative transient -> FALSE Relative boost or Pressure derivate ***************************** No Active DTCs:	True ***************************** >= 1,200 rpm ***************************** > 6.00 % >= 0.20 s ***************************** > refer to **P00C4 P2261: Compressor Surge Line** in Supporting Tables 1.50 s ***************************** TRUE >= 20.00 kPa <= -250.00 kPa/s < 3.00 kPa > 50.00 kPa/s ***************************** BSTR_b_TurboBypassCktFA BSTR_b_BoostSnsrFA MAF_SensorFA	8 Failed tests out of 10 tests 25ms/ sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Lean Bank 1 Sensor 2	P2270	The P2270 diagnostic is the first in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for secondary O2 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 O2 sensor does not achieve the required rich voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test	< 760 mvolts > 55 grams	No Active DTC's B1S2 DTC's 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, 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 DTC's") = 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 Illum.
						is above 18.0 grams/sec.		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Pedal position	≤ 3.0 %		
					Engine Airflow	2.0 ≤ gps ≤ 20.0		
					Closed loop integral	0.85 ≤ C/L Int ≤ 1.08		
					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	≥ 30.0 sec		
					Predicted Catalyst temp	550 ≤ ºC ≤ 910		
					Fuel State	= DFCO possible		
					=================	==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for at least 0.0 seconds, and then check the following			
					Engine Speed to initially enable test	1,150 ≤ RPM ≤ 3,500		
					Engine Speed range to keep test enabled (after initially enabled)	1,100 ≤ RPM ≤ 3,650		
					Vehicle Speed to initially enable test	40.4 ≤ MPH ≤ 77.7		
					Vehicle Speed range to keep test enabled (after initially enabled)	36.0 ≤ MPH ≤ 80.8		
					=================			
					All of the above met for at least 2.0 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	0.96 ≤ EQR ≤ 1.08		
					Crankshaft Torque	< 110.0 Nm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	The P2271 diagnostic is the fourth in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for secondary O2 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 O2 sensor does not achieve the required lean voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test	> 100 mvolts > 25.0 grams	No Active DTC's B1S2 DTC's 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, P013B, P013E, P013F or P2270 > 10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = 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 Illum.
						is above 18.0 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 Illum.
O2 Sensor Signal Stuck Lean Bank 2 Sensor 2	P2272	The P2272 diagnostic is the first in a sequence of six intrusive secondary O2 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for secondary O2 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 O2 sensor does not achieve the required rich voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test	< 760 mvolts > 55 grams.	No Active DTC's B2S2 DTC's 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, 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 DTC's") = 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 X, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						is above 18.0 grams/sec.		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Pedal position	≤ 3.0 %		
					Engine Airflow	2.0 ≤ gps ≤ 20.0		
					Closed loop integral	0.85 ≤ C/L Int ≤ 1.08		
					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	>= 30.0 sec		
					Predicted Catalyst temp	550 ≤ ºC ≤ 910		
					Fuel State	= DFCO possible		
					=================	==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for at least 0.0 seconds, and then check the following			
					Engine Speed to initially enable test	1,150 ≤ RPM ≤ 3,500		
					Engine Speed range to keep test enabled (after initially enabled)	1,100 ≤ RPM ≤ 3,650		
					Vehicle Speed to initially enable test	40.4 ≤ MPH ≤ 77.7		
					Vehicle Speed range to keep test enabled (after initially enabled)	36.0 ≤ MPH ≤ 80.8		
					================== All of the above met for at least 2.0 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	0.96 ≤ EQR ≤ 1.08		
					Crankshaft Torque	< 110.0 Nm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	> 0.300 MPa		
					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) 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 Illum.
					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 >= -10.0 degC -10 <=Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	True	Negative Pressure Error - 10.00 second failures out of 12.50 second samples	Type A, 1 Trips
					Battery Voltage	>= 11 Volts		
					Low Side Fuel Pressure	> 0.300 MPa		
					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 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 Illum.
					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 Barometric Pressure Inlet Air Temp Fuel Temp	 >= 70.0 KPA >= -10.0 DegC -10 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Ω impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	$\leq$ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	$\leq$ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	 $\leq$ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	$\leq$ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	$\leq$ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 > 350 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 >= 3 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 Illum.
Engine Hood Switch Performance	P257D	This DTC monitors the hood switch rationality	Hood Switch position is in an invalid position. Type of Switch: CeHSWR_e_Enumerated With an enumerated type switch the hood switch reading is invalid in these ranges With a discrete type switch the hood switch reading is invalid when With a percentage type switch the hood switch reading is invalid in these ranges With a resistance type switch the hood switch reading is invalid in these ranges	1281 Ohms to 1404 Ohms Hood Switch 1 and Hood Switch 2 are in the same state (States not equal is proper function) 71.50 % to 67.80 % or 45.70 % to 43.40 % or 17.20 % to 14.60 % 6,775.00 Ohms to 2,350.00 Ohms or 2,280.00 Ohms to 750.00 Ohms or 720.00 Ohms to 300.00 Ohms	The diagnostic is enabled Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable	= 1 (1 indicates enabled) = 1 (1 indicates Run/ Crank active enabled)	80 failed samples within 100 total samples Diagnostic runs in the 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 Illum.
Engine Hood Switch Short to Ground / Low Voltage	P257E	This DTC monitors the hood switch for a short to ground or low voltage condition	Hood Switch position reading is outside an expected bounds for Type of Switch: CeHSWR_e_Enumerated With an enumerated type switch the bound is hood switch reading With a discrete type switch the bounds are With a percentage type switch the bound is hood switch reading With a resistance type switch the bound is hood switch reading	<= 325 Ohms Hood Switch 1 and Hood Switch 2 are in the same state (States not equal is proper function) <= 14.60 % <= 300.00 Ohms	The diagnostic is enabled Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable	= 1 (1 indicates enabled) = 1 (1 indicates Run/ Crank active enabled)	80 failed samples within 100 total samples Diagnostic runs in the 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 Illum.
Engine Hood Switch Short to Voltage / High Voltage	P257F	This DTC monitors the hood switch for a short to voltage or high voltage condition	Hood Switch position reading is outside an expected bounds for Type of Switch: CeHSWR_e_Enumerated With an enumerated type switch the bound is hood switch reading With a discrete type switch the bounds are With a percentage type switch the bound is hood switch reading With a resistance type switch the bound is hood switch reading	 >= 3620 Ohms Hood Switch 1 and Hood Switch 2 are in the same state (States not equal is proper function) >= 71.50 % >= 6,775.00 Ohms	The diagnostic is enabled Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable	= 1 (1 indicates enabled) = 1 (1 indicates Run/ Crank active enabled)	80 failed samples within 100 total samples Diagnostic runs in the 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 Illum.
Crankshaft Position Signal Output Circuit Low	P2618	Controller specific output driver circuit diagnoses the crankshaft position 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 short to ground failure.	Short to ground: <= 0.5 Ohms impedance between signal and controller ground Open Circuit: >= 200 K Ohms impedance between signal and controller ground	Powertrain Relay Voltage Engine is not cranking Crankshaft Position Output is commanded high	>= 11.0 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type C, No SVS Note: In certain controllers P2617 may also set (Crankshaft Position Signal Output Circuit / Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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: 4 failures out of 20 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 Illum.
Fuel Pump "A" Low Flow / Performance	P2635	This DTC detects degradation in the performance of the electronically regulated fuel system	Filtered fuel rail pressure error	<= Low Threshold [Supporting Table] **P2635 Threshold Low** OR >= High Threshold [Supporting Table] **P2635 Threshold High**	a] Fuel Pres Sensor Circuit Low Fault Active (DTC P018C) b] Fuel Pres Sensor Circuit High Fault Active (DTC P018D) c] Fuel Pres Sensor Perf Fault Active (DTC P018B) d] Fuel Pump Circuit Low Fault Active (DTC P0231) e] Fuel Pump Circuit High Fault Active (DTC P0232) f] Fuel Pump Circuit Open Fault Active (DTC P023F) g] Reference Voltage Fault Status (DTC P0641) h] Fuel Pump Driver Control Module Overtemperature Fault Active (DTC P1255) j] Barometric Pressure Signal Valid (PPEI $4C1) k] Engine run time l] Emissions Fuel Level Low (PPEI $3FB) m] Fuel Pump Control Enabled	a] <> TRUE b] <> TRUE c] <> TRUE d] <> TRUE e] <> TRUE f] <> TRUE g] <> Active This Key h] <> TRUE j] == TRUE (for absolute fuel pressure sensor) k] >= 30 sec l] <> TRUE m] == 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 Illum.
					n] Fuel Pump Control state p] System Voltage q] Fuel flow rate r] Fuel Pressure Control System	n] == Normal p] 11V< System V <32V q1] > 0.047 gram/sec AND q2] <= Max allowed fuel flow rate [Supporting Table] **P2635 Max Fuel Flow** r1] Not responding to overperformance due to pressure buildup during Deceleration Fuel Cut Off OR r2] Not responding to a decreasing desired fuel pres commnad		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Low	P263A	Detects an inoperative malfunction indicator lamp control circuit. This diagnostic reports the DTC when a short to ground is detected.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between output and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	1 failures out of 1 samples 50 ms / sample	Type B, No MIL NO MIL Note: In certain controllers P0650 may also set (MIL Control Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) High	P263B	Detects an inoperative malfunction indicator lamp control circuit. This diagnostic reports the DTC when a short to power is detected.	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between output and controller power	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	4 failures out of 5 samples 50 ms / sample	Type B, No MIL NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Starter Relay Drive Pinion Circuit Open (12VSS)	P26E4	Controller specific output driver circuit diagnoses the Tandem Starter Pinion Relay 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 KOhms impedance between signal and controller ground.	Starter relay pinion diag enable Engine speed Run Crank voltage	= 1.00 0.00 RPM 11.00 volts	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 Illum.
Starter Relay Drive Pinion Circuit Low Voltage (12VSS)	P26E5	Controller specific output driver circuit diagnoses the Tandem Starter Pinion Relay 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 Ohms impedance between signal and controller ground	Starter control diag enable Engine speed Run Crank voltage	= 1.00 0.00 RPM 6.41 volts	8 failures out of 10 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 Illum.
Starter Relay Drive Pinion Circuit High Voltage (12VSS)	P26E6	Controller specific output driver circuit diagnoses the Tandem Starter Pinion Relay 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 Ohms impedance between signal and controller power	Starter control diag enable Engine speed Run Crank voltage	= 1.00 0.00 RPM 11.00 volts	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 Illum.
Cylinder 1 Injection Pulse Performance	P2B00	Diagnostic to determine if any of the commanded injection pulses for cylinder 1 was not delivered due to the injector pintle/ armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Injection Pulse Performance	P2B01	Diagnostic to determine if any of the commanded injection pulses for cylinder 2 was not delivered due to the injector pintle/ armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Injection Pulse Performance	P2B02	Diagnostic to determine if any of the commanded injection pulses for cylinder 3 was not delivered due to the injector pintle/ armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Injection Pulse Performance	P2B03	Diagnostic to determine if any of the commanded injection pulses for cylinder 4 was not delivered due to the injector pintle/ armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	100.00 failures out of 200.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Secondary C ircuit Performance [FTZM Brushed Motor Fuel Pump applications only]	P2BB3	The FPDCM periodically monitors fuel pump duty cycle control error. The diagnostic detects whether the pump output duty cycle [measured] value differs too much compared to the received [commanded] Fuel Pump Control Duty Cycle.	Fuel Pump Duty Cycle Command [Measured]	<> Fuel Pump Duty Cycle Command [Received]	a) Ignition Switch Run_Crank Position Circuit Voltage b) Diagnostic enabled c) CAN serial data available [$0CB] d) CAN serial data faulted status [$0D9] e) Fuel pump control circuit faults [P0231, P0232, P023F] f) No fuel pump driver over-temperature fault [P1255] g) Sensor Bus Relay On h) Duty Cycle diagnostic synchronization delay time [expiration]	a) > 11.00 volts b) == True c) == True d) <> True e) <> True f) <> True g) == True h) > 100 milliseconds	12.5 millisec / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module SIDI High Pressure Pump min/ max authority During Catalyst Warm Up	P2C1E	This DTC determines when the high pressure pump control has reached to its max or min authority during Cataylst Warm up	High Pressure Fuel Pump Delivery Angle OR High Pressure Fuel Pump Delivery Angle	>= 92 ° <= 0 °	Catalyst Warm Up High Pressure Pump Performance Diagnostic Enable	True	Windup High/ Low 10.00 seconds failures out of 12.50 Seconds samples	Type A, 1 Trips
					Battery Voltage	>= 11 Volts		
					Low Side Fuel Pressure	> 0.300 MPa		
						Enabled when a code clear is not active or not exiting device control Engine is not cranking		
					Barometric Pressure	>= 70.0 KPA		
					Inlet Air Temp	>= -10.0 degC		
					Fuel Temp	-10 <= Temp degC <= 132		
					Catalyst Warm up enabled (See Definition in Supporting Material below)	= True		
					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) andCam or			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 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 Illum.
SIDI High Pressure Pump Performance During Catalyst Warm Up	P2C1F	This DTC determines if the high pressure pump is not able to maintain target pressure Catalyst Warm Up. 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)	Catalyst Warm Up High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Catalyst Warm up enabled (See Definition in Supporting Material below) 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) 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	True >= 11 Volts > 0.300 MPa = True Enabled when a code clear is not active or not exiting device control Engine is not cranking	Positive 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 Illum.
					Device control 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 Barometric Pressure Inlet Air Temp Fuel Temp	>= 70.0 KPA >= -10.0 degC -10 <=Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump Performance During Catalyst Warm Up	P2C20	This DTC determines if the high pressure pump is delivering high pressure that desired pressure Catalyst Warm Up. 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)	Catalyst Warm Up High Pressure Pump Performance Diagnostic Enable	True	Negative Pressure Error - 10.00 second failures out of 12.50 second samples	Type A, 1 Trips
					Battery Voltage	>= 11 Volts		
					Low Side Fuel Pressure	> 0.300 MPa		
					Catalyst Warm up enabled (See Definition in Supporting Material below)	= True		
						Enabled when a code clear is not active or not exiting device control Engine is not cranking		
					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			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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			
					Barometric Pressure	>= 70.0 KPA		
					Inlet Air Temp	>= -10.0 DegC		
					Fuel Temp	-10 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Sensor Circuit 1 Low Voltage	P3051	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 1 for short to ground faults.	DC/DC Converter Actuator Voltage Raw Value 1	< 1 Volt	Diagnostic enabled Run/Crank or Accessory Battery Voltage	TRUE TRUE >= 5.00 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Sensor Circuit 2 Low Voltage	P3052	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 2 for short to ground faults.	DC/DC Converter Actuator Voltage Raw Value 2	< 1 Volt	Diagnostic enabled Run/Crank or Accessory Battery Voltage	TRUE TRUE >= 5.00 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Sensor Circuit 1 High Voltage	P3053	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 1 for short to battery faults.	DC/DC Converter Actuator Voltage Raw Value 1	> 28 Volt	Diagnostic enabled Run/Crank or Accessory Battery Voltage	TRUE TRUE >= 5.00 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Sensor Circuit 2 High Voltage	P3054	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 2 for short to battery faults.	DC/DC Converter Actuator Voltage Raw Value 2	> 28 Volt	Diagnostic enabled Run/Crank or Accessory Battery Voltage	TRUE TRUE >= 5.00 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage 1 Performance	P3055	Detects DC/DC Converter Actuator Voltage 1 Performance issues	Bypass Mode: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 1 and ECM Run/Crank	> 1 Volt	Diagnostic enabled Run/Crank or Accessory Engine running OR Engine stopped Battery Voltage	TRUE TRUE for > 160 loops in 6.25 ms loop for > 160 loops in 6.25 ms loop >= 5.00 Volts	640 failed samples out of 800 samples in a 6.25 ms loop	Type B, 2 Trips
			Stabilize Mode- Auto-Cranking: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 1 and ECM Run/Crank	> 1 Volt	Diagnostic enabled Run/Crank or Accessory Engine auto-cranking Battery Voltage	TRUE TRUE for > 0 loops in 6.25 ms loop >= 5.00 Volts	16 failed samples out of 32 samples in a 6.25 ms loop	
			Stablize Mode-Auto-Cranking Events: Number of failed auto-cranking events exceeds threshold	> 2 failed auto-cranking events	Diagnostic enabled Run/Crank or Accessory Engine auto-cranking	TRUE TRUE has occurred	2 failed auto-crank events out of 3 consecutive auto-crank events	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage 2 Performance	P3056	Detects DC/DC Converter Actuator Voltage 2 Performance issues	Bypass Mode: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 2 and ECM Run/Crank	> 1 Volt	Diagnostic enabled Run/Crank or Accessory Engine running OR Engine stopped Battery Voltage	TRUE TRUE for > 160 loops in 6.25 ms loop for > 160 loops in 6.25 ms loop >= 5.00 Volts	640 failed samples out of 800 samples in a 6.25 ms loop	Type B, 2 Trips
			Stabilize Mode- Auto-Cranking: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 2 and ECM Run/Crank	> 1 Volt	Diagnostic enabled Run/Crank or Accessory Engine auto-cranking Battery Voltage	TRUE TRUE for > 0 loops in 6.25 ms loop >= 5.00 Volts	16 failed samples out of 32 samples in a 6.25 ms loop	
			Stablize Mode-Auto-Cranking Events: Number of failed auto-cranking events exceeds threshold	> 2 failed auto-cranking events	Diagnostic enabled Run/Crank or Accessory Engine auto-cranking	TRUE TRUE has occurred	2 failed auto-crank events out of 3 consecutive auto-crank events	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Ignition Switch Run/ Start Position Ciruit High Voltage	P305B	Diagnoses the DC/DC Converter Ignition Switch Run/Start Position circuit for circuit high faults	DC/DC Converter Ignition Switch Run/Start Position	<> ECM Ignition Switch Run/Start Position	Diagnostic enabled Run/Crank Accessory Battery Voltage	TRUE FALSE TRUE >= 5.00 Volts	320 failed samples out of 400 samples in a 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Ignition Switch Run/ Start Position Ciruit Low Voltage	P305C	Diagnoses the DC/DC Converter Switch Run/ Start Position circuit for circuit low faults	DC/DC Converter Ignition Switch Run/Start Position	<> ECM Ignition Switch Run/Start Position	Diagnostic enabled Run/Crank Accessory Battery Voltage	TRUE TRUE TRUE >= 5.00 Volts	640 failed samples out of 800 samples in a 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Crank Control Circuit High Voltage	P305D	Diagnoses the DC/DC Converter Crank Control Circuit for circuit high faults	DC/DC Converter Crank Control	<> ECM Crank Control	Diagnostic enabled Run/Crank ECM Crank Control Battery Voltage	TRUE TRUE FALSE >= 5.00 Volts	640 failed samples out of 800 samples in a 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Crank Control Circuit Low Voltage	P305E	Diagnoses the DC/DC Converter Crank Control Circuit for circuit low faults	DC/DC Converter Crank Control	<> ECM Crank Control	Diagnostic enabled	TRUE	24 failed samples out of 32 samples in a 6.25 ms loop	Type A, 1 Trips
					Run/Crank or Accessory	TRUE		
					ECM Crank Control	TRUE		
					Battery Voltage	>= 5.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector Circuit Range/ Performance	P30D4	Diagnostic to determine if any of the voltage feedback measured from the analog to digital converter on any cylinder is rational (total engine based). The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit.	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltage	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	25.00 Second Fail count out of 100.00 seconds Samples Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			feedback converted to Injector closing time	**P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Closing Time** (See supporting table)				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication on Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures exceeds	5 counts (equivalent to 0.06 seconds)	General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					U0073	Not Active on Current Key Cycle		
			before the sample time of is reached	0.81 seconds	Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Run/Crank Ignition voltage	> 6.41 Volts		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					KeCMGD_b_OffKeyCycleDiagEnbl	= 0.00 (1 indicates enabled)		
					Ignition Accessory Line and	= Active		
					Battery Voltage	> 11.00 Volts		
					CAN hardware is bus OFF for	> 162.5000 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus B Off	U0074	This DTC monitors for a BUS B off condition	Bus off failures exceeds	5 counts (equivalent to 0.06 seconds)	General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					U0074	Not Active on Current Key Cycle		
			before the sample time of is reached	0.81 seconds	Normal CAN transmission on Bus B	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Run/Crank Ignition voltage	> 6.41 Volts		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					KeCMGD_b_OffKeyCycleDiagEnbl	= 0.00 (1 indicates enabled)		
					Ignition Accessory Line and	= Active		
					Battery Voltage	> 11.00 Volts		
					CAN hardware is bus OFF for	> 162.5000 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 B, 2 Trips
					U0073	Not Active on Current Key Cycle		
			Message $0BD	≥ 10,000.00 milliseconds	Normal CAN transmission on Bus A	Enabled		
			Message $0C7	≥ 10,000.00 milliseconds	Device Control	Not Active		
			Message $0F9	≥ 10,000.00 milliseconds	High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
			Message $189	≥ 10,000.00 milliseconds	Run/Crank Ignition voltage	> 6.41 Volts		
			Message $199	≥ 10,000.00 milliseconds				
					Power Mode	= run		
			Message $19D	≥ 10,000.00 milliseconds				
					Off Cycle Enable Criteria:			
			Message $1AF	≥ 10,000.00 milliseconds	KeCMGD_b_OffKeyCycleDiagEnbl	= 0.00 (1 indicates enabled)		
			Message $1F5	≥ 10,000.00 milliseconds		= Active		
			Message $4C9	≥ 10,000.00 milliseconds	Ignition Accessory Line and Battery Voltage	> 11.00 Volts		
					U0101	Not Active on Current Key Cycle		
					TCM	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Battery Monitor Module	U01B0	This DTC monitors for a loss of communication with the Battery Monitor Module on LIN bus	Message is not received from controller for ECM has lost communication over the LIN bus with Battery Monitor Module for		LIN Slave DTC is enabled	1.00 (1 indicates enabled)	Between 100ms and 175ms due to rate of LIN communication to Battery Monitor Module.	Type B, 2 Trips
					IBS is present	True		
					Slave NAD matches with reported NAD	True		
			LIN Message 18_C02	>= 1,250.00 milliseconds	Slave is present in the Deployment as per MSCL	True		
			LIN Message 19_C02	>= 1,250.00 milliseconds				
			LIN Message 16_C02	>= 1,250.00 milliseconds				
			LIN Message 1E_C02	>= 2,500.00 milliseconds				
			LIN Message 1A_C02	>= 5,000.00 milliseconds				
			LIN Message 1C_C02	>= 5,000.00 milliseconds				
			LIN Message 17_C02	>= 625.00 milliseconds				
			LIN Message 15_C02	>= 625.00 milliseconds				
			LIN Message 1D_C02	>= 1,250.00 milliseconds				
			LIN Message 1B_C02	>= 5,000.00 milliseconds				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Control Module LIN Bus 1	U1345	Detects that LIN serial data communication has been lost with the LIN Bus	Bus Status	= Off	Controller On Ignition	> 3,000 ms = Run/Crank OR = Accessory	1.0 second	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Fuel Pump Driver Control Module	U18A2	This DTC monitors for a loss of communication with the Fuel Pump Driver Control Module on Bus B	Message is not received from controller for Message $0D5 Message $0D7	 ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCMGD_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage U18A2 Fuel Pump Driver Control Module	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0.00 (1 indicates enabled) =Active > 11.00 Volts Not Active on Current Key Cycle is present on the bus	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 Illum.
Lost Communication With DC/DC Converter Control Module on Bus B	U18A7	This DTC monitors for a loss of communication with the DC/DC Converter Control Module on Bus B	Message is not received from controller for Message $0A0 Message $1D2	≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCMGD_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage U18A7 DC/DC Converter Control Module	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0.00 (1 indicates enabled) = Active > 11.00 Volts Not Active on Current Key Cycle is present on the bus	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 Illum.
Hybrid Powertrain Control Module (HPC) Requested MIL Illumination	P0AC4	Monitors the HPC MIL request message to determine when the HPC has detected a MIL illuminating fault.	HPC Module Emissions-Related DTC set and module is requesting MIL	HPC Module Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Control Torque Request Circuit	P15F2	Determines if torque request from the HCP is valid. This is done using a rolling count / protection fault for commanded engine torque.	1. Serial Communication 2's complement not equal for message $181 for Strong Hybrid or Mild Hybrid Applications OR 2. Serial Communication rolling count value shall be + 1 from previous $181 message for Strong Hybrid or Mild Hybrid Applications	Message <> 2's complement of Engine Torque Signal and if Mild Hybrid: Message <> 2's complement of Motor Torque Signal OR Message rolling count value <> previous message rolling count value plus one	Secondary High Speed Bus is Present and No Serial communication loss to HCP (U1817) Run Crank Active Ingintion Voltage > Threshold No Serial communication loss to HCP (U1817) Hybrid Type = Mild, SS or Strong	No loss of communication >= 0.40 Sec > 6.41 = Mild	1. >= 10 Protect errors out of 16 samples OR 2. >= 10 Rolling count errors out of 16 samples Pass diagnostic if samples >= 16 Performed every received message	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Driver Motor Torque Delivered Circuit	P15F4	Determines if torque archieved from BCP is valid	1. Serial Communication 2's complement not equal for message $0BF for Mild Hybrid Applications OR 2. Serial Communication rolling count value shall be + 1 from previous $0BF message for Mild Hybrid Applications	Message <> 2's complement of Motor Torque Signal OR Message rolling count value <> previous message rolling count value plus one	Secondary High Speed Bus is Present and No Serial communication loss to BCP (U1817) Run Crank Active Low Voltage not Present	No loss of Communication >= 0.50 > 6.41	1. >= 10 Protect errors out of 16 samples OR 2. >= 10 Rolling count errors out of 16 samples Executes in a 12.5ms loop	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Control Speed Request Circuit Signal Message Counter Incorrect	P15F9	This DTC monitors for an error in communication with the Torque Request signal in $281	Communication of the Alive Rolling Count or Protection Value in the Torque Request signal over CAN bus is incorrect for out of total samples	>= 10.00 counts >= 16.00 counts	Run/Crank active Runk/Crank ignition low voltage Low voltage due to crank	>= 0.50 Seconds = False = False	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 Illum.
Brake Pedal Position Sensor Signal Message Counter Incorrect	P15FB	Detects rolling count or protection value errors in Chassis Brake Pedal Position Emissions Related serial data signal	If x of y rolling count / protection value faults occur, default brake pedal positiion to zero for duration of fault		Chassis Brake Pedal Position Emissions Related Serial Data Error Diagnostic Enable	1.00	9.00 / 17.00 counts	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Shift Pending	P185F	Detects an error in the ECM trasnfer case shift pending command value realative to the ECM transfer case command	trasnfer case shift pending AND transfer case commnd state OR trasnfer case shift pending AND transfer case commnd state OR trasnfer case shift pending AND transfer case commnd state OR trasnfer case shift pending AND transfer case commnd state	= shift out of 4wd high = 4wd low = shift out of 4wd high = 4wd neutral = shift out of 4wd low = 4wd high = shift out of 4wd neutral = 4wd low			>= 1 counts (one count per 25 milliseconds)	Type B, 2 Trips
					engine mode run	TRUE		
					run/crank voltage	>= 9.00 volts		
					P2771 four wheel drive low circuit, fault fault active	FALSE		
					transfer case shift pending monitor delay time	>= 5.00		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Powertrain Control Module (HPC) 2 Requested MIL Illumination	P1E00	Monitors the HPC 2 MIL request message to determine when the HPC has detected a MIL illuminating fault.	HPC 2 Module Emissions-Related DTC set and module is requesting MIL	HPC 2 Module Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Speed Sensor Output (TCSS)	P2160	No activity in the TCSS Signal circuit	TCSS Raw Speed	≤ 25 RPM			≥ 4.50 seconds	Type B, 2 Trips
					engine torque high (transmission PARK or NEUTRAL) AND	>= 8,191.75 Nm		
					engine torque low (transmission PARK or NEUTRAL) once engine torque high met	> 8,191.75 Nm		
					engine torque high (transmission not PARK and not NEUTRAL) AND	>= 80.00 Nm		
					engine torque low (transmission not PARK and not NEUTRAL) once engine torque high met	> 35.00 Nm		
					driver accelerator pedal position high (transmission PARK or NEUTRAL) AND	>= 100.00 %		
					driver accelerator pedal position low (transmission PARK or NEUTRAL) once driver accelerator pedal position high met	> 8.00 %		
					accelerator pedal position high (transmission not PARK and not NEUTRAL) AND	>= 5.00 %		
					driver accelerator pedal position low (transmission not PARK and not NEUTRAL) once driver accelerator pedal position high met	> 3.00 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					PTO	not active		
					engine torqure inaccurate	FALSE		
					engine speed inaccurate	FALSE		
					transmission output speed inaccurate	FALSE		
					transmission range AND transmission range previous loop (12.5 msec) AND (	< NEUTRAL (PARK OR REVERSE) < NEUTRAL (PARK OR REVERSE)		
					transmission range change REVERSE calibration enabled OR	= 0		
					transmission range change NEUTRAL calibration enabled) AND transmission range NOT transmission range previous loop (12.5 msec) RUN range change timer, range change timer	= 0	>= **P2160 range change delay time** seconds	
					igntion run crank voltage AND	> 5.00 volts		
					igntion run crank voltage AND	>= 9.00 volts		
					igntion run crank voltage	<= 32.00 volts		
					engine speed	>= 300 RPM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					transmission output speed P2160 enabled calibration P2160 OR P2160	>= 181 RPM = 1 not fault active not test fail this key on		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Speed Sensor Output (TCSS)	P2161	TCSS Circuit Signal Intermittent	TCSS delta fail count	>= 5 counts				Type B, 2 Trips
					loop to loop TCSS delta speed AND loop to loop TCSS delta speed remains	>= 650 RPM > 250 RPM	>= 3.00 seconds (TCSS delta fail count then increments)	
					TCSS speed raw OR TCSS last valid raw	>= 150 RPM >= 150 RPM	>= 6.00 seconds	
					transmission range AND transmission range previous loop (12.5 msec) AND (transmission range change REVERSE calibration enabled OR transmission range change NEUTRAL calibration enabled) AND transmission range NOT transmission range previous loop (12.5 msec) RUN range change timer, range change timer	< NEUTRAL (PARK OR REVERSE) < NEUTRAL (PARK OR REVERSE) = 0 = 0	>= **P2161 range change delay time** seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					TOSS raw OR (TOSS raw - TCSS raw, delta speed loop to loop (12.5 msec) AND TOSS raw speed)	= 0 RPM <= 4,095 RPM >= 350 RPM	>= 0.00	
					TCSS raw last valid speed	>= 500 RPM		
					TCSS raw	>= 500 RPM		
					engine speed	>= 350		
					4WD range change time out		>= 5.00 seconds	
					engine speed inaccurate	= FALSE		
					transmission output speed inaccurate	= FALSE		
					PTO	not active		
					P2161 OR P2161	not fault active not test fail this key on		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Four Wheel Drive Low Switch Circuit	P2771	Fail Case 1: Continuous Open (Stuck Off) in the Four Wheel Drive Low Switch CircuitFail Case 2: Ground (Stuck On) in the Four Wheel Drive Low Switch Circuit	4WD Low Switch Transfer case gear ratio 4WD Low Switch Transfer case gear ratio	= TRUE ≥ 2.600 and ≤ 2.800 = FALSE ≥ 0.900 and ≤ 1.100	Engine Torque Engine Speed Ignition voltage Throttle position Transmission Temperature Engine Run time Vehicle Speed TPS_FA VehicleSpeedSensor_FA EngineTorqureInaccurate Transmission gear P0502, P0503, P0722, P0723, P215C, P2160, P2161, U0101 Clutch Transmission Input Speed Signal	80.0 ≤ N-M ≤ 8,191.8 2,000 ≤ RPM ≤ 5,500 9.0 ≤ Volts ≤ 32.00 10.0 ≤ % ≤ 99.0 -7.0 ≤ ºC ≤ 130.0 >= 10.0 Sec >= 15.00 Mph False False FALSE Not in Park, Reverse, or Neutral Not Fault Active Engaged (Manual transmission only) Valid (Automatic transmission only)	≥ 2.0 sec≥ 7.0 sec	Type X, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Control Module Transfer Case Command State Rationality - 4wd high command not 4wd high ratio	P279A	Monitor measures transfer case gear ratio is 4wd low ratio or neutral ratio while the transfer case control module command state is 4wd high.	measured transfer case ratio is 4wd high ratio AND measured transfer case ratio calculation updated (measured transfer case ratio = transmission output speed / transfer case output speed)	= FALSE = TRUE	transfer case contol module transfer case command state	= 4wd high	weighted fail count >= 5 out of sample count >= 280 (12.5 milleseconds per count)	Type A, 1 Trips
					weighted fail count	= **P279A P279B P279C Transfer Case Control Module Transfer Case Command State Rationality (weighting factor)** (see supproting table)		
					measured transfer case ratio is 4wd high ratio set to TRUE AND measured tranfer case ratio calculation updated set to TRUE	measured transfer case ratio >= **P279A Transfer Case Control Module Transfer Case Command State Rationality (margin of error low)** (see supporting table) AND measured transfer case ratio <= **P279A Transfer Case Control Module Transfer Case Command State Rationality (margin of error high)** (see supporting table)		
					transfer case output speed sensor configuration = CeFWDD_e_UseTCSS	transfer case output speed sensor configuration = CeFWDD_e_UseTCSS = FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0502 fault active AND P0503 fault active AND P0722 fault active AND P0723 fault active AND P2160 fault active AND P2616 fault active vehicle drive wheel type configuration NOT CeFWDG_e_No_AWD_Or_FWD AND NOT CeFWDG_e_Versatrak_AWD AND NOT CeFWDG_e_FWD_AWD_SingleSpd	= FALSE = FALSE = FALSE = FALSE = FALSE vehicle drive wheel type configuration = CeFWDR_e_FWD_ECM_TCM_TCCM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Control Module Transfer Case Command State Rationality - 4wd low command not 4wd low ratio	P279B	Monitor measures transfer case gear ratio is 4wd high ratio or neutral ratio while the transfer case control module command state is 4wd low.	measured transfer case ratio is 4wd low ratio AND measured transfer case ratio calculation updated (measured transfer case ratio = transmission output speed / transfer case output speed)	= FALSE = TRUE	transfer case contol module transfer case command state	= 4wd low	weighted fail count >= 5 out of sample count >= 280 (12.5 milleseconds per count)	Type A, 1 Trips
					weighted fail count	= **P279A P279B P279C Transfer Case Control Module Transfer Case Command State Rationality (weighting factor)** (see supproting table)		
					measured transfer case ratio is 4wd low ratio set to TRUE AND measured tranfer case ratio calculation updated set to TRUE	measured transfer case ratio >= **P279B Transfer Case Control Module Transfer Case Command State Rationality (margin of error low)** (see supporting table) AND measured transfer case ratio <= **P279B Transfer Case Control Module Transfer Case Command State Rationality (margin of error high)** (see supporting table)		
					transfer case output speed sensor configuration = CeFWDD_e_UseTCSS	transfer case output speed sensor configuration = CeFWDD_e_UseTCSS = FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0502 fault active AND P0503 fault active AND P0722 fault active AND P0723 fault active AND P2160 fault active AND P2616 fault active vehicle drive wheel type configuration NOT CeFWDG_e_No_AWD_Or_FWD AND NOT CeFWDG_e_Versatrak_AWD AND NOT CeFWDG_e_FWD_AWD_SingleSpd	= FALSE = FALSE = FALSE = FALSE = FALSE vehicle drive wheel type configuration = CeFWDR_e_FWD_ECM_TCM_TCCM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Control Module Transfer Case Command State Rationality - 4wd neutral command not 4wd neutral ratio	P279C	Monitor measures transfer case gear ratio is 4wd high ratio or 4wd low ratio while the transfer case control module command state is 4wd neutral.	measured transfer case ratio is 4wd neutral ratio AND measured transfer case ratio calculation updated (measured transfer case ratio = transmission output speed / transfer case output speed)	= FALSE = TRUE	transfer case contol module transfer case command state	= 4wd neutral	weighted fail count >= 5 out of sample count >= 280 (12.5 milleseconds per count)	Type A, 1 Trips
					weighted fail count	= **P279A P279B P279C Transfer Case Control Module Transfer Case Command State Rationality (weighting factor)** (see supproting table)		
					measured transfer case ratio is 4wd neutral ratio set to TRUE AND measured tranfer case ratio calculation updated set to TRUE when ratio check 1 AND ratio check 2	ratio check 1: measured transfer case ratio >= **P279C Transfer Case Control Module Transfer Case Command State Rationality (margin of error high 1)** (see supporting table) OR measured transfer case ratio <= **P279C Transfer Case Control Module Transfer Case Command State Rationality (margin of error low 1)** ratio check 2 measured transfer case ratio >=		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					transfer case output speed sensor configuration = CeFWDD_e_UseTCSS P0502 fault active AND P0503 fault active AND P0722 fault active AND P0723 fault active AND P2160 fault active AND P2616 fault active vehicle drive wheel type configuration NOT CeFWDG_e_No_AWD_Or_FWD AND NOT CeFWDG_e_Versatrak_AWD AND NOT CeFWDG_e_FWD_AWD_SingleSpd	**P279C Transfer Case Control Module Transfer Case Command State Rationality (margin of error high 2)** (see supporting table) OR measured transfer case ratio <= **P279C Transfer Case Control Module Transfer Case Command State Rationality (margin of error low 2)** transfer case output speed sensor configuration = CeFWDD_e_UseTCSS = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE vehicle drive wheel type configuration = CeFWDR_e_FWD_ECM_TCM_TCCM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					neutral rationality enabled	= 1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module	U0293	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					U0073	Not Active on Current Key Cycle		
			Message $0B4	≥ 10.0 seconds				
			Message $0D3	≥ 0.5 seconds	Normal CAN transmission on Bus A	Enabled		
			Message $186	≥ 0.5 seconds	Device Control	Not Active		
			Message $1DF	≥ 10.0 seconds	High Voltage Virtual Network Management	Not Active		
			Message $3C1	≥ 10.0 seconds				
					Ignition Voltage Criteria:			
					Run/Crank Ignition voltage	> 6.41 Volts		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					KeCAND_b_OffKeyCycleDiagEnbl	= 1 (1 indicates enabled)		
					Ignition Accessory Line and Battery Voltage	= Active > 11.00 Volts		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds			
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for	> 0.4000 seconds		
					U0293	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module B	U179A	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module B	Message is not received from controller for	≥ 10.0 seconds	General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					U0073	Not Active on Current Key Cycle		
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Run/Crank Ignition voltage	> 6.41 Volts		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					KeCAND_b_OffKeyCycleDiagEnbl	= 1 (1 indicates enabled)		
					Ignition Accessory Line and	= Active		
					Battery Voltage	> 11.00 Volts		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds			
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for	> 0.4000 seconds		
					U179A	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module B	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module on Bus B	U1817	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module on Bus B	Message is not received from controller for Message $0A7 Message $1E3 Message $281	 ≥ 10.0 seconds ≥ 10.0 seconds ≥ 0.5 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 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 Illum.
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U1817	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module B on Bus B	U182D	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module B on Bus B	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					U0074	Not Active on Current Key Cycle		
			Message $1D8	≥ 0.5 seconds	Normal CAN transmission on Bus B	Enabled		
			Message $3C5	≥ 10.0 seconds	Device Control	Not Active		
			Message $3DA	≥ 10.0 seconds	High Voltage Virtual Network Management	Not Active		
			Message $3FF	≥ 10.0 seconds	Ignition Voltage Criteria:			
			Message $4C2	≥ 10.0 seconds	Run/Crank Ignition voltage	> 6.41 Volts		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					KeCAND_b_OffKeyCycleDiagEnbl	= 1 (1 indicates enabled)		
					Ignition Accessory Line and	= Active		
					Battery Voltage	> 11.00 Volts		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds			
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for	> 0.4000 seconds		
					U182D	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module B (VICM)	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Insufficient Activity Bank 1 Sensor 1	P0134	This DTC determines if the O2 sensor circuit is open. When enabled, the O2 sensor signal is monitored to determine when the signal is above the lower threshold. Note: This controller uses a 1900 mvolt bias on the O2 sensor signal circuit, when the circuit is opened the signal bias will be read. The diagnostic failure counter is incremented when the O2 sensor signal is above the threshold. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	> 1,700 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition	TPS_ThrottleAuthorityDefaulted MAF_SensorFA Ethanol Composition Sensor FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 150 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Insufficient Activity Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0140	This DTC determines if the O2 sensor circuit is open. When enabled, the O2 sensor signal is monitored to determine when the signal is above the lower threshold. Note: This controller uses a 1900 mvolt bias on the O2 sensor signal circuit, when the circuit is opened the signal bias will be read. The diagnostic failure counter is incremented when the O2 sensor signal is above the threshold. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	> 1,700 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition	TPS_ThrottleAuthorityDefaulted MAF_SensorFA Ethanol Composition Sensor FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 150 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Composition Sensor Circuit Low	P0178	A continuous circuit Out-of-Range Low or Open fault is detected by monitoring the signal frequency of the Ethanol composition sensor The ethanol sensor is designed to measure ethanol concentrations from E0 (50Hz) to E100 (150Hz), with a specified accuracy of 5% ethanol (i.e. 5Hz). If the raw frequency value is less than the threshold value a fail counter will increment. When the correct ratio of failure counts vs. sample counts is achieved, the fault code is set.	Flex Fuel Sensor Output Frequency	< 45 Hertz	Powertrain Relay	> 11.0 Volts	50 failures out of 63 samples 100 ms loop Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Composition Sensor Circuit High	P0179	A continuous circuit Out-of-Range High fault is detected by monitoring the signal frequency of the Ethanol composition sensor The ethanol sensor is designed to measure ethanol concentrations from E0 (50Hz) to E100 (150Hz), with a specified accuracy of 5% ethanol (i.e. 5Hz). If the raw frequency value is greater than the threshold value a fail counter will increment. When the correct ratio of failure counts vs. sample counts is achieved, the fault code is set. If the frequency goes higher than the specified high conductivity threshold then a P2269 is set instead (see that monitor for full description)	Flex Fuel Sensor Output Frequency	> 155 Hertz <= 185	Powertrain Relay	> 11.0 Volts	50 failures out of 63 samples 100 ms loop Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Sensor Out of Range High	P0193	This DTC Diagnoses High Pressure Sensor Out of Range High	High Pressure Fuel Sensor	>= 95 % of 5Vref	Battery Voltage	>= 11 Volts Engine Running	Both Run Continuously Engine Synchronous Mode 800 failures out of 1,000 samples Time Based Mode 400 failures out of 500 samples 6.25 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 Illum.
Fuel Conductivity Out Of Range (water in fuel)	P2269	Detects the presence of High Conductivity Fuel (e.g. water in fuel) via a specific range of sensor frequency that is higher than the normal out of range high threshold. High conductivity in the fuel causes a significant upward shift in the sensor's output frequency and does not indicate a failure of the sensor or wiring, but instead is a failure of the fuel conditions which requires different repair for the vehicle. If the raw frequency value is greater than the conductivity threshold value a fail counter will increment. When the correct ratio of failure counts vs. sample counts is achieved, the fault code is set.	Flex Fuel Sensor Output Frequency	> 185 Hertz	Powertrain Relay	> 11.0 Volts	50 failures out of 63 samples 100 ms loop Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2Sensor Circuit Range / Performance Bank 1 Sensor 1	P2A00	The P2A00 diagnostic determines if the Bank 1 primary O2 sensor voltage is not meeting the criteria to enable closed loop fueling or if during closed loop fueling operation the O2 sensor voltage fails to continue to meet the requirements for closed loop fueling. The diagnostic failure counter is incremented if the criteria is not met. This DTC is set based on the fail and sample counters.	=================== Closed Loop O2S ready flag A) O2S signal must be To set Closed Loop ready flag =================== Closed Loop O2S ready flag B) Once set to ready O2S signal cannot be for Then set Closed Loop ready flag ===================	=============== = False < 1,250 mvolts = True =============== = True > 1,250 mvolts > 5.0 seconds = False ================	No Active DTC's System Voltage Engine Speed Engine Airflow Engine Coolant Engine Metal Overtemp Active Converter Overtemp ActiveFuel State AFM Status Predicted Exhaust Temp (B1S1) Engine run time Fuel Enrichment All of the above met for	TPS_ThrottleAuthorityDefaulted MAP_SensorFA ECT_Sensor_FA FuelInjectorCircuit_FA P0131, P0151 P0132, P0152 10.0 < Volts < 32.0 500 ≤ RPM ≤ 3,400 3.2 ≤ gps ≤ 30.0 ≥ 68.0 ºC = False = False DFCO not active = All Cylinders active ≥ 0.0 ºC > 100 seconds = Not Active > 5 seconds	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current Monitoring Performance (Battery Monitor Module, non-IBSM)	P058B	Determines that the Battery Monitor Module Current Monitoring is functioning properly by comparing it to a reference current sensor directly connected to, and measured by ECM.	The absolute value of the difference between the Battery Monitor Module current and the ECM measured reference current is greater than threshold value.	>= 22.00 Amp	Diagnostic Enabled P118C P118D Run/Crank or Accessory Hybrid Starter Status	TRUE Not FA or TFTKO Not FA or TFTKO TRUE <> Engine Starting or Engine Stopping for 40.00 counts	160.00 failures out of 200.00 samples 25 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 Illum.
Battery Monitor Module Voltage Monitoring Performance (Battery Monitor Module, non-IBSM)	P058D	Determines that the Battery Monitor Module Voltage Monitoring is functioning properly by comparing it to a reference battery voltage directly measured by ECM.	The absolute value of the difference between the Battery Monitor Module voltage and the ECM measured reference voltage is greater than threshold value.	>= 2.00 Volt	Diagnostic Enabled PT Relay Run/Crank or Accessory Hybrid Starter Status	TRUE Not FA or TFTKO TRUE <> Engine Starting or Engine Stopping for 40.00 counts	160.00 failures out of 200.00 samples 25 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 Illum.
Battery Current Sensor A Circuit Low (Battery Monitor Module, non-IBSM)	P118C	Detects a continuous short to ground or open in the Battery Current Sensor A signal.	Battery Current Sensor A is less than threshold.	-400.00 Amp	Diagnostic Enabled Run/Crank or Accessory	TRUE TRUE	160.00 failures out of 200.00 samples 25 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 Illum.
Battery Current Sensor A Circuit High (Battery Monitor Module, non-IBSM)	P118D	Detects a continuous short to power in the Battery Current Sensor A signal.	Battery Current Sensor A is greater than threshold.	150.00 Amp	Diagnostic Enabled Run/Crank or Accessory	TRUE TRUE	160.00 failures out of 200.00 samples 25 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 Illum.
Dual Battery Control Module Performance (Battery Monitor Module, non-IBSM)	P305F	Determines that the Dual Battery Control Module is functioning properly by detecting whether the battery voltage, as directly measured by ECM, fell below a threshold for n consecutive auto-start events, where each auto-start event had the threshold exceeded for m number of samples.	ECM measured battery voltage is less than threshold for present auto-start event.	8.90 Volt	Diagnostic Enabled Hybrid Starter Status	TRUE = Engine Starting for 0.00 counts	5.00 failures out of 10.00 samples taken during auto-start event. 6.25 ms/sample	Type A, 1 Trips
			Exceeded consecutive number of auto-start events where Present Auto-Start Event malfunction criteria was met.	2.00 auto-start events	Diagnostic Enabled	TRUE	2.00 auto-start events out of 3.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	> 200 kPa*(g/s) <= 25.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. No Active DTCs: No Pending DTCs:	>= 0 RPM <= 6,400 RPM >= -9 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 125 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 EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP	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 Illum.
Active Grill Air Shutter B Performance /Stuck OFF	P05AE	A 2-part diagnostic. Part 1 continuously monitors for failure to achieve a commanded shutter actuator position [Suspect Stuck Condtion] when X failures occur in Y samples after an electronic command latency delay. Part 1 failure enables Part 2 which makes a fixed number of repeat attempts to reach the commanded postion [ReTry to clear obstruction]. The DTC is set when the calibrated fault threshold count of repeat attempts is reached without achieving the original commanded shutter position.	Smart Shutter Actuator 2 Position Response AND Shutter 2 Diagnostic Delay Threshold count	<> Smart Shutter Actuator 2 Commanded Position percent AND Counter > 129.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter2 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1.00 failures out of 1.00 samples 1 sample / 100 milliseconds	Type B, 2 Trips
			Shutter 2 Performance Test count	= 5.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter2 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1-5 actuator cycles [1 cycle typically requires 10-25 seconds]	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Communication Error with Active Grill Air Shutter Module “B”	P151F	This DTC monitors for an internal error or error in communication with the Active Grill Air Shutter Module B	Communication of the Alive Rolling Count from the Shutter Module over LIN bus is incorrect or the Shutter Module signals it has an internal error for out of total samples	 >= 8.00 counts >= 10.00 counts	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	>= 3.00 seconds = 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 Illum.
ECM/PCM Power Relay Request Signal Message Counter Incorrect	P16FF	This DTC monitors for an error in communication with the ECM Power Relay Request Signal	Communication of the Alive Rolling Count or Protection Value from the ECM Power Relay Request Signal over CAN bus is incorrect for out of total samples	>= 10 counts >= 16 counts	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	>= 3.00 seconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 250ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Active Grill Air Shutter Module B	U0285	This DTC monitors for a loss of communication on the LIN bus with Shutter Module B	ECM has lost communication over the LIN bus with Device 1 / Shutter 2 for	>= 3.00 counts	The following criteria have been enabled for Power Mode Run/Crank Voltage	>= 400.00 milliseconds =Run >= 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 Illum.
Intake Air Pressure Measurement System - Multiple Sensor Correlation (naturally aspirated with TIAP/ 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 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 MAP_SensorCircuitFP AAP_SnsrCktFP	4 failures out of 5 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 Illum.
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	<= 200 kPa*(g/s) > 12.0 grams/sec > 25.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. -	>= 0 RPM <= 6,400 RPM >= -7 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 125 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** MAP Model 2 Error multiplied by	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 Illum.
						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 Illum.
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	**<u>Engine Running:</u>** Filtered Throttle Model Error AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	 <= 200 kPa*(g/s) > 25.0 kPa > 25.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. No Active DTCs:	>= 0 RPM <= 6,400 RPM >= -7 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 125 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: MAP1 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	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 Required	MIL Illum.
		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:	ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		
			<u>Engine Not Rotating:</u> 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 No Active DTCs: No Pending DTCs:	> 5.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	> 200 kPa*(g/s) > 12.0 grams/sec > 25.0 kPa) > 25.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. -	>= 0 RPM <= 6,400 RPM >= -7 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 125 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** MAP Model 1 Error multiplied by	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 Illum.
		single failed sensor can uniquely be identified. In this case, the Inlet Airflow System Performance diagnostic will fail.				**P0101, P0106, P0121, P012B, P0236, P1101: MAP1 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 Illum.
LIN Bus 1 Lost Communication with Device 1 (Shutter 2)	U1511	This DTC monitors for a loss of communication on the LIN bus with Shutter 2	ECM has lost communication over the LIN bus with Device 1 / Shutter 2 for	>= 3.00 counts	The following criteria have been enabled for Power Mode Run/Crank Voltage	>= 400.00 milliseconds =Run >= 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 Illum.
Mass Air Flow A Supply Voltage Control Circuit	P121A	Controller specific output driver circuit diagnoses the Mass Air Flow A Supply Voltage Control 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 Ω impedance between output and controller ground	Mass Air Flow A Power is commanded on Powertrain Relay Voltage	 >= 11.0 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips Note: In certain controllers P121B may also set (Mass Air Flow A Supply Voltage Control Circuit Low)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow A Supply Voltage Control Circuit Low	P121B	Controller specific output driver circuit diagnoses the Mass Air Flow A Supply Voltage Control 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 Ω impedance between output and controller ground	Mass Air Flow A Power is commanded on Powertrain Relay Voltage	>= 11.0 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips Note: In certain controllers P121A may also set (Mass Air Flow A Supply Voltage Control Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow A Supply Voltage Control Circuit High	P121C	Controller specific output driver circuit diagnoses the Mass Air Flow A Supply Voltage Control 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 Ω impedance between output and controller power	Mass Air Flow A Power is commanded off Powertrain Relay Voltage	>= 11.0 Volts	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 Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 2 Sensor A	P0018	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 2 sensor A occurs during the incorrect crank position	2 cam sensor pulses less than or greater than nominal position in one cam revolution.	-11.0 Crank Degrees 13.0 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	CrankSensor_FA P0345, P0346 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **P0016, P0017, P0018, P0019 Cam Correlation Oil Temperature Threshold** One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 2 Sensor B	P0019	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 2 sensor B occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	2 cam sensor pulses less than or greater than nominal position in one cam revolution.	-9.3 Crank Degrees 11.1 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	CrankSensor_FA P0390, P0391 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **P0016, P0017, P0018, P0019 Cam Correlation Oil Temperature Threshold** One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ColdStrtB_CamPstnB2	P05CF	Detects a VVT system error during Cold Starts 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	(Exhaust cam Bank 2) Cam Position Error > 4.00 deg.	**Exhaust Cam Phsr Enable**	= TRUE	40 failures out of 100 samples 100 ms /sample	Type B, 2 Trips
					System Voltage	> 11.00 Volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Catalyst Warmup Enabled	= TRUE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> 4.00 deg AND < 21.00 deg		
					Desired cam position variation	< 4.50 deg for (**P0024_P05CF_StablePositionTimeEc2**) seconds		
					No Active DTCs	P0023 P2094 P2095		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 2 Sensor A (mid-park phaser)	P0018	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 2 sensor A occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	2 cam sensor pulses less than or greater than nominal position in one cam revolution..	-6.9 Crank Degrees 12.8 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	CrankSensor_FA P0345, P0346 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. After the first failed test, there is a delay until the camshaft phaser control logic verifies and reports that the camshaft is actually parked. One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft - Sprocket Correlation Diagnostic	P0018 and P0019	On engines with a dual intermediate sprocket between the crankshaft and the camshafts, this diagnostic detects a timing misalignment between the crankshaft, sprocket and camshafts that will cause the bank 2 camshafts to be misaligned.	Bank 2 Cam Sensor A pulses more than -6.9 crank degrees before or 12.8 crank degrees after nominal position in one cam revolution + Bank 2 Cam Sensor B pulses more than -6.9 crank degrees before or 12.8 crank degrees after nominal position in one cam revolution	>= 8	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs:	CrankSensor_FA P0345, P0346 P0390, P0391	2 failures out of 3 tests. A failed test is 1 out of 10 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold** . One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 2 Sensor B (mid-park phaser)	P0019	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 2 sensor B occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	2 cam sensor pulses less than or greater than nominal position in one cam revolution..	-6.9 Crank Degrees 12.8 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	 CrankSensor_FA P0390, P0391 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. After the first failed test, there is a delay until the camshaft phaser control logic verifies and reports that the camshaft is actually parked. One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Open – Bank 2	P0020	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.	System supply voltage is within limits. 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 Illum.
Intake Camshaft System Performance – Bank 2	P0021	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 2) Cam Position Error > (**P0021_CamPosErrorLimIc2**) 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 > (**P0021_CamPosErrorLimIc2**) deg AND < (**CalculatedPerfMaxIc2**) deg < 4.50 deg for (**P0021_P05CD_StablePositionTimeIc2**) seconds P0020 P2092 P2093	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 Illum.
Exhaust Camshaft Actuator Solenoid Circuit Open – Bank 2	P0023	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.	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 Illum.
Exhaust Camshaft System Performance – Bank 2	P0024	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	(Exhaust cam Bank 2) Cam Position Error > (**P0024_CamPosErrorLimEc2**) deg	**Exhaust 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 > (**P0024_CamPosErrorLimEc2**) deg AND < (**CalculatedPerfMaxEc2**) deg < 4.50 deg for (**P0024_P05CF_StablePositionTimeEc2**) seconds P0023 P2094 P2095	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 Illum.
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	3.8 < ohms < 10.5	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA < 8.0 ºC > 28,800 seconds ≥ -30.0 ºC < 32.0 volts < 0.06 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 Illum.
Turbocharger/ Supercharger Bypass Valve B Control Circuit If two parallel turbos are present.	P00C0	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'B' actuator' low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. In series applications, turbocharger 'B' is the second turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'B' is associated with engine bank 2.	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 Ω impedance between output and controller ground.	Diagnostic enabled ***************************** Powertrain relay Voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts *****************************	50 failures out of 63 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P00C1 may also set turbocharger/ supercharger bypass valve B control circuit low

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 2 Sensor A (mid-park phaser)	P0018	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 2 sensor A occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	2 cam sensor pulses less than or greater than nominal position in one cam revolution..	-6.9 Crank Degrees 12.8 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	CrankSensor_FA P0345, P0346 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. After the first failed test, there is a delay until the camshaft phaser control logic verifies and reports that the camshaft is actually parked. One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft - Sprocket Correlation Diagnostic	P0018 and P0019	On engines with a dual intermediate sprocket between the crankshaft and the camshafts, this diagnostic detects a timing misalignment between the crankshaft, sprocket and camshafts that will cause the bank 2 camshafts to be misaligned.	Bank 2 Cam Sensor A pulses more than -6.9 crank degrees before or 12.8 crank degrees after nominal position in one cam revolution + Bank 2 Cam Sensor B pulses more than -6.9 crank degrees before or 12.8 crank degrees after nominal position in one cam revolution	>= 8	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs:	CrankSensor_FA P0345, P0346 P0390, P0391	2 failures out of 3 tests. A failed test is 1 out of 10 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold** . One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 2 Sensor B (mid-park phaser)	P0019	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 2 sensor B occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	2 cam sensor pulses less than or greater than nominal position in one cam revolution..	-6.9 Crank Degrees 12.8 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	 CrankSensor_FA P0390, P0391 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. After the first failed test, there is a delay until the camshaft phaser control logic verifies and reports that the camshaft is actually parked. One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Open – Bank 2	P0020	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.	System supply voltage is within limits. 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 Illum.
Intake Camshaft System Performance – Bank 2	P0021	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 2) Cam Position Error > (**P0021_CamPosErrorLimIc2**) deg	**Intake Cam Phsr Enable**	= TRUE	100.00 failures out of 300.00 samples 100 ms /sample	Type A, 1 Trips
					System Voltage	> 11.00 Volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> (**P0021_CamPosErrorLimIc2**) deg AND < (**CalculatedPerfMaxIc2**) deg		
					Desired cam position variation	< 4.50 deg for (**P0021_P05CD_StablePositionTimeIc2**) seconds		
					No Active DTCs	P0020 P2092 P2093		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit Open – Bank 2	P0023	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.	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 Illum.
Exhaust Camshaft System Performance – Bank 2	P0024	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	(Exhaust cam Bank 2) Cam Position Error > (**P0024_CamPosErrorLimEc2**) deg	**Exhaust Cam Phsr Enable**	= TRUE	100.00 failures out of 300.00 samples 100 ms /sample	Type A, 1 Trips
					System Voltage	> 11.00 volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> (**P0024_CamPosErrorLimEc2**) deg AND < (**CalculatedPerfMaxEc2**) deg		
					Desired cam position variation	< 4.50 deg for (**P0024_P05CF_StablePositionTimeEc2**) seconds		
					No Active DTCs	P0023 P2094 P2095		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	3.8 < ohms < 10.5	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA < 8.0 ºC > 28,800 seconds ≥ -30.0 ºC < 32.0 volts < 0.06 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 Illum.
Turbocharger/ Supercharger Bypass Valve B Control Circuit If two parallel turbos are present.	P00C0	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'B' actuator' low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. In series applications, turbocharger 'B' is the second turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'B' is associated with engine bank 2.	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 Ω impedance between output and controller ground.	Diagnostic enabled ***************************** Powertrain relay Voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts *****************************	50 failures out of 63 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P00C1 may also set turbocharger/ supercharger bypass valve B control circuit low

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger/ Supercharger Bypass Valve B Control Circuit Low If two parallel turbos are present.	P00C1	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'B' actuator' 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. In series applications, turbocharger 'B' is the second turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'B'is associated with engine bank 2.	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. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	≤ 0.5 Ω impedance between output and controller ground	Diagnostic enabled ***************************** Powertrain relay voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts *****************************	50 failures out of 63 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P00C0 may also set turbocharger/ supercharger bypass valve B control circuit

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger/ Supercharger Bypass Valve B Control Circuit High If two parallel turbos are present.	P00C2	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'B' actuator' 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. In series applications, turbocharger 'B' is the second turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'B' is associated with engine bank 2.	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. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	 ≤ 0.5 Ω impedance between output and controller power	Diagnostic enabled ***************************** Powertrain relay Voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts *****************************	50 failures out of 63 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger/ Supercharger Bypass Valve B - Mechanical If two parallel turbos are present.	P00C4	This DTC indicates if the compressor recirculation valve is permanent closed. This diagnostic is active in coast conditions where the pulsation of the airflow is observed. In series applications, turbocharger 'B' is the second turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'B' is associated with engine bank 2.	When measuring time accumulated air mass flow is high pass filtered with filter frequency ***************************** A failure is detected when Filtered Air Mass Flow	< 0.60 second, = 8.00 Hz ************************** >= 37.0 g/s	Diagnostic enabled ***************************** Engine speed ***************************** Bypass Valve Commanded Open Duty Cycle For at least ***************************** Pressure ratio over the compressor relative limit Condition keep true for ***************************** Negative transient -> TRUE Relative Boost AND Pressure derivate Hysteresis negative transient ->FALSE Relative Boost OR Pressure derivate ***************************** No active DTCs:	True ***************************** >= 1,500 rpm ***************************** > 6.00 % >= 0.35 s ***************************** > refer to **P00C4 P2261: Compressor Surge Line** in Supporting Tables 1.00 seconds ***************************** >= 15.00 kPa <= -150.00 kPa/s < 0.00 kPa > 100.00 kPa/s ***************************** BSTR_b_TurboBypassCktFA BSTR_b_BoostSnsrFA MAF_SensorFA	2 Failed tests out of 3 tests 25ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Pressure Measurement System - Multiple Sensor Correlation (twin turbo)	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), Turbocharger Boost Pressure, Barometric Pressure (BARO) and BARO B sensors values are checked to see if they are within the normal expected atmospheric pressure range. If they are, then MAP, Turbocharger Boost Pressure, BARO and BARO B are compared to see if their values are similar. If three of these four sensors are similar, but the fourth is not, then a performance diagnostic for the specific sensor with the dissimilar value will fail. If there is no	See table **P00C7: Twin Turbo Failure Matrix** for the malfunction criteria for this diagnostic. Certain failure combinations in this matrix will set other DTCs if the failures can be correlated to a single sensor. The definition of the column headings is as follows: "MAP & TCBP Diff" = Y if: ABS(Turbocharger Boost Pressure - Manifold Pressure) "MAP & Baro Diff" = Y if: ABS(Baro Pressure - Manifold Pressure) "MAP & Baro B Diff" = Y if: ABS(Baro Pressure B - Manifold Pressure) "TCBP & Baro Diff" = Y if: ABS(Turbocharger Boost Pressure - Baro Pressure) "TCBP & Baro B Diff" = Y if:	 > 10.0 kPa > 10.0 kPa > 10.0 kPa > 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 Baro Pressure B Baro Pressure B Turbocharger Boost Pressure Turbocharger Boost Pressure No Active DTCs: No Pending DTCs:	 > 10.0 seconds >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa EngineModeNotRunTimer Error MAP_SensorFA AAP_SnsrFA AAP2_SnsrFA AAP3_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP3_SnsrCktFP	4 failures out of 5 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 Illum.
		combination of three of these four sensors that is similar, then the failed sensor cannot be uniquely identified. The Multiple Pressure Sensor Correlation Diagnostic will fail in this case.	ABS(Turbocharger Boost Pressure - Baro Pressure B) "Baro & Baro B Diff" = Y if: ABS(Baro Pressure - Baro Pressure B)	> 10.0 kPa > 10.0 kPa				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow System Performance (twin turbo)	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 MAF B sensor, Manifold Pressure (MAP) sensor, Turbocharger Boost Pressure 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	See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. For P0101: MAF model fails when MAF1 model fails. MAF1 model fails when: ABS(Measured MAF1 Flow – Modeled MAF1 Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error	> 20.0 grams/sec > 25.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa > 300 kPa*(g/s)	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. -	>= 400 RPM <= 6,500 RPM >= -9 Deg C =TRUE) <= 150 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Modeled MAF1 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by	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 Illum.
		will fail.	TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow	> 30.0 kPa > 30.0 kPa > 1.5 seconds > 1.5 seconds > a threshold in	No Active DTCs: No Pending DTCs:	**P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				gm/sec as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow**				
			AND Manifold Pressure	> a threshold in kPa as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP**				
			AND Filtered Mass Air Flow - Mass Air Flow	< 2.0 gm/sec				
			Low Engine Air Flow is TRUE when Mass Air Flow	< a threshold in gm/sec as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow**				
			AND Manifold Pressure	< a threshold in kPa as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP**				
			AND Mass Air Flow - Filtered Mass Air Flow	< 2.0 gm/sec				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Performance (twin turbo)	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. If the MAP sensor value is within the normal expected atmospheric range, then MAP, Turbocharger Boost Pressure, Barometric Pressure (BARO) and BARO B are compared to see if their values are similar. If the Turbocharger Boost Pressure, BARO and BARO B sensor values are similar, but the MAP value is not similar, then a MAP performance diagnostic will fail.	<u>**Engine Running:**</u> See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when either MAF1 model fails or MAF2 model fails. MAF1 model fails when: ABS(Measured MAF1 Flow – Modeled MAF1 Flow) Filtered MAF2 model failres when: ABS(Measured MAF2 Flow – Modeled MAF2 Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered	> 20.0 grams/sec > 20.0 grams/sec > 25.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,500 RPM >= -9 Deg C = TRUE) <= 150 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Modeled MAF1 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** Modeled MAF2 Error multiplied by **P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on MAF Est** and **P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on RPM**	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 Illum.
		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, MAF B sensor, Turbocharger Boost Pressure 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 MAP sensor. In this case, the MAP Performance diagnostic will fail.	TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has	> 300 kPa*(g/s) > 30.0 kPa > 30.0 kPa > 1.5 seconds	No Active DTCs:	MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 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 Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure	> 1.5 seconds > a threshold in gm/sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow** > a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 2.0 gm/sec < a threshold in gm/sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed See table	No Pending DTCs:	IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND Mass Air Flow - Filtered Mass Air Flow	**P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec				
			Engine Not Rotating: Manifold Pressure OR Manifold Pressure OR ABS(Manifold Pressure - Turbocharger Boost Pressure) AND ABS(Manifold Pressure - Baro Pressure) AND ABS(Manifold Pressure - Baro Pressure B) AND ABS(Turbocharger Boost Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure B) AND ABS(Baro Pressure - Baro Pressure B)	< 50.0 kPa > 115.0 kPa > 10.0 kPa > 10.0 kPa > 10.0 kPa <= 10.0 kPa <= 10.0 kPa <= 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 10.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA AAP3_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP3_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass or Volume Air Flow B Circuit Range/ Performance	P010B	Detects a performance failure in the Mass Air Flow (MAF) B sensor, such as when a MAF B 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 MAF sensor, Manifold Pressure (MAP) sensor, Turbocharger Boost Pressure 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 B sensor. In this case, the MAF B Performance diagnostic	See table **Turbocharger P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. For P010B: MAF model fails when MAF2 model fails. MAF2 model fails when ABS(Measured MAF2 Flow – Modeled MAF2 Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error	> 20.0 grams/sec > 25.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa > 300 kPa*(g/s)	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. -	>= 400 RPM <= 6,500 RPM >= -9 Deg C = TRUE) <= 150 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Modeled MAF2 Error multiplied by **P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on MAF Est** and **P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on RPM** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by	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 Illum.
		will fail.	TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset**	 > 30.0 kPa > 30.0 kPa		**P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM**		
					No Active DTCs:	MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault		
			TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time	 > 1.5 seconds > 1.5 seconds				
					No Pending DTCs:	EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP		
			High Engine Air Flow is TRUE when					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Mass Air Flow AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure -	> a threshold in gm/sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow** > a threshold in kPa TIAP-MAP as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 2.0 gm/sec < a threshold in gm/sec as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed. See table				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND Mass Air Flow - Filtered Mass Air Flow	**P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow B Sensor Circuit Low Frequency	P010C	Detects a continuous short to ground in the MAF B sensor circuit or a MAF B sensor that is outputting a frequency that is too low. The diagnostic monitors the MAF B sensor frequency output and fails the diagnostic when the MAF B frequency is too low. The MAF B sensor monitors the temperature of a circuit in the air flow of the engine. The temperature of this circuit is related to the air velocity across the sensor. The MAF B sensor converts this air velocity to a mass air flow value. The mass air flow 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 B Output	<= 400 Hertz (~ 0.00 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 0.0 seconds >= 300 RPM >= 10.0 Volts >= 1.0 seconds	300 failures out of 375 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 Illum.
Mass Air Flow B Sensor Circuit High Frequency	P010D	Detects a MAF B sensor that is outputting a frequency signal that is too high. The diagnostic monitors the MAF B sensor frequency output and fails the diagnostic when the MAF B frequency is too high. The MAF B sensor monitors the temperature of a circuit in the air flow of the engine. The temperature of this circuit is related to the air velocity across the sensor. The MAF B sensor converts this air velocity to a mass air flow value. The mass air flow 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 B Output	>= 14,500 Hertz (~ 546.2 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 0.0 seconds >= 300 RPM >= 10.0 Volts >= 1.0 seconds	300 failures out of 375 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 Illum.
Throttle Position Sensor Performance (twin turbo)	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, Turbocharger Boost Pressure sensor, Mass Air Flow (MAF) sensor and MAF B 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	See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when either MAF1 model fails or MAF2 model fails. MAF1 model fails when ABS(Measured MAF1 Flow – Modeled MAF1 Flow) Filtered MAF2 model fails when ABS(Measured MAF2 Flow – Modeled MAF2 Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered	> 20.0 grams/sec > 20.0 grams/sec > 25.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. -	>= 400 RPM <= 6,500 RPM >= -9 Deg C = TRUE) <= 150 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Modeled MAF1 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** Modeled MAF2 Error multiplied by **P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on MAF Est** and	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 Illum.
		Performance diagnostic will fail.	TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is	> 300 kPa*(g/s) > 30.0 kPa > 30.0 kPa > 1.5 seconds > 1.5 seconds	No Active DTCs: -	**P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on RPM** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 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 Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			TRUE when Mass Air Flow AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure -	> a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow** > a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 2.0 gm/sec < a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed See table	No Pending DTCs:	EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND Mass Air Flow - Filtered Mass Air Flow	**P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 1 (For use with WRAF - E81	P0131	This DTC determines if the WRAF O2 sensor signal circuit is shorted low. This DTC will detect a short to ground fault to the Pump Current, Reference Cell Voltage and Reference Ground circuits. When enabled, the diagnostic monitors the three different failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the three individual fail and sample counters.	B1S1 WRAF ASIC indicates a ground short to any of the following WRAF signals: A) Pump Current - short to ground fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to ground fail counts are accumulated to determine fault status. C) Reference Ground - short to ground fail counts are accumulated to determine fault status. Note: This ASIC is referred to as ATIC142 (Continental). Note: A ground short on the Pump Current or Reference Voltage signal may also set a P223C DTC.	The ASIC provides a fault indication when the pump current, reference cell or reference ground pin is < 150mV. Note: the faults must exist for previous 100 milli - seconds to qualify for a fail flag. The three fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	B1S1 DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop WRAF Ref cell temperature ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) **************************	P0135, P0030, P0031 or P0032 = Valid = Ready = True ≥ 628 Deg C = Complete ≥ 20.0 seconds	Signal A: 128 failures out of 160 samples OR Signal B: 128 failures out of 160 samples OR Signal C: 128 failures out of 160 samples Continuous in 25 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 Illum.
O2S Circuit High Voltage Bank 1 Sensor 1 (For use with WRAF - E81	P0132	This DTC determines if the WRAF O2 sensor signal circuit is shorted high. This DTC will detect a short to power fault to the Pump Current (and Trim circuit), Reference Cell Voltage and Reference Ground circuit. When enabled, the diagnostic monitors the three different failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the three individual fail and sample counters.	B1S1 WRAF ASIC indicates a short to power on any of the following WRAF signals: A) Pump Current - short to power fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to power fail counts are accumulated to determine fault status. C) Reference Ground - short to power fail counts are accumulated to determine fault status. Note: This ASIC is referred to as ATIC142 (Continental)..	The ASIC provides a fault indication when the pump current, reference cell or reference ground pin is ≥ 5.2V. Note: the faults must exist for more than 1 msec to qualify for a fail flag. The three fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	B1S1 DTC's Not active this key cycle Measure Valid Status (ASIC) Controller status (ASIC) Engine Run or Auto stop WRAF Ref cell temperature ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) **************************	P0135, P0030, P0031 or P0032 = Valid = Ready = True ≥ 628 Deg C = Complete ≥ 20.0 seconds	Signal A: 128 failures out of 160 samples OR Signal B: 128 failures out of 160 samples OR Signal C: 128 failures out of 160 samples Frequency: Continuous in 25 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 Illum.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0137	This DTC determines if the O2 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S 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	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	320 failures out of 400 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	0.991 ≤ ratio ≤ 1.080 50 ≤ mgrams ≤ 500 = 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 Illum.
					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 Illum.
O2S Circuit High Voltage Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0138	This DTC determines if the O2 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S 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 ********************** > 150.0 seconds when engine soak time > 28,800 seconds > 150.0 seconds when engine soak time ≤ 28,800 seconds ≤ 1.080 EQR ********************** > 3.0 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 Illum.
O2S Heater Performance Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0141	This DTC determines if the O2 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	0.4 > amps > 4.3	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	8 failures out of 10 samples Frequency: 2 tests per trip 10 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 Illum.
O2 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 O2 monitor rich to lean tests (P013E / P013A / P2271), which commands fuel cut off. Note: The Primary method is used when the primary WRAF O2 sensor signal transitions from above to below the O2 measured EQR threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P015A diagnostic measures the primary WRAF O2 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 air flow rate, engine speed, Baro,	Primary method: The EWMA of the Pre O2 sensor normalized R2L time delay value. The EWMA repass limit is The EWMA calculation uses a 0.25 coefficient. OR Secondary Method: The Accumulated time monitored during the R2L Delayed Response Test. AND Pre WRAF O2 sensor measured EQR is	> 0.55 EWMA (sec) ≤ 0.48 EWMA (sec) ≥ 2.0 Seconds > 1.000 EQR	No Active DTC's	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	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
					System Voltage	> 10.0 Volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Green O2S Condition	= Not Valid,		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 O2 sensor does not achieve the required lower measured EQR			 O2 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 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: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. ≥ 30 seconds > 55 ºC = TRUE) > -40 ºC > 30 seconds 1,050 ≤ RPM ≤ 2,500 1,000 ≤ RPM ≤ 2,550 3.2 ≤ gps ≤ 11.5 42.3 ≤ MPH ≤ 80.2 38.5 ≤ MPH ≤ 82.0 0.87 ≤ C/L Int ≤ 1.07 = 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 Illum.
		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 =================== All of the above met for at least 3.0 seconds, and then the Force Cat Rich intrusive stage is requested. =================== Pre O2S EQR B1S1 at end of Cat Rich stage Fuel State Number of fueled cylinders =================== After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input).	not in control of purge = Not Active (Please see "**Ethanol Estimation in Progress**" in Supporting Tables). > 70 kpa = enabled = not active = not active ≥ 60.0 sec 500 ≤ ºC ≤ 880 = DFCO possible ================== ================== ≥ 1.100 EQR = DFCO active ≤ 5 cylinders ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1) (For use with WRAF	P015B	DTC P015B detects that the primary WRAF 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 O2 monitor lean to rich tests (P013F / P013B), which commands fuel enrichment. Note: The Primary method is used when the primary WRAF O2 sensor signal transitions from lean condition to above the O2 measured EQR threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P015B diagnostic measures the primary WRAF O2 sensor response time between a lean condition and a higher measured EQR threshold. The response time is then scaled and normalized to mass air flow rate, engine speed, Baro, and intake air temperature resulting in	Primary method: The EWMA of the Pre O2 sensor normalized L2R time delay value. The EWMA repass limit is The EWMA calculation uses a 0.25 coefficient. OR Secondary method: The Accumulated time monitored during the L2R Delayed Response Test. AND Pre WRAF O2 sensor measured EQR is OR At end of Cat Rich stage the Pre WRAF O2 sensor measured EQR is	> 0.60 EWMA (sec) ≤ 0.50 EWMA (sec) ≥ 2.0 Seconds < 1.000 EQR < 1.100 EQR	No Active DTC's P015A 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 WRAF_Bank_1_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 Illum.
		a normalized delay value. The normalized delay is fed into a 1st 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 WRAF O2 sensor does not achieve the required higher measured EQR threshold before a delay time threshold is			Green O2S Condition O2 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	= 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: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. ≥ 30 seconds > 55 ºC = TRUE) > -40 ºC > 30 seconds 1,050 ≤ RPM ≤ 2,500 1,000 ≤ RPM ≤ 2,550 3.2 ≤ gps ≤ 11.5 42.3 ≤ MPH ≤ 80.2 38.5 ≤ MPH ≤ 82.0 0.87 ≤ C/L Int ≤ 1.07 = TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		reached.				(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	> 70 kpa		
					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	500 ≤ ºC ≤ 880		
					Fuel State	= DFCO inhibit		
					Number of fueled cylinders	≥ 1 cylinders		
					================	==================		
					When above conditions are met: Fuel Enrich mode is entered.			
					================	==================		
					During this test: Engine Airflow must stay between:	0 ≤ gps ≤ 13		
					and the delta Engine Airflow over 12.5msec must be :	≤ 0.8 gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Boost Pressure (TIAP) Sensor Performance (twin turbo)	P0236	Detects a performance failure in the Turbocharger Boost Pressure sensor, such as when a Turbocharger Boost Pressure 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 Turbocharger Boost Pressure sensor value is checked to see if it is within the normal expected atmospheric pressure range. If it is not, then the Turbocharger Boost Pressure performance diagnostic will fail. If the Turbocharger Boost Pressure sensor value is within the normal expected atmospheric range, then Manifold Pressure (MAP), Turbocharger Boost Pressure, Barometric Pressure (BARO) and BARO B are compared to see if their values are similar. If the MAP, BARO and BARO B sensor values are similar, but the Turbocharger Boost	**<u>Engine Running:</u>** See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when either MAF1 model fails or MAF2 model fails. MAF1 model fails when ABS(Measured MAF1 Flow – Modeled MAF1 Flow) Filtered MAF2 model fails when ABS(Measured MAF2 Flow – Modeled MAF2 Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered	> 20.0 grams/sec > 20.0 grams/sec > 25.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,500 RPM >= -9 Deg C = TRUE) <= 150 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Modeled MAF1 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** Modeled MAF2 Error multiplied by **P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on MAF Est** and **P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on RPM**	Continuous Calculation are performed every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Pressure value is not similar, then a Turbocharger Boost Pressure 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, MAF B sensor, 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 Turbocharger Boost Pressure sensor. In this case, the	TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time	> 300 kPa*(g/s) > 30.0 kPa > 30.0 kPa > 1.5 seconds > 1.5 seconds	No Active DTCs:	MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 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 Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Turbocharger Boost Pressure Performance diagnostic will fail.	High Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure -	> a threshold in gm/sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow** > a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 2.0 gm/sec < a threshold in gm/sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed See table	No Pending DTCs:	IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND Mass Air Flow - Filtered Mass Air Flow	**P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec				
			Engine Not Rotating: Turbocharger Boost Pressure OR Turbocharger Boost Pressure OR ABS(Manifold Pressure - Turbocharger Boost Pressure) AND ABS(Manifold Pressure - Baro Pressure) AND ABS(Manifold Pressure - Baro Pressure B) AND ABS(Turbocharger Boost Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure B) AND ABS(Baro Pressure - Baro Pressure B)	< 50.0 kPa > 115.0 kPa > 10.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa > 10.0 kPa <= 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 10.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA AAP3_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP3_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Wastegate / Supercharger Boost Solenoid B Control Circuit If two parallel turbos are present.	P0247	Controller specific output driver circuit diagnostic, diagnosing the 'turbocharger boost solenoid 'B' actuator' low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. In series applications, turbocharger 'B' is the second turbocharger in the direction of exhaust flow. In a parallel application, turbocharger 'B'is associated with engine bank 2.	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 Ω impedance between output and controller ground	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts > 5.00 Volts *****************************	10 failures out of 20 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P0249 may also set turbocharger wastegate / supercharger boost solenoid B control circuit low

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Wastegate / Supercharger Boost Solenoid B Control Circuit Low If two parallel turbos are present.	P0249	Controller specific output driver circuit diagnostic, diagnosing the 'turbocharger boost solenoid 'B' actuator' 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. In series applications, turbocharger 'B' is the second turbocharger in the direction of exhaust flow. In a parallel application, turbocharger 'B'is associated with engine bank 2.	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. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	≤ 0.5 Ω impedance between output and controller ground	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts > 5.00 Volts *****************************	10 failures out of 20 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P0247 may also set turbocharger wastegate / supercharger boost solenoid B control circuit

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Wastegate / Supercharger Boost Solenoid B Control Circuit High If two parallel turbos are present.	P0250	Controller specific output driver circuit diagnostic, diagnosing the 'turbocharger boost solenoid 'B' actuator' 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. In series applications, turbocharger 'B' is the second turbocharger in the direction of exhaust flow. In a parallel application, turbocharger 'B'is associated with engine bank 2.	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. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	≤ 0.5 Ω impedance between output and controller power	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts > 5.00 Volts *****************************	10 failures out of 20 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Efficiency Below Threshold If Intercooler Present	P026A	This DTC indicates a bad efficiency of the Air to Water Charge Air Cooler. The diagnostic is based on the manifold temperature and the time duration boost pressure needs to be limited due to high intake manifold temperatures.	Manifold temperature OR duration of boost pressure limitation caused by elevated intake manifold temperatures	> 110.0 > 10,000	Diagnostic enabled ***************************** IC Pump enabled ***************************** Engine run time Coolant temperature ***************************** No active DTCS:	True ***************************** Activated via ICP-Control ***************************** >= 60.0 seconds >= -10.0 deg Celsius ***************************** ECT_Sensor_FA MnfdTempSensorFA	5 failures out of 10 samples. 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	P0300 P0301 P0302 P0303 P0304 P0305 P0306	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.	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 (Lores_Decel Lores_Jerk OR (Lores_Decel Lores_Jerk OR RevBalanceTime)	- see details of thresholds on Supporting Tables Tab > **IdleSCD_Decel** AND > **IdleSCD_Jerk)** > **SCD_Decel** AND > **SCD_Jerk)** > **IdleCyl_Decel** AND > **IdleCyl_Jerk)** > **CylModeDecel** AND > **CylModeJerk)** >**RevMode_Decel**	Engine Run Time Engine Coolant Temp Or If ECT at startup Then ECT 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 -10 ºC < ECT < 126 ºC < -10 ºC 21 ºC < ECT < 126 ºC 9.00 < volts < 32.00 < 60.00 % per 25 ms < 90.00 % 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 any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage.	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 Illum.
			****************************** **This Feature not used on Gasoline engines** Combustion Modes that force selection of Idle Tables ****************************** Other patterns of misfire use adjustments to the single cylinder continuous misfire threshold tables: RANDOM MISFIRE Use random misfire thresholds If no misfire for (Medres_Decel AND Medres_Jerk) OR (Medres_Decel AND Medres_Jerk) OR (Lores_Decel AND Lores_Jerk)	************************** **This Feature not used on Gasoline engines** **CombustModeIdleTbl** in Supporting Tables ************************** > 6 Engine Cycles > **IdleSCD_Decel** * **Random_SCD_Decel** > **IdleSCD_Jerk** * **Random_SCD_Jerk** > **SCD_Decel** * **Random_SCD_Decel** > **SCD_Jerk** * **Random_SCD_Jerk** > **IdleCyl_Decel** * **RandomCylModDecel** > **IdleCyl_Jerk** * **RandomCylModJerk**			Catalyst Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP. Continuous	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR (Revmode Active AND (within one engine cycle: 2nd largest Lores_Decel)	> **CylModeDecel * PairCylModeDecel**				
			AND Above TRUE for))	> 40 engine cycles out of 100 engine cycles				
			BANK MISFIRE Cylinders above Bank Thresholds	>= 2 cylinders				
			(Medres_Decel	> **IdleSCD_Decel** * **Bank_SCD_Decel**				
			AND Medres_Jerk)	> **IdleSCD_Jerk** * **Bank_SCD_Jerk**				
			OR (Medres_Decel	> **SCD_Decel** * **Bank_SCD_Decel**				
			AND Medres_Jerk)	> **SCD_Jerk** * **Bank_SCD_Jerk**				
			OR (Lores_Decel	> **IdleCyl_Decel** * **BankCylModeDecel**				
			AND Lores_Jerk)	>**IdleCyl_Jerk** * **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 Illum.
			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) CYLINDER DEACTIVATION MODE (Active Fuel Managment)	> **IdleSCD_Decel** * **ConsecSCD_Decel** > **IdleSCD_Jerk** * **ConsecSCD_Jerk** > **SCD_Decel** * **ConsecSCD_Decel** > **SCD_Jerk** * **ConsecSCD_Jerk** > **IdleCyl_Decel** * **ConsecCylModDecel** > **IdleSCD_Jerk** * **ConsecCylModeJerk** > **CylModeDecel** * **ConsecCylModDecel** > **CylModeJerk** * **ConsecCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AFM: SINGLE CYLINDER CONTINUOUS MISFIRE (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) OR (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk)	> **CylModeDecel** * **ClyAfterAFM_Decel** > **CylModeJerk** * **CylAfterAFM_Jerk** > **CylModeDecel** * **CylBeforeAFM_Decel** > **CylModeJerk** * **ClyBeforeAFM_Jerk**				
			AFM: RANDOM MISFIRE Use random misfire thresholds If no misfire for (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk)	> 6 Engine Cycles > **CylModeDecel** * **ClyAfterAFM_Decel** * **RandomAFM_Decl** > **CylModeJerk** * **CylAfterAFM_Jerk** * **RandomAFM_Jerk** > **CylModeDecel** * **CylBeforeAFM_Decel** * **RandomAFM_Decl** > **CylModeJerk** * **ClyBeforeAFM_Jerk** * **RandomAFM_Jerk** - see details on Supporting Tables Tab				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Misfire Percent Emission Failure Threshold	≥ 2.08 % P0300				
			Misfire Percent Catalyst Damage	> **Catalyst_Damage_Misfire_Percentage** in Supporting Tables whenever secondary conditions are met.	(at low speed/loads, one cylinder may not cause cat damage) Engine Speed Engine Load Misfire counts	> 1,500 rpm AND > 30 % load AND < 180 counts on one cylinder		
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	≤ 0 FTP rpm AND ≤ 0 FTP % load				
					Engine Speed	400 < rpm < ((Engine Over Speed Limit) - 150) OR 8,191) Engine speed limit is a function of inputs like Gear and temperature see **EngineOverSpeedLimit** in supporting tables	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensor_TFTKO CrankSensor_FA CamLctnIntFA CamLctnExhFA CamSensorAnyLctnTFTKO AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus	4 cycle delay	
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnostic	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	7 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	< **ZeroTorqueEngLoad**	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					CARB approved 3000 rpm to redline triangle.)	or <**ZeroTorqueAFM** if AFM is active in Supporting Tables		
					Below zero torque: TPS Vehicle Speed	≤ 0.6 % (≤ 0.8 % in AFM) > 19 mph (> 19 mph AFM)	4 cycle delay	
					NEGATIVE TORQ AFM If deactivated cylinders appear to make power, torque is negative: DeactivatedCyl_Decel AND DeactivatedCyl_Jerk AND # of Deact Cyls Inverted	 <**DeacCylInversionDecel** <**DeacCylInversionJerk** > 2 cylinders	9 cycle delay	
					EGR Intrusive test	if 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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					****************************** **This Feature not used on Gasoline engines** Combustion Mode Driver cranks before Wait to Start lamp extinguishes Brake Torque ******************************	****************************** = **InfrequentRegen** value in Supporting Tables IF TRUE > 199.99 % Max Torque ******************************	******************* 0 cycle delay **WaitToStart** cycle delay 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: Stop filter early:	> "**Ring Filter**" # of engine cycles after misfire in Supporting Tables > "**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 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Engine Speed	> 900 rpm		
					Veh Speed	> 3 mph		
					Auto Transmission	not shifting		
					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	> **Abnormal SCD Mode**		
					Cyl Mode	> **Abnormal Cyl Mode**		
					Rev 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			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(recognized), or some disturbance like rough road (unrecognized). At the end of 100 engine cycle test, the ratio of 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	700 < rpm < 6,500		
					Veh Speed	> 0.6 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)	> Misfire_Jerk *** 1st_FireAftrMisfr_Jerk**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Or if AFM mode is active: > Misfire_ decel * **1stFireAftrMisAcelAFM** > Misfire_Jerk * **1stFireAfterMisJerkAFM**		
					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 ddt_jerk 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	2 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			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present.			
					Ratio of Unrecog/Recog	> 0.70	discard 100 engine cycle test	
					: NON-CRANKSHAFT BASED ROUGH ROAD:	Disabled		
					Rough Road Source	TOSS		
					IF Rough Road Source = WheelSpeedInECM			
					ABS/TCS	active		
					Wheel speed noise	> **WSSRoughRoadThres**	discard 100 engine cycle test	
					VSES	active		
					IF Rough Road Source = "FromABS"			
					ABS/TCS	active	discard 100 engine cycle test	
					RoughRoad	detected		
					VSES	active		
					IF Rough Road Source = "TOSS"			
					TOSS dispersion	>**TOSSRoughRoadThres** in supporting tables	discard 100 engine cycle test	
					AND No Active DTCs	Transmission Output Shaft Angular Velocity Validity		
						TransmissionEngagedState_FA (Auto Trans only)	4 cycle delay	
						ClutchPstnSnsr FA (Manual Trans only)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 2 Sensor A	P0345	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	 = 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		Continuous every 100 msec	
			No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle		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:	 CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	 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 Illum.
Camshaft Position (CMP) Sensor Performance Bank 2 Sensor A	P0346	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 first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle)	< 4 > 6	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:	CrankSensor_FA	Continuous every MEDRES event	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	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 Illum.
Camshaft Position (CMP) Sensor Circuit Bank 2 Sensor B	P0390	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	= 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		Continuous every 100 msec	
			No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle		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:	CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	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 Illum.
Camshaft Position (CMP) Sensor Performance Bank 2 Sensor B	P0391	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 first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle)	< 4 > 6	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:	CrankSensor_FA	Continuous every MEDRES event	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	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 Illum.
Cruise Control Multi-Function Input B Circuit	P0589	Detect when cruise control multi-function switch circuit B (analog) voltage is in an illegal range	Cruise Control analog circuit B voltage must be "between ranges" for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "between ranges" when the ratio is measured in the following ranges: 0.28 -0.31, 0.415-0.445, 0.585 - 0.615, 0.78 - 0.81, 1.005 - 1.035	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 0.500 seconds	Type C, No SVS ,Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-Function Input B Circuit Low	P0592	detects short to ground failure for cruise multi-function switch circuit B	Cruise Control analog circuit B voltage must be in an "Open Short To Ground" range for greater than a calibratable period of time.	The cruise control Circuit B analog voltage A/D count ratio is considered to be "open short to groun"d when the ratio is measured in the following rangs: 0 - 0.185	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-Function Input B Circuit High	P0593	detects short to power failure for cruise multi-function switch circuit B	Cruise Control analog circuit B voltage must be in a "Short To Power" range for greater than a calibratable period of time.	The cruise control Circuit B analog voltage A/D count ratio is considered to be "short to power" when the ratio is measured in the following range: 1.005 - 1.035	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft System Cold Start Performance – Bank 1	P05CC	Detects a VVT system error during Cold Starts by comparing the desired and actual cam positions when VVT is activated. This is the same type diagnostic as P0011 except this detects excessive deviations of position while the cold start phaser positions are being commanded.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	Cam Position Error > 4.00 deg.	**Intake Cam Phsr Enable**	= TRUE	60 failures out of 100 samples 100 ms /sample	Type B, 2 Trips
					System Voltage	> 11.00 Volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Catalyst Warmup Enabled	= TRUE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> 4.00 deg AND < 6.00 deg		
					Desired cam position variation	< 4.50 deg for (**P0011_P05CC_StablePositionTimeIc1**) seconds		
					No Active DTCs	P0010 P2088 P2089		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft System Cold Start Performance – Bank 2	P05CD	Detects a VVT system error during Cold Starts by comparing the desired and actual cam positions when VVT is activated. This is the same type diagnostic as P0021 except this detects excessive deviations of position while the cold start phaser positions are being commanded.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	Cam Position Error > 4.00 deg.	**Intake Cam Phsr Enable**	= TRUE	150 failures out of 200 samples 100 ms /sample	Type B, 2 Trips
					System Voltage	> 11.00 Volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Catalyst Warmup Enabled	= TRUE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> 4.00 deg AND < 6.00 deg		
					Desired cam position variation	< 4.50 deg for (**P0021_P05CD_StablePositionTimeIc2**) seconds		
					No Active DTCs	P0020 P2092 P2093		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module O2 Sensor Processor Performance Bank 1) (For use with WRAF	P064D	Diagnoses the WRAF Application-Specific Integrated Circuit (ASIC) for Controller Status and Measure Valid faults. These faults can impact closed loop fuel control. This DTC when enabled, monitors the two different failure counters it receives from the WRAF ASIC. The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the two individual fail and sample counters.	B1S1 WRAF ASIC indicates control module faults	Controller Status fail counts and Measure Valid fail counts are accumulated to determine fault status	Engine Run or Auto stop Heater Warm-up delay WRAF circuit diagnostic delay since power up	= True = Complete ≥ 20.0 sec	128 controller status fail counts out of 160 samples OR 128 measure valid fail counts out of 160 samples 25 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 Illum.
Internal Control Module O2 Sensor Processor Performance Bank 2) (For use with WRAF	P064E	Diagnoses the WRAF Application-Specific Integrated Circuit (ASIC) for Controller Status and Measure Valid faults. These faults can impact closed loop fuel control. This DTC when enabled, monitors the two different failure counters it receives from the WRAF ASIC. The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the two individual fail and sample counters.	B2S1 WRAF ASIC indicates control module faults	Controller Status fail counts and Measure Valid fail counts are accumulated to determine fault status	Engine Run or Auto stop Heater Warm-up delay WRAF circuit diagnostic delay since power up	= True = Complete ≥ 20.0 sec	128 controller status fail counts out of 160 samples OR 128 measure valid fail counts out of 160 samples 25 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 Illum.
Shared High Side Drive #1 Control Circuit Low (STG) - (GEN III Controllers ONLY)	P0658	Controller specific output driver circuit diagnoses the shared high sided driver # 1 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 Ω impedance between output and controller ground	Shared high side drive #1 low diag enable Powertrain relay voltage Run Crank voltage Powertrain relay state	= 1.00 >= 11.00 > 5.00 = ON	20 failures out of 25 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 Illum.
Shared High Side Drive #1 Control Circuit High (STP) - (GEN III Controllers ONLY)	P0659	Controller specific output driver circuit diagnoses the shared high sided driver # 1 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 output and controller power	Shared high side drive #1 diag enable Powertrain relay voltage Run Crank voltage Powertrain relay state	= 1.00 >= 11.00 > 5.00 = ON	20 failures out of 25 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 Illum.
Inlet Airflow System Performance (twin turbo)	P1101	Detects a performance failure in the Manifold Pressure (MAP) sensor, Turbocharger Boost Pressure sensor, Throttle Position sensor (TPS), Mass Air Flow (MAF) sensor or MAF B 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 five 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	See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when either MAF1 model fails or MAF2 model fails. MAF1 model fails when ABS(Measured MAF1 Flow – Modeled MAF1 Flow) Filtered MAF2 model fails when ABS(Measured MAF2 Flow – Modeled MAF2 Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered	> 20.0 grams/sec > 20.0 grams/sec > 25.0 kPa > 25.0 kPa > 25.0 kPa > 30.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. -	>= 400 RPM <= 6,500 RPM >= -9 Deg C = TRUE) <= 150 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Modeled MAF1 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** Modeled MAF2 Error multiplied by **P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on MAF Est** and	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 Illum.
		performance issue with the system, but no single failed sensor can uniquely be identified. In this case, the Inlet Airflow System Performance diagnostic will fail.	TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is	> 300 kPa*(g/s) > 30.0 kPa > 30.0 kPa > 1.5 seconds > 1.5 seconds	No Active DTCs: -	**P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on RPM** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 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 Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			TRUE when Mass Air Flow AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure -	> a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow** > a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 2.0 gm/sec < a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed See table	No Pending DTCs:	EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND Mass Air Flow - Filtered Mass Air Flow	**P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 2.0 gm/sec				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Metal Over temperature Active	P1258	The objective of the algorithm is to protect the engine in the event of engine metal overtemperature, mainly due to loss of coolant	Engine Coolant For a period	>= 132 °C >= 2 seconds	Engine Run Time If feature was active and it set the coolant sensor fault then feature will be enabled on coolant sensor fault pending on the next trip.	>= 30 Seconds	Fault present for >= 0 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Set/ Coast Signal 2 Circuit	P155B	Detects a failure of the cruise set 2 switch in a continously applied state	Cruise Control Set 2 switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Resume/ Acceleration Signal 2 Circuit	P155C	Detects a failure of the cruise resume 2 switch in a continously applied state	Cruise Control Resume 2 switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	MIL: Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Lane Center Switch Circuit	P1589	Detects failure for cruise lane centering control circuit	Lane Center Control switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 20.00 seconds	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Lane Center Signal Message Counter Incorrect	P158B	This DTC monitors for an error in communication with the Cruise Control Lane Center Signal	Communication of the Alive Rolling Count or Protection Value from the DC/DC Converter over CAN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	>= 3.00 seconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 25ms loop.	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auto Start Stop Select Switch Signal Circuit For start stop conventional hybrid applications	P15A3	BCM to ECM Rolling Count check for CAN frame $1E1. -- Only utilize when calibration variable KeINFG_e_HybridType equals CeINFR_e_StartStopConv.	Rolling count value received from BCM does not match expected value	= TRUE	Engine Speed Engine Speed Engine speed between min/max for Vehicle Speed for Hybrid type	≥ 200 RPM ≤ 7,500 RPM ≥ 5.0 seconds ≤ 318.14 MPH ≥ 5.0 seconds =CeINFR_e_StartStopConv	> 3 error counts for > 10.0 seconds 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 Illum.
Ignition Voltage Correlation #3	P16BC	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 Illum.
Turbocharger Boost Imbalance	P16E7	The DTC indicates that the provided boost pressure of the two parallel turbos can only be balanced with completely different waste gate solenoid duty cycles leading to very different waste gate positions.	Absolut value of (VeBSTR_Pct_TwinBalance = WastegateControl A - WastegateControl B)	> 15.00 %	Diagnostic enabled ***************************** Engine speed ***************************** No DTCs active: ***************************** No boost pressure control failsoft mode active: (VeBSTR_e_FsftAction) ***************************** Boost pressure closed loop control is active.	True ***************************** <= 6,800 rpm ***************************** MAF_SensorFA ***************************** = CeBSTR_e_NoFsftAction *****************************	18 Failed tests out of 25 tests 100ms/ sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Low– Bank 2	P2092	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 Ω impedance between signal and controller ground	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	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 Illum.
Intake Camshaft Actuator Solenoid Circuit High– Bank 2	P2093	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	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	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 Illum.
Exhaust Camshaft Actuator Solenoid Circuit Low – Bank 2	P2094	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 Ω impedance between signal and controller ground	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	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 Illum.
Exhaust Camshaft Actuator Solenoid Circuit High – Bank 2	P2095	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	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	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 Illum.
Barometric Pressure Sensor B Circuit Range/ Performance	P222B	Detects a performance failure in the Barometric Pressure (BARO) B sensor, such as when a BARO B 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 BARO B sensor value is checked to see if it is within the normal expected atmospheric pressure range. If it is not, then the BARO B performance diagnostic will fail. If the BARO B sensor value is within the normal expected atmospheric range, then Manifold Pressure (MAP), Turbocharger Boost Pressure, BARO and BARO B are compared to see if their values are similar. If the MAP, Turbocharger Boost Pressure and BARO sensor values are similar, but the BARO B value is not similar, then a BARO B performance diagnostic will fail.	**<u>Engine Running:</u>** Difference between Baro Pressure B reading and Estimated Baro when distance since last Estimated Baro update OR Difference between Baro Pressure B reading and Estimated Baro when distance since last Estimated Baro update	 > 20.0 kPa <= 1.24 miles > 25.0 kPa >1.24 miles	No Active DTCs:	AmbPresSnsr2_CktFA IAT_SensorFA MAF_Snsr2_FA AfterThrottlePressureFA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA TC_BoostPresSnsrFA	320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips
			<u>Engine Not Rotating:</u> Barometric Pressure B OR Barometric Pressure B OR ABS(Manifold Pressure - Turbocharger Boost Pressure) AND ABS(Manifold Pressure - Baro Pressure) AND ABS(Manifold Pressure - Baro Pressure B) AND ABS(Turbocharger Boost Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure B) AND ABS(Baro Pressure -	< 50.0 kPa > 115.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa <= 10.0 kPa > 10.0 kPa > 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	 > 10.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA AAP3_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP3_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		When the engine is running, there is an estimate of barometric pressure that is determined with the Turbocharger Boost Pressure sensor, engine air flow and engine speed. If the BARO B value from the sensor is not similar to this barometric pressure estimate, then the BARO B performance diagnostic will fail.	Baro Pressure B)					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor B Circuit Low (Gen III)	P222C	Detects a continuous short to ground in the Barometric Pressure (BARO) B signal circuit by monitoring the BARO B sensor output voltage and failing the diagnostic when the BARO B voltage is too low. The BARO B sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO B Voltage	< 40.0 % of 5 Volt Range (This is equal to 50.9 kPa)			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 Illum.
Barometric Pressure Sensor B Circuit High (Gen III)	P222D	Detects a continuous short to power or open circuit in the Barometric Pressure (BARO) B signal circuit by monitoring the BARO B sensor output voltage and failing the diagnostic when the BARO B voltage is too high. The BARO B sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO B Voltage	> 90.0 % of 5 Volt Range (This is equal to 115.0 kPa)			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 Illum.
Barometric Pressure Sensor B Circuit Intermittent/ Erratic	P222E	Detects a noisy or erratic signal in the barometric pressure (BARO) B circuit by monitoring the BARO B sensor and failing the diagnostic when the BARO B signal has a noisier output than is expected. When the value of BARO B 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 B readings. The result of this summation is called a “string length”. Since the BARO B signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic BARO B 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 B reading - BARO B reading from 12.5 milliseconds previous)	> 100 kPa 80 consecutive BARO B readings			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 Illum.
O2 Sensor Pumping Current Performance Bank 1 (For use with WRAF - E81	P223C	This DTC determines if the WRAF O2 sensor pumping current has an incorrect or out of range value. This DTC will detect open circuit faults to the Pump current, Ref Cell voltage, Ref Ground circuits. When enabled, the diagnostic monitors the pumping current in three different fault regions during DFCO. The individual diagnostic failure counters are incremented based on the diagnostic results in each region. The DTC is set based on any of the three individual fail and sample counters.	Fault condition present when the pump current is in any of the fault regions when this test is enabled during DFCO. Note: This ASIC is referred to as ATIC142 (Continental).	The three pump current fault regions are: A) Pump current > 5.00 ma B) Pump current ≤ 0.30 ma and ≥ - 0.30 ma C) Pump current < -0.10 ma The three fault regions have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	B1S1 DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) ************************** WRAF Ref cell temperature Test starts when time in DFCO Test stops when time in DFCO	P0135, P0030, P0031 or P0032 = Valid = Ready = True = Complete ≥ 20.0 seconds ≥ 628 Deg C ≥ 5.0 seconds > 12.0 seconds	Region A: 40 failures out of 160 samples OR Region B: 40 failures out of 160 samples OR Region C: 40 failures out of 160 samples Sample rate is 25 msec. Test enabled during DFCO.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Pumping Current Performance Bank 2 (For use with WRAF - E81	P223D	This DTC determines if the WRAF O2 sensor pumping current has an incorrect or out of range value. This DTC will detect open circuit faults to the Pump current, Ref Cell voltage, Ref Ground circuits. When enabled, the diagnostic monitors the pumping current in three different fault regions during DFCO. The individual diagnostic failure counters are incremented based on the diagnostic results in each region. The DTC is set based on any of the three individual fail and sample counters.	Fault condition present when the pump current is in any of the fault regions when this test is enabled during DFCO. Note: This ASIC is referred to as ATIC142 (Continental).	The three pump current fault regions are: A) Pump current > 5.00 ma B) Pump current ≤ 0.30 ma and ≥ - 0.30 ma C) Pump current < -0.10 ma The three fault regions have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	B2S1 DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) ************************** WRAF Ref cell temperature Test starts when time in DFCO Test stops when time in DFCO	P0155, P0050, P0051 or P0052 = Valid = Ready = True = Complete ≥ 20.0 seconds ≥ 628 Deg C ≥ 5.0 seconds > 12.0 seconds	Region A: 40 failures out of 160 samples OR Region B: 40 failures out of 160 samples OR Region C: 40 failures out of 160 samples Sample rate is 25 msec. Test enabled during DFCO.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Reference Resistance Out Of Range Bank 1	P223E	This DTC determines if the WRAF O2 sensor reference cell has an incorrect or out of range resistance value. This test compares the element's resistance (from the WRAF sensor Application-Specific Integrated Circuit (ASIC)) to the expected values for the enabled condition. The element temperature is directly related to the element resistance based on the released sensor element specifications. The diagnostic failure counter is incremented if the element temperature is outside the expected range. This DTC is set based on the fail and sample counters.	Measured Reference cell temperature	< 700 Deg C OR > 1,000.0 Deg C	B1S1 DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) Then Delay after WRAF circuit diagnostic delay **************************	P0135, P0030, P0031 or P0032 = Valid = Ready = True = Complete ≥ 20.0 seconds ≥ 0.0 seconds	64 failures out of 80 samples Sample rate is 25 msec Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Reference Resistance Out Of Range Bank 2	P223F	This DTC determines if the WRAF O2 sensor reference cell has an incorrect or out of range resistance value. This test compares the element's resistance (from the WRAF sensor Application-Specific Integrated Circuit (ASIC)) to the expected values for the enabled condition. The element temperature is directly related to the element resistance based on the released sensor element specifications. The diagnostic failure counter is incremented if the element temperature is outside the expected range. This DTC is set based on the fail and sample counters.	Measured Reference cell temperature	< 700 Deg C OR > 1,000.0 Deg C	B2S1 DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) Then Delay after WRAF circuit diagnostic delay **************************	P0155, P0050, P0051 or P0052 = Valid = Ready = True = Complete ≥ 20.0 seconds ≥ 0.0 seconds	64 failures out of 80 samples Sample rate is 25 msec Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
VVT Lock Control Open Ckt Bnk2	P25CD	Controller specific output driver circuit diagnoses the VVL park pin system 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.	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 Illum.
VVT Lock Control Low Ckt Bnk2	P25CE	Controller specific output driver circuit diagnoses the VVL park pin system 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 Ω impedance between signal and controller ground	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 Illum.
VVT Lock Control Hi Ckt Bnk2	P25CF	Controller specific output driver circuit diagnoses the VVL park pin system 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	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 Illum.
Crankshaft Position Signal Output Circuit High	P2619	Controller specific output driver circuit diagnoses the crankshaft position 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.	Short to power: <= 0.5 Ohms impedance between signal and controller power	Powertrain Relay Voltage Engine is not cranking Crankshaft Position Output is commanded low	>= 11.0 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type X, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Pumping Current Trim Circuit/Open Bank 1 Sensor 1 (For use with WRAF - E81	P2626	This DTC determines if the WRAF O2S trim circuit is open. The trim circuit fine tunes the WRAF O2S pump current signal. The diagnostic is an Application-Specific Integrated Circuit (ASIC) intrusive test which runs when the Run/Crank signal changes from False to True. The diagnostic failure counter is incremented if the ASIC test fails and the enable conditions are met. This DTC is set based on the fail and sample counters.	B1S1 Trim circuit Open test. This application uses the following type of WRAF sensor: The ASIC Open trim test detects a fault if the trim circuit resistance is: For NGK_ZFAS_U2 For Bosch_LSU_4p9 Note: This ASIC is referred to as ATIC142 (Continental).	CeWRSG_e_NGK_ZFAS_U2 > 4,644 ohms > 379.5 ohms	Run/Crank Signal WRAF circuit diagnostic delay (since heater Warm-up delay is complete) Fuel Control State Off Stoich Closed Loop DFCO WRAF Pump current	changes from false to true ≥ 20.0 seconds = Closed Loop = Not active = Not active ≤ 0.3 ma	128 fail counts out of 160 samples 25 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 Illum.
O2 Sensor Pumping Current Trim Circuit/Open Bank 2 Sensor 1 (For use with WRAF - E81	P2629	This DTC determines if the WRAF O2S trim circuit is open. The trim circuit fine tunes the WRAF O2S pump current signal. The diagnostic is an Application-Specific Integrated Circuit (ASIC) intrusive test which runs when the Run/Crank signal changes from False to True. The diagnostic failure counter is incremented if the ASIC test fails and the enable conditions are met. This DTC is set based on the fail and sample counters.	B2S1 Trim circuit Open test. This application uses the following type of WRAF sensor: The ASIC Open trim test detects a fault if the trim circuit resistance is: For NGK_ZFAS_U2 For Bosch_LSU_4p9 Note: This ASIC is referred to as ATIC142 (Continental).	CeWRSG_e_NGK_ZFAS_U2 > 4,644 ohms > 379.5 ohms	Run/Crank Signal WRAF circuit diagnostic delay (since heater Warm-up delay is complete) Fuel Control State Off Stoich Closed Loop DFCO WRAF Pump current	changes from false to true ≥ 20.0 seconds = Closed Loop = Not active = Not active ≤ 0.3 ma	128 fail counts out of 160 samples 25 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 Illum.
Shared High Side Drive #2 Control Circuit Low (STG) - (GEN III Controllers ONLY)	P2670	Controller specific output driver circuit diagnoses the shared high sided driver # 2 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 Ω impedance between output and controller ground	Shared high side drive #2 low diag enable Powertrain relay voltage Run Crank voltage Powertrain relay state	= 1.00 >= 11.00 > 5.00 = ON	20 failures out of 25 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 Illum.
Shared High Side Drive #2 Control Circuit High (STP) - (GEN III Controllers ONLY)	P2671	Controller specific output driver circuit diagnoses the shared high sided driver # 2 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 output and controller power	Shared high side drive #2 diag enable Powertrain relay voltage Run Crank voltage Powertrain relay state	= 1.00 >= 11.00 > 5.00 = ON	20 failures out of 25 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 Illum.
Cylinder 2 Deactivation Solenoid Control Circuit/Open	P3409	Controller specific output driver circuit diagnoses the Cylinder 2 Deactivation 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.	Open Circuit: ≥ 200 k Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3411 may also set (Cylinder 2 Deactivation Solenoid Control Circuit/ Low)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Deactivation Solenoid Control Circuit/Low	P3411	Controller specific output driver circuit diagnoses the Cylinder 2 Deactivation 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.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3409 may also set (Cylinder 2 Deactivation Solenoid Control Circuit/ Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Deactivation Solenoid Control Circuit/High	P3412	Controller specific output driver circuit diagnoses the Cylinder 2 Deactivation 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.	Short to Power ≤ 0.5 Ω impedance between output and controller power	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Deactivation Solenoid Control Circuit/Open	P3433	Controller specific output driver circuit diagnoses the Cylinder 5 Deactivation 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.	Open Circuit: ≥ 200 k Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3435 may also set (Cylinder 5 Deactivation Solenoid Control Circuit/ Low)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Deactivation Solenoid Control Circuit/Low	P3435	Controller specific output driver circuit diagnoses the Cylinder 5 Deactivation 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.	Controller specific output driver circuit diagnoses the Cylinder 3 Deactivation 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.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3433 may also set (Cylinder 5 Deactivation Solenoid Control Circuit/ Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Deactivation Solenoid Control Circuit/High	P3436	Controller specific output driver circuit diagnoses the Cylinder 5 Deactivation 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.	Short to Power ≤ 0.5 Ω impedance between output and controller power	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Transfer Case Control Module	U0102	This DTC monitors for a loss of communication with the transfer case control module	Message is not received from controller for Message $1CB Message $1CC	 ≥ 10.0 seconds ≥ 0.5 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 Volts	Diagnostic runs in 12.5 ms loop	Type C, No SVS "Special Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for	> 0.4000 seconds		
					U0102	Not Active on Current Key Cycle		
					TCCM	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication LIN Bus 1 Off	U1501	This DTC monitors for a LIN bus off condition	LIN bus off failures	>= 3.00 counts	The following criteria have been enabled for Power Mode Run/Crank Voltage	>= 400.00 milliseconds =Run >= 11.00 Volts	Dependent on bus loading.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
LIN Bus 1 Lost Communication with Device 0 (Shutter 1)	U1510	This DTC monitors for a loss of communication on the LIN bus with Shutter 1	ECM has lost communication over the LIN bus with Device 0 / Shutter 1 for	>= 3.00 counts	The following criteria have been enabled for Power Mode Run/Crank Voltage	>= 400.00 milliseconds =Run >= 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 Illum.
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 Ω 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 Illum.
O2S Heater Control Circuit Bank2 Sensor1	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 Ω 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 Illum.
O2S Heater Control Circuit Bank2 Sensor1	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 Ω 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 Illum.
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 Ω 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 Illum.
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 Ω 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 Illum.
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 Ω 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 Illum.
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 ºC > 28,800 seconds ≥ -30.0 ºC < 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 Illum.
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 ºC > 28,800 seconds ≥ -30.0 ºC < 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 Illum.
Intake Air Pressure Measurement System - Multiple Sensor Correlation (supercharged)	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), Supercharger Inlet Pressure (SCIAP) 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, SCIAP and BARO are compared to see if their values are similar. If two of these three sensors are similar, but the third is not, then a performance diagnostic for the specific sensor with the dissimilar value will fail. If there is no combination of two of these three sensors	ABS(Manifold Pressure - Baro Pressure) AND ABS(Supercharger Inlet Pressure - Manifold Pressure) AND ABS(Supercharger Inlet Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Supercharger Inlet Pressure - Manifold Pressure) AND ABS(Supercharger Inlet Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Supercharger Inlet Pressure - Manifold Pressure) AND ABS(Supercharger Inlet Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Supercharger Inlet Pressure - Manifold	> 10.0 kPa <= 10.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa <= 10.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa > 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 Supercharger Inlet Pressure Supercharger Inlet Pressure No Active DTCs: No Pending DTCs:	> 8.0 seconds >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa EngineModeNotRunTimer Error MAP_SensorFA SCIAP_SensorFA AAP2_SnsrFA MAP_SensorCircuitFP SCIAP_SensorCircuitFP AAP2_SnsrCktFP	4 failures out of 5 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 Illum.
		that is similar, then the failed sensor cannot be uniquely identified. The Multiple Pressure Sensor Correlation Diagnostic will fail in this case.	Pressure) AND ABS(Supercharger Inlet Pressure - Baro Pressure)	> 10.0 kPa > 10.0 kPa				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Press Regulator Solenoid Supply Voltage Control High Side Circuit Open	P00C8	Controller specific output driver circuit diagnoses High Pressure pump Control 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 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 Illum.
Mass Air Flow System Performance (supercharged)	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, Supercharger Inlet Pressure (SCIAP) 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	See table **P0101, P0106, P0121, P012B, P1101: Supercharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. TPS model fails when Filtered Throttle Model Error MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 400 kPa*(g/s) > 30.0 grams/sec > 30.0 kPa > 30.0 kPa > 25.0 kPa > 25.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -7 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 129 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost**	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 Illum.
		will fail.			-	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** SCIAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P1101: SCIAP1 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost** SCIAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P1101: SCIAP2 Residual Weight Factor based on RPM** and		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost		
					No Active DTCs:	MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA SCIAP_SensorCircuitFA AmbientAirDefault		
					No Pending DTCs:	EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP SCIAP_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Performance (supercharged)	P0106	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. If the MAP sensor value is within the normal expected atmospheric range, then MAP, Supercharger Inlet Absolute Pressure (SCIAP), and Barometric Pressure (BARO) are compared to see if their values are similar. If the SCIAP and BARO sensor values are similar, but the MAP value is not similar, then a MAP performance diagnostic will fail. The engine running portion of this diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled	**<u>Engine Running:</u>** See table **P0101, P0106, P0121, P012B, P1101: Supercharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. TPS model fails when Filtered Throttle Model Error MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 400 kPa*(g/s) > 30.0 grams/sec > 30.0 kPa > 30.0 kPa > 25.0 kPa > 25.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -7 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 129 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost**	Continuous Calculation are performed every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		values of sensors from other sensors. The other sensors are the Mass Air Flow (MAF) sensor, Supercharger Inlet Pressure (SCIAP) 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 MAP sensor. In this case, the MAP Performance diagnostic will fail.				MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** SCIAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P1101: SCIAP1 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost** SCIAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P1101: SCIAP2 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No Active DTCs: No Pending DTCs:	MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA SCIAP_SensorCircuitFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP SCIAP_SensorCircuitFP		
			Engine Not Rotating: Manifold Pressure OR Manifold Pressure OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Supercharger Inlet Pressure - Manifold Pressure) AND ABS(Supercharger Inlet Pressure - Baro Pressure)	< 50.0 kPa > 115.0 kPa > 10.0 kPa > 10.0 kPa <= 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 8.0 seconds EngineModeNotRunTimerError MAP_SensorFA SCIAP_SensorFA AAP2_SnsrFA MAP_SensorCircuitFP SCIAP_SensorCircuitFP AAP2_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 LowFuelCondition Diag ================== Block Heater detection is enabled when either of the following occurs: 1) ECT at power up > IAT at power up by 2) Cranking time ================== Block Heater is detected and diagnostic is aborted when 1) or 2) occurs: 1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows:	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunning Valid = Not occurred = False = False ≥ -9 ºC = False ================== > 19.3 ºC < 10.0 seconds ================== > 400 seconds with > 15 MPH 0.00 times the seconds with vehicle speed below 1b	1 failure 500 msec/ sample 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 Illum.
					1d) IAT drops from power 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 ºC ≥ 1 ºC Within ≤ 30 seconds ================== > 1800 seconds ≤ -9 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle Position Sensor Performance (supercharged)	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, Supercharger Inlet Pressure (SCIAP) 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	See table **P0101, P0106, P0121, P012B, P1101: Supercharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. TPS model fails when Filtered Throttle Model Error MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 400 kPa*(g/s) > 30.0 grams/sec > 30.0 kPa > 30.0 kPa > 25.0 kPa > 25.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -7 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 129 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost**	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 Illum.
		Performance diagnostic will fail.			-	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** SCIAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P1101: SCIAP1 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost** SCIAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P1101: SCIAP2 Residual Weight Factor based on RPM** and		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost		
					No Active DTCs:	MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA SCIAP_SensorCircuitFA AmbientAirDefault		
					No Pending DTCs:	EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP SCIAP_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Supercharger Inlet Absolute Pressure (SCIAP) Sensor Performance	P012B	Detects a performance failure in the Supercharger Inlet Absolute Pressure (SCIAP) sensor, such as when a SCIAP 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 SCIAP sensor value is checked to see if it is within the normal expected atmospheric pressure range. If it is not, then the SCIAP performance diagnostic will fail. If the SCIAP sensor value is within the normal expected atmospheric range, then Manifold Pressure (MAP), SCIAP and Barometric Pressure (BARO) are compared to see if their values are similar. If the MAP and BARO sensor values are similar, but the SCIAP value is not similar, then a SCIAP performance diagnostic will fail. The engine running portion of this	**Engine Running:** See table **P0101, P0106, P0121, P012B, P1101: Supercharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. TPS model fails when Filtered Throttle Model Error MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 400 kPa*(g/s) > 30.0 grams/sec > 30.0 kPa > 30.0 kPa > 25.0 kPa > 25.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -7 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 129 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 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**	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 Illum.
		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, 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 SCIAP sensor. In this case, the SCIAP Performance diagnostic will fail.			 No Active DTCs: No Pending DTCs:	MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA SCIAP_SensorCircuitFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP SCIAP_SensorCircuitFP		
			<u>**Engine Not Rotating:**</u> Supercharger Inlet		Time between current ignition cycle and the last time the engine was		4 failures out of 5 samples	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pressure OR Supercharger Inlet Pressure OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Supercharger Inlet Pressure - Manifold Pressure) AND ABS(Supercharger Inlet Pressure - Baro Pressure)	< 50.0 kPa > 115.0 kPa <= 10.0 kPa > 10.0 kPa > 10.0 kPa	running Engine is not rotating No Active DTCs: No Pending DTCs:	> 8.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA SCIAP_SensorCircuitFA AAP2_SnsrCktFA MAP_SensorCircuitFP SCIAP_SensorCircuitFP AAP2_SnsrCktFP	1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Supercharger Inlet Absolute Pressure (SCIAP) Sensor Circuit Low (Gen II)	P012C	Detects a continuous short to ground or open circuit in the Supercharger Inlet Absolute Pressure (SCIAP) signal circuit by monitoring the SCIAP sensor output voltage and failing the diagnostic when the SCIAP voltage is too low. The SCIAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	SCIAP Voltage	< 3.0 % of 5 Volt Range (This is equal to 6.1 kPa)	Continuous		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 Illum.
Supercharger Inlet Absolute Pressure (SCIAP) Sensor Circuit High (Gen II)	P012D	Detects a continuous short to power in the Supercharger Inlet Absolute Pressure (SCIAP) signal circuit by monitoring the SCIAP sensor output voltage and failing the diagnostic when the SCIAP voltage is too high. The SCIAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	SCIAP Voltage	> 97.0 % of 5 Volt Range (This is equal to 124.0 kPa)	Continuous		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 Illum.
O2 Sensor Slow Response Rich to Lean Bank 2 Sensor 2	P013C	The P013C diagnostic is the third in a sequence of six intrusive secondary O2 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary O2 sensor has an slow response to an A/F change from Rich to Lean and thereby can no longer be used for secondary O2 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 O2 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 O2 sensor voltage response rate	Primary Method: The EWMA of the Post O2 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.30 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 ≤ 7.5 units > 70.0 grams (upper voltage threshold is 450 mvolts and lower voltage threshold is 150 mvolts)	No Active DTC's B2S2 DTC's 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 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 DTC's") = 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 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 Illum.
		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. DTC P013C 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. 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. < 100.0 Nm P2272 P014A ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		This fault is set if the secondary O2 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 Illum.
O2 Sensor Slow Response Lean to Rich Bank 2 Sensor 2	P013D	The P013D diagnostic is the sixth in a sequence of six intrusive secondary O2 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary O2 sensor has an slow response to an A/F change from Lean to Rich and thereby can no longer be used for secondary O2 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 O2 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 O2 sensor voltage response rate	Primary Method: The EWMA of the Post O2 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.30 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 ≤ 7.5 units > 200 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 650 mvolts)	No Active DTC's B2S2 DTC's Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition Green Cat System	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 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 DTC's") = 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 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 Illum.
		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. DTC P013D 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. Secondary method:			Condition Low Fuel Condition Only when FuelLevelDataFault Post fuel cell DTC's Passed =================== After above conditions are met: Fuel Enrich mode continued. ================= During this test the following must stay TRUE or the test will abort:	= 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 ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		This fault is set if the secondary O2 sensor does not achieve the required upper voltage threshold before the accumulated mass air flow threshold is reached.			0.950 ≤ Base Commanded EQR ≤ 1.100			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 2 Sensor 2	P014A	The P014A diagnostic is the second in a sequence of six intrusive secondary O2 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary O2 sensor has an initial delayed response to an A/F change from Rich to Lean and thereby can no longer be used for secondary O2 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 O2 sensor does not achieve the required voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor voltage AND The Accumulated mass air flow 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	> 450 mvolts > 45 grams > 1 secs ≥ 8 grams	No Active DTC's B2S2 DTC's 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 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 DTC's") = 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 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 B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Low Fuel Condition Only when FuelLevelDataFault Post fuel cell Crankshaft Torque DTC's Passed Number of fueled cylinders =================== After above conditions are met: DFCO mode entered (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. < 100.0 Nm P2272 ≤ 7 cylinders ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 2 Sensor 2	P014B	The P014B diagnostic is the fifth in a sequence of six intrusive secondary O2 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary O2 sensor has an initial delayed response to an A/F change from Lean to Rich and thereby can no longer be used for secondary O2 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 O2 sensor does not achieve the required voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor AND The Accumulated mass air flow monitored during the Delayed Response Test	< 350 mvolts > 250 grams.	No Active DTC's	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	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
					B2S2 DTC's Not Active this key cycle	P013C, P013D, P014A, P2272 or P2273		
					System Voltage	> 10.0 Volts		
					Learned heater resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Green O2S Condition	= 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 is above 22.0 grams/sec.		
					Green Cat System			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	P2272 P014A P013C P2273		
					Number of fueled cylinders	≥ 1 cylinders		
					================== After above conditions are met: Fuel Enrich mode entered. ================ During this test the following must stay TRUE or the test will abort:	==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					0.950 ≤ Base Commanded EQR ≤ 1.100			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 2 Sensor 1	P0151	This DTC determines if the O2 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S 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	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	0.992 ≤ ratio ≤ 1.014 175 ≤ APC ≤ 800 mgrams		
					Fuel Control State Closed Loop Active	= Closed Loop = TRUE (Please see "**Closed Loop Enable**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Clarification" in Supporting Tables). Enabled (On) ≤ 87 % Ethanol		
					All Fuel Injectors for active Cylinders Fuel Condition			
					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 Illum.
O2S Circuit High Voltage Bank 2 Sensor 1	P0152	This DTC determines if the O2 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S 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 Illum.
O2S Slow Response Bank 2 Sensor 1) (For use with ESPD and w/o WRAF	P0153	This DTC determines if the Bank 2 primary O2 sensor has a slow response (in the Rich to Lean (R2L) or Lean to Rich (L2R) direction) and thereby can no longer be used for closed loop fuel control based on emission correlation testing. This diagnostic runs passively (see enable conditions) and monitors the time the O2 sensor signal is between an upper and lower voltage thresholds over the sample period. The diagnostic also monitors the O2 sensor signal for the number of Slope Time (ST) switches in each direction between the same upper and lower voltage thresholds over the sample period. When the required data is collected, an average R2L and L2R response time and individual R2L and L2R Slope Time (ST) switch count is calculated. This fault is set when the L2R and R2L response test results are compared to the	Fault condition present when the average response time is caluclated over the test time, and compared to the threshold. OR Slope Time L/R Switches OR Slope Time R/L Switches	Refer to **P0153_O2S Slow Response Bank 2 Sensor 1 Pass/Fail Threshold table** in the Supporting Tables tab < 3 < 3 The test averages the signal response time over 60.0 seconds when the signal is transitioning between 300 mvolts and 600 mvolts. An average rich to lean time and lean to rich time are each calculated separately. Note: the table listed above uses the following calibratable X axis: **P0153_KnEOSD_t_ST_LRC_LimRS2** and calibratable Y axis:	No Active DTC's Bank 2 Sensor 1 DTC's not active 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 Ethanol Composition Sensor FA EngineMisfireDetected_FA = P0151, P0152 or P0154 > 10.0 Volts = Not active = Not active = Not active = Not active = False = False = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than	Sample time is 60 seconds Frequency: Once per trip	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		"P0153_O2S Slow Response Bank 1 Sensor 1 "Pass/Fail Threshold Table" and the outcome determines a response faulted condition. Additionally, this fault is set when the L2R or R2L slope time switch count test results are less than the ST individual thresholds.		**P0153_KnEOSD_t_ST_RLC_LimRS2**		**Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.		
					O2 Heater on for	≥ 40 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 50 ºC		
					(Or OBD Coolant Enable Criteria	= TRUE)		
					IAT	> -40 ºC		
					Engine run Accum	> 30 seconds		
					Time since any AFM status change	> 2.0 seconds		
					Time since Purge On to Off change	> 1.0 seconds		
					Time since Purge Off to On change	> 2.0 seconds		
					Engine airflow	15 ≤ grams/sec ≤ 55		
					Engine speed	1,000 ≤ RPM ≤ 3,000		
					Fuel Condition	< 87 % Ethanol		
					Baro	> 70 kpa		
					Air Per Cylinder	≥ 175 mGrams		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE (Please see "**Closed Loop Enable Clarification**" in		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					 LTM (Block Learn) fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain ================= All of the above met for	Supporting Tables). = Enabled, refer to **Multiple DTC Use - Response Cell Enable Table** for additional info. ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active ≥ 0.0 % ================ > 3.5 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 2 Sensor 1	P0155	This DTC determines if the O2 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	8 failures out of 10 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 Illum.
O2S Circuit Low Voltage Bank 2 Sensor 2	P0157	This DTC determines if the O2 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S 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	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	320 failures out of 400 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	0.992 ≤ ratio ≤ 1.014 175 ≤ mgrams ≤ 800 = 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 Illum.
					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 > 2.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 2 Sensor 2	P0158	This DTC determines if the O2 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S 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 Illum.
O2 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 O2 monitor rich to lean tests (P014A / P013C / P2273), which commands fuel cut off. Note: The Primary method is used when the primary O2 sensor signal transitions from above to below the O2 voltage threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P015C diagnostic measures the primary O2 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 air flow rate, engine speed, Baro, and intake air temperature resulting in a normalized delay	Primary method: The EWMA of the Pre O2 sensor normalized R2L time delay value. The EWMA repass limit is The EWMA calculation uses a 0.25 coefficient. OR Secondary method: The Accumulated time monitored during the R2L Delayed Response Test. AND Pre O2 sensor voltage is above	> 0.60 EWMA (sec) ≤ 0.58 EWMA (sec) ≥ 2.0 Seconds > 550 mvolts	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, P014A, 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 Illum.
		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. Secondary method: This fault is set if the primary O2 sensor does not achieve the required lower voltage threshold before a delay time threshold is reached.			O2 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 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. ≥ 40 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 50 ºC = TRUE) > -40 ºC > 30 seconds 1,075 ≤ RPM ≤ 2,000 1,000 ≤ RPM ≤ 2,050 4.0 ≤ gps ≤ 20.0 44.7 ≤ MPH ≤ 82.0 37.3 ≤ MPH ≤ 87.0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 ================== 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 Fuel State Number of fueled cylinders ================== After above conditions are	0.74 ≤ C/L Int ≤ 1.08 = 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). > 70 kpa = enabled = not active = not active ≥ 60.0 sec 500 ≤ ºC ≤ 1,000 = DFCO possible ================ =============== ≥ 790 mvolts = DFCO active <= 7 cylinders ===============		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
O2 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 O2 monitor lean to rich tests (P014B / P013D), which commands fuel enrichment. Note: The Primary method is used when the primary O2 sensor signal transitions from lean condition to above the O2 voltage threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P015D diagnostic measures the primary O2 sensor response time between a lean condition and a higher voltage threshold. The response time is then scaled and normalized to mass air flow 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 O2 sensor normalized L2R time delay value. The EWMA repass limit is The EWMA calculation uses a 0.25 coefficient. OR Secondary method: The Accumulated time monitored during the L2R Delayed Response Test. AND Pre O2 sensor voltage is below OR At end of Cat Rich stage the Pre O2 sensor output is	> 0.60 EWMA (sec) ≤ 0.58 EWMA (sec) ≥ 2.0 Seconds < 350 mvolts < 790 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, P014A, 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 Illum.
		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 O2 sensor does not achieve the required higher voltage threshold before a delay time threshold is reached.			Green O2S Condition O2 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 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: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. ≥ 40 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 50 ºC = TRUE) > -40 ºC > 30 seconds 1,075 ≤ RPM ≤ 2,000 1,000 ≤ RPM ≤ 2,050 4.0 ≤ gps ≤ 20.0 44.7 ≤ MPH ≤ 82.0 37.3 ≤ MPH ≤ 87.0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Closed loop integral	0.74 ≤ C/L Int ≤ 1.08		
					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	> 70 kpa		
					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	500 ≤ ºC ≤ 1,000		
					Fuel State	= DFCO inhibit		
					Number of fueled cylinders	≥ 1 cylinders		
					=================	=================		
					When above conditions are met: Fuel Enrich mode is entered.			
					================	=================		
					During this test: Engine Airflow must stay between:	3 ≤ gps ≤ 20		
					and the delta Engine Airflow over 12.5msec must be :	≤ 100.0 gps		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 2 Sensor 2	P0161	This DTC determines if the O2 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	8 failures out of 10 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 Illum.
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)	>= 1.295 >= 0.100 If a fault has been detected the long-term fuel trim metric must be < 1.295 and the short-term fuel trim metric must be < 2.000 to repass the diagnostic.	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 Closed Loop Long Term FT	375 <rpm< 7,000 > 70 kPa > -20 °C (or OBD Coolant Enable Criteria = TRUE) < 150 °C 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 > 10 % or if fuel sender is faulty the diagnostic will bypass the fuel level criteria. > 30.0 seconds of data must accumulate on each trip, with at least 20.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made. (Please see **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage** in Supporting Tables for a list of cells utilized for diagnosis) Enabled Enabled (Please see "**Closed Loop Enable Clarification**" and "**Long Term FT Enable Criteria**" in Supporting Tables.)	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 Illum.
					EGR Diag.	Intrusive Test Not Active		
					Catalyst Diag.	Intrusive Test Not Active		
					Post O2 Diag.	Intrusive Test Not Active		
					Device Control	Not Active		
					EVAP Diag.	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 Illum.
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. ***************************** <= 100.00 % 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 > 0.0 grams,	Frequency: 100 ms Continuous Loop ******************* **Segment Definition:** Segments can last up to 30 seconds and are separated by the lesser of 20.0 seconds of purge-on time or enough time to purge 16 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 Illum.
		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		0.705 and the short-term fuel trim metric must be > 0.000 to repass the diagnostic. The intrusive test will be enabled at long-term fuel metric values < 0.71 until the diagnostic repasses after a failure.		the intrusive test will not be inhibited even if Purge Vapor Fuel is > 100.0 %. (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 200.0 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 Illum.
		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 Illum.
Engine Oil Temperature (EOT) Circuit Low	P0197	Controller specific output driver circuit diagnoses the Engine Oil Temperature (EOT) Sensor 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.	Engine Oil Temperature Sensor (EOT) Circuit Resistance	< 25 ohms	Diagnostic Status	Enabled	20 failures out of 50 samples Sampled every 1 second	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Temperature (EOT) Circuit High	P0198	Controller specific output driver circuit diagnoses the Engine Oil Temperature (EOT) Sensor 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.	Engine Oil Temperature Sensor (EOT) Circuit Resistance	> 450,000 ohms	Diagnostic Status Engine Run Time OR ECT	Enabled > 20.0 seconds >= -20 Deg C	20 failures out of 50 samples Sampled every 1 second	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
Turbo/Super Charger Intercooler Coolant Pump Control Circuit If Intercooler pump are present	P023A	Controller specific output driver circuit diagnoses the 'charged air cooler 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.	≥ 200 K Ω impedance between output and controller ground	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine is not cranking Diagnostic system not disabled	True ***************************** >= 11.0 Volts > 5.00 Volts *****************************	50 failures out of 63 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P023B may also set turbo/ super charger intercooler coolant pump control circuit low

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbo/Super Charger Intercooler Coolant Pump Control Circuit Low If Intercooler pump are present	P023B	Controller specific output driver circuit diagnoses the 'charged air cooler 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. In certain controlers this diagnosis runs only when the HWIO-output is driven by the application S/W.	≤ 0.5 Ω impedance between output and controller ground	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine is not cranking Diagnostic system not disabled	True ***************************** >= 11.0 Volts > 5.00 Volts *****************************	50 failures out of 63 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P023A may also set turbo/ super charger intercooler coolant pump control circuit

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbo/Super Charger Intercooler Coolant Pump Control Circuit High If Intercooler pump are present	P023C	Controller specific output driver circuit diagnoses the 'charged air cooler 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. In certain controlers this diagnosis runs only when the HWIO-output is driven by the application S/W.	≤ 0.5 Ω impedance between output and controller power	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine is not cranking Diagnostic system not disabled	True ***************************** >= 11.0 Volts > 5.00 Volts *****************************	50 failures out of 63 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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.	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 (Lores_Decel Lores_Jerk OR (Lores_Decel Lores_Jerk OR RevBalanceTime)	- see details of thresholds on Supporting Tables Tab > **IdleSCD_Decel** AND > **IdleSCD_Jerk)** > **SCD_Decel** AND > **SCD_Jerk)** > **IdleCyl_Decel** AND > **IdleCyl_Jerk)** > **CylModeDecel** AND > **CylModeJerk)** >**RevMode_Decel**	Engine Run Time Engine Coolant Temp Or If ECT at startup Then ECT 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 -9 ºC < ECT < 130 ºC < -9 ºC 21 ºC < ECT < 130 ºC 9.00 < volts < 32.00 < 40.00 % per 25 ms < 40.00 % 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 any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage.	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 Illum.
			***************************** **This Feature not used on Gasoline engines** Combustion Modes that force selection of Idle Tables ***************************** Other patterns of misfire use adjustments to the single cylinder continuous misfire threshold tables: RANDOM MISFIRE Use random misfire thresholds If no misfire for (Medres_Decel AND Medres_Jerk) OR (Medres_Decel AND Medres_Jerk) OR (Lores_Decel AND Lores_Jerk)	************************* **This Feature not used on Gasoline engines** **CombustModeIdleTbl** in Supporting Tables ************************* > 3 Engine Cycles > **IdleSCD_Decel** * **Random_SCD_Decel** > **IdleSCD_Jerk** * **Random_SCD_Jerk** > **SCD_Decel** * **Random_SCD_Decel** > **SCD_Jerk** * **Random_SCD_Jerk** > **IdleCyl_Decel** * **RandomCylModDecel** > **IdleCyl_Jerk** * **RandomCylModJerk**			Catalyst Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP. Continuous	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR (Revmode Active AND (within one engine cycle: 2nd largest Lores_Decel) AND Above TRUE for)) BANK MISFIRE Cylinders above Bank Thresholds (Medres_Decel AND Medres_Jerk) OR (Medres_Decel AND Medres_Jerk) OR (Lores_Decel AND Lores_Jerk) OR (Lores_Decel AND Lores_Jerk)	> **CylModeDecel * PairCylModeDecel** > 50 engine cycles out of 100 engine cycles >= 2 cylinders > **IdleSCD_Decel** * **Bank_SCD_Decel** > **IdleSCD_Jerk** * **Bank_SCD_Jerk** > **SCD_Decel** * **Bank_SCD_Decel** > **SCD_Jerk** * **Bank_SCD_Jerk** > **IdleCyl_Decel** * **BankCylModeDecel** >**IdleCyl_Jerk** * **BankCylModeJerk** > **CylModeDecel** * **BankCylModeDecel** > **CylModeJerk** * **BankCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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) CYLINDER DEACTIVATION MODE (Active Fuel Managment)	> **IdleSCD_Decel** * **ConsecSCD_Decel** > **IdleSCD_Jerk** * **ConsecSCD_Jerk** > **SCD_Decel** * **ConsecSCD_Decel** > **SCD_Jerk** * **ConsecSCD_Jerk** > **IdleCyl_Decel** * **ConsecCylModDecel** > **IdleSCD_Jerk** * **ConsecCylModeJerk** > **CylModeDecel** * **ConsecCylModDecel** > **CylModeJerk** * **ConsecCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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 CylBeforeDeacCyl_Jerk)	> **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** > **CylModeJerk** * **ClyBeforeAFM_Jerk** * **RandomAFM_Jerk** - see details on Supporting Tables Tab				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Misfire Percent Emission Failure Threshold	≥ 2.21 % P0300				
			Misfire Percent Catalyst Damage	> **Catalyst_Damage_Misfire_Percentage** in Supporting Tables whenever secondary conditions are met.	(at low speed/loads, one cylinder may not cause cat damage) Engine Speed Engine Load Misfire counts	 > 1,000 rpm AND > 10 % load AND < 180 counts on one cylinder		
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	≤ 0 FTP rpm AND ≤ 0 FTP % load				
					Engine Speed	375 < 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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensor_TFTKO CrankSensor_FA CamLctnIntFA CamLctnExhFA CamSensorAnyLctnTFTKO AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus	4 cycle delay	
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnostic	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	7 cycle delay	
					Undetectable engine speed and engine load region	***Undetectable region*** from Malfunction Criteria	4 cycle delay	
					Abusive Engine Over Speed	> 7,100 rpm	1,250 cycle delay	
					Below zero torque (except	< **ZeroTorqueEngLoad**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					CARB approved 3000 rpm to redline triangle.)	or <**ZeroTorqueAFM** if AFM is active in Supporting Tables	4 cycle delay	
					Below zero torque: TPS Vehicle Speed	≤ 0.5 % (≤ 0.5 % in AFM) > 30 mph (> 19 mph AFM)	4 cycle delay	
					NEGATIVE TORQ AFM If deactivated cylinders appear to make power, torque is negative: DeactivatedCyl_Decel AND DeactivatedCyl_Jerk AND # of Deact Cyls Inverted	<**DeacCylInversionDecel** <**DeacCylInversionJerk** > 3 cylinders	2 cycle delay	
					EGR Intrusive test	if 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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					****************************** **This Feature not used on Gasoline engines** Combustion Mode Driver cranks before Wait to Start lamp extinguishes Brake Torque ******************************	****************************** = **InfrequentRegen** value in Supporting Tables IF TRUE > 199.99 % Max Torque ******************************	******************* 4 cycle delay **WaitToStart** cycle delay 4 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: Stop filter early:	> "**Ring Filter**" # of engine cycles after misfire in Supporting Tables > "**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 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Engine Speed	> 950 rpm		
					Veh Speed	> 3 mph		
					Auto Transmission	not shifting		
					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	> **Abnormal SCD Mode**		
					Cyl Mode	> **Abnormal Cyl Mode**		
					Rev 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			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(recognized), or some disturbance like rough road (unrecognized). At the end of 100 engine cycle test, the ratio of 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	Enabled		
					Pattern Recog Enabled consecutive cyl pattrn	Enabled		
					Engine Speed Veh Speed	900 < rpm < 3,000 > 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)	> Misfire_Jerk ***** **1st_FireAftrMisfr_Jerk**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Or if AFM mode is active: > Misfire_ decel * **1stFireAftrMisAcelAFM** > Misfire_Jerk * **1stFireAfterMisJerkAFM**		
					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 ddt_jerk 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			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present.			
					Ratio of Unrecog/Recog	> 0.60	discard 100 engine cycle test	
					:			
					NON-CRANKSHAFT BASED ROUGH ROAD:	Enabled		
					Rough Road Source	Wheel Speed in ECM		
					IF Rough Road Source = WheelSpeedInECM			
					ABS/TCS	active		
					Wheel speed noise	> **WSSRoughRoadThres**		
					VSES	active	discard 100 engine cycle test	
					IF Rough Road Source = "FromABS"			
					ABS/TCS	active		
					RoughRoad	detected	discard 100 engine cycle test	
					VSES	active		
					IF Rough Road Source = "TOSS"			
					TOSS dispersion	>**TOSSRoughRoadThres** in supporting tables	discard 100 engine cycle test	
					AND No Active DTCs	Transmission Output Shaft Angular Velocity Validity TransmissionEngagedState_FA (Auto Trans only) ClutchPstnSnsr FA (Manual Trans only)	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	**Open Circuit Method chosen** (2 possible methods: 20 kHz or Normal Noise): Filtered FFT Output Filtered FFT Output	= **P0325_P0330_OpenMethod_2** (supporting table) **Case 1 (20 kHz Method):** **> P0325_P0330_OpenCktThrshMin (20 kHz)** **AND** **< P0325_P0330_OpenCktThrshMax (20 kHz)** **Case 2 (Normal Noise Method):** **> P0325_P0330_OpenCktThrshMin (Normal Noise)** **AND** **< P0325_P0330_OpenCktThrshMax (Normal Noise)**	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 ≤ 5,500 RPM ≥100 revs ≥ 10 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 A, 1 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background engine noise) Filtered FFT Intensity	**Case 1: Engine <u>not</u> in AFM mode** < **P0326_P0331_AbnormalNoise_Threshold** (Supporting Table) OR **Case 2: Engine <u>is</u> in AFM mode** < **P0326_P0331_AbnormalNoise_Thresh_AFM** (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 ≥ 1,700 RPM (not in AFM mode) OR > 8,500 (in AFM mode) AND ≤ 8,500 RPM ≥ 200 mg/cylinder AND ≤ 2,000 mg/cylinder ≥ 0 deg's C = TRUE ≥ -10 deg's C **P0326_P0331_AbnormalNoise_CylsEnabled** (Supporting Table) ≥ 400 Revs	First Order Lag Filters with Weight Coefficient = 0.0024 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 kΩ 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 Illum.
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.	 $\geq$ 30 kΩ 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 Illum.
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.	$\geq$ 30 kΩ 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 Illum.
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 kΩ 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 Illum.
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 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 (EWMA filtered)	< 0.35	All enable criteria associated with P0430 can be found under P2272 - (O2 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 O2 Sensor or Front WRAF Rear O2 Sensor General Enable Criteria In addition to the p-codes listed under P2272, the following DTC's shall also	> 0.48 < 0.14 12 > 2.00 g/s < 20.00 g/s < 1,000 ° C > 790.00 mV or > 1.25 EQR > 790.00 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 Illum.
		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 O2 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 O2 sensors: For WRAF O2 sensors:	 O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA WRAF_Bank_1_FA WRAF_Bank_2_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 Illum.
Transmission Output Speed Sensor (TOSS)	P0502	The diagnostic monitor detects no activity in the TOSS circuit due to an electrical fault, wiring fault or sensor fault. The TOSS signal is rationalized against operating conditions of the vehicle. If the vehicle is in motion, accelerator pedal, engine torque, transmission in gear, and no vehicle braking, and the TOSS signal registers below a threshold, the DTC will set.	transmission output speed raw	≤ 12 RPM	service mode $04 active diagnostic monitor enable PTO active ignition voltage (controller run crank ignition in range) engine load enable occurs when: (accelerator pedal position engine torque) engine load disable occurs when: (accelerator pedal position engine torque OR accelerator pedal position engine torque) brake pedal position brake pedal position engine speed engine speed P0503 test fail this key on if clutch pedal is enabled clutch pedal position clutch pedal position P0502 test fail this key on OR P0502 fault active DTCs not fault active	= FALSE = 1 Boolean = FALSE ≥ 11.00 volts ≥ 12.0 % ≥ 140.0 Nm ≤ 6.0 % ≤ 80.0 Nm > 6.0 % ≤ 80.0 Nm ≤ 1.9 % < 80.0 % ≥ 6,500.0 RPM ≤ 1,400.0 RPM = FALSE = 1 Boolean ≥ 89.0 % > 84.0 % = FALSE = FALSE AcceleratorPedalFailure EngineTorqueEstInaccurate	fail time ≥ 4.5 seconds 100 millisecond update rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Output Speed Sensor (TOSS)	P0503	The diagnostic monitor detects an unrealistic drop in the TOSS signal due to a sudden electrical fault, wiring fault or sensor fault. The TOSS signal is rationalized against operating conditions of the vehicle. If the vehicle is in motion, accelerator pedal, engine torque, transmission in gear, and no vehicle braking, and the TOSS signal drops above a delta threshold, a fail timer is enabled. When a TOSS drop occurs it is possible to enable the P0502 fail time as well as the P0503 fail time. With both P0502 and P0503 fail timers active it is a race condition to either DTC.	ABS(raw transmssion output speed current loop - raw transmssion output speed previous loop), 25 millisecond update rate	≥ delta fail threshold RPM	service mode $04 active	= FALSE	fail time ≥ 0.300 seconds, increment fail count, fail count ≥ 5 counts, 25 millisecond update rate	Type A, 1 Trips
					diagnostic monitor enable	= 1 Boolean		
					PTO active	= FALSE		
					ignition voltage (controller run crank ignition in range)	≥ 11.00 volts		
					4WD range current loop, update 4WD range time, reset 4WD range time when	≠ 4WD range previous loop	4wd range time ≥ 6.00 seconds	
					4WD range current loop	≠ 4WD range previous loop		
					raw transmission output speed OR	≥ 300.0 RPM	transmission output speed active time ≥ 2.00 seconds	
					last valid transmision output speed before delta drop, update transmission output speed active time	≥ 300.0 RPM		
					25 millisecond loop to loop transmision output speed positive delta, update transmission output speed stable time	≤ 150.0 RPM	transmission output speed stable time ≤ 2.000 seconds	
					P0503 fault active OR	= FALSE		
					P0503 test fail this key on	= FALSE		
					if shift lever position is enable:	= 1 Boolean	shift lever position stablity time ≥ 0.500 seconds	
					(shift lever position previous loop AND	= NEUTRAL		
					shift lever position current loop) OR	= IN GEAR		
					shift lever position current	= IN GEAR		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					loop, update shift lever position stablity time P0503 fault pending delta fail threshold P0503 fault pending clutch pedal position select delta fail threshold where mesaured ratio = TISS/TOSS: 1st gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 2nd gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 3rd gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 4th gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 5th gear mesaured ratio	 = TRUE = 800.0 RPM = FALSE ≥ 89.00 % ≥ 2.170 ≤ 2.370 = 1,200.0 RPM ≤ 2.170 ≥ 1.690 = 1,200.0 RPM ≥ 1.530 ≤ 1.690 = 1,200.0 RPM ≤ 1.530 ≥ 1.250 = 1,200.0 RPM ≥ 1.140 ≤ 1.250 = 1,500.0 RPM ≤ 1.140 ≥ 1.050 = 1,500.0 RPM ≥ 0.940 ≤ 1.050 = 1,500.0 RPM ≤ 0.940 ≥ 0.850 = 1,500.0 RPM ≥ 0.770		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 6th gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 7th gear mesaured ratio mesaured ratio delta fail threshold, otherwise delta fail threshold P0503 fault pending clutch pedal position delta fail threshold	≤ 0.850 = 1,500.0 RPM ≤ 0.770 ≥ 0.700 = 1,500.0 RPM ≥ 0.630 ≤ 0.700 = 1,500.0 RPM ≤ 0.630 ≥ 0.500 = 1,500.0 RPM ≥ 0.400 ≤ 0.500 = 1,500.0 RPM = 850.0 RPM = FALSE ≤ 84.00 % = 850.0 RPM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	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 < 4,400 RPM ≥ 200 Revs ≥ 150 mg/cylinder and ≤ 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0200 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Temperature Sensor Circuit Low Voltage	P0712	Controller specific analog circuit diagnoses the transmission fluid temperature sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds, converted to a resistance value.	circuit resistance	≤ 17.88 Ohms (temperature reads greater than 150 °C)	diagnostic monitor enable P0712 fault active OR P0712 test fail this key on vehicle load for non-hybrid only: Engine speed AND Engine speed AND vehicle speed crank diag enable: igntion voltage controller run crank active: ignition voltage	= 1 Boolean = FALSE = FALSE ≥ 200.0 RPM ≤ 7,500.0 RPM ≤ 512.0 KPH ≥ 5.00 volts ≥ 9.0 volts	>= 12.00 seconds for both fail thresholds 250 millisecond update rate ≥ 5.000 seconds ≥ 5.000 seconds ≥ 25 milliseconds	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Temperature Sensor Circuit High Voltage	P0713	Controller specific analog circuit diagnoses the transmission fluid temperature sensor and wiring for an open circuit or short to power failure by comparing a voltage measurement to controller specific voltage thresholds, converted to a resistance value.	circuit resistance	≥ 420,000.00 Ohms (temperature reads less than -40 °C)	diagnostic monitor enable P0713 fault active OR P0713 test fail this key on vehicle load for non-hybrid only: Engine speed AND Engine speed AND vehicle speed crank diag enable: igntion voltage controller run crank active: ignition voltage vehicle speed TCC slip speed DTCs not fault active	= 1 Boolean = FALSE = FALSE ≥ 200.0 RPM ≤ 7,500.0 RPM ≤ 512.0 KPH ≥ 5.00 volts ≥ 9.0 volts ≥ 30.0 KPH ≥ -4,096.0 RPM P0502, P0503, P0722, P0723, P077D, P0716, P0717, P07BF, P07C0	>= 80.00 seconds for both fail thresholds 250 millisecond update rate ≥ 5.000 seconds ≥ 5.000 seconds ≥ 25 milliseconds ≥ 200.0 seconds ≥ 200.0 seconds	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear 6 incorrect ratio (gear shift lever position sensor rationality)	P0729	Detects when the N/V gear ratio indicates 6th gear but the Gear (shift lever) Position Sensor does not indicate 6th gear	Gear Position Sensor	≠ Gear 6	Gear Position Sensor learn status Ignition voltage Engine Torque Inaccurate Engine actual torque Transmission output speed Throttle position Clutch pedal displacement If four wheel drive low AND Transmission gear ratio Transmission gear ratio If four wheel drive low AND Transmission gear ratio Transmission gear ratio The above conditions are met for DTC's not fault active	= Learned ≥ 9.00 volts = False ≥ 50.00 Nm ≥ 120.00 rpm ≥ 8.00 Pct ≤ 10.00 Pct = TRUE ≥ 5.00 ratio < 5.50 ratio = FALSE ≥ 0.64 ratio < 0.73 ratio ≥ 1.50 seconds TransmissionOutputRotationalStatusValidity EngineTorqueEstInaccurate ClutchPstnSnsr FA ClutchPstnSnsrNotLearned P18C4 P18C5 P18C6 P18C7	≥ 1.00 seconds Once the above fail time is achieved then increment the fail counter once ≥ 1.00 fail counts	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P18C8 P2771		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear 1 incorrect ratio (gear shift lever position sensor rationality)	P0731	Detects when the N/V gear ratio indicates 1st gear but the Gear (shift lever) Position Sensor does not indicate 1st gear	Gear Position Sensor	≠ Gear 1	Gear Position Sensor learn status Ignition voltage Engine Torque Inaccurate Engine actual torque Transmission output speed Throttle position Clutch pedal displacement If four wheel drive low AND Transmission gear ratio Transmission gear ratio If four wheel drive low AND Transmission gear ratio Transmission gear ratio The above conditions are met for DTC's not fault active	= Learned ≥ 9.00 volts = False ≥ 50.00 Nm ≥ 120.00 rpm ≥ 8.00 Pct ≤ 10.00 Pct = TRUE ≥ 5.00 ratio < 5.50 ratio = FALSE ≥ 2.25 ratio < 2.41 ratio ≥ 1.50 seconds TransmissionOutputRotationalStatusValidity EngineTorqueEstInaccurate ClutchPstnSnsr FA ClutchPstnSnsrNotLearned P18C4 P18C5 P18C6 P18C7	≥ 1.00 seconds Once the above fail time is achieved then increment the fail counter once ≥ 1.00 fail counts	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P18C8 P2771		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear 2 incorrect ratio (gear shift lever position sensor rationality)	P0732	Detects when the N/V gear ratio indicates 2nd gear but the Gear (shift lever) Position Sensor does not indicate 2nd gear	Gear Position Sensor	≠ Gear 2	Gear Position Sensor learn status Ignition voltage Engine Torque Inaccurate Engine actual torque Transmission output speed Throttle position Clutch pedal displacement If four wheel drive low AND Transmission gear ratio Transmission gear ratio If four wheel drive low AND Transmission gear ratio Transmission gear ratio The above conditions are met for DTC's not fault active	= Learned ≥ 9.00 volts = False ≥ 50.00 Nm ≥ 120.00 rpm ≥ 8.00 Pct ≤ 10.00 Pct = TRUE ≥ 5.00 ratio < 5.50 ratio = FALSE ≥ 1.57 ratio < 1.66 ratio ≥ 1.50 seconds TransmissionOutputRotationalStatusValidity EngineTorqueEstInaccurate ClutchPstnSnsr FA ClutchPstnSnsrNotLearned P18C4 P18C5 P18C6 P18C7	≥ 1.00 seconds Once the above fail time is achieved then increment the fail counter once ≥ 1.00 fail counts	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P18C8 P2771		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear 3 incorrect ratio (gear shift lever position sensor rationality)	P0733	Detects when the N/V gear ratio indicates 3rd gear but the Gear (shift lever) Position Sensor does not indicate 3rd gear	Gear Position Sensor	≠ Gear 3	Gear Position Sensor learn status	= Learned	≥ 1.00 seconds Once the above fail time is achieved then increment the fail counter once ≥ 1.00 fail counts	Type A, 1 Trips
					Ignition voltage	≥ 9.00 volts		
					Engine Torque Inaccurate	= False		
					Engine actual torque	≥ 50.00 Nm		
					Transmission output speed	≥ 120.00 rpm		
					Throttle position	≥ 8.00 Pct		
					Clutch pedal displacement	≤ 10.00 Pct		
					If four wheel drive low AND Transmission gear ratio Transmission gear ratio	= TRUE ≥ 5.00 ratio < 5.50 ratio		
					If four wheel drive low AND Transmission gear ratio Transmission gear ratio	= FALSE ≥ 1.17 ratio < 1.26 ratio		
					The above conditions are met for	≥ 1.50 seconds		
					DTC's not fault active	TransmissionOutputRotationalStatusValidity EngineTorqueEstInaccurate ClutchPstnSnsr FA ClutchPstnSnsrNotLearned P18C4 P18C5 P18C6 P18C7		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P18C8 P2771		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear 4 incorrect ratio (gear shift lever position sensor rationality)	P0734	Detects when the N/V gear ratio indicates 4th gear but the Gear (shift lever) Position Sensor does not indicate 4th gear	Gear Position Sensor	≠ Gear 4	Gear Position Sensor learn status Ignition voltage Engine Torque Inaccurate Engine actual torque Transmission output speed Throttle position Clutch pedal displacement If four wheel drive low AND Transmission gear ratio Transmission gear ratio If four wheel drive low AND Transmission gear ratio Transmission gear ratio The above conditions are met for DTC's not fault active	= Learned ≥ 9.00 volts = False ≥ 50.00 Nm ≥ 120.00 rpm ≥ 8.00 Pct ≤ 10.00 Pct = TRUE ≥ 5.00 ratio < 5.50 ratio = FALSE ≥ 0.96 ratio < 1.05 ratio ≥ 1.50 seconds TransmissionOutputRotationalStatusValidity EngineTorqueEstInaccurate ClutchPstnSnsr FA ClutchPstnSnsrNotLearned P18C4 P18C5 P18C6 P18C7	≥ 1.00 seconds Once the above fail time is achieved then increment the fail counter once ≥ 1.00 fail counts	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P18C8 P2771		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear 5 incorrect ratio (gear shift lever position sensor rationality)	P0735	Detects when the N/V gear ratio indicates 5th gear but the Gear (shift lever) Position Sensor does not indicate 5th gear	Gear Position Sensor	≠ Gear 5	Gear Position Sensor learn status	= Learned	≥ 1.00 seconds Once the above fail time is achieved then increment the fail counter once ≥ 1.00 fail counts	Type A, 1 Trips
					Ignition voltage	≥ 9.00 volts		
					Engine Torque Inaccurate	= False		
					Engine actual torque	≥ 50.00 Nm		
					Transmission output speed	≥ 120.00 rpm		
					Throttle position	≥ 8.00 Pct		
					Clutch pedal displacement	≤ 10.00 Pct		
					If four wheel drive low AND Transmission gear ratio Transmission gear ratio	= TRUE ≥ 5.00 ratio < 5.50 ratio		
					If four wheel drive low AND Transmission gear ratio Transmission gear ratio	= FALSE ≥ 0.78 ratio < 0.87 ratio		
					The above conditions are met for	≥ 1.50 seconds		
					DTC's not fault active	TransmissionOutputRotationalStatusValidity EngineTorqueEstInaccurate ClutchPstnSnsr FA ClutchPstnSnsrNotLearned P18C4 P18C5 P18C6 P18C7		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P18C8 P2771		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear 7 incorrect ratio (gear shift lever position sensor rationality)	P076F	Detects when the N/V gear ratio indicates 7th gear but the Gear (shift lever) Position Sensor does not indicate 7th gear	Gear Position Sensor	≠ Gear 7	Gear Position Sensor learn status Ignition voltage Engine Torque Inaccurate Engine actual torque Transmission output speed Throttle position Clutch pedal displacement If four wheel drive low AND Transmission gear ratio Transmission gear ratio If four wheel drive low AND Transmission gear ratio Transmission gear ratio The above conditions are met for DTC's not fault active	= Learned ≥ 9.00 volts = False ≥ 50.00 Nm ≥ 120.00 rpm ≥ 8.00 Pct ≤ 10.00 Pct = TRUE ≥ 5.00 ratio < 5.50 ratio = FALSE ≥ 0.41 ratio < 0.50 ratio ≥ 1.50 seconds TransmissionOutputRotationalStatusValidity EngineTorqueEstInaccurate ClutchPstnSnsr FA ClutchPstnSnsrNotLearned P18C4 P18C5 P18C6 P18C7	≥ 1.00 seconds Once the above fail time is achieved then increment the fail counter once ≥ 1.00 fail counts	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P18C8 P2771		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reverse Inhibit Control Circuit Open (Manual Transmission Only)	P0801	Detects an open in the reverse inhibit control circuit. This diagnostic reports the DTC when an open circuit is present. Monitoring occurs when the engine speed is above a calibrated value.	Reverse inhibit control open circuit	Controller internal diagnostic	Reverse inhibit control open circuit diagnostic enabled Run/Crank Run/Crank Voltage Engine Speed	= 1.00 = TRUE Voltage ≥ 9 volts > 250 RPM	20 failures out of 25 samples 250 ms / sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Skip Shift Solenoid Control Circuit Open (Manual Transmission Only)	P0803	Detects an open in the skip shift solenoid control driver circuit. This diagnostic reports the DTC when an open circuit is present. Monitoring occurs when the engine speed is above a calibrated value.	Voltage low during driver off state (indicates open circuit)	Open Circuit: ≥ 200 K Ω impedance between output and controller ground	Run/Crank Voltage Engine Speed	Voltage ≥ 9 volts > 250 RPM	5 failures out of 6 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P080C may also set (Skip Shift Solenoid Circuit Short to Ground).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch Pedal Position Sensor Circuit Range / Performance	P0806	A Clutch Pedal position sensor range fault is detected, if Clutch Pedal Position Sensor is in a range indicative of a vehicle NOT in gear, when the vehicle is determined to be in gear. Gear determination is made by verifying that the ratio of engine RPM versus Transmission Output Speed (N/TOS) represents a valid gear. When this occurs a clutch pedal position error is measured and processed by a 1st order lag filter. When this clutch pedal position error exceeds the defined threshold, a this fault code is set.	Filtered Clutch Pedal Position Error when the vehicle is determined to be in gear	> 4 %	N/TOS Ratio:	Must match actual gear (i.e. vehicle in gear)	12.5 ms loop Continuous	Type A, 1 Trips
					Transfer Case:	Not in 4WD Low range		
					Vehicle speed:	> 5.6 MPH		
					Engine Torque:	> **P0806 EngTorqueThreshold Table** (see Supporting Tables)		
					Clutch Pedal Position:	< **P0806 ResidualErrEnableLow Table** (see Supporting Tables)		
					OR	> **P0806 ResidualErrEnableHigh Table** (see Supporting Tables)		
					No Active DTCs:	ClutchPstnSnsrCktHi FA ClutchPstnSnsrCktLo FA CrankSensor_FA Transmission Output Shaft Angular Velocity Validity VehicleSpeedSensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch Pedal Position Sensor Circuit Low	P0807	A continuous circuit Out-of-Range Low or open fault is detected by monitoring the percent voltage range of the clutch pedal position signal. This sensor by design is dead banded at both the high and low positions. If the voltage from the sensor is below the defined threshold value for the dead banded region, a fail counter increments. When the correct ratio of fail counts to samples occurs the fault code is set.	Clutch Position Sensor Circuit	< 4 % of Vref	Engine Not Cranking System Voltage	 > 9.0 Volts	200 counts out of 250 samples 12.5 ms loop Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch Pedal Position Sensor Circuit High	P0808	A continuous circuit Out-of-Range High fault is detected by monitoring the percent voltage range of the clutch pedal position signal. This sensor by design is dead banded at both the high and low positions. If the voltage from the sensor is above the defined threshold value for the dead banded region, a fail counter increments. When the correct ratio of fail counts to samples occurs the fault code is set.	Clutch Position Sensor Circuit	> 96 % of Vref	Engine Not Cranking System Voltage	 > 9.0 Volts	200 counts out of 250 samples 12.5 ms loop Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch Pedal Position Not Learned	P080A	During final assembly at the manufacturing facility an initial Clutch Pedal Applied Learn is established. This Learn is used to understand the variation in the clutch fully applied position vs. the clutch pedal position. This position is then adjusted over time based on a learning algorithm in the engine controller to adjust for clutch physical wear with usage. This Diagnostic is used to detect when this Applied Learn value is outside of defined range based on the thresholds set by the diagnostic. If the Applied Learn value is outside of the range of the threshold values this fault code is set. The OBD Manufacturer's enable counter is utilized to prevent the MIL from setting during the vehicle assembly before a Position lean can be completed in the manufacturing facility.	Fully Applied Learn Position OR	< 9.0 % > 36.0 %	OBD Manufacturer's Enable Counter	= 0	250 ms loop Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Skip Shift Solenoid Control Circuit Low (Manual Transmission Only)	P080C	Detects a short to ground in the skip shift solenoid control driver circuit. This diagnostic reports the DTC when a short to ground is present. Monitoring occurs when the engine speed is above a calibrated value.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between output and controller ground	Run/Crank Voltage Engine Speed	Voltage ≥ 9 volts > 250 RPM	5 failures out of 6 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0803 may also set (Skip Shift Solenoid Circuit Open Circuit).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Skip Shift Solenoid Control Circuit High (Manual Transmission Only)	P080D	Detects a short to power in the skip shift solenoid control driver circuit. This diagnostic reports the DTC when a short to power is present. Monitoring occurs when the engine speed is above a calibrated value.	Voltage high during driver on state (indicates short to power)	Short to Power: ≤ 0.5 Ω impedance between output and controller power	Run/Crank Voltage Engine Speed	Voltage ≥ 9 volts > 250 RPM	5 failures out of 6 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 Illum.
Reverse Inhibit Control Circuit Low (Manual Transmission Only)	P088C	Detects a short to ground in the reverse inhibit control circuit. This diagnostic reports the DTC when a short to ground is present. Monitoring occurs when the engine speed is above a calibrated value.	Reverse inhibit control circuit short low	Controller internal diagnostic	Reverse inhibit control open circuit diagnostic enabled Run/Crank Run/Crank Voltage Engine Speed	= 1.00 = TRUE Voltage ≥ 9 volts > 250 RPM	20 failures out of 25 samples 250 ms / sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reverse Inhibit Control Circuit High (Manual Transmission Only)	P088D	Detects a short to power in the reverse inhibit control circuit. This diagnostic reports the DTC when a short to power is present. Monitoring occurs when the engine speed is above a calibrated value.	Reverse inhibit control circuit short high	Controller internal diagnostic	Reverse inhibit control open circuit diagnostic enabled Run/Crank Run/Crank Voltage Engine Speed	= 1.00 = TRUE Voltage ≥ 9 volts > 250 RPM	20 failures out of 25 samples 250 ms / sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor A / C Correlation	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	> 20.0 kPa	None		320 failures out of 400 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Run/Start Input Supply Source Relay Control/ Open	P10E1	Controller specific output driver circuit diagnoses the Dual Contact Relay 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.			3 failures out of 4 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 Illum.
Run/Start Input Supply Source Relay Control Low	P10E2	Controller specific output driver circuit diagnoses the Dual Contact Relay 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.	<= 0.5 Ohms impedance between signal and controller ground			3 failures out of 4 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 Illum.
Run/Start Input Supply Source Relay Control High	P10E3	Controller specific output driver circuit diagnoses the Dual Contact Relay 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 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 Ohms impedance between signal and controller power			3 failures out of 4 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 Illum.
Run/Start Input Supply Source Relay Control Range/ Performance	P10E4	Rationality circuit diagnostic for the Run/ Start Input Supply Source Relay output to the ECM. The diagnostic compares the measured ECM Run/Crank input with the desired Run/Crank input	(ECM Run Crank Relay Commaded state is False AND Run Crank Voltage) OR (ECM Run Crank Relay Commaded state is True AND Run Crank Voltage)	>= 5.00 <= 2.00	Run/Start Input Supply Source Relay Control Range/Performance Enable (See Definition in Supporting Material below)	= True	128 failures out of s 160 amples 6.25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Inlet Airflow System Performance (supercharg ed)	P1101	Detects a performance failure in the Manifold Pressure (MAP) sensor, Supercharger Inlet Absolute Pressure (SCIAP) 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 four 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	See table **P0101, P0106, P0121, P012B, P1101: Supercharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. TPS model fails when Filtered Throttle Model Error MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 400 kPa*(g/s) > 30.0 grams/sec > 30.0 kPa > 30.0 kPa > 25.0 kPa > 25.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -7 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 129 Deg C >= 0.50 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** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost**	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 Illum.
		performance issue with the system, but no single failed sensor can uniquely be identified. In this case, the Inlet Airflow System Performance diagnostic will fail.			-	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** SCIAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P1101: SCIAP1 Residual Weight Factor based on RPM** and **P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost** SCIAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P1101: SCIAP2 Residual Weight Factor based on RPM** and		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P0101, P0106, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost		
					No Active DTCs:	MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA SCIAP_SensorCircuitFA AmbientAirDefault		
					No Pending DTCs:	EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP SCIAP_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
Fuel Pump Driver Control Module Signal Message Counter Incorrect	P129E	To detect if the command message received as serial data from the engine control module is valid The "rolling count check" value is created by adding an appended hexadecimal calculation to the pump duty cycle command value. In order to achieve a desired fuel pressure, a hexadecimal equivalent value representing the necessary fuel pump current pulse "On" time (duty cycle as a percent value) is transmitted to the FPPM. The corresponding "check" value is transmitted as well. At the FPPM, the received duty cycle command value is used to create an expected "rolling count" value using the same calculation method as the ECM. The expected "rolling count" value calculated at the receiving power module (smart device) is compared to the transmitted "rolling count" value. If these do not match, a fault condition is reported	FPPM Received Duty Cycle Rolling Count	<> Transmitted Duty Cycle Rolling Count (ECM) (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) FPPM configuration KeFRPR_e_ChassisFuelPresSysType b) Fault state determination enabled c) FPPM Received Duty Cycle Count result d) FPPM Diagnostic feedback received e) CAN communication f) System Voltage	a) == CeFRPR_e_ECM_FPPM_Sys b) == TRUE c) == Valid d) == TRUE e) == Valid f) 9v < Sys Voltage > 32v	64 failures / 80 samples 1 sample / 12.5 millisec	Type B, 2 Trips
			FPPM Received Duty Cycle Protection Value	<> Transmitted Duty Cycle Protection Value (ECM) (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) FPPM configuration KeFRPR_e_ChassisFuelPresSysType b) Fault state determination enabled c) FPPM Received Duty Cycle Protection Value result d) FPPM Diagnostic feedback received e) CAN communication f) System Voltage	a) == CeFRPR_e_ECM_FPPM_Sys b) == TRUE c) == Valid d) == TRUE e) == Valid f) 9v < Sys Voltage > 32v	64 failures / 80 samples 1 sample / 12.5 millisec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		forward to the ECM where X/Y diagnostic counting is performed.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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)		
					Case 1: Battery Delay starting at Key-On	5 Engine Revs		
					Case 2: Ignition Run/ Crank Ignition Run/Crank Voltage	> 5.0 volts		
					Case 3: PT Relay PT Relay Voltage	> 11.0 volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ABS Rough Road malfunction	P1380	This diagnostic detects if the ABS controller is indicating a fault, and misfire is present. When this occurs, misfire will continue to run. If Misfire P0300 then sets while the ABS fault is present, P1380 will set as a diagnostic aid.	This DTC is used as a misfire diagnostic aid. If P0300 is set, and ECM has recieved indication that the rough road information from EBCM is faulted, the technition may take into account that the Misfire DTC may be due to rough road. The diagnnostic aid DTC will only set if secondary parameters are in a speed load condition where Misfire is susceptable to rough road. GMLan Message: "Wheel Sensor Rough Road Magnitude Validity"	 = FALSE	Vehicle Speed Engine Speed Engine Load RunCrankActive Active DTC	VSS ≥ 5 mph rpm < 8,192 load < 100 % max indicated torque = TRUE P0300, MIL Request	40 failures out of 80 samples 250 ms /sample Continuous	Type C, No SVS "Special Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ABS System Rough Road Detection Communication Fault	P1381	This diagnostic detects if the rough road information is no longer being received from the ABS controller, and misfire is present. When this occurs, misfire will continue to run. If Misfire P0300 then sets while the communication fault is present, P1381 will set as a diagnostic aid.	This DTC is used as a misfire diagnostic aid. If P0300 is set, and ECM has lost the rough road information from EBCM, the technition may take into account that the Misfire DTC may be due to rough road. The diagnnostic aid DTC will only set if secondary parameters are in a speed load condition where Misfire is susceptable to rough road. Loss of GMLan Message: "Wheel Sensor Rough Road Magnitude"	= TRUE	Vehicle Speed Engine Speed Engine Load RunCrankActive Active DTC	VSS ≥ 5 mph rpm < 8,192 load < 100 max indicated torque = TRUE P0300, MIL Request	40 failures out of 80 samples 250 ms /sample Continuous	Type C, No SVS "Special Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Analog Mode Switch Circuit Low	P159F	This DTC will detect an analog mode switch input that is too low out of range.	For button type Normal_Button Analog Mode Switch low voltage threshold % of 5V range For button type Enhanced_Button Analog Mode Switch low voltage threshold % of 5V range For button type Mulitple_Button Analog Mode Switch low voltage threshold % of 5V range	< 29.00 % < 24.30 % < 21.20 %	Vehicle mode analog switch button type	= CeDMDG_e_Enhanced_ Button	200 failures out of 250 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Analog Mode Switch Circuit High	P15A0	This DTC will detect an analog mode switch input that is too high out of range.	For button type Normal_Button Analog Mode Switch high voltage threshold % of 5V range For button type Enhanced_Button Analog Mode Switch high voltage threshold % of 5V range For button type Mulitple_Button Analog Mode Switch high voltage threshold % of 5V range	>= 94.10 % >= 94.10 % >= 95.30 %	Vehicle mode analog switch button type	= CeDMDG_e_Enhanced_ Button	200 failures out of 250 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Analog Mode Switch Performance	P15A1	This DTC will detect an analog mode switch input that is in an indeterminate range.	For button type Normal_Button Analog Mode Switch indeterminate region % of 5V range For button type Enhanced_Button Analog Mode Switch indeterminate regions % of 5V range For button type Mulitple_Button Analog Mode Switch indeterminate regions % of 5V range	66.80 % ≤ % of 5 volts < 72.80 % 63.50 % ≤ % of 5 volts < 65.50 % 83.50 % ≤ % of 5 volts < 85.50 % 52.90 % ≤ % of 5 volts < 54.10 % 74.10 % ≤ % of 5 volts < 75.30 % 87.50 % ≤ % of 5 volts < 88.60 %	Vehicle mode analog switch button type	= CeDMDG_e_Enhanced_ Button	200 failures out of 250 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 1	P16F0	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 before receiving a valid message.		Run/Crank voltage	> 6.41 Volts	39 / 399 counts continuous; 12.5 ms /count in the ECM main processor	Type A, 1 Trips
			This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor after receiving a valid message.		Run/Crank voltage	> 6.41 Volts	159 / 399 counts continuous; 12.5 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 Illum.
Gear Position Sensor Circuit A Low	P18C4	The gear position sensor is a single component containing an X-axis and a Y-axis sensor. The gear position sensor determines the manual transmission shift lever positon based on the PWM output of the X-axis and Y-axis sensors. Controller specific Gear Position Sensor Circuit A Low diagnoses Gear Position Sensor Circuit A and wiring for an out of range low circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	Sensor type used If sensor type = Direct Proportional and Gear Position Sensor A duty cycle OR If sensor type = Indrect Proportional and Gear Position Sensor A duty cycle	CeSPMI_e_VoltageDirectProp ≤ 9.00 % ≥ 9.00 %	Ignition voltage	≥ 9.00 volts	≥ 3.00 seconds of fail time out of 5.00 seconds of sample time	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear Position Sensor Circuit A High	P18C5	The gear position sensor is a single component containing an X-axis and a Y-axis sensor. The gear position sensor determines the manual transmission shift lever positon based on the PWM output of the X-axis and Y-axis sensors. Controller specific Gear Position Sensor Circuit A High diagnoses Gear Position Sensor Circuit A and wiring for an out of range high circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	Sensor type used If sensor type = Direct Proportional and Gear Position Sensor A duty cycle OR If sensor type = Indrect Proportional and Gear Position Sensor A duty cycle	CeSPMI_e_VoltageDirectProp ≥ 90.00 % ≤ 90.00 %	Ignition voltage	≥ 9.00 volts	≥ 3.00 seconds of fail time out of 5.00 seconds of sample time	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear Position Sensor Circuit B Low	P18C6	The gear position sensor is a single component containing an X-axis and a Y-axis sensor. The gear position sensor determines the manual transmission shift lever positon based on the PWM output of the X-axis and Y-axis sensors. Controller specific Gear Position Sensor Circuit B Low diagnoses Gear Position Sensor Circuit AB and wiring for an out of range low circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	Sensor type used If sensor type = Direct Proportional and Gear Position Sensor B duty cycle OR If sensor type = Indrect Proportional and Gear Position Sensor B duty cycle	CeSPMI_e_VoltageDirectProp ≤ 9.00 % ≥ 9.00 %	Ignition voltage	≥ 9.00 volts	≥ 3.00 seconds of fail time out of 5.00 seconds of sample time	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear Position Sensor Circuit B High	P18C7	The gear position sensor is a single component containing an X-axis and a Y-axis sensor. The gear position sensor determines the manual transmission shift lever positon based on the PWM output of the X-axis and Y-axis sensors. Controller specific Gear Position Sensor Circuit B High diagnoses Gear Position Sensor Circuit B and wiring for an out of range high circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	Sensor type used If sensor type = Direct Proportional and Gear Position Sensor B duty cycle OR If sensor type = Indrect Proportional and Gear Position Sensor B duty cycle	CeSPMI_e_VoltageDirectProp ≥ 90.00 % ≤ 90.00 %	Ignition voltage	≥ 9.00 volts	≥ 3.00 seconds of fail time out of 5.00 seconds of sample time	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear Position Sensor Indicates Incorrect Gear Ratio (gear shift lever position sensor rationality)	P18C9	The gear position sensor is a single component containing an X-axis and a Y-axis sensor. The gear position sensor determines the manual transmission shift lever positon based on the PWM output of the X-axis and Y-axis sensors. Detects when transmission is mechanically in neutral and Gear Position Sensor is not indicating a neutral position.	Gear Position Sensor	= In Gear	Gear Position Sensor learn status Ignition voltage Transmission output speed Clutch pedal displacement Engine speed DTCs not fault active	= Learned ≥ 9.00 volts ≤ 10.00 rpm ≤ 10.00 pct ≥ 450.00 rpm TransmissionOutputRotationalStatusValidity ClutchPstnSnsr FA ClutchPstnSnsrNotLearned P18C4 P18C5 P18C6 P18C7 P18C8	≥ 3.00 seconds Once the above fail time is achieved then increment the fail counter once ≥ 2.00 fail counts	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Gear Position Sensor Not Learned	P18CA	The gear position sensor is a single component containing an X-axis and a Y-axis sensor. The gear position sensor determines the manual transmission shift lever positon based on the PWM output of the X-axis and Y-axis sensors. Detects when the gear position sensor position not learned. Any offset due to hardware variation is captured when the gear position sensor X-axis and Y-axis PWM duty cycle offset is not learned during vehicle assembly or service, with the transmission shift lever in neutral position and the transmission mechanically in neutral.	Gear Position Sensor Learn status	= Not Learned	Manufacturer Enable Counter (MEC) Service learn timer The service learn timer will increment while a learn is in progress. If the learn is not completed in less than 120.00 seconds then the learn will abort	= 0 Counts = 0 seconds	Immediate Frequency 500ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 2 Performance (For use on vehicles with mechanical transfer pump dual fuel tanks)	P2066	This DTC will detect a fuel sender stuck in range in the secondary fuel tank.	****************************** Fuel Level in Primary and Secondary Tanks Remain in an Unreadable Range too Long ****************************** This subtest is used If fuel volume in primary tank is and fuel volume in secondary tank is and remains in this condition for of fuel consumed by the engine. OR ****************************** Fuel Level is in a Readable Range for both Primary and Secondary Tanks too Long ****************************** This subtest is used Volume in primary tank is and volume in secondary tank is and remains in this condition for OR ****************************** Fuel consumed without a Secondary Fuel Level Change	≥ 27.8 liters < 3.0 liters 21.8 liters < 28 liters > 3 liters 1,800 seconds	Engine Running No active DTCs: Volume in secondary tank	VehicleSpeedSensor_FA ≥ 3.0 liters	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 Illum.
			****************************** If the vehicle is driven with the fuel consumed by the engine of without the secondary fuel level changing by 3 liters, then the sender must be stuck.	13 liters				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 2 Circuit Low Voltage (For use on vehicles with dual fuel tanks)	P2067	This DTC will detect a fuel sender stuck out of range low in the secondary fuel tank.	Fuel level Sender % of 5V range	< 10 %			100 failures out of 125 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 Illum.
Fuel Level Sensor 2 Circuit High Voltage (For use on vehicles with dual fuel tanks)	P2068	This DTC will detect a fuel sender stuck out of range low in the secondary fuel tank.	Fuel level Sender % of 5V range	> 60 %			100 failures out of 125 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 Illum.
Post Catalyst Fuel Trim System Low Limit Bank 2 (Too Rich)	P2098	Determines if the post catalyst O2 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 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 O2 voltage is too rich, the post catalyst O2 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 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 >= 22 % 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 <= 18 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	<= -97.5 % <= -86.4 % If the P2098 is actively failing then the Average Integral Offset must be > -95.0 % and the Average Total Offset must be > -70.0 % for the diagnostic to report a pass.	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 O2 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 Condition	 No No Yes No No >= 70 kPa >= 0.0 g/s <= 10,000.0 >= 0 kPa <= 200 >= -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, Green Cat System condition is considered valid until the	Frequency: Continuous Monitoring in 100ms loop. The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 40.0 seconds (400 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 Illum.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst O2 sensor that is within its optimal operating range (neither rich nor lean).				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 22 grams/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 O2S_Bank_2_Sensor_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 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).	O2S_Bank_2_Sensor_2_FA 100 100 100 100 100		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System High Limit Bank 2 (Too Lean)	P2099	Determines if the post catalyst O2 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 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 O2 voltage is too lean, the post catalyst O2 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 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 >= 22 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 18 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	>= 97.5 % . >= 81.6 % If the P2099 is actively failing then the Average Integral Offset must be < 95.0 % and the Average Total Offset must be < 68.0 % 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 40.0 seconds (400 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 Illum.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst O2 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 failures out of 20 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 Illum.
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 O2 voltage is used to generate a variance metric that represents the statistical variation of the O2 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	Filtered Ratio > The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table **P219B Variance Threshold Bank2 Table**) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table (see Supporting Table **P219B Normalizer Bank2 Table**) This quotient is then multiplied by a quality factor calibration from a 17 x 17 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.	0.80 If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.55 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing when the Filtered Ratio remains near the initial failure threshold of 0.80 .	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 Air Per Cylinder (APC) APC delta during short term sample period	no lower than 11.0 Volts for more than 0.2 seconds > 10.0 percent AND no fuel level sensor fault > -20 deg. C (or OBD Coolant Enable Criteria = TRUE) > 0.0 seconds No 800 to 3,750 RPM < 120 RPM 5 to 1,000 g/s < 10 g/s < 0.20 g/s 100 to 720 mg/cylinder < 75 mg/cylinder	Minimum of 1 test per trip, up to 4 tests per trip during RSR or FIR. The front O2 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, 19.92 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 Illum.
		P219B Variance Threshold Bank2 Table) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table (see Supporting Table **P219B Normalizer Bank2 Table**) This quotient is then multiplied by a quality factor calibration from a 17 x 17 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			Filtered APC delta between samples Note: first order lag filter coefficient applied to APC = 0.050 Spark Advance Throttle Area (percent of max) Intake Cam Phaser Angle Exhaust Cam Phaser Angle 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	< 5.00 percent 5 to 55 degrees 0 to 200 percent 0 to 30 degrees 0 to 30 degrees >= 0.99 >= 1.2 seconds (Please see "Closed Loop Enable Clarification" and "Long Term FT Enable Criteria" in Supporting Tables) Not active Not on	minutes of operation. For RSR or FIR, 8 tests must complete before the diagnostic can report.See P219A info	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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.			CASE learn EGR EVAP Engine Over Speed Protection Idle speed control PTO Injector base pulse width O2 learned htr resistance Rapid Step Response (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:	Not active Not intrusive Not intrusive Not Active Normal Not Active Above min pulse limit = Valid (the O2 heater resistance has learned since NVM reset) >= 0.70 >= 0.67 0.00 0.00 EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						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 Illum.
O2 Sensor Signal Stuck Lean Bank 2 Sensor 2	P2272	The P2272 diagnostic is the first in a sequence of six intrusive secondary O2 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for secondary O2 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 O2 sensor does not achieve the required rich voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test	< 790 mvolts > 105 grams.	No Active DTC's B2S2 DTC's 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 P013C, 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 DTC's") = 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 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 B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Low Fuel Condition Only when FuelLevelDataFault	= False = False		
					Pedal position	≤ 100.0 %		
					Engine Airflow	4.0 ≤ gps ≤ 20.0		
					Closed loop integral	0.74 ≤ C/L Int ≤ 1.08		
					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	< 100.0 Nm		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	>= 60.0 sec		
					Predicted Catalyst temp	500 ≤ ºC ≤ 1,000		
					Fuel State	= DFCO possible		
					=================	==================		
					All of the above met for at least 0.0 seconds, and			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					then check the following Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) ================= 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 Crankshaft Torque	 1,075 ≤ RPM ≤ 2,000 1,000 ≤ RPM ≤ 2,050 44.7 ≤ MPH ≤ 82.0 37.3 ≤ MPH ≤ 87.0 0.95 ≤ EQR ≤ 1.10 < 110.0 Nm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Rich Bank 2 Sensor 2	P2273	The P2273 diagnostic is the fourth in a sequence of six intrusive secondary O2 monitors which include DTCs P2272, P014A, P013C, P2273, P014B, & P013D. This DTC determines if the secondary O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for secondary O2 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 O2 sensor does not achieve the required lean voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test	> 100 mvolts > 20.0 grams.	No Active DTC's B2S2 DTC's 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 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 DTC's") = 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 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 B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor C Circuit Low (Gen II)	P227C	Detects a continuous short to ground or open circuit in the Barometric Pressure (BARO) C signal circuit by monitoring the BARO C sensor output voltage and failing the diagnostic when the BARO C voltage is too low. The BARO C sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO C Voltage	< 40.0 % of 5 Volt Range (This is equal to 50.9 kPa)			320 failures out of 400 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor C Circuit High (Gen II)	P227D	Detects a continuous short to power in the Barometric Pressure (BARO) C signal circuit by monitoring the BARO C sensor output voltage and failing the diagnostic when the BARO C voltage is too high. The BARO C sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO C Voltage	> 90.0 % of 5 Volt Range (This is equal to 115.0 kPa)			320 failures out of 400 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor C Circuit Intermittent/ Erratic	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 12.5 milliseconds previous)	> 150 kPa 80 consecutive BARO C readings			4 failures out of 5 samples Each sample takes 1.0 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	$\leq$ 100 Ω 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 Illum.
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 Ω 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 Illum.
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 Ω 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 Illum.
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 Ω 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 Illum.
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.	$\leq$ 100 Ω 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 Illum.
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 Ω 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 Illum.
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 Ω 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 Illum.
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 Ω 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 Illum.
Performance Traction Torque & Speed Request Circuit	P2548	Determines if torque and/or speed request from the EBTCM is valid	Protection error - Serial Communication message ($1C8/$237) 2's complement not equal Torque Request Speed Request OR Rolling count error - Serial Communication message ($1C8/$237) rolling count index value	 Message <> two's complement of message Message <> two's complement of message Message <> previous message rolling count value + one	Diagnostic Status Run/Crank Active Ignition Voltage No Serial communication loss to EBTCM (U0121)	Enabled > 0.50 seconds > 6.41 volts No loss of communication	Fail Threshold: >= 10 failures out of 20 samples Pass Threshold: >= 10 samples during key cycle. OR Fail Threshold >= 6 Rolling count errors out of 10 samples Performed on every received message	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position Signal Output Circuit Low	P2615	Controller specific output driver circuit diagnoses the camshaft 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.	Short to ground: <= 0.5 Ohms impedance between signal and controller ground Open Circuit: >= 200 K Ohms impedance between signal and controller ground	Powertrain Relay Voltage Engine is not cranking Camshaft Position Output is commanded high	>= 11.0 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type C, No SVS Note: In certain controllers P2614 may also set (Camshaft Position Signal Output Circuit / Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position Signal Output Circuit High	P2616	Controller specific output driver circuit diagnoses the camshaft position 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.	Short to power: <= 0.5 Ohms impedance between signal and controller power	Powertrain Relay Voltage Engine is not cranking Camshaft Position Output is commanded low	>= 11.0 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Deactivation System Performance	P3400	Detects a performance failure in the cylinder deactivation system. This diagnostic will fail if one or more cylinders that has been commanded to deactivate does not deactivate. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates a modeled values of the Manifold Pressure (MAP) sensor using the Mass Air Flow (MAF) sensor. This is called the MAP2 Model. The MAP2 modeled value is compared against the actual MAP sensor values when all cylinders are active. An "all cylinder" MAP2 Model error is established with this comparison. When cylinders are deactivated, a "cylinder deactivation" MAP2 Model error is similarly established. If the "all cylinder" and "cylinder deactivation" MAP2 Model errors are similar, then air flow through the system	Current MAP Model 2 Error AND (All Cylinder MAP Model 2 Error) - (Current MAP Model 2 Error) Where: Current MAP Model 2 Error = (Measured MAP – MAP Model 2) Filtered Where: All Cylinder MAP Model 2 Error = (Measured MAP – MAP Model 2) Filtered stored the last time that all cylinders were active for a time greater than	< -4 kPa > -4 kPa > 2.0 seconds	**ReducedEngineCapacityMode_Enable** = TRUE for a time Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. No Active DTCs: No Pending DTCs:	> 2.0 seconds >= 400 RPM <= 6,200 RPM >= -7 Deg C = TRUE) <= 129 Deg C >= -20 Deg C <= 129 Deg C >= 0.50 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 EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP	100 failures out of 200 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 Illum.
		when cylinders are deactivated is the expected value. All cylinders are properly deactivated. If these two MAP2 Model errors are not similar, then air flow through the system when cylinders are deactivated is different than the expected value. This indicates that a cylinder is pumping air when it should not. This cylinder is not properly deactivated. In this case, the Deactivation System Performance diagnostic will fail.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Deactivation Solenoid Control Circuit/Open	P3401	Controller specific output driver circuit diagnoses the Cylinder 1 Deactivation 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.	Open Circuit: ≥ 200 k Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3403 may also set (Cylinder 1 Deactivation Solenoid Control Circuit/ Low)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Deactivation Solenoid Control Circuit/Low	P3403	Controller specific output driver circuit diagnoses the Cylinder 1 Deactivation 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.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3401 may also set (Cylinder 1 Deactivation Solenoid Control Circuit/ Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Deactivation Solenoid Control Circuit/High	P3404	Controller specific output driver circuit diagnoses the Cylinder 1 Deactivation 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.	Short to Power ≤ 0.5 Ω impedance between output and controller power	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Deactivation Solenoid Control Circuit/Open	P3425	Controller specific output driver circuit diagnoses the Cylinder 4 Deactivation 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.	Open Circuit: ≥ 200 k Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3427 may also set (Cylinder 4 Deactivation Solenoid Control Circuit/ Low)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Deactivation Solenoid Control Circuit/Low	P3427	Controller specific output driver circuit diagnoses the Cylinder 4 Deactivation 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.	Controller specific output driver circuit diagnoses the Cylinder 1 Deactivation 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.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3425 may also set (Cylinder 4 Deactivation Solenoid Control Circuit/ Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Deactivation Solenoid Control Circuit/High	P3428	Controller specific output driver circuit diagnoses the Cylinder 4 Deactivation 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.Diagnoses cylinder 4 deactivation solenoid control low side driver circuit for circuit faults	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	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Deactivation Solenoid Control Circuit/Open	P3441	Controller specific output driver circuit diagnoses the Cylinder 6 Deactivation 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 low during driver off state (indicates open circuit)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 impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3443 may also set (Cylinder 6 Deactivation Solenoid Control Circuit/ Low)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Deactivation Solenoid Control Circuit/Low	P3443	Controller specific output driver circuit diagnoses the Cylinder 6 Deactivation 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.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3441 may also set (Cylinder 6 Deactivation Solenoid Control Circuit/ Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Deactivation Solenoid Control Circuit/High	P3444	Controller specific output driver circuit diagnoses the Cylinder 6 Deactivation 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.	Short to Power ≤ 0.5 Ω impedance between output and controller power	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 7 Deactivation Solenoid Control Circuit/Open	P3449	Controller specific output driver circuit diagnoses the Cylinder 7 Deactivation 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.	Open Circuit: ≥ 200 k Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3451 may also set (Cylinder 7 Deactivation Solenoid Control Circuit/ Low)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 7 Deactivation Solenoid Control Circuit/Low	P3451	Controller specific output driver circuit diagnoses the Cylinder 7 Deactivation 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 low during driver off state (indicates an short circuit to Ground) 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 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3449 may also set (Cylinder 7 Deactivation Solenoid Control Circuit/ Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 7 Deactivation Solenoid Control Circuit/High	P3452	Controller specific output driver circuit diagnoses the Cylinder 7 Deactivation 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.	Short to Power ≤ 0.5 Ω impedance between output and controller power	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Chassis Control Module A	U012A	This DTC monitors for a loss of communication with the Chassis Control Module A.	Message is not received from controller for Message $4DB	≥ 12.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds	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 Illum.
					U012A CHCM A	Not Active on Current Key Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Lost Communication with ECM/PCM	U2616	To detect lost serial data communication from the power driver controller to the ECM	Timer - Fuel System Control message CAN $0D9 not received (FPPM Received Serial Data Communication Status)	t > 10 s (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate)	a) FPPM configuration KeFRPR_e_ChassisFuelPresSysType b) Fault state determination enabled c) Run_Crank status d) FPPM Control Status Alive Rolling Count result e) FPPM Diagnostic feedback received f) System Voltage	a) == CeFRPR_e_ECM_FPPM_Sys b) == TRUE c) == Active d) == Valid e) == TRUE f) 9v < Sys Voltage > 32v	64 failures / 80 samples 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 Illum.
O2S Circuit Low Voltage Bank 1 Sensor 1 (For use with WRAF - E80	P0131	This DTC determines if the WRAF O2 sensor signal circuit is shorted low. This DTC will detect a short to ground fault to the Pump Current, Reference Cell Voltage and Reference Ground circuits. When enabled, the diagnostic monitors the three different failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the three individual fail and sample counters.	B1S1 WRAF ASIC indicates a ground short to any of the following WRAF signals: A) Pump Current - short to ground fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to ground fail counts are accumulated to determine fault status. C) Reference Ground - short to ground fail counts are accumulated to determine fault status. Note: This ASIC is referred to as C2WRAF (Delphi). Note: A ground short on the Pump Current or Reference Voltage signal may also set a P223C DTC.	The ASIC provides a fault indication when the pump current pin is between -150 mV and +175 mV. The ASIC provides a fault indication when the Refernce Cell Voltage pin < 225 mV. The ASIC provides a fault indication when during the intrusive test the Reference Cell impedance change is ≤ 90 ohms. Note: Signal A & B faults must exist for 24 ASIC clock cycles to qualify for a fail flag. The three fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	B1S1 DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop WRAF Ref cell temperature ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) **************************	P0135, P0030, P0031 or P0032 = Valid = Ready = True ≥ 600 Deg C = Complete ≥ 20.0 seconds	Signal A: 128 failures out of 160 samples OR Signal B: 128 failures out of 160 samples OR Signal C: 3 failures out of 1 samples Frequency for Signal A & B: Continuous in 25 milli - second loop Frequency for Signal C: Tested during an intrusive event performed every 60 seconds. During each event the impedance is measured 3 times once every 12.5 msec. Note: If the fail count value is greater than the sample count value that individual	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 1 (For use with WRAF - E80	P0132	This DTC determines if the WRAF O2 sensor signal circuit is shorted high. This DTC will detect a short to power fault to the Pump Current (and Trim circuit), Reference Cell Voltage and Reference Ground circuit. When enabled, the diagnostic monitors the three different failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the three individual fail and sample counters.	B1S1 WRAF ASIC indicates a short to power on any of the following WRAF signals: A) Pump Current - short to power fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to power fail counts are accumulated to determine fault status. C) Reference Ground - short to power fail counts are accumulated to determine fault status. Note: This ASIC is referred to as C2WRAF (Delphi).	The ASIC provides a fault indication when the pump current pin > 2.8 V. The ASIC provides a fault indication when the Reference Cell Voltage pin > 3.3 V. The ASIC provides a fault indication when the Reference Ground pin > 225 mV. Note: The above faults must exist for 21 ASIC clock cycles to qualify for a fail flag. The three fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	B1S1 DTC's Not active this key cycle Measure Valid Status (ASIC) Controller status (ASIC) Engine Run or Auto stop WRAF Ref cell temperature ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) **************************	P0135, P0030, P0031 or P0032 = Valid = Ready = True ≥ 600 Deg C = Complete ≥ 20.0 seconds	Signal A: 128 failures out of 160 samples OR Signal B: 128 failures out of 160 samples OR Signal C: 128 failures out of 160 samples Frequency: Continuous in 25 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 Illum.
Exhaust Camshaft System Cold Start Performance – Bank 1	P05CE	Detects a VVT system error during Cold Starts by comparing the desired and actual cam positions when VVT is activated. This is the same type diagnostic as P0014 except this detects excessive deviations of position while the cold start phaser positions are being commanded.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	Cam Position Error > 6.00 deg.	**Exhaust Cam Phsr Enable**	= TRUE	65 failures out of 75 samples 100 ms /sample	Type A, 1 Trips
					System Voltage	> 11.00 volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Catalyst Warmup Enabled	= TRUE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> 6.00 deg AND < 32.00 deg		
					Desired cam position variation	< 3.00 deg for (**P0014_P05CE_StablePositionTimeEc1**) sec		
					No Active DTCs	P0013 P2090 P2091		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Control Module (FPCM) Requested MIL Illumination	P069E	Monitors the FPCM MIL request message to determine when the FPCM has detected a MIL illuminating fault.	Fuel Pump Control Module Emissions-Related DTC set and module is requesting MIL	Fuel Pump Control Module Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Temperature Sensor Circuit High	P105B	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P105B diagnoses the ESC temperature sensor for out of range high circuit faults. The diagnostic failure counter is incremented if the ESC temperature information is below the threshold value. This DTC is set based on the fail and sample counters.	Stop-Start capacitor temperature value	< -60.0 ºC	No active DTCs Diagnostic reporting is enabled when the following two steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec	10 failure out of 14 samples 500ms cycle time continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Temperature Sensor Circuit Low	P105C	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P105C diagnoses the ESC temperature sensor for out of range low circuit faults. The diagnostic failure counter is incremented if the ESC temperature information is above the threshold value. This DTC is set based on the fail and sample counters.	Stop-Start capacitor temperature value	> 180.0 ºC	No active DTCs Diagnostic reporting is enabled when the following two steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec	10 failure out of 14 samples 500ms cycle time Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Temperature Sensor Not Plausible	P105D	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P105D diagnoses the ESC temperature sensor for rationality faults by comparing it to other temperature sensors after a soak time (to allow all sensors to reach ambient condition). The diagnostic fails if the absolute ESC temperature difference when compared to the other temperature sensors is above the threshold value.	Absolute value of temperature difference between capacitor and DCDC converter AND Absolute value of temperature difference between capacitor and capacitor switch (K2)	> 15.0 ºC > 15.0 ºC	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) ECM off time Then, (B) LIN bus wake up Then, (C) ESCM wake up delay Note: This is not a continuous diagnositc. It runs once at LIN bus wake up, after ECM off time is large enough.	U135C, U1347, P1066 > 28,800 sec = TRUE > 0.50 sec	Wake up test only. Fault is set at first detection.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module DCDC Converter Temperature Sensor Circuit High	P105E	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P105E diagnoses the DCDC Converter (inside the ESCM) temperature sensor for out of range high circuit faults. The diagnostic failure counter is incremented if the DCDC temperature information is below the threshold value. This DTC is set based on the fail and sample counters.	DCDC converter temperature	< -50.0 ºC	No active DTCs Diagnostic reporting is enabled when the following two steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec	10 failure out of 14 samples 500ms cycle time continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module DC/ DC Converter Temperature Sensor Circuit Low	P105F	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P105F diagnoses the DCDC Converter (inside the ESCM) temperature sensor for out of range low circuit faults. The diagnostic failure counter is incremented if the DCDC temperature information is above the threshold value. This DTC is set based on the fail and sample counters.	DCDC converter temperature	> 160.0 ºC	No active DTCs Diagnostic reporting is enabled when the following two steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec	10 failure out of 14 samples 500ms cycle time continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module DC/ DC Converter Temperature Sensor Not Plausible	P1060	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1060 diagnoses the DCDC Converter (inside the ESCM) temperature sensor for rationality faults by comparing it to other temperature sensors after a soak time (to allow all sensors to reach ambient condition). The diagnostic fails if the absolute DCDC Converter temperature difference when compared to the other temperature sensors is above the threshold value.	The absolute value of temperature difference between DCDC converter and capacitor. AND The absolute value of temperature difference between DCDC converter and capacitor switch (K2).	> 15.0 ºC > 15.0 ºC	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) ECM off time Then, (B) LIN bus wake up Then, (C) ESCM wake up delay Note: This is not a continuous diagnositc. It runs once at LIN bus wake up, after ECM off time is large enough.	U135C, U1347, P1066 > 28,800 sec = TRUE > 0.50 sec	Wake up test only. Fault is set at first detection.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Secondary Switch Temperature Sensor Circuit High	P1061	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1061 diagnoses the Secondary Switch (K2) (inside the ESCM) temperature sensor for out of range high circuit faults. The diagnostic failure counter is incremented if the Secondary Switch temperature information is below the threshold value. This DTC is set based on the fail and sample counters.	Capacitor switch (K2) temperature	< -50.0 ºC	No active DTCs Diagnostic reporting is enabled when the following two steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec	10 failure out of 14 samples 500ms cycle time continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Secondary Switch Temperature Sensor Circuit Low	P1062	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1062 diagnoses the Secondary Switch (K2) (inside the ESCM) temperature sensor for out of range low circuit faults. The diagnostic failure counter is incremented if the Secondary Switch temperature information is above the threshold value. This DTC is set based on the fail and sample counters.	The capacitor switch (K2) temperature	> 160.0 ºC	No active DTCs Diagnostic reporting is enabled when the following two steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec	10 failure counts out of 14 samples 500ms cycle time continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Secondary Switch Temperature Sensor Not Plausible	P1063	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1063 diagnoses the Secondary Switch (K2) (inside the ESCM) temperature sensor for rationality faults by comparing it to other temperature sensors after a soak time (to allow all sensors to reach ambient condition). The diagnostic fails if the absolute Secondary Switch (K2) temperature difference when compared to the other temperature sensors is above the threshold value.	The absolute value of temperature difference between the capacitor switch (K2) and the capacitor. AND The absolute value of tempeature difference between the capacitor switch (K2) and DCDC converter.	> 15.0 ºC > 15.0 ºC	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) ECM off time Then, (B) LIN bus wake up Then, (C) ESCM wake up delay Note: This is not a continuous diagnositc. It runs once at LIN bus wake up, after ECM off time is large enough.	U135C, U1347, P1066 > 28,800 sec = TRUE > 0.50 sec	Wake up test only. Fault is set at first detection.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage Low During Start Assist	P1064	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1064 diagnoses the assist system by monitoring the system voltage during an auto start event. Note: in some cases it averages over multiple auto start events for improved robustness. The diagnostic fails if the calibrated diagnostic method does not satisfy the corresponding threshold value.	The diagnostic method is selected from method (A) or (B) below. The two methods are: Method (A) = CeUCCD_e_UseGrd OR Method (B) = CeUCCD_e_UseDeltaVlt The method used on this application is ********************* Method (A) - The average system voltage during an assisted auto start is Method (B) - The average system voltage delta during an assisted auto start is	= CeUCCD_e_UseDelta Vlt ********************* ≤ 9.00 V > 1.50 V	No active DTCs Low Fuel Condition Diag Fuel Level Data Fault ECT (Or OBD Coolant Enable Criteria Auto start is commanded from an auto stop state	U135C, U1347, P1066, UCAP_RmdlActFltFA UCAP_TempOOR_FA UCAP_TempRatFA ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA = FALSE = FALSE > 30.0 ºC = TRUE) = TRUE	Diagnostic runs when auto start is commaned from an auto stop state. Minimum auto stop time > 1.00 sec The test result average is calculated using data from 3 auto start events.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Charging Current Performance	P1065	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1065 diagnoses the ESS charging system by monitoring the capacitor voltage while the engine is running and comparing it to the expected voltage target value. The diagnostic failure counter is incremented if the ESC voltage is below the threshold value based on the temperature derating level. This DTC is set based on the fail and sample counters.	The diagnostic measures the capacitor voltage and compares it to a calibration value that is specific to the temperature derating level . **************************** Derating level 0 Capacitor temperature Capacitor voltage threshold to arm the auto start **************************** Derating level 1 Capacitor temperature Capacitor voltage threshold **************************** Derating level 2 Capacitor temperature Capacitor voltage threshold ****************************	************************ -40.0 ºC < capacitor temperature < 55.0 ºC ≤ Refer to **P1065_UCAP_Arm_Autostart_Thresh_Derating_Zero** in the Supporting Tables tab. ************************ 55.0 ºC ≤ capacitor temperature < 61.0 ºC ≤ 2.70 V ************************ 61.0 ºC ≤ capacitor temperature < 73.0 ºC ≤ 2.20 V ************************	No active DTCs ECT (Or OBD Coolant Enable Criteria Engine run No change of the capacitor derating level during the test Capacitor temperature Delay period before accumulating fails (allows time for caps to charge)	U135C, U1347, P1066, UCAP_RmdlActFltFA UCAP_TempOOR_FA UCAP_TempRatFA ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA > 30.0 ºC = TRUE) = TRUE = TRUE -40.0 ºC < capacitor temperature < 73.0 ºC = 20.0 seconds	320 failures out of 400 samples 500ms cycle time Continuously runs when 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 Illum.
Stop-Start Capacitor Control Module Status Message Counter Incorrect (UltraCap)	P1066	This DTC monitors for an error in communication with the Stop-Start Capacitor Control Module Status Signals	Communication of the Alive Rolling Count or Protection Value of the Current Status from the UltraCap over CAN bus is incorrect for	>= 8.00 counts	All the following conditions are met for	>= 300.00 seconds	Executes in 10ms loop.	Type A, 1 Trips
					Power Mode	= Run		
					Powertrain Relay Voltage	>= 11.00 Volts		
			out of total samples	>= 10.00 counts	Run/Crank Ignition Voltage	>= 11.00 Volts		
			Or					
			Communication of the Alive Rolling Count or Protection Value of the Part Number from the UltraCap over CAN bus is incorrectfor	>= 8.00 counts				
			out of total samples	>= 10.00 counts				
			Or					
			Communication of the Alive Rolling Count or Protection Value of the Temperature Fault from the UltraCap over CAN bus is incorrect for	>= 8.00 counts				
			out of total samples	>= 10.00 counts				
			Or					
			Communication of the Alive Rolling Count or Protection Value of the Temperature Status Fault from the UltraCap over CAN bus is incorrect for	>= 8.00 counts				
			out of total samples	>= 10.00 counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Performance	P1067	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1067 diagnoses the ESCM performance by monitoring five specific fault cases. P1067 Indicates one or more of the following faults have occured: Case 1: The ground switch (K1) current sensor is faulty. Case 2: The capacitor switch (K2) current sensor is faulty. Case 3: The onboard voltages indicate a faulty voltage regulator. Case 4: The analog input circuits are faulty. Case 5: The capacitor voltage sensor is stuck at maximum. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Case 1: The ground switch (K1) current is out of range	< -1330 amps OR > 1330 amps	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.51 sec	Test cycle time is 5ms Error count increases by 10 if an error is detected, up to a maximum value of 200. Error count decreases by 1 if no error is detected, minimum value 0. Fault is set when error count = 200 (100ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips
			Case 2: The ground switch (K2) current is out of range	< -1330 amps OR > 1330 amps	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then,	U135C, U1347, P1066 = TRUE	Test cycle time is 5ms Error count increases by 10 if an error is detected, up to a maximum value of 200. Error count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously.	> 0.50 sec > 0.51 sec	decreases by 1 if no error is detected, minimum value 0. Fault is set when error count = 200 (100ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	
			Case 3: Internal Power Supplies 2.5 V Reference 5.0 V Linear regulator 15.0 V Boost regulator are not functional or out of range.	Correct range is: 2.5 V +/- 0.1% 5.0 V +/- 0.2 V 15.0 V +/- 1.0 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; ; or whenever fault state from ESCM changes its value	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.51 sec	Test cycle time is 5ms Error count increases by 100 if an error is detected, up to a maximum value of 200. Error count decreases by 1 if no error is detected, minimum value 0. Fault is set when error count = 200 (10 ms fault maturity) Fault is removed	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Afterwards, this diagnostic runs continuously.		when error count = 0. (1 sec healing time)	
			Case 4: The analog input circuits are faulty: Measured 2.5V Reference voltage of out of range, which is a indicator that the analog inputs to A/D converter are faulty	< 2.23 V OR > 2.78 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: Internal Power Supplies DCDC	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.51 sec = OK = Not active	Test cycle time is 5ms Error count increases by 20 if an error is detected, up to a maximum value of 200. Error count decreases by 1 if no error is detected, minimum value 0. Fault is set when error count = 200 (50ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	
			Case 5: The measured capacitor voltage	≥ 5.86 V	No active DTCs Diagnostic reporting is enabled when the following three steps	U135C, U1347, P1066	Test cycle time is 10ms Error count increases by 10 if an error is	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously.	 = TRUE > 0.50 sec > 0.51 sec	detected, up to a maximum value of 100. Error count decreases by 1 if no error is detected, minimum value 0. Fault is set when error count = 100 (100ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Deteriorated	P1068	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1068 diagnoses the ESC deteriation (end of life) by monitoring three specific fault cases. This DTC is set any of the three criteria met their respective thresholds.	Capacitance OR Equivalent serial resistance (ESR) OR Number of consecutive cycles in which one of the capacitor cells has a voltage 0.6V lower than the other.	< 480 Farads > 3.6 milliion Ohms = 10 times	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Note: This is not continuous diagnostic.	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.10 sec	The capacitance and ESR are calculated during state of health determination. Fault is set after first detection. Cell voltage difference is calculated after ESCM wake up. Fault is set after 10 consecutive detections. This is a persistent fault that can only be removed by service.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Voltage High	P1069	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1069 diagnoses the ESC voltage for out of range high faults. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	capacitor voltage	> 5.8 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.51 sec	Test cycle time 10ms Error count increases by 2 if an error is detected, up to a maximum value of 100. Error count decreases by 1 if no error is detected, minimum value 0. Fault is set when error count = 100 (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Battery Negative Circuit Driver "A" and "B" Stuck Open	P106A	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P106A indicates that the ground switch (K1) is in a high impedance state. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Voltage drop across the ground switch (K1) when current > 550 amps OR Voltage drop across the ground switch (K1) when current > 550 amps OR Voltage drop across the ground switch (K1) when current ≤ 550 amps OR Voltage drop across the ground switch (K1) when current ≤ 550 amps	< -0.8 V > 0.8 V < -0.4 V > 0.4 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the folloiwng conditions are met: Capacitor switch (K2) open Ground switch (K1) close is commanded	U135C, U1347, P1066 = TRUE > 0.50 sec > 1.01 sec = TRUE = TRUE	Test cycle time is 10ms. Error count increases by 1 if an error is detected, up to a maximum of 100. Error count decreases by 1 if no error is detected, up to a minimum of 0. Fault is set when error count = 100. (1 sec fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Ground Switches "A" or "B" Stuck Open	P106B	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P106B indicates that both banks of ground switch (K1) stuck open, cannot be closed. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	The ground switch (K1) flip-flop state. Note: flip-flop is a basic hardware component used by software to command the switch to open or close. K1 driver voltage bank A K1 driver voltage bank B	= stuck open < 10.46 V < 10.46 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: Ground switch is commanded to close	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.05 sec = TRUE	Test cycle time is 5ms. Error count increases by 20 if an error is detected, up to a maximum of 200. Error count decreases by 1 if no error is detected, up to a minimum of 0. Fault is set when error count = 200. (50ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Charge Pump Performance	P106D	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P106D indicates that the charge pump (internal safety supply voltage) does not work correctly. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	The Internal safety supply voltage	< 11.23 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met, once per drive cyle: Capacitor voltage Authorization to support start	U135C, U1347, P1066 = TRUE > 0.50 sec > 1.10 sec ≥ 4.7 V = FALSE	Tested once per driving cycle. Needs enabling from SW: enable - wait 500ms - diagnose during 500 ms - disable. Test cycle time 10 ms. Error count increases by 10 if an error detection occurs up to a maximum of 100. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 100. (100ms fault maturity) Fault can only be removed in the next wake up, or by LIN message.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module State of Health Unkown	P106E	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P106E indicates that the ESCM has determined the ESC state of health as unknown. The DTC is set when enabled and the ESC state of health is not determined.	ESC state of health	= not determined.	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Note: This diagnostic runs once per trip.	U135C, U1347, P1066 = TRUE > 0.50 sec > 10.00 sec	Once per trip.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Self Test Incomplete	P106F	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P106F indicates that the ESCM self test has not been performed / completed for multiple consecutive trip cycles. The self test is performed during powerdown after trip completion. The DTC is set when the not performed / completed trip cycle counter is greater than the threshold.	Consecutive trip cycles in which the self-test has not been performed / completed	> 10 drive cycles	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Note: This diagnostic runs at wake up using information from previous power down.	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.03 sec	Wake up test only. Fault is set after first detection. Fault can be healed if the self test is performed / completed without errors in the last trip cycle.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Output Circuit	P1070	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1070 indicates that the ESC voltage output line is disconnected or the DCDC converter is defective. The DTC is set when: 1) The malfunction criteria mets the threshold value (Case 1 & 3) or, 2) The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value (Case 2).	Case 1: The capacitor voltage increase rate after 5s of charge	< 20 mV / s	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Note: This diagnostic runs at every charge when the following conditions are met: DCDC charging Capacitor voltage	U135C, U1347, P1066 = TRUE > 0.50 sec > 5.00 sec = Active > 0.5 V	First 5 seconds of each charge. Fault is set after first detetion. Once Fault is set, it will persist in the same driving cycle, and inhibit use of DCDC. Fault will be removed in the next wake up or by LIN message.	Type A, 1 Trips
			Case 2: Capacitor output voltage Capacitor (dual cell) mid point voltage	< 0.5 V > 0.8 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up	U135C, U1347, P1066 = TRUE	Test cycle time is 5ms. Error count increases by 10 if an error detection occurs up to a maximum	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously.	> 0.50 sec > 5.00 sec	of 100. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 100. (50ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	
			Case 3: The difference between the following items (A) and (B) (A) the sum of 3 Capacitor voltage samples (sampled with a 10ms reccurence after DCDC starts charging) (B) the Capacitor voltage sampled before starting the charge multiplied by 3	> 2.7 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM	U135C, U1347, P1066 = TRUE > 0.50 sec > 5.00 sec	First 30ms every time DCDC charging is active. Fault is set after first detetion. Once Fault is set, it will persist in the same driving cycle, and inhibit use of DCDC. Fault will be removed in the next wake up or by LIN message	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					changes its value Note: This diagnostic runs at every charge, when the following conditions met: DCDC charging	 = Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Read Only Memory Performance	P1071	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1071 indicates a failure of the ESCM ROM (flash program memory). The DTC is set when enabled and the ESCM ROM memory checksum does not match.	The calculated checksum across the ROM memory doesn't match the stored checksum computed during the build of the software.	checksum does not match.	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.01 sec	10ms cycle time to scan a portion of ROM. The whole memory is scanned in less than 2.6 seconds. If fault is detected, perform a reset up to a predefined number of times (5 times). if this number has expired go to a Fail Safe State that can only be left by ECU powerdown Note: in Fail Safe State, LIN communication is on, K1 is closed, DCDC is off. Fault can only be removed in next wake up or by LIN message.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Random Access Memory Performance	P1072	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1072 indicates a failure of the ESCM RAM. The DTC is set when enabled and the ESCM RAM memory cell is stuck high or low.	An error is detected while testing the RAM.	RAM memory cell is stuck at high or low	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received. or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.01 sec	10ms cycle time to scan a portion of RAM. The whole memory is scanned in less than 2.6 seconds. Fault is detected when one of the cells is not functioning correctly. If fault is detected, perform a reset up to a predefined number of times (5 times). If this number has expired go to a Fail Safe State that can only be left by ECU Powerdown Note: in Fail Safe State, LIN communication is on, K1 is closed, DCDC is off. Fault can only removed in next wake up or by	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Long Term Memory Performance	P1073	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1073 indicates a failure of the ESCM EPROM. The DTC is set when enabled and the ESCM EPROM memory checksum does not match the stored value.	CRC checksum calculation of the non volatile memory blocks	The calculated CRC doesn't match the stored CRC	No active DTCs	U135C, U1347, P1066	EEPROM is scanned at control module wake up. Fault is set at first detection. Fault can only be removed in next wake up, or by LIN message.	Type B, 2 Trips
					Diagnostic reporting is enabled when the following three steps finish:			
					(A) LIN bus wake up	= TRUE		
					Then,			
					(B) ESCM wake up delay	> 0.50 sec		
					Then,			
					(C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value	> 0.10 sec		
					Note: diagnostic runs at control module wake up.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Long Term Memory Reset	P1074	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1074 indicates a failure of the ESCM long term mermory. The DTC is set when enabled and the ESCM reset counter mets / exceeds the threshold value.	unexpected reset counter	≥ 15 counts	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Note: diagnostic runs at capacitor control module wake up.	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.10 sec	Capacitor control module wake up test only. Each unexpected reset increments the Unexpected Resets counter by 3 up to a maximum of 15. Each expected reset decrements the conter by 1 up to a minimum of 0. Fault is set when the counter reaches 15. Fault can only by removed in next wake up, or by LIN message.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Start-Stop Capacitor Sense Circuit Low	P1075	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1075 indicates that the ESC middle point voltage sense line is in an open circuit / short to GND faulted state or that the ESC is defective. The DTC is set when the malfunction criteria mets the threshold value for Case 1 or Case 2.	Case 1: Voltage increase rate of the capacitor after 5 seconds of charge	< 10 mV / s	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: DCDC charging Charging current	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.03 sec = active > 40 Amps	Detection is done in the first 5 seconds at each charge. Fault is set at first detection. Fault can only be removed at next wake up, or by LIN message.	Type A, 1 Trips
			Case 2: The capacitor (dual cell) mid point voltage before starting balance The capacitor (dual cell) mid point voltage after starting balance.	< 0.1 V > 0.8 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up	U135C, U1347, P1066 = TRUE	Detect after each balance of capacitor cells. Fault is set at first detection. Once set, this fault will inhibit	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Note: balance is used to make the capacitor voltage equally distributed between the two cells.		Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Then, this diagnostic runs after each balance.	> 0.50 sec > 0.03 sec	further cells balancing. Fault can only be removed in the next wake up or by LIN message.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Start-Stop Capacitor Sense Circuit High	P1076	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1076 indicates that the ESC middle point voltage sense line has a short to power fault. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Capacitor mid point line voltage	> 4.8 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec > 2.10 sec	Test cycle time is 100ms. Error count increases by 1 if an error is detected, up to a maximum of 20. Error count decreases by 1 if no error is detected, up to a minimum of 0. Fault is set when error count = 20. (2 sec fault maturity) Fault is removed when error count = 0. (2 sec healing time)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module LIN System Voltage Low	P1077	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1077 indicates that the LIN supply voltage is too low. The LIN supply voltage input is monitored and compared to the threshold value. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	LIN supply voltage	< 9.12 V	No active DTCs Diagnostic reporting is enabled when the following steps (A)~(D) finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Engine run time Then, (D) Fault maturity delay time expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions met: Ground switch (K1) Capactor switch (K2) Engine run time after each auto stop event	U135C, U1347, P1066 = TRUE > 0.50 sec > 3.0 sec > 5.00 sec = Closed = Open > 3.0 sec	Test cycle time is 10ms. Error count increases by 2 if an error is detected, up to a maximum of 100. Error count decreases by 1 if no error is detected up to a minimum of 0. Fault is set when error count = 100. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module LIN System Voltage High	P1078	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1078 indicates that the LIN supply voltage is too high. The LIN supply voltage input is monitored and compared to the threshold value. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	LIN supply voltage	> 17.16 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: Ground switch (K1) Capactor switch (K2)	U135C, U1347, P1066 = TRUE > 0.50 sec > 5.00 sec = Closed = Open	Test cycle time is 10ms. Error count increases by 2 if an error is detected up to a maximum of 100. Error count decreases by 1 if no error is detected up to a minimum of 0. Fault is set when error count = 100. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module LIN System Voltage Performance	P1079	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1079 indicates that the difference between the received reference voltage and the measured LIN supply votlage is too high. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	The absolute value of difference of the following two items (A) and (B): (A) measured LIN supply voltage (B) received engine run crank voltage from LIN message	> 2.5 V	No active DTCs Diagnostic reporting is enabled when the following steps (A)~(D) finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Engine Mode Run Then, (D) Fault maturity delay time expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: Ground switch (K1) Capactor switch (K2) Engine run time after each auto stop event	U135C, U1347, P1066 = TRUE > 0.50 sec > 3.0 sec > 5.00 sec = Closed = Open > 3.0 sec	Test cycle time is 100ms. Error count increases by 2 if an error is detected, up to a maximum of 10. Error count decreases by 1 if no error is detected up to a minimum of 0. Fault is set when error count = 10. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module DC/ DC Converter System Voltage Low	P107A	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P107A indicates that the measured battery (input to the DC/DC Converter system) is too low. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Measured battery voltage	< 6.34 V	No active DTCs Diagnostic reporting is enabled when the following steps (A)~(D) finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Engine run time Then, (D) Fault maturity delay time expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously when the following conditions are met: Measured LIN supply voltage Engine run time after each auto stop event	U135C, U1347, P1066 = TRUE > 0.50 sec > 3.0 sec > 0.11 sec > 6.5V + 380 mv hysteresis > 3.0 sec	Test cycle time is 10ms. Error count increases by 10 if an error is detected, up to a maximum of 100. Error count decreases by 1 if no error is detected up to a minimum of 0. Fault is set when error count = 100. (100ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module DC/ DC Converter System Voltage High	P107B	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P107B indicates that the measured battery (input to the DC/DC Converter system) is too high. The measured battery (input to the DC/DC Converter system) input is monitored and compared to the threshold value. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Measured battery voltage	> 17.06 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously when the following conditions are met: Measured LIN supply voltage	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.11 sec > 6.5 V + 380 mv hysteresis	Test cycle time is 10ms. Error count increases by 10 if an error detection occurs up to a maximum of 100. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 100. (100ms fault maturity) Fault is removed when error count = 0. (1 sec healing time).	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module DC/ DC Converter Supply Voltage Circuit Performance	P107C	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P107C indicates that the difference between the received reference voltage and the measured battery (input to the DC/DC Converter system) voltage is too high. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	The absolute value of difference between the following two items (A) and (B): (A) Mesured battery voltage (B) Received engine run crank voltage	> 2.5 V	No active DTCs	U135C, U1347, P1066	Test cycle time is 100ms. Error count increases by 2 if an error is detected up to a maximum of 10. Error count decreases by 1 if no error is detected up to a minimum of 0. Fault is set when error count = 10. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips
					Diagnostic reporting is enabled when the following steps (A)~(D) finish:			
					(A) LIN bus wake up	= TRUE		
					Then, (B) ESCM wake up delay	> 0.50 sec		
					Then, (C) Engine run time	> 3.0 sec		
					Then, (D) Fault maturity delay time expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value	> 5.00 sec		
					Afterwards, this diagnostic runs when the following conditions are met:			
					Ground swith (K1)	= Closed		
					Capacitor switch (K2)	= Open		
					Engine run time after each auto stop event	> 3.0 sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Control Module Backup System Voltage Low	P107D	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P107D indicates that the measured external safe supply (input to the ESCM) voltage is too low. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Measured external safe supply voltage	< 62 % of the measured battery voltage	No active DTCs Diagnostic reporting is enabled when the following steps (A)~(D) finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Engine run time Then, (D) Fault maturity delay time expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously when the following conditions are met: Measured LIN supply voltage Engine run time after each auto stop event	U135C, U1347, P1066 = TRUE > 0.50 sec > 3.0 sec > 0.60 sec > 6.5 V + 380 mv hysteresis > 3.0 sec	Test cycle time is 100ms. Error count increases by 2 if an error is detected, up to a maximum of 10. Error count decreases by 1 if no error is detected, up to a minimum of 0. Fault is set when error count = 10. (500ms fault maturity) Fault is removed when error count = 0. (1sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Control Module Backup System Voltage High	P107E	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P107E indicates that the measured external safe supply (input to the ESCM) voltage is too high. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Measured external safe supply voltage	> 17.16 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Aftterwards, this diagnostic runs when the following conditions are met: Ground switch (K1) Capacitor switch (K2)	U135C, U1347, P1066 = TRUE > 0.50 sec > 5.00 sec = Closed = Open	Test cycle time is 100ms. Error count increases by 2 if an error is detected, up to a maximum of 10. Error count decreases by 1 if no error is detected, up to a minimum of 0. Fault is set when error count = 10. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Control Module Backup System Voltage Performance	P107F	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P107F indicates that the difference between the received reference voltage and the measured external safe supply (input to the ESCM) voltage is too high. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Absolute value of difference of the following two items (A) and (B): (A) measured extrnal safe supply voltage (B) received engine run crank voltage	> 2.5 V	No active DTCs Diagnostic reporting is enabled when the following steps (A)~(D) finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Engine run time Then, (D) Fault maturity delay time expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: Ground switch (K1) Capacitor switch (K2) Engine run time after each auto stop event	U135C, U1347, P1066 = TRUE > 0.50 sec > 3.0 sec > 5.00 sec = Closed = Open > 3.0 sec	Test cycle time is 100ms. Error count increases by 2 if an error is detected, up to a maximum of 10. Error count decreases by 1 if no error is detected, up to a minimum of 0. Fault is set when error count = 10. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Battery Negative Circuit Driver "A" Low	P1080	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1080 indicates that the ground switch (K1) bank A driver is stuck at open when should be closed. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Gound switch (K1) bank A gate voltage is low. Note: the gate voltage is to assure that the switch stays closed when commanded.	< 10.5V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: Measured LIN supply voltage Ground switch (K1) is commanded to close according to flip-flop output	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.50 sec > 6.5 V + 380 mv hysteresis = TRUE	Test cycle time is 5ms. Error count increases by 2 if an error detection occurs up to a maximum of 200. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 200. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Battery Negative Circuit Driver "A" High	P1081	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1081 indicates that the ground switch (K1) bank A driver is stuck at closed when should be open. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value	Ground switch (K1) bank A gate voltage	> 2.0 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: Ground switch (K1) is commaned to open according to flip-flop output And, Measured LIN supply voltage	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.05 sec = TRUE > 6.5 V + 380 mv hysteresis	Test cycle time is 5ms. Error count increases by 29 if an error detection occurs up to a maximum of 203. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 203. (50ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Battery Negative Circuit Driver "A"-"B" Not Plausible	P108A	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P108A indicates that the difference between the ESCM ground switch (K1) bank A gate voltage and bank B gate voltage is too high. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	The absolute value of difference between the following two items (A) and (B) (A) K1A gate voltage (B) K1B gate voltage	> 2.0 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously	U135C, U1347, P1066 = TRUE > 0.50 sec > 5.00 sec	Test cycle time is 100ms. Error count increases by 2 if an error detection occurs up to a maximum of 10. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 10. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Battery Negative Circuit Driver "B" Low	P108B	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P108B indicates that the ground switch (K1) bank B driver is stuck at open when should be closed. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Gound switch (K1) bank B gate voltage	< 10.5 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received. Afterwards, this diagnostic runs when the following conditions are met: Measured LIN supply voltage Ground switch (K1) is commanded to close according to flip-flop output	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.50 sec > 6.5 V + 380mv hysteresis = TRUE	Test cycle time is 5ms. Error count increases by 2 if an error detection occurs up to a maximum of 200. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 200. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Battery Negative Circuit Driver "B" High	P108C	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P108C indicates that the ground switch (K1) bank B is stuck at closed when should be open. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Ground switch (K1) bank B gate voltage	> 2.0 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received. Afterwards, this diagnostic runs when the following conditions are met: Ground switch (K1) is commanded to close according to flip-flop output And, Measured LIN supply voltage	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.05 sec = TRUE > 6.5 V + 380 mv hysteresis	Test cycle time is 5ms. Error count increases by 29 if an error detection occurs up to a maximum of 203. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 203. (50ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module DC/DC Converter Discharging Performance	P108D	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P108D indicates that one or more of the following two ESCM DC/DC Converter discharging faults have occurred: Case 1) DCDC does not stop charging when requested; Case 2) DCDC is unable to discharge the capacitor The DTC is set when: 1) The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the	Case 1: DCDC does not stop charging when requsted Charging current	> 10 Amps	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: DCDC disabled OR DCDC discharging	U135C, U1347, P1066 = TRUE > 0.50 sec > 15.00 sec = TRUE = TRUE	Test cycle time is 10ms. Error count increases by 1 if an error detection occurs up to a maximum of 200. Error count decreases by 2 if no error detection occurs up to a minimum of 0. Fault is set when error count = 200. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		error count maximum value (Case 1) or, 2) The malfunction criteria mets the threshold value (Case 2)	Case 2: DCDC is unable to discharge the capacitor: Capacitor voltage decrease rate	< 6 mv / second in first 15 sec discharging time	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: DCDC discharging Capacitor voltage	U135C, U1347, P1066 = TRUE > 0.50 sec > 15.00 sec = TRUE > 0.5 V	Detect during first 15 seconds ot discharging. Fault is set after first detection. Fault can only be removed in the next wake up, or by LIN message.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capcitor Control Module DC/ DC Converter Charging Performance	P108E	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P108E indicates that one or more of the following two ESCM DC/DC Converter Charging faults have occurred: Case 1) Charge current is too high Case 2) DCDC does not charge when requested The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Case 1: Charge current is too high Phase 1 charge current OR Phase 2 charge current	 > 36.75 Amps > 68.25 Amps	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: DCDC charging	U135C, U1347, P1066 = TRUE > 0.50 sec > 2.10 sec = TRUE	Test cycle time is 10 ms. Error count increases by 10 if an error detection occurs up to a maximum of 100. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 100. (100 ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type A, 1 Trips
			Case 2: DCDC does not charge when requested: ****************************** Condition (I) if DCDC is charging with half current OR capacitor voltage > 4V ***************************** Charge current	 < 15 Amps	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay	U135C, U1347, P1066 = TRUE > 0.50 sec	Detection starts after 500 ms charge. Test cycle time is 10 ms. Error count increases by 1 if an error detection occurs up to a maximum of 200.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			****************************** Condtion (II) if DCDC is charging with full current AND capacitor voltage ≤ 4 V ****************************** Charge current	< 30 Amps	Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received. Note: After intial time delay, diagnostic runs if the following conditions satisfy: DCDC charging DCDC charging time	> 2.10 sec = TRUE ≥ 500 ms	Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 200. Fault is removed when error count = 0.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Self Test Failed	P108F	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P108F indicates that one ore more of the following three faults have occurred: Case 1) Unable to switch over to capacitor switch (K2) during self test, Case 2) An unintended switchover to capacitor switch (K2) during self test, Case 3) Capacitor switch (K2) is in a high impedance state or diode mode during self test The DTC is set when the malfunction criteria mets the threshold values in any of the three cases.	Case 1: Unable to switch over to capacitor switch (K2) during self test if either (A) or (B) is TRUE: (A) Hardware current comparator output stuck at passive. And, the measured battery voltage Note: hardware current comparator is used to automatically provoke a switch if the current flowing through the ground switch (K2) is greater than a threshold. (B) Hardware voltage comparator is stuck at passive. And, the measured battery voltage Note: hardware voltage comparator is used to automatically provoke a switch if the battery voltage is less than a threshold.	< 13.3 V ≥ 13.3 V	No active DTCs Diagnostic reporting is enabled when the following steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value And, (D) Fault is deteced following previous drive cycle during powerdown self test. Note: This is not continuous diagnostic.	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.10 sec	Detect during part two of the self test procedure only if there was no switch (K1-K2-K1) in the drving cycle. Self test procedure is performed at the end of the drive cycle after ESCM is not in working state, i.e. no LIN commnication, and further delay by 120 seconds. Fault is set after first detection. Fault can only be removed in the following driving cycle when self test runs again.	Type A, 1 Trips
			Case 2: Unintended switchover to capacitor switch (K2) during self test if either (A) or (B) is TRUE: (A) Hardware current comparator output is		No active DTCs Diagnostic reporting is enabled when the following steps finish: (A) LIN bus wake up	U135C, U1347, P1066	Detect during part one of the self test procedure. Self test procedure is performed at the	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			always triggerred. And, the measured battery voltage Note: hardware current comparator is used to automatically provoke a switch if the current flowing through the ground switch (K2) is greater than a threshold. (B) Hardware voltage comparator output is always triggerred. And, the measured battery voltage Note: hardware voltage comparator is used to automatically provoke a switch if the battery voltage is less than a threshold (9.5V)	< 3.3 V OR > 7.5 V ≥ 3.3 V AND ≤ 7.5 V	Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value And, (D) Fault is deteced following previous drive cycle during powerdown self test. Note: This is not continuous diagnostic.	= TRUE > 0.50 sec > 0.10 sec	end of the drive cycle after ESCM is not in working state, i.e. no LIN commnication, and further delay by 120 seconds. Fault can only be removed in the following driving cycle when self test runs again.	
			Case 3: Capacitor switch (K2) is in a high impedance state or diode mode during self test; Measured battery voltage jumps immediately after the switch, i.e. ground switch (K1) changes from close to open, meanwhile capacitor switch (K2) changes from open to close.	< 1.0 V	No active DTCs Diagnostic reporting is enabled when the following steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.10 sec	Detect during part two of the self test procedure. Self test procedure is performed at the end of the drive cycle after ESCM is not in working state, i.e. no LIN commnication,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Note: this test requires that measured capacitor voltage	> 2.0 V	expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value And, (D) Fault is deteced following previous drive cycle during powerdown self test.		and further delay by 120 seconds. Fault can only be removed in the following driving cycle when self test runs again.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Internal Circuitry Performance	P1090	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1090 indicates a ESCM power interconnection defect on control board / power board. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the counter reaches the error count maximum value.	Measured 2.5V reference voltage	< 2.18 V OR > 2.83 V	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: Internal power supply DCDC charging OR discharging	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.51 sec = OK = TRUE	Test cycle time is 10ms. Error count increases by 2 if an error detection occurs up to a maximum of 100. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 100. (500ms fault maturity) Fault is removed when error count = 0. (1 sec healing time)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop-Start Capacitor Control Module Switch Deteriorated	P1091	The Energy Storage Capacitor (ESC) and Energy Storage Control Module (ESCM) are used on certain 12 volt start stop applications to improve the vehicle system voltage during engine start events. P1091 diagnoses the ESCM switch degridation by monitoring four specific fault cases. P1091 Indicates one or more of the following faults have occured: Case 1) Ground switch (K1) is in short circuit when it should be open Case 2) Capacitor switch (K2) is in a high impedance or in diode mode when it should be closed. Case 3) Capacitor switch (K2) close command does not close K2 when required. Case 4) Capacitor control module has reached its end of life. The diagnostic failure counters are incremented and decremented based on error detection, the DTC is set when the	Case 1: Ground switch (K1) current measurement AND Capcitor switch current measurement	< -120 Amps > 60 Amps	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value. Afterwards, this diagnostic runs when the following conditions are met: Capacitor switch (K2) closed	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.03 sec = TRUE	Test cycle time is 1ms. Error count increases by 10 if an error detection occurs up to a maximum of 100. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 100. (10ms fault maturity) Fault is removed when error count = 0. (100ms healing time)	Type A, 1 Trips
			Case 2: Measured ground switch (K1) current AND Measured capacitor switch (K2) current	> 40A < 30A	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay	U135C, U1347, P1066 = TRUE > 0.50 sec	Test cycle time is 1ms. Error count increases by 10 if an error detection occurs up to a maximum of 100. Error count decreases by 1 if no error	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		counter reaches the error count maximum value.			Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met: Capacitor switch (K2)	 > 0.03 sec = Closed	detection occurs up to a minimum of 0. Fault is set when error count = 100. (10 ms fault maturity) Fault is removed when error count = 0. (100ms healing time)	
			Case 3: Capacitor switch (K2) stuck at open when it should be closed	n.a.	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) Diagnostic delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs when the following conditions are met:	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.03 sec	Test cycle time is 10ms. Error count increases by 34 if an error detection occurs up to a maximum of 102. Error count decreases by 1 if no error detection occurs up to a minimum of 0. Fault is set when error count = 102. (30ms fault maturity) Fault is removed when error count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Capacitor switch (K2) is commanded to close, according to flip-flop output	= TRUE	= 0. (1.2 sec healing time)	
			Case 4: Number of switchbacks between ground switch (K1) and capacitor switch (K2)	> 2 million times	No active DTCs Diagnostic reporting is enabled when the following three steps finish: (A) LIN bus wake up Then, (B) ESCM wake up delay Then, (C) Fault maturity delay expires, and the next valid LIN frame has been received; or whenever fault state from ESCM changes its value Afterwards, this diagnostic runs continuously.	U135C, U1347, P1066 = TRUE > 0.50 sec > 0.03 sec	Detect after every switch-back. Fault is set after first detection. This fault is permament, can only be removed by service tool.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Pumping Current Performance Bank 1 (For use with WRAF - E80	P223C	This DTC determines if the WRAF O2 sensor pumping current has an incorrect or out of range value. This DTC will detect open circuit faults to the Pump current, Ref Cell voltage, Ref Ground and Trim circuits. When enabled, the diagnostic monitors the pumping current in three different fault regions during DFCO. The individual diagnostic failure counters are incremented based on the diagnostic results in each region. The DTC is set based on any of the three individual fail and sample counters.	Fault condition present when the pump current is in any of the fault regions when this test is enabled during DFCO. Note: This ASIC is referred to as C2WRAF (Delphi).	The three pump current fault regions are: A) Pump current > 4.18 ma B) Pump current ≤ 0.10 ma and ≥ - 0.10 ma C) Pump current < -0.10 ma The three fault regions have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set. Note: A open circuit on the Pump current signal may also set a P0131 DTC. Note: A short to ground on the trim circuit can set P223C.	DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop WRAF Ref cell temperature ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) ************************** Test starts when time in DFCO Test stops when time in DFCO	WRAF_Bank_1_FA P0135, P0030, P0031, P0032 = Valid = Ready = True ≥ 600 Deg C = Complete ≥ 20.0 seconds ≥ 5.0 seconds > 12.0 seconds	Region A: 224 failures out of 280 samples OR Region B: 224 failures out of 280 samples OR Region C: 224 failures out of 280 samples Sample rate is 25 msec. Test enabled during DFCO.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Coolant Pump Relay Control Circuit	P2600	Controller specific output driver circuit diagnoses the Auxillary Coolant Pump Relay Control Circuit 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 Ω impedance between signal and controller ground.	Run Crank Ignition in Range Engine not cranking == Above is true and == Last Open Circuit Test	= True = True ==================== not Indeterminate	5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips Note: In certian controllers P2602 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Coolant Pump Relay Control Circuit Low Voltage	P2602	Controller specific output driver circuit diagnoses the Auxiliary Coolant Pump Relay Control Circuit 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 Ω impedance between signal and controller ground	Run Crank Ignition in Range Engine not cranking == Above is true and == Last Open Circuit Test	= True = True ==================== not Indeterminate	5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips Note: In certian controllers P2600 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Coolant Pump Relay Control Circuit High Voltage	P2603	Controller specific output driver circuit diagnoses the Auxiliary Coolant Pump Relay Control Circuit 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 Ω impedance between signal and controller power.	Run Crank Ignition in Range Engine not cranking == Above is true and == Last Open Circuit Test	= True = True ==================== not Indeterminate	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 Illum.
Lost Communication With Fuel Pump Control Module	U0109	This DTC monitors for a loss of communication with the fuel pump control module	Message is not received from controller for Message $1EB Message $4D9	 ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) = Active > 11.00 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 Illum.
					not active for	> 0.4000 seconds		
					U0109	Not Active on Current Key Cycle		
					Fuel Pump Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication LIN Bus 3 Off	U1347	This DTC monitors for a LIN bus 3 off condition	LIN bus off failures	>= 3.00 counts	The following criteria have been enabled for Power Mode Run/Crank Voltage	>= 400.00 milliseconds =Run >= 11.00 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 Illum.
LIN Bus 3 Loss of Communication with Stop-Start Control Module (UltraCap)	U135C	This DTC monitors for a loss of communication on the LIN bus 3 with UltraCap Module	ECM has lost communication over the LIN bus 3 with the UltraCap Module for	>= 3.00 counts	The following criteria have been enabled for Power Mode Run/Crank Voltage	>= 400.00 milliseconds =Run >= 11.00 Volts	LIN bus communication executes in 500ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Control Module Transfer Case Command State Rationality - 4WD high or 4WD low command not 4wd high or 4WD low ratio	P17D4	The diagnostic monitor compares measured transfer case ratio to the transfer case control module commanded transfer case state. When the measured transfer case gear ratio is 4WD neutral ratio, while, the transfer case control module command state is 4WD high ratio or 4WD low ratio, the DTC is set. The 4WD neutral ratio regions are considered ratios outside the nominal 4WD high and nominal 4WD low ratios. The 4WD ratio is calculated as transmission output shaft speed divided by the transfer case output shaft speed, both speed are measured values based on speed sensors.	transfer case contol module transfer case command state AND measured transfer case ratio is NOT in 4WD low ratio window AND measured transfer case ratio is NOT in 4WD high window AND measured transfer case ratio is NOT in 4WD low ratio window AND measured transfer case ratio is NOT in 4WD high window OR vehicle is stopped: transfer case output shaft speed transmission output shaft speed vehicle stopped secondary parameter thresholds met (measured transfer case ratio = transmission output speed / transfer case output speed)	≠ 4WD neutral 4WD low ratio window ≤ 3.00 ≥ 2.40 4WD high ratio window ≤1.30 ≥ 0.70 ≥ 2.90 ≤ 2.00 ≥ 1.20 ≤ 0.80 ≤ 10.0 RPM ≥ 500.0 RPM	vehicle stopped: transmission output shaft speed engine torque engine speed accelerator pedal position accelerator pedal position brake pedal position transmssion gear is forward gear: transmission output shaft speed engine torque engine speed accelerator pedal position accelerator pedal position brake pedal position transmssion gear is reverse gear: transmission output shaft speed engine torque engine speed accelerator pedal position accelerator pedal position brake pedal position diagnsotic monitor enable PTO active engine power limited DTCs not fault active	≥ 500.0 RPM ≥ 100.0 Nm ≥ 300.0 RPM ≥ 5.0 % hysteresis high NOT ≤ 3.0 % hysteresis low ≤ 100.0 % ≥ 500.0 RPM ≥ 0.0 Nm ≥ 0.0 RPM ≥ 0.0 % hysteresis high NOT ≤ 0.0 % hysteresis low ≤ 100.0 % ≥ 500.0 RPM ≥ 90.0 Nm ≥ 300.0 PRM ≥ 6.0 % hysteresis high NOT ≤ 3.0 % hysteresis low ≤ 100.0 % = 1 Boolean = FALSE = FALSE CrankSensor_FA VehicleSpeedSensor_FA EngineTorqueEstInaccura te P057B, P057C, P057D,	fail time ≥ 10.50 seconds out of sample time ≥ 15.00 seconds update rate 12.5 milliseconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			update fail time update rate 12.5 milliseconds			P057E, P279A, P279B, P279C, P0502, P0503, P0722, P0723, P2160, P2161		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Deactivation Solenoid Control Circuit/Open	P3417	Controller specific output driver circuit diagnoses the Cylinder 3 Deactivation 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.	Open Circuit: ≥ 200 k Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3419 may also set (Cylinder 3 Deactivation Solenoid Control Circuit/ Low)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Deactivation Solenoid Control Circuit/Low	P3419	Controller specific output driver circuit diagnoses the Cylinder 3 Deactivation 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.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3417 may also set (Cylinder 3 Deactivation Solenoid Control Circuit/ Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Deactivation Solenoid Control Circuit/High	P3420	Controller specific output driver circuit diagnoses the Cylinder 3 Deactivation 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.	Short to Power ≤ 0.5 Ω impedance between output and controller power	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Deactivation Solenoid Control Circuit/Open	P3441	Controller specific output driver circuit diagnoses the Cylinder 6 Deactivation 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 low during driver off state (indicates open circuit)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 impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3443 may also set (Cylinder 6 Deactivation Solenoid Control Circuit/ Low)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Deactivation Solenoid Control Circuit/Low	P3443	Controller specific output driver circuit diagnoses the Cylinder 6 Deactivation 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.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips Note: In certain controllers P3441 may also set (Cylinder 6 Deactivation Solenoid Control Circuit/ Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Deactivation Solenoid Control Circuit/High	P3444	Controller specific output driver circuit diagnoses the Cylinder 6 Deactivation 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.	Short to Power ≤ 0.5 Ω impedance between output and controller power	Diagnostic Status Powertrain Relay Voltage Engine RPM	Enabled ≥ 11.00 volts ≥ 400 rpm	>= 20 errors out of 25 samples Performed every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp Sensor Circuit Low Voltage	P00B3	Circuit Continuity This DTC detects a short to ground in the RCT (Radiator Coolant temperature) signal circuit or the RCT sensor. This is accomplished by monitoring the resitance of the circuit. If the resistance goes out of the expected range the DTC is set.	RCT Resistance (@ 150ºC)	< 34 Ohms	Engine run time OR IAT min	> 10.0 seconds ≤ 70.3 °C	5 failures out of 10 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp Sensor Circuit High Voltage	P00B4	Circuit Continuity This DTC detects a short to high or open in the RCT (Radiator Coolant temperature) signal circuit or the RCT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	RCT Resistance (@ -60ºC)	> 260,000 Ohms	Engine run time OR IAT min	> 60.0 seconds ≥ -7.0 °C	5 failures out of 10 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Insufficient	P00B7	This DTC detects a Insufficient Flow Condition in the main cooling circuit. This check is done when all known restrictions in the system such as a thermostat are open and allowing coolant to flow through the radiator. DTC indication can be caused by a stuck closed thermostat or other unexpected restriction in the cooling system.	Engine Coolant Temp (ECT) is AND Difference between ECT and RCT (Radiator Coolant Temp) is When above is present for fail counts start.	> 120.0 Deg C > 40.0 Deg C > 5 seconds	No Active DTC's Engine run time AND Engine Coolant Temp	THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA > 300 seconds > 80.0 Deg C	30 failures out of 300 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Open Circuit - (PFI)	P0201	This DTC Diagnoses Injector 1 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: >= 200 KΩ impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips Note: In certain controllers P0261 may also set (Injector 1 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Open Circuit - (PFI)	P0202	This DTC Diagnoses Injector 2 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: >= 200 KΩ impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips Note: In certain controllers P0264 may also set (Injector 2 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Open Circuit - (PFI)	P0203	This DTC Diagnoses Injector 3 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: >= 200 KΩ impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips Note: In certain controllers P0267 may also set (Injector 3 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Open Circuit - (PFI)	P0204	This DTC Diagnoses Injector 4 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: >= 200 KΩ impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips Note: In certain controllers P0270 may also set (Injector 4 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Low side circuit shorted to ground (PFI)	P0261	This DTC Diagnoses Injector 1 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips Note: In certain controllers P0201 may also set (Injector 1 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Low side circuit shorted to power (PFI)	P0262	This DTC Diagnoses Injector 1 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Low side circuit shorted to ground (PFI)	P0264	This DTC Diagnoses Injector 2 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips Note: In certain controllers P0202 may also set (Injector 2 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Low side circuit shorted to power (PFI)	P0265	This DTC Diagnoses Injector 2 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Low side circuit shorted to ground (PFI)	P0267	This DTC Diagnoses Injector 3 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips Note: In certain controllers P0203 may also set (Injector 3 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Low side circuit shorted to power (PFI)	P0268	This DTC Diagnoses Injector 3 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Low side circuit shorted to ground (PFI)	P0270	This DTC Diagnoses Injector 4 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips Note: In certain controllers P0204 may also set (Injector 4 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Low side circuit shorted to power (PFI)	P0271	This DTC Diagnoses Injector 4 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 1 Seconds >= 0 Seconds	20 failures out of 25 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Incorrect Airflow (for single valve systems)	P0411	Detects an insufficient flow condition.This test is run during Phase 1 (AIR pump commanded On, Valve commanded Open).Leaks downstream of the valve are detected via an evaluation of average pressure error and average "String Length"(SL) – a term that represents the absolute pressure delta accumulated every 6.25ms, then averaged over the duration of the test. Low SL values are indicative of downstream leaks or blockages.	Average Pressure Error or OR the following String Length (SL) Test: Average Pressure Error or and the Average String Length NOTE: Average Pressure Error is the average difference between the predicted pressure and the measured pressure	> 5.0 kPa < -4.9 kPa > 1.0 kPa < -1.0 kPa **P0411 SL Threshold** < **Bank 1 Table**	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not SL Stability time SL RPM range No active DTCs:	> 60 kPa > -10.0 deg C > -10.0 deg C < 80.0 > 3,600.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec > 5.0 seconds Bank 1 > 5.0 seconds Bank 2 < 6,000 RPM or > 6,500 AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA P0606 IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Phase 1 Conditional test weight > 7.0 seconds Total 'String Length' accumulation time: > 10.0 sec Bank1 > 10.0 sec Bank2 Frequency: Once per trip when AIR pump commanded On Conditional test weight is calculated by multiplying the following Factors: **P0411 Phase 1 Baro Test Weight Factor , P0411 Phase 1 MAF Test Weight Factor , P0411 Phase 1 System Volt Test Weight Factor , P0411 Phase 1 Amb Temp Test Weight Factor** (see Supporting Tables)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Solenoid Control Circuit Open	P0412	Diagnoses the Secondary AIR Solenoid Control Low Side Driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: >= 200K Ohms impedance between signal and controller ground	Powertrain Relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips Note: In certain controllers P041F may also set (Secondary AIR solenoid control circuit low voltage)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Pump Control Circuit Open	P0418	Diagnoses the Secondary AIR Pump Control Low Side Driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: >= 200K Ohms impedance between signal and controller ground	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips Note: In certain controllers P2257 may also set (Secondary AIR Pump Control Circuit Low Voltage)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Solenoid Control Circuit Low Voltage	P041F	Diagnoses the Secondary AIR Solenoid Control Low Side Driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <= 0.5 Ohms impedance between signal and controller ground	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips Note: In certain controllers P0412 may also set (Secondary AIR solenoid control circuit Open)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Solenoid Control Circuit High Voltage	P044F	Diagnoses the Secondary AIR Solenoid Control Low Side Driver circuit for circuit faults	Voltage high during driver on state (indicates short-to-power)	Short to power: <= 0.5 Ohms impedance between signal and controller power	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Relay Control Circuit Open (ODM)	P0481	Diagnoses the cooling fan 2 relay control low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage	Voltage ≥ 11.00 volts	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P0693 may also set (Fan 2 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Thermostat Heater Control Open Circuit	P0597	Controller specific output driver circuit diagnoses the Thermostat Heater Control 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 Ω impedance between signal and controller ground.	Run Crank Ignition in Range Engine not cranking Run Crank active == Above is true and == Last Open Circuit Test	= True = True = True =================== = not Indeterminate	15 failures out of 30 samples 1 sec/ sample Continuous	Type B, 2 Trips Note: In certian controllers P0598 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Thermostat Heater Control Circuit Low	P0598	Controller specific output driver circuit diagnoses the Thermostat Heater low sided driver for a short to ground failure. A DTC is set 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: ≤ 0.5 Ω impedance between signal and controller ground	Run Crank Ignition in Range Engine not cranking Run Crank active == Above is true and == Last Ground Short Circuit Test	= True = True = True ================ = not Indeterminate	15 failures out of 30 samples 1 sec/ sample Continuous	Type B, 2 Trips Note: In certian controllers P0597 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Thermostat Heater Control Circuit High	P0599	Controller specific output driver circuit diagnoses the Thermostat Heater 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 signal and controller power.	Run Crank Ignition in Range Engine not cranking Run Crank active == Above is true and == Last Power Short Circuit Test	= True = True = True ================== = not Indeterminate	15 failures out of 30 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Tuning (IMT) Valve Solenoid Control Circuit Bank 1	P0660	Diagnoses the Intake Manifold Tuning (IMT) Valve low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: >= 200K Ohms impedance between signal and controller ground	Powertrain Relay Voltage Engine Speed	>= 11.00 Volts >= 400 RPM	40 failures out of 50 samples 1 sample every 12.5 msec	Type B, 2 Trips Note in certain controllers P0661 may also set (Intake Manifold Tuning (IMT) Valve Solenoid Control Circuit Low Voltage Bank 1)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Tuning (IMT) Valve Solenoid Control Circuit Low Voltage Bank 1	P0661	Diagnoses the Intake Manifold Tuning (IMT) Valve low side driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground or open circuit)	Short to ground: <= 0.5 Ohms impedance between signal and controller ground Open Circuit: >= 200K Ohms impedance between signal and controller ground	Powertrain Relay Voltage Engine Speed	>= 11.00 Volts >= 400 RPM	40 failures out of 50 samples 1 sample every 12.5 msec	Type B, 2 Trips Note in certain controllers P0660 may also set (Intake Manifold Tuning (IMT) Valve Solenoid Control Circuit Bank 1)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Tuning (IMT) Valve Solenoid Control Circuit High Voltage Bank 1	P0662	Diagnoses the Intake Manifold Tuning (IMT) Valve low side driver circuit for circuit faults	Voltage low during driver on state (indicates short-to-power)	Short to power: <= 0.5 Ohms impedance between signal and controller power	Powertrain Relay Voltage Engine Speed	>= 11.00 Volts >= 400 RPM	40 failures out of 50 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Relay Control Circuit Low Voltage (ODM)	P0693	Diagnoses cooling fan 2 relay control low side driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage	Voltage ≥ 11.00 volts	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P0481 may also set (Fan 2 Open Circuit).

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Relay Control Circuit High Voltage (ODM)	P0694	Diagnoses the cooling fan 2 relay control low side driver circuit for circuit faults	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage	Voltage ≥ 11.00 volts	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temperature Sensor Not Plausible	P112F	This DTC detects either a biased high or low RCT (Radiator Coolant Temperature) sensor. This is done by comparing the RCT sensor output to two other temperature sensor outputs after a soak condition.	**Sensor usage definitions:** **Sensor1 =** CeECTD_e_ECT_Snsr (Sensor1 is the temp sensor most impacted by the block heater (if equipped)) **Sensor2 =** CeECTD_e_RCT_Snsr **Sensor3 =** CeECTD_e_IAT_Snsr ================== A failure will be reported if (based on the above calibrations): 1) Sensor2 (if RCT is Sensor2)power up absolute temp difference to Sensor1 and Sensor3 is: OR (based on usage) 2) Sensor3 (if RCT is Sensor3) power up absolute temp difference to Sensor1 and Sensor2 is:	≥ 19.0 ºC ≥ 19.0 ºC	No Active DTC's Engine Off Soak Time Propulsion Off Soak Time Non-volatile memory initization Test complete this trip Test aborted this trip Test disabled this trip Ambient LowFuelCondition Diag	VehicleSpeedSensor_FA IAT_SensorCircuitFA THMR_RCT_Sensor_Ckt_FA ECT_Sensor_Ckt_FA EngineModeNotRunTimerError EngineModeNotRunTimer_FA OAT_PtEstFiltFA OAT_PtEstRawFA PSAR_PropSysInactveCrs_FA DRER_DiagSystemDsbl > 28,800 seconds > 0 seconds = Not occurred = False = False = False ≥ -7 ºC = False	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Tuning (IMT) Valve Stuck Open	P2070	Detects an Intake Manifold Tuning Valve that is stuck in the open position	Time after the close command without the Intake Manifold Tuning Valve reaching the closed position	>= 5.00 seconds	Intake Manifold Tuning Valve is commanded closed		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips
					No Active DTCs:	P0660 P0661 P0662 P2077 P2078		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Tuning (IMT) Valve Stuck Closed	P2071	Detects an Intake Manifold Tuning Valve that is stuck in the closed position	Time after the open command without the Intake Manifold Tuning Valve reaching the open position	>= 5.00 seconds	Intake Manifold Tuning Valve is commanded closed No Active DTCs:	 P0660 P0661 P0662 P2077 P2078	320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Tuning (IMT) Valve Position Sensor/ Switch Circuit Range/ Performance	P2076	Detects an Intake Manifold Tuning Valve Actuator that has initiated its learn sequence for too long a period of time, or too many times per ignition cycle	Valve Position AND Valve Position for a time period OR Valve Position AND Valve Position for a time period for	>= 5.0 % <= 35.0 % >= 5.0 seconds >= 5.0 % <= 35.0 % >= 0.2 seconds >= 10 times in one ignition cycle	Powertrain Relay Voltage Powertrain Relay Voltage Engine Run Time	>= 11.00 Volts <= 999.00 Volts >= 1.0 seconds	Executes every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Tuning (IMT) Valve Position Sensor/ Switch Circuit Low	P2077	Detects a continuous open or short to low in the Intake Manifold Tuning Valve Position Sensor circuit	Valve Position	>= 95.0 %	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Tuning (IMT) Valve Position Sensor/ Switch Circuit High	P2078	Detects a continuous short to high in the Intake Manifold Tuning Valve Position Sensor circuit	Valve Position	<= 5.0 %	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling System Performance	P2181	This DTC detects a stuck open thermostat by comparing the ECT sensor reading with the Radiator Coolant Temperature (RCT) sensor reading while the thermostat is expected to be closed (ie: during warm up). If the sensors follow each other the DTC is set.	This diagnostic can be calibrated to fail in <u>one</u> of two methods based on the following calibration. This application has been calibrated as a Type 0 . <u>Type 0 - Airflow Method:</u> Engine Coolant Temp (ECT) is ≤ commanded temperature minus 11 Deg C and normalized ratio is When above is present for more than 0 seconds, fail counts start. == Ratio Definition:=== Current temp difference between ECT and RCT minus PwrUp difference divided by total airgrams. Note: Minimum total airgrams is 500.0 grams. <u>Type 1 - Energy Method:</u> Engine Coolant Temp (ECT) is ≤ commanded temperature minus 11 Deg C and normalized ratio is When above is present for more than 0 seconds, fail counts start. == Ratio Definition:=== Current temp difference between ECT and RCT minus PwrUp difference divided by predicted energy.	≤ 0.65 ≤ 0.01	No Active DTC's Engine not run time Engine run time Fuel Condition ECT at Power Up IAT min T-Stat Heater duty cycle commanded Type 0: Airflow range to accumulate Type 1: Minumum energy to enable	MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA THMR_AHV_FA ≥ 7,200 seconds 120 ≤ Time ≤ 1,400 seconds Ethanol ≤ 100 % -10.0 ≤ ECT ≤ 45.0 °C -7 °C ≤ IAT ≤ 60 °C. ≤ 10 % 11.0 ≤ Airflow ≤ 100.0 gps 240.0 kJ	225 failures out of 280 samples 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Pump Control Circuit Low Voltage	P2257	Diagnoses the Secondary AIR Pump Control Low Side Driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <= 0.5 Ohms impedance between signal and controller ground	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips Note: In certain controllers P0418 may also set (Secondary AIR Pump Control Circuit Open)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Pump Control Circuit High Voltage	P2258	Diagnoses the Secondary AIR Pump Control Low Side Driver circuit for circuit faults	Voltage high during driver on state (indicates short-to-power)	Short to power: <= 0.5 Ohms impedance between signal and controller power	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Bank 1	P2430	This DTC detects a stuck in range pressure sensor signal when the AIR pump is commanded on.	Average Pressure Error AND Signal Variation	< 0.50 kPa < 1.00 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not No active DTCs:	> 60 kPa > -10.0 deg C > -10.0 deg C < 80.0 > 3,600.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec AIRValveControlCircuit FA AIRPumpControlCircuit FA P2432 P2437 P2433 P2438 P0606	Stuck in range cumulative time > 5.0 seconds Frequency: Once per trip when SAI pump is commanded On	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Performance Bank 1	P2431	This DTC detects a skewed pressure sensor signal via a comparison of the AIR pressure sensor signal and estimated BARO, as well as an evaluation of the quality of the comparison.	Difference between AIR pressure sensor and BARO (Pump Commanded Off) or OR Difference between AIR pressure sensor and BARO (Pump Commanded On)	> 15.0 kPa < -15.0 kPa > 50.0 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Transfer Case not in 4WD Low Run/crank active No active DTCs:	> 60 kPa > -10.0 deg C > -10.0 deg C < 80.0 > 3,600.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec AIRValveControlCircuit FA AIRPumpControlCircuit FA P2432 P2437 P2433 P2438 MAF_SensorFA EngineMisfireDetected_FA P0606	Skewed sensor cumulative test weight > 30.0 seconds Continuous 6.25ms loop Skewed sensor cumulatative test weight is based on distance from the last Baro update. See **P2431_P2436 Baro Skewed Sensor Weight Factor** table.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Low Voltage Bank 1	P2432	This DTC detects an out of range low AIR pressure sensor signal	AIR Pressure Sensor signal	< 6 % of 5Vref for 800 failures out of 1,000 samples	No active DTCs:	P0606	1,000 samples (6.25 ms per sample) Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Hi Voltage Bank 1	P2433	This DTC detects an out of range high AIR pressure sensor signal	AIR Pressure Sensor signal	> 94 % of 5Vref for 800 failures out of 1,000 samples	No active DTCs:	P0606	1,000 samples (6.25 ms per sample) Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Shut-off Valve Stuck Open (for single valve systems)	P2440	This DTC detects if one or both of the AIR system control valves is stuck openThis test is run during Phase 2 (Pump commanded On, valve commanded closed)	Average Pressure Error or	**P2440 Bank 1 Valve** < **Pressure Error** table > 32 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Stability Time AIR diagnostic Phase 1 passed No active DTCs:	> 60 kPa > -10.0 deg C > -10.0 deg C < 80.0 > 3,600.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec > 0.5 seconds AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA P0606 IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Phase 2 Conditional test weight > 1.5 sec Frequency: Once per trip when AIR pump commanded On Conditional test weight is calculated by multiplying the following Factors: **P2440 Phase 2 Baro Test Weight Factor , P2440 Phase 2 MAF Test Weight Factor , P2440 Phase 2 System Volt Test Weight Factor , P2440 Phase 2 Amb Temp Test Weight Factor** (see Supporting Tables)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pump Stuck On (for single valve systems)	P2444	This DTC detects if the SAI pump is stuck On. This test is run during Phase 3 (Pump commanded Off, valve commanded closed)	Average Pressure Error or	**P2444 Bank 1 Pump > Pressure Error** table < -32 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Stability Time AIR diagnostic Phase 1 passed AIR diagnostic Phase 2 passed No active DTCs:	> 60 kPa > -10.0 deg C > -10.0 deg C < 80.0 > 3,600.0 seconds > 10.0 Volts < 32.0 < 20 kPa for > 2.0 sec < 5,000 RPM > 50 gm/s for > 3.0 sec > 4.0 seconds Phase 3 cumulatative test weight is based on the distance from the last Baro update. See **P2431_P2436 Baro Skewed Sensor Weight Factor** table. AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA P0606 IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Phase 3 Cumlatative test weight > 2.0 sec. Frequency: Once per trip when AIR pump is commanded On	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Remote PRNDL Display Internal Electronic Failure	B071F	Indicates error on Transmission Range Indicator Bezel	Fault Flag	=True	Ignition	Run/Crank	120 failures out of 200 samples 25 ms loop	DTC Type C No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric Park Brake Availability Status Message Counter Incorrect	C1280	Detects error on ARC & PV reported by CHCM / ECM about signal $214 from EBCM on HS GMLAN	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Controler On	> 3,000 ms	8 failures out of 10 samples 12.5 ms loop	DTC Type C No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric Park Brake Application Status Message Counter Incorrect	C1281	Detects error on ARC & PV reported by CHCM / ECM about signal $22A from EBCM on HS GMLAN	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Controler On	> 3,000 ms	8 failures out of 10 samples 12.5 ms loop	DTC Type C No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor A (mid-park phaser)	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	4 cam sensor pulses less than or greater than nominal position in one cam revolution.	-7.1 Crank Degrees 8.3 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	CrankSensor_FA P0340, P0341 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. After the first failed test, there is a delay until the camshaft phaser control logic verifies and reports that the camshaft is actually parked. One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor B (mid-park phaser)	P0017	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 1 sensor B occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	. 4 cam sensor pulses less than or greater than nominal position in one cam revolution..	-8.4 Crank Degrees 9.2 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	CrankSensor_FA P0365, P0366 < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. After the first failed test, there is a delay until the camshaft phaser control logic verifies and reports that the camshaft is actually parked. One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Active Grill Air Shutter A Performance /Stuck OFF	P059F	A 2-part diagnostic. Part 1 continuously monitors for failure to achieve a commanded shutter actuator position [Suspect Stuck Condtion] when X failures occur in Y samples after an electronic command latency delay. Part 1 failure enables Part 2 which makes a fixed number of repeat attempts to reach the commanded postion [ReTry to clear obstruction]. The DTC is set when the calibrated fault threshold count of repeat attempts is reached without achieving the original commanded shutter position.	Smart Shutter Actuator 1 Position Response AND Shutter 1 Diagnostic Delay Threshold count	<> Smart Shutter Actuator 1 Commanded Position percent AND Counter > 99.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter1 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1.00 failures out of 1.00 samples 1 sample / 100 milliseconds	Type B, 2 Trips
			Shutter 1 Performance Test count	= 5.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter1 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1-5 actuator cycles [1 cycle typically requires 10-25 seconds]	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #5 Circuit	P06D2	Detects a continuous or intermittent short on the 5 volt reference circuit #5 by monitoring the reference percent Vref5 and failing the diagnostic when the percent Vref5 is too low or too high or if the delta between the filtered percent Vref5 and non-filtered percent Vref5 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref5 < or ECM percent Vref5 > or the difference between ECM filtered percent Vref5 and percent Vref5 >	4.875 % Vref5 5.125 % Vref5 0.0495 % Vref5	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.03 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 Illum.
Unable to Engage Neutral	P073D	Detects the inability to achieve or remain in Neutral.	Actual Arbitrated Transmission Range	≠Neutral	Actual Transmission Range Commanded Transmission Range	= Good value = Neutral	10,000.00 msec from Park 10,000.00 msec from Reverse 10,000.00 from Drive	DTC Type B, Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Unable to Engage Reverse	P073E	Detects the failure to achieve the expected command to Reverse range.	Actual Arbitrated Transmission Range	≠Reverse	Actual Transmission Range Commanded Transmission Range	= Good value = Reverse	10,000.00 msec from Park 10,000.00 msec from Neutral 10,000.00 msec from Drive	DTC Type B, Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Unable to Engage Park	P07E4	Detects the inability to achieve or remain in Park.	Actual Arbitrated Transmission Range	≠Park	Actual Transmission Range Commanded Transmission Range	= Good value = Park	2,000.00 msec from Reverse 2,000.00 msec from Neutral 2,000.00 msec from Drive	DTC Type B, Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Unable to Engage Drive	P07E5	Detects the failure to achieve the expected command to Drive range.	Actual Arbitrated Transmission Range	≠Drive	Actual Transmission Range Commanded Transmission Range	= Good value = Drive	10,000.00 msec from Park 10,000.00 msec from Reverse 10,000.00 msec from Neutral	DTC Type B, Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Communication Error with Active Grill Air Shutter Module “A”	P151E	This DTC monitors for an internal error or error in communication with the Active Grill Air Shutter Module A	Communication of the Alive Rolling Count from the Shutter Module over LIN bus is incorrect or the Shutter Module signals it has an internal error for out of total samples	 >= 8.00 counts >= 10.00 counts	All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	>= 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 Illum.
Internal Control Module Transmissio n Range Control Performance	P16F4	Determines if the Electronic Transmission Range Select control module software incorrectly processes a range request which would result in an unsafe condition	Driver Requested Arbitrated Range Commanded	is issued unexpectedly OR ≠ expected range			200 to 500 msec (depends on conditions)	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powerflow Engaged Signal Message Incorrect	P1772	Detects error on ARC & PV reported by CHCM/ ECM about signal $197 from TCM on HS GMLAN	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Controler initialized for	> 3,000 ms	8 failures out of 10 samples 12.5 ms loop	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IMS State Signal Message Incorrect	P1773	Detects error on ARC & PV reported by CHCM/ ECM about signal $197 from TCM on HS GMLAN	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Controler On	> 3,000 ms	8 failures out of 10 samples 12.5 ms loop	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Availability Signal Message Incorrect	P1778	Detects error on ARC & PV reported by CHCM / ECM about signal $3F5 from TCM on HS GMLAN	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Controler On	> 3,000 ms	8 failures out of 10 samples 12.5 ms loop	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Unexpected Range Change Detected	P1787	Detects an unexpected change in transmission range.	Actual Arbitrated Transmission Range	≠ Previous Value	Actual Tranmission Range Range Change Achievement Diag	= Good value = Not running	500 to 2000 msec (depends on request and reported range)	DTC Type B, Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Current Transmission Range Unknown	P1789	Detects the failure of the ETRS system to identify the current transmission range with sufficient confidence.	Actual Transmission Range	≠ Undefined	Range Indication Source	= Valid	80 failures out of 100 samples 12.5 ms loop	DTC Type B, Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switches Primary Signal Message Counter Incorrect	P187F	Detects error on ARC & PV reported by ECM about signal $1E4 from TRS on PT Sensor Bus	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Controler On	> 3,000 ms	8 failures out of 10 samples 12.5 ms loop	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switches Secondary Signal Message Counter Incorrect	P188A	Detects error on ARC & PV reported by ECM about signal $2C2 from TRS on PT Exp Bus	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Controler On	> 3,000 ms	8 failures out of 10 samples 12.5 ms loop	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switch "A" Circuit Correlation	P18CD	Compares Switch "A" with other relavent TRS Switches Switch "A" = Drive Input 1	Valid switch status "pressed" or "released", but disagree		Not Fault Active	P17E3, P17E4, P17E5	80 failures out of 100 samples 12.5 ms loop	DTC Type B Two trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switch "B" Circuit Correlation	P18CF	Compares Switch "B" with other relavent TRS Switches Switch "B" = Drive Input 2	Valid switch status "pressed" or "released", but disagree		Not Fault Active	P17E6, P17E7, P17E8	80 failures out of 100 samples 12.5 ms loop	DTC Type B Two trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switch "C" Circuit Correlation	P18D1	Compares Switch "C" with other relavent TRS Switches Switch "C" = Drive Input 3	Valid switch status "pressed" or "released", but disagree		Not Fault Active	P17E9, P17EA, P17EB	2 failures out of 100 samples 12.5 ms loop	DTC Type B Two trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switch "D" Circuit Correlation	P18D3	Compares Switch "D" with other relavent TRS Switches Switch "D" = Neutral Input 1	Valid switch status "pressed" or "released", but disagree		Not Fault Active	P17EC, P17ED, P17EE	80 failures out of 100 samples 12.5 ms loop	DTC Type B Two trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switch "E" Circuit Correlation	P18D5	Compares Switch "E" with other relavent TRS Switches Switch "E" = Neutral Input 2	Valid switch status "pressed" or "released", but disagree		Not Fault Active	P17EF, P17F0, P17F8	80 failures out of 100 samples 12.5 ms loop	DTC Type B Two trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switch "F" Circuit Correlation	P18D7	Compares Switch "F" with other relavent TRS Switches Switch "F" = Neutral Input 3	Valid switch status "pressed" or "released", but disagree		Not Fault Active	P17F9, P17FD, P17FE	80 failures out of 100 samples 12.5 ms loop	DTC Type B Two trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switch "G" Circuit Correlation	P18D9	Compares Switch "G" with other relavent TRS Switches Switch "G" = Reverse Input 1	Valid switch status "pressed" or "released", but disagree		Not Fault Active	P1803, P1805, P1806	80 failures out of 100 samples 12.5 ms loop	DTC Type B Two trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switch "H" Circuit Correlation	P18DB	Compares Switch "H" with other relavent TRS Switches Switch "H" = Reverse Input 2	Valid switch status "pressed" or "released", but disagree		Not Fault Active	P1807, P180C, P180D	80 failures out of 100 samples 12.5 ms loop	DTC Type B Two trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Selector Switch "J" Circuit Correlation	P18DD	Compares Switch "J" with other relavent TRS Switches Switch "J" = Reverse Input 3	Valid switch status "pressed" or "released", but disagree		Not Fault Active	P180E, P180F, P1812	80 failures out of 100 samples 12.5 ms loop	DTC Type B Two trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
VVT Lock Control Open Ckt Bnk1	P25CA	Controller specific output driver circuit diagnoses the VVL park pin system 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.	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	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 Illum.
VVT Lock Control Low Ckt Bnk1	P25CB	Controller specific output driver circuit diagnoses the VVL park pin system 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 Ω impedance between signal and controller ground	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	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 Illum.
VVT Lock Control Hi Ckt Bnk1	P25CC	Controller specific output driver circuit diagnoses the VVL park pin system 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	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 Illum.
Transmission Range Sensor B Circuit Low	P2802	Controller specific PWM circuit diagnoses the internal range sensor (IRS) B for a short to ground failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates short to ground failure Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to ground	≤ 0.5 Ω impedance between signal and controller ground	diagnostic monitor enable battery voltage update battery voltage timer PWM % duty cycle when voltage directly proportional OR PWM % duty cycle when voltage inversly proportional circuit sensor type	= 1 Boolean ≥ 0.00 volts ≤ 10.00 % ≥ 10.00 % CeTRGD_e_VoltDirctProp	fail time ≥ 1.00 seconds out of sample time ≥ 1.50 seconds battery voltage timer ≥ 1.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Sensor B Circuit High	P2803	Controller specific PWM circuit diagnoses the internal range sensor (IRS) B for a power short or open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit or power short failure Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit or power short	≤ 0.5 Ω impedance between signal and controller voltage source OR ≥ 200 K Ω impedance between signal and controller ground	diagnostic monitor enable battery voltage update battery voltage timer PWM % duty cycle when voltage directly proportional OR PWM % duty cycle when voltage inversly proportional circuit sensor type	= 1 Boolean ≥ 0.00 volts ≥ 92.00 % ≤ 92.00 % CeTRGD_e_VoltDirctProp	fail time ≥ 1.00 seconds out of sample time ≥ 1.50 seconds battery voltage timer ≥ 1.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus E Off	U0077	This DTC monitors for a BUS E off condition	Bus off failures exceeds before the sample time of is reached	5 counts (equivalent to 0.06 seconds) 0.81 seconds	General Enable Criteria: U0077 Normal CAN transmission on Bus E Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds CAN hardware is bus OFF for	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 Volts > 0.1625 seconds	Diagnostic runs in 12.5 ms loop	Type X, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Active Grill Air Shutter Module A	U0284	This DTC monitors for a loss of communication on the LIN bus with Shutter Module A	ECM has lost communication over the LIN bus with Device 0 / Shutter 1 for	>= 3.00 counts	The following criteria have been enabled for Power Mode Run/Crank Voltage	>= 400.00 milliseconds =Run >= 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 Illum.
Lost Communication with Transmission Range Selector Control Module on Powertrain Sensor CAN Bus	U18D2	Detects that CAN serial data communication has been lost with the TRS PT Sensor Bus	TRS Buttons Message: $2F3, $4C4, $1E4, TRS Linear Shifter Messages: $2F3, $4C4, $1EC	=Undetected	Controller On Ignition	> 3,000 ms = Run/Crank OR = Accessory	1.0 second	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Transmission Range Selector Control Module on Powertrain Expansion CAN Bus	U18D3	Detects that CAN serial data communication has been lost with the SIB PT Exp Bus	TRS Buttons Message: $2C2 TRS Linear Shifter Message: $2EC	=Undetected	Controller On Ignition	> 3,000 ms = Run/Crank OR = Accessory	1.0 second	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Front Object Detection Control Module	U216A	This DTC monitors for a loss of communication with the Front Object Detection Control Module.	Messages are not received from controller for Message $2CB Message $2CD Message $2CF Message $370	 ≥ 0.5 seconds ≥ 0.5 seconds ≥ 0.5 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U216A	Not Active on Current Key Cycle		
					EOCM, FCM, or RDCM modules (Front Object Detection Modules)	are present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Transmission Control Module on Chassis Control Module LIN Bus 2	U250D	Detects if Range Command Echo from TCM matches current Range Command	Check Range Command Echo vs Range Command when Range Command Poke is called	Range Command Echo ≠ Range Command	Diagnostic Enable Calibration Recent Range Command Transition TCM LIN Node or Bus FA	= TRUE = FALSE = FALSE	80 failures out of 100 samples	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 20.0 ºC 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 20.0 C after a minimum 28,800 seconds soak and the time spent cranking the engine without starting is greater than 7.5 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 LowFuelCondition Diag ================== Block Heater detection is enabled when either of the following occurs: 1) ECT at power up > IAT at power up by 2) Cranking time ================== Block Heater is detected and diagnostic is aborted when 1) or 2) occurs: 1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows:	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunning Valid = Not occurred = False = False ≥ -7 ºC = False ================== > 20.0 ºC < 7.5 seconds ================== > 400 seconds with > 15 MPH 0.00 times the seconds with vehicle speed below 1b	1 failure 500 msec/ sample 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 Illum.
					1d) IAT drops from power 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	≥ 5.0 ºC ≥ 5 ºC Within ≤ 60 seconds ================= > 1800 seconds ≤ -7 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Relay Control Circuit Open (ODM)	P0481	Diagnoses the cooling fan 2 relay control low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage	Voltage ≥ 11.00 volts	50.00 failures out of 63.00 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P0693 may also set (Fan 2 Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Output Speed Sensor (TOSS)	P0502	The diagnostic monitor detects no activity in the TOSS circuit due to an electrical fault, wiring fault or sensor fault. The TOSS signal is rationalized against operating conditions of the vehicle. If the vehicle is in motion, accelerator pedal, engine torque, transmission in gear, and no vehicle braking, and the TOSS signal registers below a threshold, the DTC will set.	transmission output speed raw	≤ 20 RPM	service mode $04 active diagnostic monitor enable PTO active ignition voltage (controller run crank ignition in range) engine load enable occurs when: (accelerator pedal position engine torque) engine load disable occurs when: (accelerator pedal position engine torque OR accelerator pedal position engine torque) brake pedal position brake pedal position engine speed engine speed P0503 test fail this key on if clutch pedal is enabled clutch pedal position clutch pedal position P0502 test fail this key on OR P0502 fault active DTCs not fault active	= FALSE = 1 Boolean = FALSE ≥ 11.00 volts ≥ 15.0 % ≥ 90.0 Nm ≤ 6.0 % ≤ 65.0 Nm > 6.0 % ≤ 65.0 Nm ≤ 1.9 % < 80.0 % ≥ 6,500.0 RPM ≤ 1,500.0 RPM = FALSE = 1 Boolean ≥ 89.0 % > 84.0 % = FALSE = FALSE AcceleratorPedalFailure EngineTorqueEstInaccurate	fail time ≥ 3.5 seconds 100 millisecond update rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Output Speed Sensor (TOSS)	P0503	The diagnostic monitor detects an unrealistic drop in the TOSS signal due to a sudden electrical fault, wiring fault or sensor fault. The TOSS signal is rationalized against operating conditions of the vehicle. If the vehicle is in motion, accelerator pedal, engine torque, transmission in gear, and no vehicle braking, and the TOSS signal drops above a delta threshold, a fail timer is enabled. When a TOSS drop occurs it is possible to enable the P0502 fail time as well as the P0503 fail time. With both P0502 and P0503 fail timers active it is a race condition to either DTC.	ABS(raw transmssion output speed current loop - raw transmssion output speed previous loop), 25 millisecond update rate	≥ delta fail threshold RPM	service mode $04 active diagnostic monitor enable PTO active ignition voltage (controller run crank ignition in range)	= FALSE = 1 Boolean = FALSE ≥ 11.00 volts	fail time ≥ 3.250 seconds, increment fail count, fail count ≥ 5 counts, 25 millisecond update rate	Type A, 1 Trips
					4WD range current loop, update 4WD range time, reset 4WD range time when 4WD range current loop	≠ 4WD range previous loop ≠ 4WD range previous loop	4wd range time ≥ 6.00 seconds	
					raw transmission output speed OR last valid transmision output speed before delta drop, update transmission output speed active time	≥ 300.0 RPM ≥ 300.0 RPM	transmission output speed active time ≥ 2.00 seconds	
					25 millisecond loop to loop transmision output speed positive delta, update transmission output speed stable time	≤ 150.0 RPM	transmission output speed stable time ≤ 2.000 seconds	
					P0503 fault active OR P0503 test fail this key on	= FALSE = FALSE		
					if shift lever position is enable: (shift lever position previous loop AND shift lever position current loop) OR shift lever position current	= 0 Boolean = NEUTRAL = IN GEAR = IN GEAR	shift lever position stablity time ≥ 0.500 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					loop, update shift lever position stablity time			
					P0503 fault pending delta fail threshold	= TRUE = 300.0 RPM		
					P0503 fault pending clutch pedal position select delta fail threshold where mesaured ratio = TISS/TOSS: 1st gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 2nd gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 3rd gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 4th gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 5th gear mesaured ratio	= FALSE ≥ 89.00 % ≥ 14.000 ≤ 15.179 = 300.0 RPM ≤ 14.000 ≥ 7.871 = 300.0 RPM ≥ 7.200 ≤ 7.871 = 300.0 RPM ≤ 7.200 ≥ 5.070 = 300.0 RPM ≥ 4.600 ≤ 5.070 = 300.0 RPM ≤ 4.600 ≥ 4.087 = 300.0 RPM ≥ 3.600 ≤ 4.087 = 300.0 RPM ≤ 3.600 ≥ 3.310 = 300.0 RPM ≥ 2.900		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 6th gear mesaured ratio mesaured ratio delta fail threshold, mesaured ratio mesaured ratio delta fail threshold, 7th gear mesaured ratio mesaured ratio delta fail threshold, otherwise delta fail threshold P0503 fault pending clutch pedal position delta fail threshold	≤ 3.310 = 300.0 RPM ≤ 2.900 ≥ 3.310 = 300.0 RPM ≥ 2.900 ≤ 3.310 = 300.0 RPM ≤ 2.900 ≥ 13.990 = 300.0 RPM ≥ 12.900 ≤ 13.990 = 300.0 RPM = 300.0 RPM = FALSE ≤ 84.00 % = 300.0 RPM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage Performance	P0561	Detects a low performing 12V battery system. This diagnostic reports the DTC when the absolute value of the difference between the battery voltage and the run/ crank voltage exceeds a calibrated value.	Run Crank voltage low and high	ABS(Battery voltage - Run Crank voltage) > 3.00	Battery voltage B+ line present = TRUE Battery voltage low and high diag enable = TRUE Run Crank voltage	1.00 1.00 Voltage ≥ 5.00 volts	50 failures out of 63 samples 100 ms / sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage Low	P0562	Detects a low 12V battery system. This diagnostic reports the DTC when battery voltage is low. Monitoring occurs when the engine speed is above a calibrated value.	System voltage low	Battery voltage <= 9.00	System voltage low diag enable = TRUE Run Crank voltage Engine speed >=	1.00 Voltage ≥ 5.00 volts 400.00	400 failures out of 500 samples 12.5 ms / sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage High	P0563	Detects a high 12V battery system. This diagnostic reports the DTC when battery voltage is high.	System voltage high	Battery voltage >= 18.00	System voltage high diag enable = TRUE Run Crank voltage	1.00 Voltage ≥ 5.00 volts	400 failures out of 500 samples 12.5 ms / sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1 by monitoring the reference percent Vref1 and failing the diagnostic when the percent Vref1 is too low or too high or if the delta between the filtered percent Vref1 and non-filtered percent Vref1 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref1 < or ECM percent Vref1 > or the difference between ECM filtered percent Vref1 and percent Vref1 >	4.875 % Vref1 5.125 % Vref1 0.0495 % Vref1	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= <KaVLTR_b_SnsrRefVoltCktEnbl [CeVLTR_i_V5B1]> > 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 Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Open	P0650	Detects an inoperative malfunction indicator lamp control low side driver circuit. This diagnostic reports the DTC when an open circuit is detected.	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	1 failures out of 1 samples 50 ms / sample	Type B, No MIL NO MIL Note: In certain controllers P263A may also set (MIL Control Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Relay Control Circuit Low Voltage (ODM)	P0693	Diagnoses cooling fan 2 relay control low side driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage	Voltage ≥ 11.00 volts	50.00 failures out of 63.00 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P0481 may also set (Fan 2 Open Circuit).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Relay Control Circuit High Voltage (ODM)	P0694	Diagnoses the cooling fan 2 relay control low side driver circuit for circuit faults	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage	Voltage ≥ 11.00 volts	50.00 failures out of 63.00 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 Illum.
Clutch Pedal Position Sensor Circuit Range / Performance	P08A8	A Clutch Pedal position sensor range fault is detected, if Clutch Pedal Position Sensor is in a range indicative of a vehicle NOT in gear, when the vehicle is determined to be in gear. Gear determination is made by verifying that the ratio of engine RPM versus Transmission Output Speed (N/TOS) represents a valid gear. When this occurs a clutch pedal position error is measured and processed by a 1st order lag filter. When this clutch pedal position error exceeds the defined threshold, a this fault code is set.	Filtered Clutch Pedal Position Error when the vehicle is determined to be in gear	> 4 %	N/TOS Ratio:	Must match actual gear (i.e. vehicle in gear)	12.5 ms loop Continuous	Type A, 1 Trips
					Transfer Case:	Not in 4WD Low range		
					Vehicle speed:	> 4.3 MPH		
					Engine Torque:	> **P08A8 EngTorqueThreshold Table** (see Supporting Tables)		
					Clutch Pedal Position:	< **P08A8 ResidualErrEnableLow Table** (see Supporting Tables)		
					OR	> **P08A8 ResidualErrEnableHigh Table** (see Supporting Tables)		
					No Active DTCs:	ClutchPstnSnsrCktHi FA ClutchPstnSnsrCktLo FA CrankSensor_FA Transmission Output Shaft Angular Velocity Validity VehicleSpeedSensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch Pedal Position Sensor Circuit Low	P08A9	A continuous circuit Out-of-Range Low or open fault is detected by monitoring the percent voltage range of the clutch pedal position signal. This sensor by design is dead banded at both the high and low positions. If the voltage from the sensor is below the defined threshold value for the dead banded region, a fail counter increments. When the correct ratio of fail counts to samples occurs the fault code is set.	Clutch Position Sensor Circuit	< 4 % of Vref	Engine Not Cranking System Voltage	 > 9.0 Volts	400 counts out of 500 samples 12.5 ms loop Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch Pedal Position Sensor Circuit High	P08AA	A continuous circuit Out-of-Range High fault is detected by monitoring the percent voltage range of the clutch pedal position signal. This sensor by design is dead banded at both the high and low positions. If the voltage from the sensor is above the defined threshold value for the dead banded region, a fail counter increments. When the correct ratio of fail counts to samples occurs the fault code is set.	Clutch Position Sensor Circuit	> 96 % of Vref	Engine Not Cranking System Voltage	 > 9.0 Volts	400 counts out of 500 samples 12.5 ms loop Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch Pedal Position Not Learned	P08AC	During final assembly at the manufacturing facility an initial Clutch Pedal Applied Learn is established. This Learn is used to understand the variation in the clutch fully applied position vs. the clutch pedal position. This position is then adjusted over time based on a learning algorithm in the engine controller to adjust for clutch physical wear with usage. This Diagnostic is used to detect when this Applied Learn value is outside of defined range based on the thresholds set by the diagnostic. If the Applied Learn value is outside of the range of the threshold values this fault code is set. The OBD Manufacturer's enable counter is utilized to prevent the MIL from setting during the vehicle assembly before a Position lean can be completed in the manufacturing facility.	Fully Applied Learn Position OR	< 7.0 % > 33.0 %	OBD Manufacturer's Enable Counter	= 0	250 ms loop Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Heater Supply Voltage Sense Circuit Range/ Performance	P103B	The P103B diagnostic determines if the heater supply circuit is rational by comparing the heater supply voltage to the run crank voltage and calculating the difference. The heater supply voltage input is connected to the O2 heater supply circuit inside the vehicle relay center. It is representative of the voltage supplied to the O2 heaters. The O2 heater voltage is used by the HWIO to calculate the O2 heater resistance on switching type O2 sensors (non-WRAF). With a fault set, the resistance calculation is performed with run crank voltage. The diagnostic failure counter is incremented if the voltage difference is greater than the threshold. This DTC is set based on the fail and sample counters.	The absolute value of Heater Supply Voltage delta from Run Crank voltage	> 2.00 volts	Powertrain relay in range (Relay in range is defined as relay voltage Run Crank signal active	= True > 11.00 volts) = True (Please see "**Run/Crank Active conditiions**" in Supporting Tables)	8 failures out of 10 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 Illum.
O2 Sensor Heater Supply Voltage Sense Circuit Low	P103C	The P103C diagnostic determines if the heater supply circuit is low by comparing the heater supply voltage to the threshold. The heater supply voltage input is connected to the O2 heater supply circuit inside the vehicle relay center. It is representative of the voltage supplied to the O2 heaters. The O2 heater voltage is used by the HWIO to calculate the O2 heater resistance on switching type O2 sensors (non-WRAF). With a fault set, the resistance calculation is performed with run crank voltage. The diagnostic failure counter is incremented if the heater supply voltage is less than the threshold. This DTC is set based on the fail and sample counters.	Heater Supply Voltage	< 8.00 volts	Powertrain relay in range (Relay in range is defined as relay voltage Run Crank signal active	= True > 11.00 volts) = True (Please see "**Run/Crank Active conditiions**" in Supporting Tables)	8 failures out of 10 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 Illum.
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	> 130 kPa*(g/s) > 11.0 grams/sec > 19.0 kPa) > 19.0 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 <= 6,500 RPM >= -7 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 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 Illum.
		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: MAP1 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 Illum.
Cold Start Emissions Reduction System Fault	P1400	Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range.	Average desired accumulated exhaust power - Average actual accumulated exhaust power (too much energy delivered to catalyst) Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst) (EWMA filtered) Average Power = output of **P1400_EngineSpeedResidual_Table** * output of **P1400_SparkResidual_Table** NOTE: Desired accumulated power would use the desired catalyst light off spark and desired engine speed and the actual accumuated power would use the final commanded spark and actual engine speed. Refer to the Supporting Tables for details	< -32.00 KJ/s (high RPM failure mode) > 5.00 KJ/s (low RPM failure mode)	To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following: Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following: Catalyst Temperature AND Engine Run Time OR Engine Run Time OR Barometric Pressure	< 350.00 degC > 19.00 degC <= 50.00 degC >= 70.00 KPa >= 900.00 degC >= 20.00 seconds > **P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details. < 70.00 KPa	Runs once per trip when the cold start emission reduction strategy is active Frequency: 100ms Loop Test completes after 10 seconds of accumulated qualified data.	EWMA Based - Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Other Enable Criteria:			
					OBD Manufacturer Enable Counter	0		
					Vehicle Speed	< 1.24 MPH		
					Allow diagnostic to calculate residual in an off-idle state. If the value of the OffIdleEnable is equal to 1 then the "DriverOffAccelPedal" will not be checked. However, if the value of OffIdleEnable is 0 then driver must be off the accel pedal	0 (A value of 1 allows diagnostic to run and calculate the residual while off idle. A value of 0 requires calculation of the residual at idle)		
					A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. Therefore when the:			
					Pedal Close Delay Timer	> 5.00 seconds		
					the diagnostic will continue the calculation.			
					A change in gear will initiate a delay in the calculation of the average qualified residual value to			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					allow time for the actual engine speed and actual final commanded spark to achieve their desired values. Therefore, when the:			
					Gear Shift Delay Timer	> 2.00 seconds		
					the diagnostic will continue the calculation			
					For Manual Transmission vehicles:			
					Clutch Pedal Position	> 88.00 %		
					Clutch Pedal Position	< 25.00 %		
					The diagnostic will delay calculation of the residual value and potentially weight the residual calculation differently based on engine run time. This is to ensure the diagnostic is operating in idle speed control as well as during the peak catalyst light off period.			
					The time weighting factor must be :	> 0 These are scalar values that are a function of engine run time. Refer to		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P1400_ColdStartDiagnosticDelayBasedOnEngineRunTime and the cal axis, **P1400_ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis** in the "Supporting Tables" for details.		
					General Enable:			
					DTC's Not Set:			
						AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFP CrankSensor_FA FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA EngineMisfireDetected_FA ClutchPstnSnsr FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA 5VoltReferenceMAP_OOR_Flt TransmissionEngagedState_FA EngineTorqueEstInaccurate		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	> 6.41 Volts	0.49 ms	Type B, 2 Trips
					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	< 0.25 percent		
					For a settling time period	> 4.00 seconds		
					Ignition voltage failure is false	P1682		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Switch State Undertermined	P155A	Detects when cruise switch state cannot be determined, such as low voltage conditions	cruise switch state is received as "undetermined" for greater than a calibratable time	fail continuously for greater than 0.5 seconds			fail continuously for greater than 0.5 seconds	Type C, No SVS , Emissions Neutral Diagnostics – special type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Calibration Incorrect	P158A	Type of cruise in Body Control Module does not match that in the Engine Control Module for 2.5 seconds	Type of cruise system in GMLAN $4E9 does not match with that in the Engine Control Module for a fix time.	2.5 seconds	DID $40 from BCM says cruise system is present (ECM recieves programmble information from Body Control Module) OR ECM will not receive Programmable information for Cruise from Body Control Module	True	fail continuously for greater than 2.5 seconds.	Type C, No SVS Emissions Neutral Diagnostics – Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Wheel Speed Sensor Sequence Number Incorrect	P15FD	Detects error on ARC reported by the CHCM/ ECM about signal $0C1 from EBCM on HS GMLAN	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1	Current ARC ≠ Previous ARC +1	Controler On	> 3,000 ms	0.5 second	DTC Type C No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 1	P16F0	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 before receiving a valid message.		Run/Crank voltage	> 6.41 Volts	39 / 399 counts continuous; 12.5 ms /count in the ECM main processor	Type A, 1 Trips
			This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor after receiving a valid message.		Run/Crank voltage	> 6.41 Volts	159 / 399 counts continuous; 12.5 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 Illum.
Throttle Return to Default Performance	P2119	Throttle unable to return to default throttle position after de-energizing ETC motor.	(Normalized TPS1 percent Vref > AND Normailzed TPS2 percent Vref > On the main processor) OR (Normalized TPS1 percent Vref < AND Normailzed TPS2 percent Vref < On the main processor)	1.7560 % Vref 1.7590 % Vref 1.4340 % Vref 1.4310 % Vref	PT Relay Voltage Throttle de-energized for Actuator, Controller, or Ignition Faults No TPS circuit faults No 5V reference error or fault for # 4 5V reference circuit	> 5.500 Volts (P21104, P2100, P2101, P2102, P2103, P1682, P0068, P16F3) P06A3	0.4969 s	Type C, No SVS
			(Normalized TPS1 Voltage > AND Normailzed TPS2 Voltage > On the main processor) OR (Normalized TPS1 Voltage < AND Normailzed TPS2 Voltage < On the main processor)	1.7560 1.7590 1.4340 1.4310	Throttle de-energized for Battery Saver Mode Engine not running No TPS circuit faults PT Relay Voltage No 5V reference error or fault for # 4 5V reference circuit	> 5.500 Volts P06A3	5.0000 s	

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	25	25	25	15	15	15	25	30	30	30

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	32	32	32	32	32	32	32	32	32	32	32	31	29	28	26	25	25

Initial Supporting table - P08A8 EngTorqueThreshold Table

Description: The diagnostic is inhibited if torque (NM) is less than this value. Prevents false fails in regions where false in-gear N/TOS ratios are possible due to low torque, where high torque would otherwise cause slip and prevent a valid in-gear state.

Value Units: Torque (NM)
X Unit: Percent Clutch Pedal Position (%)

y/x	0.00	6.25	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25	62.50	68.75	75.00	81.25	87.50	93.75	100.00
1	10.0	10.0	10.0	10.0	10.0	20.0	35.0	35.0	40.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Initial Supporting table - P08A8 ResidualErrEnableHigh Table

Description: Represents the upper threshold of a deadband where the diagnostic will be inhibited to prevent false fails due to clutch slip that can falsely indicate a valid in-gear N/TOS ratio. The lower threshold of the deadband is represented by the table "P08A8 ResidualErrEnableLow Table". A lower threshold value that is greater than or equal to the upper threshold for the same gear is an indication that this portion of the diagnostic's enable critera is ignored in that gear. Conversely if the lower threshold value is at or near 0% and the upper threshold for the same gear is at or near 100%, then diagnosis is not enabled in that gear.

Value Units: Percent Clutch Pedal Position (%)
X Unit: Gear, where "0" - "6" is gear 1 - 7, respectively; "7" is reverse

y/x	CeMTCI_e_Gear1	CeMTCI_e_Gear2	CeMTCI_e_Gear3	CeMTCI_e_Gear4	CeMTCI_e_Gear5	CeMTCI_e_Gear6	CeMTCI_e_Gear7	CeMTCI_e_Reverse
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - P08A8 ResidualErrEnableLow Table

Description: Represents the lower threshold of a deadband where the diagnostic will be inhibited to prevent false fails due to clutch slip that can falsely indicate a valid in-gear N/TOS ratio. The upper threshold of the deadband is represented by the table "P08A8 ResidualErrEnableHigh Table". An upper threshold value that is less than or equal to the lower threshold for the same gear is an indication that this portion of the diagnostic's enable critera is ignored in that gear. Conversely if the lower threshold value is at or near 0% and the upper threshold for the same gear is at or near 100%, then diagnosis is not enabled in that gear.

Value Units: Percent Clutch Pedal Position (%)
X Unit: Gear, where "0" - "6" is gear 1 - 7, respectively; "7" is reverse

y/x	CeMTCI_e_Gear1	CeMTCI_e_Gear2	CeMTCI_e_Gear3	CeMTCI_e_Gear4	CeMTCI_e_Gear5	CeMTCI_e_Gear6	CeMTCI_e_Gear7	CeMTCI_e_Reverse
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Initial Supporting table - P0411 Phase 1 Amb Temp Test Weight Factor

Description: SAI Flow (Phase 1) Test ambient temperature weight factor.

Notes: DTC: P0411; Cal: KtAIRD_K_SAI_TstTempDsbld; Axis is Ambient (IAT) Temp (C).

y/x	-30	-20	-10	0	10	20	30	40	50
1	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - P0411 Phase 1 Baro Test Weight Factor

Description: SAI Flow (Phase 1) Test baro weight factor.

Notes: DTC: P0411; Cal: KtAIRD_K_SAI_TstBaroDsbld; Axis is atmospheric pressure (kPa)

y/x	40	50	60	70	80	90	100	110	120
1	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0	0.0

Initial Supporting table - P0411 Phase 1 MAF Test Weight Factor

Description: KtAIRD_K_SAI_TstMAF_Dsbld: SAI Flow (Phase 1) Test MAF weight factor.

Notes: Axis is Mass Airflow (g/sec).

y/x	0.0	3.0	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	45.0	48.0
1.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - P0411 Phase 1 System Volt Test Weight Factor

Description: SAI Flow (Phase 1) Test system voltage weight factor.

Notes: DTC: P0411; Cal: KtAIRD_K_SAI_TstVoltDsbld; Axis is system voltage (V).

y/x	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
1.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	1.0	1.0	1.0	1.0	1.0	0.8	0.5	0.5	0.5	0.5

Initial Supporting table - P0411 SL Threshold Bank 1 Table

Description: Bank 1 SAI Flow (Phase 1) Test Average String Length failure threshold versus MAF (g/sec).

Notes: DTCs: P0411; Cal: KtAIRD_dp_SAI_SL_ThrshBank1

y/x	0.0	3.0	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	45.0	48.0
1.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

Initial Supporting table - P2431_P2436 Baro Skewed Sensor Weight Factor

Description: The AIR Pressure Sensor Test quality factor based on the distance traveled since the last unthrottled ambient pressure update.

Notes: DTCs: P2431 & P2436; Cal: KtAIRD_K_APPD_BaroQlty; P2436 is applicable on dual valve applications only. Axis is distance traveled from last Baro update in Km (1Km = 0.62 Miles).

y/x	0.0	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0	32.0
1.0	1.0	0.8	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - P2440 Bank 1 Valve Pressure Error

Description: Sensor 1 minimum average pressure error (kPa) threshold for the valve-shut (Phase 2) test .

Notes: DTCs: P2440; Cal: KaAIRD_p_VlvTstPresErrMin[CeAIRR_e_PresSnsrOne]; Axis is Conditional Test Weight Time in seconds.

y/x	0	1	2	3	4	5	6	7	8
1	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0

Initial Supporting table - P2440 Phase 2 Amb Temp Test Weight Factor

Description: Ambient Temperature component of the conditional test weight for the valve-shut (Phase 2) test.

Notes: DTCs: P2440; Cal: KtAIRD_K_VlvTstTempDsbld; Axis is ambient temperature (IAT) in Deg C.

y/x	-30	-20	-10	0	10	20	30	40	50
1	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - P2440 Phase 2 Baro Test Weight Factor

Description: Ambient pressure component of the conditional test weight for the valve-shut (Phase 2) test .

Notes: DTCs: P2440; Cal: KtAIRD_K_VlvTstBaroDsbld; Axis is ambient pressure (kPa).

y/x	40	50	60	70	80	90	100	110	120
1	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0	0.0

Initial Supporting table - P2440 Phase 2 MAF Test Weight Factor

Description: Mass Airflow (MAF) component of the conditional test weight for the valve-shut (Phase 2) test.

Notes: DTCs: P2440; Cal: KtAIRD_K_VlvTstMAF_Dsbld; Axis is mass airflow (g/s).

y/x	0.0	3.0	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	45.0	48.0
1.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - P2440 Phase 2 System Volt Test Weight Factor

Description: System Voltage component of the conditional test weight for the valve-shut (Phase 2) test.

Notes: DTCs: P2440; Cal: KtAIRD_K_VlvTstVoltDsbld; Axis is system volts (V).

y/x	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
1.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	1.0	1.0	1.0	1.0	1.0	0.8	0.5	0.5	0.5	0.5

Initial Supporting table - P2444 Bank 1 Pump Pressure Error

Description: Sensor 1 maximum average pressure error threshold for the pump-off (Phase 3) test.

Notes: DTCs: P2444; Cal: KaAIRD_p_PmpTstPresErrMax[CeAIRR_e_PresSnsrOne]; Axis is Conditional Test Weight Time in seconds.

y/x	0	1	2	3	4	5	6	7	8
1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Initial Supporting table - P0014_P05CE_StablePositionTimeEc1

Description: Minimum time for Exhaust 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	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,200	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,600	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,000	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,200	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,600	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,000	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,200	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,600	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,000	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Initial Supporting table - P1065_UCAP_Arm_Autostart_Thresh_Derating_Zero

Description: This is the minimum Cap voltage to arm an AutoStop-Start. When the charging diagnostic is enabled, and the Cap voltage is less than the table value a failure counter is incrementated.

Value Units: Volts
X Unit: The axis of this table is ESC capacitor state of health level (0 to 100%)

y/x	0	13	25	38	50	63	75	88	100
1	4.30	4.20	4.10	4.00	3.90	3.80	3.70	3.60	3.50

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_Cell00_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_PurgOnAirMode0 = 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_PurgOffAirMode0 = 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 - Response Cell Enable Table

Description: This table describes the Block learn cells which enable the Pre (Primary) Oxygen sensor response tests.
Note: When the table column heading matches the calibration value below it, that individual cell is enabled.

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

Multiple DTC Use - Response Cell Enable Table - Part 1

y/x	CeFADR_e_Cell00_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR_e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2
1	CeFADR_e_Cell00_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR_e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2

Multiple DTC Use - Response Cell Enable Table - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode 1	CeFADR_e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADR_e_Cell04_PurgOnAirMode 1	CeFADR_e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel

Multiple DTC Use - Response Cell Enable Table - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR_e_Cell10_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2
1	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR_e_Cell10_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2

Multiple DTC Use - Response Cell Enable Table - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode 1	CeFADR_e_Cell13_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADR_e_Cell12_PurgOffAirMode 1	CeFADR_e_Cell13_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel

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 - P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

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

y/x	500	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,500	4,000	4,500	5,000	5,500	6,500	7,500
1	0.850	0.850	0.850	0.850	0.850	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	500	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,500	4,000	4,500	5,000	5,500	6,500	7,500
1	0.850	0.850	0.850	0.850	0.850	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: MAP3 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP3 Residual Weight Factor based on RPM

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

y/x	13	263	750	1,200	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,313	7,000	7,488
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, 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	500	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,500	4,000	4,500	5,000	5,500	6,500	7,500
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, P0121, P012B, P1101: Boost Residual Weight Factor based on % of Boost

Description: P0101_P0106_P0121_P012B_P1101 Boost Residual Weight Factor based on % of Boost

Value Units: Weight Factor (Unitless)
X Unit: Boost Percentage (%)

y/x	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
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, P0121, P012B, P1101: SCIAP1 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P1101 SCIAP1 Residual Weight Factor based on RPM

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

y/x	500	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,500	4,000	4,500	5,000	5,500	6,500	7,500
1	0.850	0.850	0.850	0.850	0.850	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, P1101: SCIAP2 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P1101 SCIAP2 Residual Weight Factor based on RPM

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

y/x	500	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,500	4,000	4,500	5,000	5,500	6,500	7,500
1	0.850	0.850	0.850	0.850	0.850	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, P1101: Supercharger Intake Flow Rationality Diagnostic Failure Matrix

Description: Supercharger Intake Flow Rationality Diagnostic Failure Matrix - This table describes combinations of individual model failures that will set P0101, P0106, P012B, P0121 and P1101 on supercharged applications.

Value Units: Boolean
X Unit: Unitless (See top line for heading information)
Y Units: Unitless

y/x	1	2	3	4	5	6	7
1	TPS Model Failure	MAF Model Failure	MAP1 Model Failure	MAP2 Model Failure	SCIAP1 Model Failure	SCIAP2 Model Failure	DTC Set
2	F	F	F	F	F	F	No DTC
3	F	F	F	F	F	T	No DTC
4	F	F	F	F	T	F	No DTC
5	F	F	F	F	T	T	P012B
6	F	F	F	T	F	F	No DTC
7	F	F	F	T	F	T	P1101
8	F	F	F	T	T	F	P1101
9	F	F	F	T	T	T	P1101
10	F	F	T	F	F	F	No DTC
11	F	F	T	F	F	T	P1101
12	F	F	T	F	T	F	P1101
13	F	F	T	F	T	T	P1101
14	F	F	T	T	F	F	P0106
15	F	F	T	T	F	T	P1101
16	F	F	T	T	T	F	P1101
17	F	F	T	T	T	T	P1101
18	F	T	F	F	F	F	No DTC
19	F	T	F	F	F	T	P0101
20	F	T	F	F	T	F	No DTC
21	F	T	F	F	T	T	P0101 & P012B
22	F	T	F	T	F	F	P1101
23	F	T	F	T	F	T	P0101
24	F	T	F	T	T	F	P1101
25	F	T	F	T	T	T	P0101 & P012B
26	F	T	T	F	F	F	P1101
27	F	T	T	F	F	T	P1101
28	F	T	T	F	T	F	P1101
29	F	T	T	F	T	T	P1101
30	F	T	T	T	F	F	P1101
31	F	T	T	T	F	T	P1101

Initial Supporting table - P0101, P0106, P0121, P012B, P1101: Supercharger Intake Flow Rationality Diagnostic Failure Matrix

32	F	T	T	T	T	F	P1101
33	F	T	T	T	T	T	P1101
34	T	F	F	F	F	F	P0121
35	T	F	F	F	F	T	No DTC
36	T	F	F	F	T	F	P0121
37	T	F	F	F	T	T	P1101
38	T	F	F	T	F	F	P1101
39	T	F	F	T	F	T	P1101
40	T	F	F	T	T	F	P1101
41	T	F	F	T	T	T	P1101
42	T	F	T	F	F	F	P0121
43	T	F	T	F	F	T	P1101
44	T	F	T	F	T	F	P0121
45	T	F	T	F	T	T	P1101
46	T	F	T	T	F	F	P1101
47	T	F	T	T	F	T	P1101
48	T	F	T	T	T	F	P1101
49	T	F	T	T	T	T	P1101
50	T	T	F	F	F	F	P0121
51	T	T	F	F	F	T	P1101
52	T	T	F	F	T	F	P0121
53	T	T	F	F	T	T	P1101
54	T	T	F	T	F	F	P1101
55	T	T	F	T	F	T	P1101
56	T	T	F	T	T	F	P1101
57	T	T	F	T	T	T	P1101
58	T	T	T	F	F	F	P0121
59	T	T	T	F	F	T	P1101
60	T	T	T	F	T	F	P0121
61	T	T	T	F	T	T	P1101
62	T	T	T	T	F	F	P1101
63	T	T	T	T	F	T	P1101
64	T	T	T	T	T	F	P1101
65	T	T	T	T	T	T	P1101

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

Description: P0101_P0106_P0121_P0236_P1101 TIAP Residual Weight Factor based on RPM

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

y/x	13	263	750	1,200	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,313	7,000	7,488
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 - P0153_KnEOSD_t_ST_LRC_LimRS2

Description: X Table Axis for P0153

Value Units: Seconds
X Unit: X Table Axis for P0153, L2R Response time breakpoints for table

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.030	0.045	0.060	0.075	0.090	0.105	0.120	0.135	0.150	0.165	0.180	0.195	0.210	0.225	0.240	1.000

Initial Supporting table - P0153_KnEOSD_t_ST_RLC_LimRS2

Description: Y Table Axis for P0153

Value Units: Seconds
Y Units: Y Table Axis for P0153, R2L Response time breakpoints for table

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.045	0.060	0.075	0.090	0.105	0.120	0.135	0.150	0.165	0.180	0.195	0.210	0.225	0.240	0.255	1.000

Initial Supporting table - P0153_O2S Slow Response Bank 2 Sensor 1 Pass/Fail Threshold table

Description: This table discribes the Pass and Fail regions based on the diagnostic test result

Value Units: If the cell contains a "0" then the fault is indicated, if it contains a "1" a fault is not indicated.
X Unit: X axis is Lean to Rich response time (in sec), Please see the table below named "KnEOSD_t_ST_LRC_LimRS2" for the 17 X axis table breakpoints.
Y Units: Y axis is Rich to Lean response time (in sec), Please see the table below named "KnEOSD_t_ST_RLC_LimRS2" for the 17 Y axis table breakpoints.

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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	500	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,500	4,000	4,500	5,000	5,500	6,500	7,500
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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 - 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_Cell00_PurgOnAirMode5	CeFADR_e_Cell01_PurgOnAirMode4	CeFADR_e_Cell02_PurgOnAirMode3	CeFADR_e_Cell03_PurgOnAirMode2
1	65,535	65,535	65,535	65,535

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode1	CeFADR_e_Cell05_PurgOnAirMode0	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_PurgOffAirMode5	CeFADR_e_Cell09_PurgOffAirMode4	CeFADR_e_Cell10_PurgOffAirMode3	CeFADR_e_Cell11_PurgOffAirMode2
1	65,535	65,535	65,535	65,535

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode1	CeFADR_e_Cell13_PurgOffAirMode0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	65,535	65,535	65,535	65,535

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_Cell00_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_NonSelectedCell

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_NonSelectedCell

Initial Supporting table - P0806 EngTorqueThreshold Table

Description: The diagnostic is inhibited if torque (NM) is less than this value. Prevents false fails in regions where false in-gear N/TOS ratios are possible due to low torque, where high torque would otherwise cause slip and prevent a valid in-gear state.

Value Units: Torque (NM)
X Unit: Percent Clutch Pedal Position (%)

y/x	0.00	6.25	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25	62.50	68.75	75.00	81.25	87.50	93.75	100.00
1	50.0	50.0	50.0	53.0	59.0	69.0	83.0	106.0	125.0	130.0	-8,192.0	-8,192.0	-8,192.0	-8,192.0	-8,192.0	-8,192.0	-8,192.0

Initial Supporting table - P0806 ResidualErrEnableHigh Table

Description: Represents the upper threshold of a deadband where the diagnostic will be inhibited to prevent false fails due to clutch slip that can falsely indicate a valid in-gear N/TOS ratio. The lower threshold of the deadband is represented by the table "P0806 ResidualErrEnableLow Table". A lower threshold value that is greater than or equal to the upper threshold for the same gear is an indication that this portion of the diagnostic's enable critera is ignored in that gear. Conversely if the lower threshold value is at or near 0% and the upper threshold for the same gear is at or near 100%, then diagnosis is not enabled in that gear.

Value Units: Percent Clutch Pedal Position (%)
X Unit: Gear, where "0" - "6" is gear 1 - 7, respectively; "7" is reverse

y/x	CeMTCI_e_Gear1	CeMTCI_e_Gear2	CeMTCI_e_Gear3	CeMTCI_e_Gear4	CeMTCI_e_Gear5	CeMTCI_e_Gear6	CeMTCI_e_Gear7	CeMTCI_e_Reverse
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - P0806 ResidualErrEnableLow Table

Description: Represents the lower threshold of a deadband where the diagnostic will be inhibited to prevent false fails due to clutch slip that can falsely indicate a valid in-gear N/TOS ratio. The upper threshold of the deadband is represented by the table "P0806 ResidualErrEnableHigh Table". An upper threshold value that is less than or equal to the lower threshold for the same gear is an indication that this portion of the diagnostic's enable critera is ignored in that gear. Conversely if the lower threshold value is at or near 0% and the upper threshold for the same gear is at or near 100%, then diagnosis is not enabled in that gear.

Value Units: Percent Clutch Pedal Position (%)
X Unit: Gear, where "0" - "6" is gear 1 - 7, respectively; "7" is reverse

y/x	CeMTCI_e_Gear1	CeMTCI_e_Gear2	CeMTCI_e_Gear3	CeMTCI_e_Gear4	CeMTCI_e_Gear5	CeMTCI_e_Gear6	CeMTCI_e_Gear7	CeMTCI_e_Reverse
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Initial Supporting table - P219B Normalizer Bank2 Table

Description: Bank 2 Normalizer table 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	980	1,160	1,340	1,520	1,700	1,880	2,060	2,240	2,420	2,600	2,780	2,960	3,140	3,320	3,500	3,680
120	400.00	400.00	42.50	42.50	48.50	45.75	45.75	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
150	63.25	63.25	56.25	42.50	48.50	45.75	54.50	63.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
180	63.25	63.25	69.75	51.75	47.00	43.50	63.00	59.00	55.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
210	82.25	82.25	70.00	66.50	72.00	66.50	67.00	55.00	77.50	100.25	400.00	400.00	400.00	400.00	400.00	400.00	400.00
240	62.50	62.50	61.75	57.50	66.00	77.00	72.00	54.00	100.25	95.00	82.00	101.00	101.00	400.00	400.00	400.00	400.00
270	75.00	75.00	62.25	81.00	82.25	90.00	83.25	75.00	99.75	89.75	82.00	101.00	101.00	400.00	400.00	400.00	400.00
300	92.00	92.00	81.50	88.00	89.50	98.75	91.75	81.00	105.50	110.00	107.25	112.75	112.75	400.00	400.00	400.00	400.00
330	84.50	84.50	98.25	126.50	116.50	108.75	93.50	107.00	103.50	109.25	103.00	95.00	95.00	400.00	400.00	400.00	400.00
360	104.75	104.75	96.50	159.25	155.50	155.50	159.25	156.50	130.00	133.50	131.75	145.50	145.50	400.00	400.00	400.00	400.00
390	80.00	80.00	108.00	163.00	178.25	175.25	176.75	170.75	169.50	155.50	154.25	183.50	183.50	400.00	400.00	400.00	400.00
420	37.00	37.00	104.50	172.00	182.00	181.50	175.00	171.00	169.50	152.75	149.75	182.25	182.25	400.00	400.00	400.00	400.00
450	37.00	43.50	50.25	176.25	192.50	182.75	183.00	178.50	169.00	154.50	155.00	126.00	126.00	400.00	400.00	400.00	400.00
480	400.00	100.50	100.50	182.25	196.50	178.50	175.75	170.50	158.50	177.25	159.25	146.75	146.75	400.00	400.00	400.00	400.00
510	400.00	100.50	145.50	190.50	195.25	172.75	164.00	142.50	145.75	162.50	139.00	135.75	135.75	400.00	400.00	400.00	400.00
540	400.00	400.00	160.25	160.25	185.75	188.00	147.50	147.50	161.50	138.50	124.50	120.50	120.50	400.00	400.00	400.00	400.00
570	400.00	400.00	160.25	160.25	185.75	188.00	147.50	147.50	161.50	138.50	124.50	120.50	120.50	400.00	400.00	400.00	400.00
600	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00

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	980	1,160	1,340	1,520	1,700	1,880	2,060	2,240	2,420	2,600	2,780	2,960	3,140	3,320	3,500	3,680
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
150	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	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	0.00	0.00	0.00
210	0.00	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	0.00	0.00
240	0.00	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	0.00
270	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	0.00
300	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	0.00
330	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	0.00
360	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	0.00
390	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	0.00
420	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	0.00
450	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	0.00
480	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	0.00
510	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	0.00
540	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	0.00
570	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
600	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 Variance Threshold Bank2 Table

Description: Bank 2 lookup table of Variance metric used to calculate the Ratio for the current sample period

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

y/x	800	980	1,160	1,340	1,520	1,700	1,880	2,060	2,240	2,420	2,600	2,780	2,960	3,140	3,320	3,500	3,680
120	200.00	200.00	18.00	18.00	17.25	18.25	18.25	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
150	28.75	28.75	23.25	18.00	17.25	18.25	18.50	19.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
180	28.75	28.75	28.50	25.50	33.00	23.50	19.00	21.50	24.25	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
210	34.25	34.25	44.00	37.75	45.50	35.00	31.00	24.25	29.00	34.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
240	62.00	62.00	53.50	51.25	47.75	38.50	42.75	38.00	34.00	37.25	35.50	26.75	26.75	200.00	200.00	200.00	200.00
270	69.00	69.00	66.00	51.75	45.50	39.75	46.50	45.75	44.50	40.50	35.50	26.75	26.75	200.00	200.00	200.00	200.00
300	75.25	75.25	74.00	63.00	58.00	53.25	59.25	57.50	50.75	46.00	42.00	27.50	27.50	200.00	200.00	200.00	200.00
330	103.00	103.00	85.75	64.75	55.50	62.25	70.50	59.50	53.50	48.75	46.25	59.75	59.75	200.00	200.00	200.00	200.00
360	107.25	107.25	104.25	69.00	60.50	58.75	57.50	54.75	47.50	45.50	41.50	32.25	32.25	200.00	200.00	200.00	200.00
390	166.50	166.50	111.50	77.25	65.75	60.50	58.25	53.75	46.75	46.50	43.00	34.00	34.00	200.00	200.00	200.00	200.00
420	242.75	242.75	130.75	79.50	67.25	69.25	62.75	63.25	56.50	53.25	50.00	45.50	45.50	200.00	200.00	200.00	200.00
450	242.75	226.25	209.75	85.00	69.00	72.50	67.75	62.00	60.00	62.00	56.25	54.00	54.00	200.00	200.00	200.00	200.00
480	200.00	184.75	184.75	91.00	77.50	84.00	78.25	76.00	63.75	64.50	66.00	64.50	64.50	200.00	200.00	200.00	200.00
510	200.00	184.75	141.75	98.50	82.50	88.25	90.00	78.50	69.25	79.00	82.50	80.25	80.25	200.00	200.00	200.00	200.00
540	200.00	200.00	139.50	139.50	100.50	83.75	108.75	85.25	73.25	87.50	85.00	84.50	84.50	200.00	200.00	200.00	200.00
570	200.00	200.00	139.50	139.50	100.50	83.75	108.75	85.25	73.25	87.50	85.00	84.50	84.50	200.00	200.00	200.00	200.00
600	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00

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	2,400	2,600	2,800	3,000
8	0.20	0.20	0.20	0.20	0.20	0.23	0.27	0.30	0.25	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
12	0.13	0.13	0.13	0.13	0.13	0.12	0.11	0.10	0.08	0.07	0.10	0.13	0.13	0.13	0.13	0.13	0.13
16	0.03	0.03	0.03	0.03	0.03	0.00	-0.03	-0.07	-0.03	0.00	0.03	0.07	0.07	0.08	0.09	0.09	0.10
20	-0.10	-0.10	-0.10	-0.10	-0.10	-0.13	-0.17	-0.20	-0.10	0.00	0.00	0.00	0.02	0.04	0.06	0.08	0.10
24	-0.10	-0.10	-0.10	-0.10	-0.10	-0.11	-0.12	-0.13	-0.07	0.00	0.00	0.00	0.02	0.04	0.06	0.08	0.10
30	-0.10	-0.10	-0.10	-0.10	-0.10	-0.09	-0.08	-0.07	-0.04	0.00	-0.03	-0.06	-0.03	0.01	0.04	0.07	0.10
40	-0.10	-0.10	-0.10	-0.10	-0.10	-0.07	-0.03	0.00	0.00	0.00	-0.10	-0.20	-0.14	-0.08	-0.02	0.04	0.10
60	-0.10	-0.10	-0.10	-0.10	-0.10	-0.07	-0.03	0.00	0.00	0.00	-0.10	-0.20	-0.14	-0.08	-0.02	0.04	0.10
100	-0.10	-0.10	-0.10	-0.10	-0.10	-0.07	-0.03	0.00	0.00	0.00	-0.10	-0.20	-0.14	-0.08	-0.02	0.04	0.10

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	2,400	2,600	2,800	3,000
8	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.10	-1.00	-0.96	-0.92	-0.88	-0.84	-0.80
12	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.03	-1.00	-0.99	-0.97	-0.96	-0.95	-0.93
16	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07
20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20
24	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20
30	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20
40	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20
60	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20
100	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20	-1.20

Initial Supporting table - 1stFireAfterMisJerkAFM

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 - 1stFireAftrMisAcelAFM

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	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
16	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
18	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
20	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
24	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
30	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
40	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
60	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
98	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

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	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
18	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 - 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	2,400	2,600	2,800	3,000
12	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
16	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.67	0.60	0.60	0.60	0.60	0.60	0.60	0.60
18	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.67	0.60	0.60	0.60	0.60	0.60	0.60	0.60
20	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.67	0.60	0.60	0.60	0.60	0.60	0.60	0.60
24	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.67	0.60	0.60	0.60	0.60	0.60	0.60	0.60
30	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.67	0.60	0.60	0.60	0.60	0.60	0.60	0.60
40	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.67	0.60	0.60	0.60	0.60	0.60	0.60	0.60
60	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.67	0.60	0.60	0.60	0.60	0.60	0.60	0.60
98	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.67	0.60	0.60	0.60	0.60	0.60	0.60	0.60

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	2,400	2,600	2,800	3,000
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	1.00	1.00	1.00	1.00	1.00
18	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
20	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
24	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
30	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
40	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
60	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
98	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

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	11.3	11.3	10.3	7.5	4.8	4.8	4.8	4.8
10	11.3	11.3	8.4	6.3	4.8	4.8	4.8	4.8
20	9.2	6.8	6.8	4.8	4.8	4.8	4.8	4.8
30	7.3	6.3	6.3	4.8	4.8	4.8	4.8	4.8
40	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
50	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
60	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
70	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
80	4.8	4.8	4.8	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	1,400	1,600	2,000	2,400	2,600	3,000
8	1.50	1.50	1.50	1.50	1.50	1.50	1.50	2.00	2.00
10	1.05	1.05	1.30	1.20	1.05	1.00	1.20	1.50	1.50
12	0.70	0.70	0.85	0.80	0.65	0.60	0.55	0.90	1.50
14	0.60	0.60	0.65	0.55	0.45	0.45	0.70	0.65	1.15
16	0.65	0.65	0.55	0.45	0.35	0.35	0.50	0.50	1.30
20	0.55	0.55	0.25	0.20	0.15	0.25	0.35	0.35	0.55
24	0.20	0.20	0.20	0.20	0.15	0.20	0.25	0.25	0.45
30	0.30	0.30	0.20	0.20	0.20	0.25	0.30	0.25	0.25
40	0.30	0.30	0.20	0.20	0.20	0.25	0.30	0.25	0.25

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	1,400	1,600	2,000	2,400	2,600	3,000
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	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
14	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

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 differant 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	2,400	2,600	2,800	3,000
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	0.81	0.63	0.70	0.77	0.89	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	0.79	0.58	0.79	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
20	1.00	0.79	0.58	0.79	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
24	1.00	0.76	0.53	0.76	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
30	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
40	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
60	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
98	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

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	2,400	2,600	2,800	3,000
8	-1	-1	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0
12	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
16	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
20	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1
24	-1	-1	0	0	0	0	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1
30	-1	-1	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1
40	-1	-1	0	0	0	0	0	0	-1	-1	-1	0	0	0	-1	-1	-1
60	-1	-1	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1
98	-1	-1	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1

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	1.00	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 - 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	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
12	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
16	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
20	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
24	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
30	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
40	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
60	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
98	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

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	1,400	1,600	2,000	2,400	2,600	3,000
8	1	1	1	1	1	2	2	2	2
10	0	0	1	1	0	1	1	2	2
12	0	0	0	0	0	-1	0	0	1
14	0	0	0	0	-1	-1	-1	0	0
16	0	0	0	-1	-1	-1	0	0	0
20	-1	-1	-1	-1	-1	-1	-1	0	0
24	-1	-1	-1	-1	-1	-1	-1	-1	-1
30	-2	-2	-2	-1	-1	-1	-1	-1	-1
40	-2	-2	-2	-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	1,400	1,600	2,000	2,400	2,600	3,000
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	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
14	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

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 (usec)
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	779	708	643	400	245	172	118	90	73	40	32	25	19
6	938	853	775	400	245	172	118	90	73	40	32	25	16
8	1,150	1,045	950	490	290	192	140	100	73	47	31	23	15
10	1,573	1,430	1,300	600	367	269	200	140	95	69	47	36	24
12	1,888	1,716	1,560	736	520	346	260	185	135	91	63	48	33
14	2,202	2,002	1,820	976	672	422	320	240	175	113	79	60	42
16	2,517	2,288	2,080	1,216	825	499	380	294	215	135	95	73	51
18	2,832	2,574	2,340	1,456	978	576	440	348	255	157	111	85	60
20	3,146	2,860	2,600	1,696	1,131	653	500	403	295	179	127	97	69
22	3,461	3,146	2,860	1,936	1,284	729	560	457	336	201	144	110	78
24	3,775	3,432	3,120	2,176	1,437	806	620	511	376	223	160	122	87
26	4,090	3,718	3,380	2,416	1,589	883	680	566	416	245	176	135	96
30	4,719	4,290	3,900	2,896	1,895	1,036	800	674	496	289	208	159	114
40	6,292	5,720	5,200	4,096	2,659	1,420	1,100	946	697	399	289	221	160
60	9,438	8,580	7,800	6,496	4,188	2,188	1,700	1,489	1,098	619	450	345	250
78	12,191	11,083	10,075	8,596	5,525	2,859	2,225	1,964	1,449	812	591	453	329
97	15,337	13,943	12,675	10,996	7,054	3,627	2,825	2,507	1,850	1,032	752	577	419

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	15	13	11	10	7	7	5	6	10	6	4	4	4
6	15	8	11	10	7	7	5	6	10	6	4	4	4
8	15	13	10	8	7	7	5	6	10	6	4	4	4
10	21	18	12	9	8	7	5	6	10	6	4	4	4
12	27	23	16	11	10	8	6	6	10	6	4	4	4
14	33	28	20	14	12	10	6	6	10	6	4	4	4
16	39	33	24	17	15	12	7	6	10	6	4	4	4
18	45	38	28	20	17	14	8	6	9	6	4	4	4
20	51	43	32	23	20	15	9	6	9	6	4	4	4
22	57	48	36	26	23	17	10	7	9	6	4	4	4
24	63	53	40	29	26	19	11	8	8	7	4	4	4

Initial Supporting table - CylModeDecel

26	69	58	44	32	29	21	12	8	8	7	5	4	4
30	81	68	52	38	35	25	14	10	8	6	4	4	4
40	111	93	72	54	49	34	19	14	9	7	4	4	4
60	171	143	112	84	78	52	28	23	16	8	5	6	6
78	223	187	147	111	103	68	37	31	22	11	6	8	8
97	283	237	187	141	132	87	46	40	29	15	7	10	10

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 (usec)
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	648	540	450	398	262	148	81	73	66	51	39	29	25
6	684	570	475	398	196	164	81	73	66	40	32	24	20
8	1,296	1,080	900	524	260	190	100	77	54	40	29	21	15
10	1,548	1,290	1,075	650	372	270	160	125	80	62	45	32	24
12	1,750	1,458	1,215	776	484	350	220	173	118	84	61	43	29
14	1,951	1,626	1,355	902	596	430	280	221	156	106	77	54	35
16	2,153	1,794	1,495	1,028	708	510	340	269	194	128	93	65	41
18	2,355	1,962	1,635	1,154	820	590	400	317	232	150	109	76	48
20	2,556	2,130	1,775	1,280	932	670	460	365	270	172	125	87	54
22	2,758	2,298	1,915	1,406	1,044	750	520	413	308	194	141	98	61
24	2,959	2,466	2,055	1,532	1,156	830	580	461	346	216	157	109	67
26	3,161	2,634	2,195	1,658	1,268	910	640	509	384	238	173	120	73
30	3,564	2,970	2,475	1,910	1,492	1,070	760	605	460	282	205	142	86
40	4,572	3,810	3,175	2,540	2,052	1,470	1,060	845	650	392	285	197	118
60	6,588	5,490	4,575	3,800	3,172	2,270	1,660	1,325	1,030	612	445	307	182
78	8,352	6,960	5,800	4,903	4,152	2,970	2,185	1,745	1,363	805	585	404	238
97	10,368	8,640	7,200	6,163	5,272	3,770	2,785	2,225	1,743	1,025	745	514	302

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	14	12	11	0	0	0	0	0	0	0	0
6	19	16	14	12	10	0	0	0	0	0	0	0	0
8	14	13	11	9	8	0	0	0	0	0	0	0	0
10	17	16	12	10	9	0	0	0	0	0	0	0	0
12	22	20	14	12	10	0	0	0	0	0	0	0	0
14	27	23	17	13	11	0	0	0	0	0	0	0	0
16	33	26	20	15	12	0	0	0	0	0	0	0	0
18	39	31	23	17	14	0	0	0	0	0	0	0	0
20	45	36	27	20	16	0	0	0	0	0	0	0	0
22	50	40	30	22	18	0	0	0	0	0	0	0	0
24	55	44	34	24	20	0	0	0	0	0	0	0	0

Initial Supporting table - CylModeJerk

26	61	49	37	27	22	0	0	0	0	0	0	0	0
30	71	57	44	31	26	0	0	0	0	0	0	0	0
40	98	77	62	43	37	0	0	0	0	0	0	0	0
60	152	118	96	67	57	0	0	0	0	0	0	0	0
78	199	154	127	88	76	0	0	0	0	0	0	0	0
97	252	195	162	112	96	0	0	0	0	0	0	0	0

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

y/x	800	1,000	1,200	1,400	1,600	2,000	2,400	2,600	3,000
8	150	136	40	29	23	26	18	18	10
10	0	0	0	0	0	26	18	18	10
12	0	0	0	0	0	0	18	18	10
14	101	92	56	26	10	0	0	18	10
16	156	142	86	55	30	12	0	0	0
20	214	195	114	106	68	36	12	5	0
24	318	289	166	138	96	46	17	13	0
30	550	500	204	171	110	58	35	20	13
40	605	550	224	188	121	64	38	22	15

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

y/x	800	1,000	1,200	1,400	1,600	2,000	2,400	2,600	3,000
8	272	247	74	51	40	43	28	29	21
10	104	95	31	23	27	43	28	28	21
12	271	247	111	33	44	23	28	28	21
14	399	363	168	125	82	24	0	29	21
16	509	463	263	198	124	42	16	4	0
20	785	714	424	305	213	108	34	20	8
24	1,093	994	647	415	276	137	51	41	14
30	1,595	1,450	859	540	352	178	83	64	37
40	1,755	1,595	945	594	387	196	92	71	41

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	6,600	6,600	6,600	6,600	6,600	6,600	6,600

EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGr10	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrRvrs	CeTGRR_e_TransGrPark	CeTGRR_e_TransGr7	CeTGRR_e_TransGr8	
1	6,600	6,600	6,600	6,600	6,600	6,600	

Initial Supporting table - IdleCyl_Decel

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

Value Units: Delta time per cylinder (usec)
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	779	708	643	400	245	172	160	125	95	65	32	25	19
6	938	853	775	400	245	172	160	125	95	65	32	25	16
8	1,150	1,045	950	490	290	175	190	135	105	70	31	23	15
10	1,573	1,430	1,300	600	367	225	200	160	103	69	47	36	24
12	1,888	1,716	1,560	736	520	346	290	185	135	91	63	48	33
14	2,202	2,002	1,820	976	672	422	320	240	175	113	79	60	42
16	2,517	2,288	2,080	1,216	825	499	380	294	215	135	95	73	51
18	2,832	2,574	2,340	1,456	978	576	440	348	255	157	111	85	60
20	3,146	2,860	2,600	1,696	1,131	653	500	403	295	179	127	97	69
22	3,461	3,146	2,860	1,936	1,284	729	560	457	336	201	144	110	78
24	3,775	3,432	3,120	2,176	1,437	806	620	511	376	223	160	122	87
26	4,090	3,718	3,380	2,416	1,589	883	680	566	416	245	176	135	96
28	4,405	4,004	3,640	2,656	1,742	960	740	620	456	267	192	147	105
30	4,719	4,290	3,900	2,896	1,895	1,036	800	674	496	289	208	159	114
32	5,034	4,576	4,160	3,136	2,048	1,113	860	729	536	311	224	172	123
34	5,348	4,862	4,420	3,376	2,201	1,190	920	783	576	333	240	184	132
36	5,663	5,148	4,680	3,616	2,354	1,267	980	837	616	355	256	196	142

Initial Supporting table - IdleCyl_Jerk

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

Value Units: Change in Delta time per cylinder from last cylinder (usec)
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	648	540	450	398	262	148	81	73	66	65	39	29	25
6	684	570	475	398	196	164	81	73	66	65	32	24	20
8	1,296	1,080	900	524	260	170	180	110	65	60	29	21	15
10	1,548	1,290	1,075	650	372	200	188	155	125	70	45	32	24
12	1,750	1,458	1,215	776	484	310	265	200	118	84	61	43	29
14	1,951	1,626	1,355	902	596	430	280	221	156	106	77	54	35
16	2,153	1,794	1,495	1,028	708	510	340	269	194	128	93	65	41
18	2,355	1,962	1,635	1,154	820	590	400	317	232	150	109	76	48
20	2,556	2,130	1,775	1,280	932	670	460	365	270	172	125	87	54
22	2,758	2,298	1,915	1,406	1,044	750	520	413	308	194	141	98	61
24	2,959	2,466	2,055	1,532	1,156	830	580	461	346	216	157	109	67
26	3,161	2,634	2,195	1,658	1,268	910	640	509	384	238	173	120	73
28	3,363	2,802	2,335	1,784	1,380	990	700	557	422	260	189	131	80
30	3,564	2,970	2,475	1,910	1,492	1,070	760	605	460	282	205	142	86
32	3,766	3,138	2,615	2,036	1,604	1,150	820	653	498	304	221	153	93
34	3,967	3,306	2,755	2,162	1,716	1,230	880	701	536	326	237	164	99
36	4,169	3,474	2,895	2,288	1,828	1,310	940	749	574	348	253	175	105

Initial Supporting table - IdleSCD_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold while in SCD mode. 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 (usec)
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	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
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 - IdleSCD_Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold while in SCD mode. 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 (usec)
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	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
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 - 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 differant 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 - P0326_P0331_AbnormalNoise_Thresh_AFM

Description: Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine IS in AFM mode

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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	0.700	0.700	0.700	0.600	0.450	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350

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	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 - 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	1.00	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 - 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	2,400	2,600	2,800	3,000
8	1.00	0.92	0.85	0.85	0.85	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.63	0.63	0.63	0.70	0.77	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	0.58	0.58	0.58	0.72	0.85	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	0.58	0.58	0.58	0.79	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
24	0.53	0.53	0.53	0.76	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
30	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
40	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
60	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
98	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

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	2,400	2,600	2,800	3,000
8	1.00	1.00	1.00	0.92	0.84	0.92	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	0.75	0.49	0.60	0.70	0.75	0.80	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	0.81	0.62	0.60	0.59	0.69	0.80	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	0.81	0.62	0.66	0.70	0.75	0.80	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	0.77	0.55	0.71	0.87	0.94	1.00	1.00	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	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	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	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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	1.00	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 - 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, Mulitplier to 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	1,400	1,600	2,000	2,400	2,600	3,000
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	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
14	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

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	1,400	1,600	2,000	2,400	2,600	3,000
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	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
14	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

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	2,400	2,600	2,800	3,000
8	1.00	1.00	1.00	1.05	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.30	1.30	1.30	1.40	1.50	1.40	1.30	1.30	1.30
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.35	1.40
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.35	1.40
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15

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	2,400	2,600	2,800	3,000
8	1.00	1.00	1.00	1.05	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
12	1.00	1.00	1.00	1.05	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
16	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10

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	1,800	2,200	2,600	3,000	4,000	5,000
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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 (usec)
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	65	40	60	30	28	26	26	26
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	65	40	60	30	28	26	26	26
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	65	40	40	30	28	26	26	26
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	70	45	33	25	24	16	16	16
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	90	57	28	20	16	16	16	16
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	110	69	36	27	19	14	10	10
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	130	81	44	33	25	17	14	14
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	150	93	52	40	30	21	17	17
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	170	105	60	46	36	25	21	21
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	190	117	68	52	42	29	25	25
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	210	129	76	59	47	33	28	28
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	230	141	84	65	53	37	32	32
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	270	165	100	78	64	45	39	39
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	370	225	140	110	92	65	57	57
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	570	345	220	174	148	105	93	93
78	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	745	450	290	230	197	140	125	125
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	945	570	370	294	253	180	161	161

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	7	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 (usec)
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	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
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
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
78	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 (usec)
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	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
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
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
78	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 ddt_jerk 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	1,800	2,200	2,600	3,000	4,000	5,000
0	1.60	2.30	2.70	2.10	2.00	2.00	1.90	1.90	1.90
1	1.60	2.30	2.70	2.10	2.00	2.00	1.90	1.90	1.90
1	1.60	2.30	2.70	2.10	2.00	2.00	1.90	1.90	1.90
1	1.60	2.30	2.70	2.10	2.00	2.00	1.90	1.90	1.90
2	1.60	2.30	2.70	2.10	2.00	2.00	1.90	1.90	1.90
2	1.60	2.30	2.70	2.10	2.00	2.00	1.90	1.90	1.90
3	1.60	2.30	2.70	2.10	2.00	2.00	1.90	1.90	1.90
5	1.60	2.30	2.70	2.10	2.00	2.00	1.90	1.90	1.90
5	1.60	2.30	2.70	2.10	2.00	2.00	1.90	1.90	1.90

Initial Supporting table - TOSSRoughRoadThres

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	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
200	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
300	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
400	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
500	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
600	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
700	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
800	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
900	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,000	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,100	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,200	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,300	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,400	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

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	0.24255	0.25647	0.27026	0.28418	0.29797	0.31189	0.32568	0.33960	0.36035	0.38110	0.40881	0.44348	0.47119	0.48511	0.48511	0.48511	0.48511

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	0.50	0.50	0.50	0.50	0.50	0.50	0.70	1.00	1.20	1.30	1.20	1.10	1.00
75	0.50	0.50	0.50	0.50	0.50	0.50	0.70	1.00	1.20	1.30	1.20	1.10	1.00
85	0.50	0.50	0.50	0.50	0.50	0.50	0.70	1.00	1.20	1.30	1.20	1.10	1.00
95	0.50	0.50	0.50	0.50	0.50	0.50	0.70	1.00	1.20	1.30	1.20	1.10	1.00
105	0.50	0.50	0.50	0.50	0.50	0.50	0.70	1.00	1.20	1.30	1.20	1.10	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	0.90	0.60	0.80	0.80	0.80	0.00	1.29	2.58	3.86	5.15	6.44	7.73	10.30
75	0.90	0.60	0.80	0.80	0.80	0.00	1.29	2.58	3.86	5.15	6.44	7.73	10.30
85	0.90	0.60	0.80	0.80	0.80	0.00	1.29	2.58	3.86	5.15	6.44	7.73	10.30
95	0.90	0.60	0.80	0.80	0.80	0.00	1.29	2.58	3.86	5.15	6.44	7.73	10.30
105	0.90	0.60	0.80	0.80	0.80	0.00	1.29	2.58	3.86	5.15	6.44	7.73	10.30

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	-3.00	-3.00	-3.00	-2.30	-1.80	-1.50	-1.30	-1.10	-0.90	-0.70	-0.80	-1.00	-1.20
75	-3.00	-3.00	-3.00	-2.30	-1.80	-1.50	-1.30	-1.10	-0.90	-0.70	-0.80	-1.00	-1.20
85	-3.00	-3.00	-3.00	-2.30	-1.80	-1.50	-1.30	-1.10	-0.90	-0.70	-0.80	-1.00	-1.20
95	-3.00	-3.00	-3.00	-2.30	-1.80	-1.50	-1.30	-1.10	-0.90	-0.70	-0.80	-1.00	-1.20
105	-3.00	-3.00	-3.00	-2.30	-1.80	-1.50	-1.30	-1.10	-0.90	-0.70	-0.80	-1.00	-1.20

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	-0.80	-0.70	-0.80	-0.90	-1.00	-0.99	0.44	1.88	3.32	4.75	6.20	7.64	10.52
75	-0.80	-0.70	-0.80	-0.90	-1.00	-0.99	0.44	1.88	3.32	4.75	6.20	7.64	10.52
85	-0.80	-0.70	-0.80	-0.90	-1.00	-0.99	0.44	1.88	3.32	4.75	6.20	7.64	10.52
95	-0.80	-0.70	-0.80	-0.90	-1.00	-0.99	0.44	1.88	3.32	4.75	6.20	7.64	10.52
105	-0.80	-0.70	-0.80	-0.90	-1.00	-0.99	0.44	1.88	3.32	4.75	6.20	7.64	10.52

Initial Supporting table - P0325_P0330_OpenCktThrshMax (20 kHz)

Description: Knock Open Circuit Diagnostic Maximum Threshold when using the 20 kHz method (see "OpenMethod" description)

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine Speed (RPM).
Y Units: N/A

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	7.6289	7.7285	7.7871	7.8066	7.7852	7.7266	7.6270	7.4883	7.3086	7.0898	6.8320	6.5332	6.1953	5.8184	5.4004	4.9434	4.4473

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).

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3887	0.6016	0.7539	0.9375	0.9375	0.9375	0.9375	0.9375

Initial Supporting table - P0325_P0330_OpenCktThrshMin (20 kHz)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the 20 kHz method (see "OpenMethod" description)

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine (RPM)
Y Units: N/A

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	2.7480	2.7324	2.7207	2.7129	2.7070	2.7070	2.7109	2.7168	2.7266	2.7402	2.7598	2.7793	2.8984	3.3027	3.7461	4.2344	4.7637

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).

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1211	0.1465	0.1816	0.2559	0.2559	0.2559	0.2559	0.2559

Initial Supporting table - P0325_P0330_OpenMethod_2

Description: Defines which Knock Open Circuit Diagnostic method to use.

Value Units: Identifies one of two diagnostic methods (either 20 kHz or Normal Noise) used (as a function of engine speed) for Open Circuit detection
X Unit: Engine Speed Index, 500 to 8500 (RPM) by 500 rpm increments (Index 0, 1, 2.... 16 = 500, 1000, 1500.... 8500 RPM)
Y Units: N/A

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_NormalNoise	CeKNKD_e_Open_NormalNoise	CeKNKD_e_Open_NormalNoise	CeKNKD_e_Open_NormalNoise

P0325_P0330_OpenMethod_2 - Part 4

y/x	15	16			
1	CeKNKD_e_Open_NormalNoise	CeKNKD_e_Open_NormalNoise			

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)

Value Units: Boolean that indicates which engine cylinders are being used for the per-sensor Knock Performance diagnostic (0 = not used, 1 = used)
X Unit: Cylinder number in firing order (i.e. Cyl 0 = first cylinder in firing order, Cyl 1 = second cylinder in firing order....)
Y Units: N/A

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

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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	0.800	0.800	0.800	0.600	0.450	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400

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.

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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	0.180	0.180	0.184	0.207	0.227	0.238	0.342	0.471	0.633	1.049	1.496	1.496	1.496	1.496	1.496	1.496	1.496

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.

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine Speed (RPM).
Y Units: N/A

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	0.094	0.094	0.098	0.109	0.119	0.125	0.172	0.236	0.285	0.467	0.711	0.711	0.711	0.711	0.711	0.711	0.711

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 - 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	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
1,200	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
1,600	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
2,000	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
2,400	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
2,800	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
3,200	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
3,600	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
4,000	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
4,400	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
4,800	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
5,200	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
5,600	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
6,000	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
6,400	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
6,800	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

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	300	7	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P0021_CamPosErrorLimIc2

Description: Maximum Intake Cam 2 phase error as a function of engine speed and engine oil temperature.

Value Units: Maximum Intake Cam 2 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	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
800	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
1,200	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
1,600	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2,000	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2,400	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2,800	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
3,200	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
3,600	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
4,000	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
4,400	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
4,800	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5,200	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5,600	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6,000	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6,400	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6,800	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Initial Supporting table - P0021_P05CD_StablePositionTimeIc2

Description: Minimum time for Intake Cam 2 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	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
1,200	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
1,600	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
2,000	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
2,400	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
2,800	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
3,200	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
3,600	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
4,000	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
4,400	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
4,800	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
5,200	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
5,600	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
6,000	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
6,400	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
6,800	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

Initial Supporting table - P0024_CamPosErrorLimEc2

Description: Maximum Exhaust Cam 2 phase error as a function of engine speed and engine oil temperature.

Value Units: Maximum Exhaust Cam 2 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	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
800	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
1,200	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
1,600	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2,000	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2,400	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2,800	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
3,200	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
3,600	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
4,000	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
4,400	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
4,800	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5,200	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5,600	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6,000	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6,400	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6,800	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Initial Supporting table - P0024_P05CF_StablePositionTimeEc2

Description: Minimum time for Exhaust Cam 2 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	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
1,200	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
1,600	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
2,000	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
2,400	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
2,800	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
3,200	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
3,600	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
4,000	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
4,400	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
4,800	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
5,200	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
5,600	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
6,000	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
6,400	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
6,800	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

Initial Supporting table - P00C4 P2261: Compressor Surge Line

Description: Turbo compressor recirculation valve diagnosis surge area limit.

Value Units: [ratio] CRV diagnosis surge area limit.
X Unit: [g/sec[] KnBSTD_dm_AirFlowBP - Air FLow

y/x	7.40	18.60	47.37	71.53	97.92	129.60
1	1.250	1.650	2.148	2.754	3.072	3.432

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

Description: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix - This table describes combinations of individual model failures that will set P0101, P0106, P010B, P0121, P0236 and P1101 on turbocharged applications.

Value Units: Boolean
X Unit: Unitless (See top line for heading information)
Y Units: Unitless

y/x	1	2	3	4	5	6	7	8	9
1	MAF Model	MAP1 Model	MAP2 Model	MAP3 Model	TIAP1 Model	TPS Model	TIAP Correlation	TIAP Correlation	DTC Set
2	Failed	Failed	Failed	Failed	Failed	Failed	Failed	Valid	
3	F	F	F	F	F	F	F	F	No DTC
4	F	F	F	F	F	F	F	T	No DTC
5	F	F	F	F	F	F	T	F	No DTC
6	F	F	F	F	F	F	T	T	No DTC
7	F	F	F	F	F	T	F	F	No DTC
8	F	F	F	F	F	T	F	T	No DTC
9	F	F	F	F	F	T	T	F	No DTC
10	F	F	F	F	F	T	T	T	No DTC
11	F	F	F	F	T	F	F	F	No DTC
12	F	F	F	F	T	F	F	T	No DTC
13	F	F	F	F	T	F	T	F	No DTC
14	F	F	F	F	T	F	T	T	No DTC
15	F	F	F	F	T	T	F	F	P1101
16	F	F	F	F	T	T	F	T	P0121
17	F	F	F	F	T	T	T	F	P1101
18	F	F	F	F	T	T	T	T	P0236
19	F	F	F	T	F	F	F	F	No DTC
20	F	F	F	T	F	F	F	T	P1101
21	F	F	F	T	F	F	T	F	P1101
22	F	F	F	T	F	F	T	T	P1101
23	F	F	F	T	F	T	F	F	P1101
24	F	F	F	T	F	T	F	T	P1101
25	F	F	F	T	F	T	T	F	P1101
26	F	F	F	T	F	T	T	T	P1101
27	F	F	F	T	T	F	F	F	P1101
28	F	F	F	T	T	F	F	T	P1101
29	F	F	F	T	T	F	T	F	P1101
30	F	F	F	T	T	F	T	T	P1101
31	F	F	F	T	T	T	F	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

32	F	F	F	T	T	T	F	T	P1101
33	F	F	F	T	T	T	T	F	P1101
34	F	F	F	T	T	T	T	T	P1101
35	F	F	T	F	F	F	F	F	No DTC
36	F	F	T	F	F	F	F	T	P1101
37	F	F	T	F	F	F	T	F	P1101
38	F	F	T	F	F	F	T	T	P1101
39	F	F	T	F	F	T	F	F	P1101
40	F	F	T	F	F	T	F	T	P1101
41	F	F	T	F	F	T	T	F	P1101
42	F	F	T	F	F	T	T	T	P1101
43	F	F	T	F	T	F	F	F	P1101
44	F	F	T	F	T	F	F	T	P1101
45	F	F	T	F	T	F	T	F	P1101
46	F	F	T	F	T	F	T	T	P1101
47	F	F	T	F	T	T	F	F	P1101
48	F	F	T	F	T	T	F	T	P1101
49	F	F	T	F	T	T	T	F	P1101
50	F	F	T	F	T	T	T	T	P1101
51	F	F	T	T	F	F	F	F	P1101
52	F	F	T	T	F	F	F	T	P1101
53	F	F	T	T	F	F	T	F	P1101
54	F	F	T	T	F	F	T	T	P1101
55	F	F	T	T	F	T	F	F	P1101
56	F	F	T	T	F	T	F	T	P1101
57	F	F	T	T	F	T	T	F	P1101
58	F	F	T	T	F	T	T	T	P1101
59	F	F	T	T	T	F	F	F	No DTC
60	F	F	T	T	T	F	F	T	No DTC
61	F	F	T	T	T	F	T	F	No DTC
62	F	F	T	T	T	F	T	T	No DTC
63	F	F	T	T	T	T	F	F	P1101
64	F	F	T	T	T	T	F	T	P1101
65	F	F	T	T	T	T	T	F	P1101
66	F	F	T	T	T	T	T	T	P1101
67	F	T	F	F	F	F	F	F	No DTC
68	F	T	F	F	F	F	F	T	P1101
69	F	T	F	F	F	F	T	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

70	F	T	F	F	F	F	T	T	P0236
71	F	T	F	F	F	T	F	F	P1101
72	F	T	F	F	F	T	F	T	P0121
73	F	T	F	F	F	T	T	F	P1101
74	F	T	F	F	F	T	T	T	P0236
75	F	T	F	F	T	F	F	F	P1101
76	F	T	F	F	T	F	F	T	P1101
77	F	T	F	F	T	F	T	F	P1101
78	F	T	F	F	T	F	T	T	P0236
79	F	T	F	F	T	T	F	F	P1101
80	F	T	F	F	T	T	F	T	P0121
81	F	T	F	F	T	T	T	F	P1101
82	F	T	F	F	T	T	T	T	P0236
83	F	T	F	T	F	F	F	F	P1101
84	F	T	F	T	F	F	F	T	P1101
85	F	T	F	T	F	F	T	F	P1101
86	F	T	F	T	F	F	T	T	P1101
87	F	T	F	T	F	T	F	F	P1101
88	F	T	F	T	F	T	F	T	P1101
89	F	T	F	T	F	T	T	F	P1101
90	F	T	F	T	F	T	T	T	P1101
91	F	T	F	T	T	F	F	F	P1101
92	F	T	F	T	T	F	F	T	P1101
93	F	T	F	T	T	F	T	F	P1101
94	F	T	F	T	T	F	T	T	P1101
95	F	T	F	T	T	T	F	F	P1101
96	F	T	F	T	T	T	F	T	P1101
97	F	T	F	T	T	T	T	F	P1101
98	F	T	F	T	T	T	T	T	P1101
99	F	T	T	F	F	F	F	F	P1101
100	F	T	T	F	F	F	F	T	P1101
101	F	T	T	F	F	F	T	F	P1101
102	F	T	T	F	F	F	T	T	P1101
103	F	T	T	F	F	T	F	F	P1101
104	F	T	T	F	F	T	F	T	P1101
105	F	T	T	F	F	T	T	F	P1101
106	F	T	T	F	F	T	T	T	P1101
107	F	T	T	F	T	F	F	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

108	F	T	T	F	T	F	F	T	P1101
109	F	T	T	F	T	F	T	F	P1101
110	F	T	T	F	T	F	T	T	P1101
111	F	T	T	F	T	T	F	F	P1101
112	F	T	T	F	T	T	F	T	P1101
113	F	T	T	F	T	T	T	F	P1101
114	F	T	T	F	T	T	T	T	P1101
115	F	T	T	T	F	F	F	F	P0106
116	F	T	T	T	F	F	F	T	P0106
117	F	T	T	T	F	F	T	F	P0106
118	F	T	T	T	F	F	T	T	P0106
119	F	T	T	T	F	T	F	F	P1101
120	F	T	T	T	F	T	F	T	P1101
121	F	T	T	T	F	T	T	F	P1101
122	F	T	T	T	F	T	T	T	P1101
123	F	T	T	T	T	F	F	F	P1101
124	F	T	T	T	T	F	F	T	P1101
125	F	T	T	T	T	F	T	F	P1101
126	F	T	T	T	T	F	T	T	P1101
127	F	T	T	T	T	T	F	F	P1101
128	F	T	T	T	T	T	F	T	P1101
129	F	T	T	T	T	T	T	F	P1101
130	F	T	T	T	T	T	T	T	P1101
131	T	F	F	F	F	F	F	F	No DTC
132	T	F	F	F	F	F	F	T	P1101
133	T	F	F	F	F	F	T	F	P1101
134	T	F	F	F	F	F	T	T	P0236
135	T	F	F	F	F	T	F	F	P1101
136	T	F	F	F	F	T	F	T	P0121
137	T	F	F	F	F	T	T	F	P1101
138	T	F	F	F	F	T	T	T	P0236
139	T	F	F	F	T	F	F	F	P1101
140	T	F	F	F	T	F	F	T	P1101
141	T	F	F	F	T	F	T	F	P1101
142	T	F	F	F	T	F	T	T	P0236
143	T	F	F	F	T	T	F	F	P1101
144	T	F	F	F	T	T	F	T	P0121
145	T	F	F	F	T	T	T	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

146	T	F	F	F	T	T	T	T	P0236
147	T	F	F	T	F	F	F	F	P1101
148	T	F	F	T	F	F	F	T	P1101
149	T	F	F	T	F	F	T	F	P1101
150	T	F	F	T	F	F	T	T	P1101
151	T	F	F	T	F	T	F	F	P1101
152	T	F	F	T	F	T	F	T	P1101
153	T	F	F	T	F	T	T	F	P1101
154	T	F	F	T	F	T	T	T	P1101
155	T	F	F	T	T	F	F	F	P1101
156	T	F	F	T	T	F	F	T	P1101
157	T	F	F	T	T	F	T	F	P1101
158	T	F	F	T	T	F	T	T	P1101
159	T	F	F	T	T	T	F	F	P1101
160	T	F	F	T	T	T	F	T	P1101
161	T	F	F	T	T	T	T	F	P1101
162	T	F	F	T	T	T	T	T	P1101
163	T	F	T	F	F	F	F	F	P1101
164	T	F	T	F	F	F	F	T	P1101
165	T	F	T	F	F	F	T	F	P1101
166	T	F	T	F	F	F	T	T	P1101
167	T	F	T	F	F	T	F	F	P1101
168	T	F	T	F	F	T	F	T	P1101
169	T	F	T	F	F	T	T	F	P1101
170	T	F	T	F	F	T	T	T	P1101
171	T	F	T	F	T	F	F	F	P1101
172	T	F	T	F	T	F	F	T	P1101
173	T	F	T	F	T	F	T	F	P1101
174	T	F	T	F	T	F	T	T	P1101
175	T	F	T	F	T	T	F	F	P1101
176	T	F	T	F	T	T	F	T	P1101
177	T	F	T	F	T	T	T	F	P1101
178	T	F	T	F	T	T	T	T	P1101
179	T	F	T	T	F	F	F	F	P1101
180	T	F	T	T	F	F	F	T	P1101
181	T	F	T	T	F	F	T	F	P1101
182	T	F	T	T	F	F	T	T	P1101
183	T	F	T	T	F	T	F	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

184	T	F	T	T	F	T	F	T	P1101
185	T	F	T	T	F	T	T	F	P1101
186	T	F	T	T	F	T	T	T	P1101
187	T	F	T	T	T	F	F	F	P0101 or P010B
188	T	F	T	T	T	F	F	T	P0101 or P010B
189	T	F	T	T	T	F	T	F	P0101 or P010B
190	T	F	T	T	T	F	T	T	P0101 or P010B
191	T	F	T	T	T	T	F	F	P1101
192	T	F	T	T	T	T	F	T	P1101
193	T	F	T	T	T	T	T	F	P1101
194	T	F	T	T	T	T	T	T	P1101
195	T	T	F	F	F	F	F	F	P1101
196	T	T	F	F	F	F	F	T	P1101
197	T	T	F	F	F	F	T	F	P1101
198	T	T	F	F	F	F	T	T	P0236
199	T	T	F	F	F	T	F	F	P1101
200	T	T	F	F	F	T	F	T	P0121
201	T	T	F	F	F	T	T	F	P1101
202	T	T	F	F	F	T	T	T	P0236
203	T	T	F	F	T	F	F	F	P1101
204	T	T	F	F	T	F	F	T	P1101
205	T	T	F	F	T	F	T	F	P1101
206	T	T	F	F	T	F	T	T	P0236
207	T	T	F	F	T	T	F	F	P1101
208	T	T	F	F	T	T	F	T	P0121
209	T	T	F	F	T	T	T	F	P1101
210	T	T	F	F	T	T	T	T	P0236
211	T	T	F	T	F	F	F	F	P1101
212	T	T	F	T	F	F	F	T	P1101
213	T	T	F	T	F	F	T	F	P1101
214	T	T	F	T	F	F	T	T	P1101
215	T	T	F	T	F	T	F	F	P1101
216	T	T	F	T	F	T	F	T	P1101
217	T	T	F	T	F	T	T	F	P1101
218	T	T	F	T	F	T	T	T	P1101
219	T	T	F	T	T	F	F	F	P1101
220	T	T	F	T	T	F	F	T	P1101
221	T	T	F	T	T	F	T	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

222	T	T	F	T	T	F	T	T	P1101
223	T	T	F	T	T	T	F	F	P1101
224	T	T	F	T	T	T	F	T	P1101
225	T	T	F	T	T	T	T	F	P1101
226	T	T	F	T	T	T	T	T	P1101
227	T	T	T	F	F	F	F	F	P1101
228	T	T	T	F	F	F	F	T	P1101
229	T	T	T	F	F	F	T	F	P1101
230	T	T	T	F	F	F	T	T	P1101
231	T	T	T	F	F	T	F	F	P1101
232	T	T	T	F	F	T	F	T	P1101
233	T	T	T	F	F	T	T	F	P1101
234	T	T	T	F	F	T	T	T	P1101
235	T	T	T	F	T	F	F	F	P1101
236	T	T	T	F	T	F	F	T	P1101
237	T	T	T	F	T	F	T	F	P1101
238	T	T	T	F	T	F	T	T	P1101
239	T	T	T	F	T	T	F	F	P1101
240	T	T	T	F	T	T	F	T	P1101
241	T	T	T	F	T	T	T	F	P1101
242	T	T	T	F	T	T	T	T	P1101
243	T	T	T	T	F	F	F	F	P1101
244	T	T	T	T	F	F	F	T	P1101
245	T	T	T	T	F	F	T	F	P1101
246	T	T	T	T	F	F	T	T	P1101
247	T	T	T	T	F	T	F	F	P1101
248	T	T	T	T	F	T	F	T	P1101
249	T	T	T	T	F	T	T	F	P1101
250	T	T	T	T	F	T	T	T	P1101
251	T	T	T	T	T	F	F	F	P1101
252	T	T	T	T	T	F	F	T	P1101
253	T	T	T	T	T	F	T	F	P1101
254	T	T	T	T	T	F	T	T	P1101
255	T	T	T	T	T	T	F	F	P1101
256	T	T	T	T	T	T	F	T	P1101
257	T	T	T	T	T	T	T	F	P1101
258	T	T	T	T	T	T	T	T	P1101

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

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

y/x	600	950	1,300	1,650	2,000	2,350	2,700	3,050	3,400	3,750	4,100	4,450	4,800	5,150	5,500	6,000	6,500
1	0.900	0.935	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.949	1.000	1.000	1.000	0.992	0.973	0.950	0.950

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	600	950	1,300	1,650	2,000	2,350	2,700	3,050	3,400	3,750	4,100	4,450	4,800	5,150	5,500	6,000	6,500
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, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP3 Residual Weight Factor based on RPM

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

y/x	600	950	1,300	1,650	2,000	2,350	2,700	3,050	3,400	3,750	4,100	4,450	4,800	5,150	5,500	6,000	6,500
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, 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	600	950	1,300	1,650	2,000	2,350	2,700	3,050	3,400	3,750	4,100	4,450	4,800	5,150	5,500	6,000	6,500
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, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P0236_P1101 TIAP Residual Weight Factor based on RPM

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

y/x	600	950	1,300	1,650	2,000	2,350	2,700	3,050	3,400	3,750	4,100	4,450	4,800	5,150	5,500	6,000	6,500
1	1.000	1.000	1.000	1.000	0.950	0.950	0.950	0.950	0.950	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max Air Flow

Value Units: Engine Air Flow (Grams/Second)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	6.5	8.5	10.0	15.0	18.0	22.0	12.0	13.0	13.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max MAP

Value Units: Manifold Pressure (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	40.0	37.0	33.0	31.0	28.0	28.0	30.0	30.0	30.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Offset

Value Units: Pressure Difference (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	0.7	0.5	0.5	0.7	1.0	1.5	2.0	2.5	3.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min Air Flow

Value Units: Engine Air Flow (Grams/Second)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	24.0	36.0	55.0	85.0	100.0	140.0	150.0	150.0	150.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min MAP

Value Units: Manifold Pressure (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	105.0	108.0	115.0	130.0	140.0	150.0	150.0	150.0	150.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Offset

Value Units: Pressure Difference (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	1.5	1.0	1.0	1.3	2.5	3.0	3.3	4.0	5.0

Initial Supporting table - P00C7: Twin Turbo Failure Matrix

Description: Intake Air Pressure System Performance Failure Matrix for Twin Turbo Applications. This table describes the combination of intake system pressure sensor difference combinations that will set P00C7 on twin turbocharged applications

Value Units: Yes or No
X Unit: Unitless (See top line for heading information)
Y Units: Unitless

y/x	1	2	3	4	5	6	7
1	DTC	MAP & TCBP Diff	MAP & Baro Diff	MAP & Baro B Diff	TCBP & Baro Diff	TCBP & Baro B Diff	Baro & Baro B Diff
2	No DTC	N	N	N	N	N	N
3	P00C7	Y	N	N	N	N	N
4	P00C7	N	Y	N	N	N	N
5	P00C7	Y	Y	N	N	N	N
6	P00C7	N	N	Y	N	N	N
7	P00C7	Y	N	Y	N	N	N
8	P00C7	N	Y	Y	N	N	N
9	P0106	Y	Y	Y	N	N	N
10	P00C7	N	N	N	Y	N	N
11	P00C7	Y	N	N	Y	N	N
12	P00C7	N	Y	N	Y	N	N
13	P00C7	Y	Y	N	Y	N	N
14	P00C7	N	N	Y	Y	N	N
15	P00C7	Y	N	Y	Y	N	N
16	P00C7	N	Y	Y	Y	N	N
17	P00C7	Y	Y	Y	Y	N	N
18	P00C7	N	N	N	N	Y	N
19	P00C7	Y	N	N	N	Y	N
20	P00C7	N	Y	N	N	Y	N
21	P00C7	Y	Y	N	N	Y	N
22	P00C7	N	N	Y	N	Y	N
23	P00C7	Y	N	Y	N	Y	N
24	P00C7	N	Y	Y	N	Y	N
25	P00C7	Y	Y	Y	N	Y	N
26	P00C7	N	N	N	Y	Y	N
27	P0236	Y	N	N	Y	Y	N
28	P00C7	N	Y	N	Y	Y	N
29	P00C7	Y	Y	N	Y	Y	N
30	P00C7	N	N	Y	Y	Y	N
31	P00C7	Y	N	Y	Y	Y	N

Initial Supporting table - P00C7: Twin Turbo Failure Matrix

32	P00C7	N	Y	Y	Y	Y	N
33	P00C7	Y	Y	Y	Y	Y	N
34	P00C7	N	N	N	N	N	Y
35	P00C7	Y	N	N	N	N	Y
36	P00C7	N	Y	N	N	N	Y
37	P00C7	Y	Y	N	N	N	Y
38	P00C7	N	N	Y	N	N	Y
39	P00C7	Y	N	Y	N	N	Y
40	P00C7	N	Y	Y	N	N	Y
41	P00C7	Y	Y	Y	N	N	Y
42	P00C7	N	N	N	Y	N	Y
43	P00C7	Y	N	N	Y	N	Y
44	P2227	N	Y	N	Y	N	Y
45	P00C7	Y	Y	N	Y	N	Y
46	P00C7	N	N	Y	Y	N	Y
47	P00C7	Y	N	Y	Y	N	Y
48	P00C7	N	Y	Y	Y	N	Y
49	P00C7	Y	Y	Y	Y	N	Y
50	P00C7	N	N	N	N	Y	Y
51	P00C7	Y	N	N	N	Y	Y
52	P00C7	N	Y	N	N	Y	Y
53	P00C7	Y	Y	N	N	Y	Y
54	P222B	N	N	Y	N	Y	Y
55	P00C7	Y	N	Y	N	Y	Y
56	P00C7	N	Y	Y	N	Y	Y
57	P00C7	Y	Y	Y	N	Y	Y
58	P00C7	N	N	N	Y	Y	Y
59	P00C7	Y	N	N	Y	Y	Y
60	P00C7	N	Y	N	Y	Y	Y
61	P00C7	Y	Y	N	Y	Y	Y
62	P00C7	N	N	Y	Y	Y	Y
63	P00C7	Y	N	Y	Y	Y	Y
64	P00C7	N	Y	Y	Y	Y	Y
65	P00C7	Y	Y	Y	Y	Y	Y

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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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	600	950	1,300	1,650	2,000	2,350	2,700	3,050	3,400	3,750	4,100	4,450	4,800	5,150	5,500	6,000	6,500
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on MAF Est

Description: P0101_P0106_P010B_P0121_P0236_P1101 MAF2 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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: MAF2 Residual Weight Factor based on RPM

Description: P0101_P0106_P010B_P0121_P0236_P1101 MAF2 Residual Weight Factor based on RPM

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

y/x	600	950	1,300	1,650	2,000	2,350	2,700	3,050	3,400	3,750	4,100	4,450	4,800	5,150	5,500	6,000	6,500
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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	23.000	85.000	95.000	105.000	125.000
1.000	7.000	8.699	9.000	9.199	10.000

Initial Supporting table - CalculatedPerfMaxEc2

Description: Maximum desired camshaft position for Exhaust CAM - Bank2

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	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
2	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
3	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
4	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
6	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
7	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
8	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
9	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
10	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
11	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
12	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
13	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
14	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
15	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
16	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
17	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5

Initial Supporting table - CalculatedPerfMaxIc2

Description: Maximum desired camshaft position for Intake CAM - Bank2

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	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
7	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
8	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
9	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
11	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
12	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
13	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
14	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
16	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
17	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
8	0.71	0.63	0.46	0.46	0.58	0.53	0.73	0.58	0.43	0.42	0.68	0.50	0.37	0.28	0.25	0.33	0.25
12	0.90	0.03	0.07	0.32	0.14	0.14	0.39	0.06	0.81	0.83	0.00	1.00	0.56	0.00	0.77	0.50	1.00
16	0.13	0.04	0.06	0.14	0.13	0.09	0.05	0.05	0.25	0.39	0.44	0.30	0.35	0.38	0.23	-0.08	0.90
20	0.05	0.03	0.05	0.07	0.06	0.24	-0.06	0.00	0.09	0.12	0.08	0.12	-0.05	-0.06	-0.13	-0.25	0.80
24	0.02	0.03	0.04	0.05	0.06	-0.04	0.07	0.00	0.14	0.09	-0.05	0.10	-0.08	-0.11	-0.13	-0.08	0.70
30	0.65	0.01	0.03	0.04	0.03	-0.08	-0.05	0.12	-0.03	0.10	0.04	-0.08	-0.11	-0.05	-0.16	-0.07	-0.25
40	0.65	0.65	0.65	0.65	0.04	-0.04	-0.04	-0.04	-0.16	-0.07	-0.14	-0.07	-0.19	-0.20	-0.10	-0.13	0.60
60	0.65	0.65	0.65	0.65	0.03	-0.09	0.03	-0.11	0.65	-0.04	-0.08	-0.17	-0.25	-0.21	-0.25	-0.25	0.60
100	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.60

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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
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	-1.17	-1.10	-1.18	-1.46	-1.19	-1.46	-1.13	-1.00	-1.00	-0.89	-0.60	-0.93	-1.20	-1.00	-1.00	-1.00
16	-1.00	-1.19	-0.98	-1.14	-1.64	-1.49	-1.56	-1.34	-0.94	-1.03	-0.90	-0.90	-1.06	-1.70	-1.44	-1.86	-1.86
20	-1.00	-1.07	-0.97	-1.04	-1.20	-1.08	-1.39	-1.17	-1.17	-1.36	-1.28	-1.25	-1.15	-1.42	-2.00	-1.86	-1.86
24	-1.00	-1.00	-1.00	-0.98	-1.31	-1.08	-1.20	-1.01	-1.07	-1.19	-1.44	-1.41	-1.17	-1.25	-1.78	-2.00	-2.00
30	-1.00	-1.00	-1.01	-1.00	-1.33	-1.24	-1.19	-1.29	-1.05	-1.20	-1.23	-1.30	-1.27	-1.20	-1.90	-2.00	-2.00
40	-1.00	-1.00	-1.00	-1.00	-1.32	-1.07	-1.16	-1.01	-1.30	-1.03	-1.28	-1.20	-1.41	-2.00	-2.00	-2.00	-2.00
60	-1.00	-1.00	-1.00	-1.00	-1.32	-1.08	-0.98	-1.00	-1.00	-1.00	-1.15	-1.32	-1.79	-2.00	-2.00	-2.00	-2.00
100	-1.00	-1.00	-1.00	-1.13	-1.32	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00

Initial Supporting table - 1stFireAfterMisJerkAFM

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	0	0	0	1	2	-1	-1	-1	0
12	0	-1	-1	-1	-1	-1	-1	-1	0
16	0	-1	-1	-1	-1	-1	0	2	0
20	0	-2	-1	-1	-1	-1	-1	0	0
24	0	-2	-1	-1	-1	-1	-1	-1	0
30	0	-2	-1	-2	-1	0	-1	-1	0
40	0	-2	-1	-1	-1	0	-1	-1	0
60	0	-2	-1	-1	-1	0	-1	-1	0
100	0	-1	-1	-1	-1	0	-1	-1	0

Initial Supporting table - 1stFireAftrMisAcelAFM

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	0	0	1	2	2	0	0	0	0
12	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	2	3	0
20	0	0	0	0	0	0	1	2	0
24	0	0	0	0	0	0	0	1	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0

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	7	7	7	7	7	7	7	7	7

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	3	3	3	3	3	3	3	3	3

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	1,000	1,200	1,400	1,600
6	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
8	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
18	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
24	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
40	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
60	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
77	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

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	1,000	1,200	1,400	1,600
6	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
8	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
18	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
77	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15

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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
6	0.75	0.75	0.75	0.75	0.75	0.47	0.55	0.68	0.43	0.54	0.57	0.50	0.37	0.28	0.25	0.33	0.25
8	0.75	0.75	0.75	0.59	0.56	0.45	0.62	0.63	0.54	0.55	0.75	0.73	0.75	0.69	0.75	0.50	0.75
10	0.75	0.75	0.54	0.62	0.55	0.44	0.51	0.61	0.48	0.51	0.67	0.74	0.75	0.75	0.62	0.42	0.75
18	0.67	0.72	0.51	0.56	0.49	0.46	0.48	0.53	0.45	0.53	0.60	0.65	0.62	0.69	0.67	0.58	0.75
24	0.68	0.73	0.55	0.51	0.46	0.44	0.44	0.42	0.45	0.46	0.59	0.58	0.54	0.58	0.75	0.62	0.75
30	0.75	0.75	0.57	0.46	0.42	0.40	0.45	0.45	0.47	0.46	0.62	0.54	0.50	0.57	0.63	0.71	0.75
40	0.75	0.75	0.63	0.41	0.43	0.43	0.45	0.45	0.44	0.48	0.65	0.61	0.65	0.48	0.70	0.75	0.75
60	0.75	0.75	0.75	0.54	0.50	0.41	0.44	0.75	0.50	0.66	0.69	0.62	0.69	0.50	0.67	0.75	0.75
77	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
6	1.00	0.95	0.87	0.55	0.62	0.63	0.79	0.73	0.82	0.66	0.58	0.58	0.58	0.70	0.70	0.70	1.00
8	1.00	1.00	1.00	1.14	1.25	0.96	1.24	1.32	0.95	0.88	0.93	0.80	0.87	1.33	1.33	1.20	1.00
10	1.00	1.00	1.00	1.25	1.25	1.14	1.11	1.43	0.98	1.00	0.97	0.86	0.75	1.33	1.33	1.20	1.00
18	1.00	1.00	1.06	1.21	1.13	1.03	1.00	1.10	1.00	1.00	1.00	1.29	0.90	1.33	1.33	1.20	1.00
24	1.00	1.00	0.92	1.21	1.07	1.00	1.00	1.00	1.00	1.00	1.00	1.22	0.96	1.33	1.33	1.20	1.00
30	1.00	1.00	0.96	1.12	1.13	1.00	1.00	1.09	1.00	1.00	0.96	1.09	0.96	1.33	1.33	1.20	1.00
40	1.00	1.00	1.01	1.23	1.12	1.00	1.13	1.00	1.18	1.00	0.89	1.24	1.14	1.33	1.33	1.20	1.00
60	1.00	1.00	1.00	1.25	1.15	0.96	1.00	0.71	0.86	1.00	0.79	1.24	1.33	1.33	1.33	1.20	1.00
77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.42	1.33	1.33	1.20	1.00

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	13.0	13.0	9.2	4.8	4.8	4.8	4.8	4.8
10	13.0	13.0	9.2	4.8	4.8	4.8	4.8	4.8
20	13.0	13.0	9.2	4.8	4.8	4.8	4.8	4.8
30	13.0	13.0	4.8	4.8	4.8	4.8	4.8	4.8
40	12.3	8.0	4.8	4.8	4.8	4.8	4.8	4.8
50	7.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8
60	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
70	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
80	4.8	4.8	4.8	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	1,000	1,200	1,400	1,600	1,800	2,200	2,400	2,600	2,800
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	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
77	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	1,000	1,200	1,400	1,600	1,800	2,200	2,400	2,600	2,800
6	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
14	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
18	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
22	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
26	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
40	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
77	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

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 differant 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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
6	0.71	0.63	0.46	0.46	0.58	0.53	0.73	0.58	0.43	0.42	0.68	0.50	0.50	0.50	0.50	0.50	0.50
8	1.07	0.85	0.94	0.90	0.96	0.53	1.00	0.81	0.81	0.83	1.10	1.00	1.00	0.85	0.77	0.50	1.00
10	0.83	0.77	0.75	0.87	0.94	0.82	0.87	0.86	0.80	0.82	1.25	1.00	1.06	0.77	0.62	0.42	1.00
18	0.83	0.61	0.75	0.75	0.59	0.60	0.83	0.83	0.73	0.82	0.65	0.65	0.90	0.81	0.67	0.58	1.00
24	0.96	0.76	0.74	0.68	0.61	0.67	0.75	0.73	0.61	0.70	0.55	0.61	0.83	0.74	0.75	0.62	1.00
30	1.00	0.81	0.93	0.87	0.62	0.62	0.55	0.72	0.56	0.60	0.56	0.43	0.89	0.71	0.63	0.71	1.00
40	1.00	1.00	1.00	1.00	0.88	0.60	0.62	0.57	0.77	0.61	0.47	0.52	0.48	0.48	0.70	0.75	1.00
60	1.00	1.00	1.00	1.00	0.96	0.87	0.63	0.86	0.75	1.00	0.49	0.50	0.51	0.61	0.67	0.88	1.00
77	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.78	1.00	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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
6	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
8	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
10	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1
18	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
24	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
30	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
40	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
60	0	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
77	0	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1

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	1,000	1,200	1,400	1,600
6	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
8	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
10	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
18	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
24	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
30	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
40	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
60	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
77	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83

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	1,000	1,200	1,400	1,600
6	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17
8	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17
10	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17
18	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17
24	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17
30	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17
40	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17
60	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17
77	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-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	1,000	1,200	1,400	1,600	1,800	2,200	2,400	2,600	2,800
6	1	1	1	1	1	0	0	0	0
10	1	1	1	1	1	1	0	0	0
14	1	1	1	1	1	1	0	0	0
18	1	1	1	1	1	1	1	0	0
22	1	1	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	0	0
40	1	1	1	1	1	1	1	0	0
77	1	1	1	1	1	1	0	0	0

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	1,000	1,200	1,400	1,600	1,800	2,200	2,400	2,600	2,800
6	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
10	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
14	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
18	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
22	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
26	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
40	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
77	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

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 (usec)
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	3,700	2,627	1,878	1,126	655	401	254	195	145	186	93	62	39
6	3,600	2,880	2,148	1,432	871	625	412	224	162	78	56	42	31
8	3,741	3,107	2,423	1,688	1,404	933	507	337	245	170	117	105	64
10	4,637	3,258	2,497	1,880	1,563	1,041	616	363	305	189	128	100	70
12	5,008	3,511	2,693	2,051	1,680	1,287	690	460	370	245	160	131	81
14	5,317	3,688	2,913	2,265	1,959	1,630	873	644	430	293	198	145	100
16	5,500	3,966	3,109	2,457	2,309	1,809	1,026	777	538	362	251	175	112
18	5,610	4,193	3,378	2,671	2,472	2,100	1,233	969	662	463	309	190	127
20	5,829	4,420	3,598	2,949	2,659	2,301	1,441	1,209	695	562	355	233	143
22	6,151	4,749	3,770	3,132	2,846	2,502	1,676	1,408	802	624	373	252	186
24	6,385	4,925	3,966	3,362	3,102	2,747	1,828	1,591	910	719	441	293	215
26	6,650	5,153	4,186	3,683	3,382	2,971	1,981	1,747	968	822	483	344	220
30	7,017	5,481	4,602	4,119	3,779	3,350	2,216	1,988	1,100	895	549	395	272
40	8,001	6,567	5,679	5,151	4,665	4,288	2,811	2,568	1,530	1,249	641	523	380
60	9,662	8,184	7,539	7,041	6,577	6,186	4,071	3,784	2,266	1,905	901	795	555
78	11,088	9,648	9,057	8,511	8,187	7,839	5,081	4,831	2,936	2,491	1,101	1,028	728
97	12,624	11,120	10,760	10,428	10,003	9,643	6,460	6,091	3,622	3,113	1,340	1,281	912

CylModeDecel - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	30	24	23	30	26	23	22	20	15	12	8	7	6
6	25	24	23	20	18	16	12	11	11	9	5	5	5
8	63	38	23	28	16	11	9	8	7	8	5	4	4
10	61	50	35	34	25	15	10	8	7	7	5	4	4
12	59	54	49	37	32	18	12	8	7	7	5	5	5
14	80	66	51	43	35	19	13	9	9	7	7	5	5
16	90	68	61	43	37	21	15	10	9	8	6	5	5
18	93	77	61	53	41	28	18	11	10	8	6	5	5
20	105	82	67	62	51	33	21	12	10	8	7	6	6
22	131	99	78	74	59	36	24	14	10	9	7	6	6
24	153	110	90	78	66	41	27	16	11	10	8	7	7

Initial Supporting table - CylModeDecel

26	183	127	105	87	68	46	31	18	11	10	8	7	7
30	202	154	122	99	81	54	36	26	12	10	8	8	8
40	291	195	167	139	116	67	45	30	13	11	9	9	8
60	424	293	246	199	163	96	60	36	16	13	10	10	10
78	544	377	316	255	212	121	74	41	18	14	11	11	11
97	679	468	391	311	260	151	88	47	20	16	13	13	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 (usec)
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	2,650	2,833	1,879	1,822	1,143	971	622	324	229	139	112	109	95
6	2,889	2,609	1,605	1,466	944	900	448	241	166	110	92	84	60
8	3,126	3,308	2,010	1,647	1,312	990	632	277	245	166	95	89	64
10	3,725	3,676	3,070	2,214	1,377	1,122	664	351	251	188	109	98	63
12	4,664	4,202	3,318	2,276	1,413	1,164	677	358	262	237	135	126	73
14	5,189	4,517	3,872	2,404	1,618	1,443	693	364	265	261	165	129	89
16	5,589	4,937	4,297	2,500	1,793	1,479	907	759	411	328	197	140	101
18	5,944	5,253	4,638	2,597	2,012	1,624	1,020	743	489	380	223	157	109
20	6,331	5,726	5,148	2,693	2,187	1,893	1,160	973	548	462	286	181	123
22	6,519	6,304	5,531	2,773	2,405	2,133	1,324	1,173	620	526	292	198	150
24	6,649	6,461	5,787	2,917	2,565	2,373	1,577	1,373	665	583	360	239	172
26	6,735	6,829	6,084	3,013	2,697	2,472	1,843	1,493	724	679	386	286	180
30	6,929	7,460	6,808	3,238	2,974	2,754	2,172	1,733	874	786	448	341	212
40	7,167	9,299	8,595	3,831	3,629	3,375	2,894	2,306	1,135	929	661	423	338
60	7,578	12,610	12,041	4,888	4,533	4,364	3,969	3,506	1,708	1,055	890	694	564
78	7,924	15,395	14,849	5,818	5,510	5,324	4,931	4,546	2,204	1,150	1,006	851	735
97	8,356	19,656	19,126	6,897	6,581	6,209	6,016	5,665	2,746	1,229	1,099	973	872

CylModeJerk - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	68	46	36	28	19	14	13	12	8	7	4	3	3
6	42	37	28	23	17	11	11	7	6	5	3	2	2
8	50	31	23	23	15	10	9	6	6	6	4	4	4
10	52	46	29	25	19	11	9	6	6	5	4	4	4
12	53	48	38	27	22	15	10	6	6	5	4	4	4
14	73	56	42	31	22	18	11	7	7	6	4	4	4
16	81	60	44	33	26	19	12	7	7	6	5	4	4
18	86	64	45	36	28	19	14	7	7	6	5	4	4
20	96	66	48	43	30	21	16	8	8	6	5	5	5
22	110	71	56	45	33	22	16	10	8	7	5	5	5
24	129	75	60	47	35	23	17	10	9	8	5	5	5

Initial Supporting table - CylModeJerk

26	149	80	64	48	37	24	17	11	9	8	5	5	5
30	177	88	68	52	39	25	18	13	11	10	6	5	5
40	243	138	75	59	44	27	20	15	13	11	8	7	7
60	335	196	86	69	49	31	24	19	15	14	12	11	11
78	393	247	97	77	52	36	28	22	18	17	15	14	14
97	449	297	108	86	56	40	32	27	23	21	19	18	18

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

y/x	1,000	1,200	1,400	1,600	1,800	2,200	2,400	2,600	2,800
6	400	180	170	180	100	70	70	70	70
10	600	260	250	200	110	66	66	66	66
14	750	125	280	230	125	73	68	68	68
18	200	150	240	200	149	91	85	85	85
22	243	175	350	220	199	120	115	115	115
26	422	200	123	280	257	140	125	125	125
30	536	252	138	120	270	145	130	130	130
40	932	339	323	200	150	150	140	140	140
77	1,764	593	592	217	170	170	150	150	150

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

y/x	1,000	1,200	1,400	1,600	1,800	2,200	2,400	2,600	2,800
6	377	300	220	160	111	100	100	70	70
10	600	500	316	200	129	100	100	70	70
14	856	600	438	225	161	120	120	80	80
18	1,112	817	440	280	217	134	134	90	90
22	1,465	1,141	688	372	278	173	152	96	96
26	1,620	1,190	722	518	307	201	201	91	91
30	1,780	1,220	700	600	400	220	220	69	69
40	2,250	1,398	800	700	500	240	240	97	97
77	4,919	2,929	1,283	919	869	260	260	165	165

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	6,500	6,500	6,500	6,500	6,500	6,500	6,500

EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGr10	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrRvrs	CeTGRR_e_TransGrPark	CeTGRR_e_TransGr7	CeTGRR_e_TransGr8	
1	6,500	3,200	6,500	3,200	6,500	6,500	

Initial Supporting table - IdleCyl_Decel

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

Value Units: Delta time per cylinder (usec)
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	2,830	2,830	1,277	893	713	549	443	364	288	220	103	76	52
6	3,156	3,156	1,401	819	626	512	373	289	250	200	117	76	53
8	3,506	3,506	1,546	800	713	561	431	297	260	240	117	76	53
10	4,132	4,132	1,988	1,194	907	695	500	314	270	260	132	84	58
12	4,750	4,750	2,991	1,721	1,075	832	596	336	280	270	147	102	72
14	5,041	5,041	3,506	2,140	1,392	986	706	384	340	320	170	119	84
16	5,318	5,318	3,993	2,572	1,713	1,164	779	569	500	410	185	136	96
18	5,610	5,610	4,339	2,941	2,014	1,298	904	732	650	500	209	171	118
20	5,829	5,829	4,601	3,177	2,222	1,446	1,016	843	750	580	248	214	133
22	6,151	6,151	4,804	3,430	2,428	1,553	1,085	916	822	660	286	236	158
24	6,385	6,385	5,007	3,649	2,634	1,647	1,160	1,000	911	761	335	262	181
26	6,650	6,650	5,251	3,851	2,813	1,754	1,263	1,079	1,001	840	422	279	199
30	7,017	7,017	5,597	4,224	3,170	1,956	1,463	1,163	1,085	920	509	321	235
40	8,001	8,001	6,329	5,052	3,908	2,382	1,916	1,258	1,135	1,000	654	435	313
60	9,662	9,662	7,879	6,613	5,324	3,315	2,800	1,508	1,319	1,170	888	644	465
78	11,088	11,088	9,351	7,976	6,492	4,127	3,575	1,829	1,659	1,520	1,139	814	597
97	12,624	12,624	10,847	9,480	7,714	4,996	4,522	2,157	2,061	1,901	1,421	1,017	742

Initial Supporting table - IdleCyl_Jerk

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

Value Units: Change in Delta time per cylinder from last cylinder (usec)
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	2,155	1,725	1,146	928	700	554	459	360	259	206	72	58	47
6	2,077	1,646	1,020	665	570	451	373	296	239	180	69	55	46
8	2,311	1,725	1,114	828	675	509	390	324	267	230	77	58	49
10	2,663	2,077	1,456	1,111	845	654	476	344	289	250	107	76	57
12	2,995	2,370	1,798	1,297	925	689	521	368	311	260	140	90	68
14	3,210	2,507	1,954	1,441	1,018	757	529	412	338	285	169	125	97
16	3,445	2,722	2,141	1,641	1,191	815	554	461	415	361	181	138	107
18	3,699	2,917	2,327	1,784	1,284	883	668	565	492	446	221	154	117
20	3,934	3,132	2,421	1,913	1,457	979	807	702	596	522	245	176	133
22	4,207	3,386	2,607	2,114	1,619	1,124	928	815	717	607	249	201	153
24	4,696	3,660	2,919	2,328	1,826	1,289	1,015	936	816	718	285	213	152
26	5,087	4,149	3,323	2,629	2,034	1,482	1,206	1,065	937	808	322	230	171
30	5,693	4,618	3,806	3,188	2,439	1,773	1,418	1,250	1,030	873	384	272	214
40	6,455	5,243	4,412	3,861	3,086	2,382	1,834	1,467	1,151	974	533	384	300
60	6,964	5,986	5,097	4,505	3,779	3,050	2,382	1,944	1,376	1,161	817	593	471
78	7,668	6,553	5,750	5,121	4,275	3,545	2,908	2,525	1,755	1,544	1,084	770	622
97	8,356	7,218	6,414	5,879	5,049	4,065	3,456	3,143	2,155	1,974	1,374	962	791

Initial Supporting table - IdleSCD_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold while in SCD mode. 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 (usec)
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	5,423	5,328	2,362	1,589	1,425	660	713	380	380	285	143	119	76
6	5,543	5,448	2,313	1,249	1,360	540	713	470	380	285	176	114	70
8	5,649	5,554	2,419	1,220	1,115	611	713	642	380	241	187	122	80
10	5,755	5,660	2,470	1,297	919	659	658	642	263	218	107	107	95
12	5,861	5,766	2,962	1,470	1,085	814	569	642	249	179	189	80	69
14	5,967	5,872	3,338	1,668	1,260	969	604	444	332	198	145	83	65
16	6,073	5,978	3,400	1,880	1,429	1,124	705	514	377	291	139	94	73
18	6,179	6,084	3,559	2,109	1,601	1,279	799	584	394	270	163	107	82
20	6,720	6,190	3,856	2,390	1,772	1,435	958	724	423	273	199	130	97
22	7,266	6,295	4,611	2,533	1,936	1,589	1,035	793	493	342	248	157	111
24	7,813	6,728	4,750	2,789	2,106	1,745	1,136	835	525	375	277	178	131
26	8,267	7,206	4,804	3,028	2,275	1,947	1,170	888	576	404	294	189	144
30	8,861	7,956	5,336	3,417	2,614	2,210	1,367	1,052	692	472	343	216	168
40	9,477	9,477	6,817	4,248	3,460	2,986	1,861	1,357	1,046	689	480	339	242
60	9,477	9,477	9,448	6,191	5,153	4,537	2,848	2,059	1,446	872	766	573	410
78	9,477	9,477	9,477	7,892	6,634	5,817	3,712	2,673	1,895	1,170	888	619	427
97	11,164	10,149	9,477	9,477	8,014	6,650	4,518	3,246	2,312	1,568	1,087	759	523

Initial Supporting table - IdleSCD_Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold while in SCD mode. 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 (usec)
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	5,803	5,708	2,850	1,498	1,330	643	689	357	380	285	171	114	76
6	5,923	5,828	2,850	1,241	1,297	587	689	447	380	285	171	86	70
8	6,029	5,934	2,894	1,160	1,115	611	700	486	380	241	136	90	66
10	6,135	6,040	2,945	1,297	906	584	658	360	274	218	98	82	74
12	6,241	6,146	3,011	1,521	1,013	689	552	413	252	189	110	83	66
14	6,347	6,252	3,194	1,735	1,260	825	599	444	332	200	130	94	71
16	6,453	6,358	3,405	1,976	1,430	961	670	515	362	209	150	101	84
18	6,559	6,464	3,437	2,192	1,600	1,097	859	632	430	286	179	115	91
20	6,720	6,570	3,910	2,397	1,770	1,294	965	768	512	315	212	142	106
22	7,266	6,675	4,191	2,543	1,939	1,385	1,070	827	596	396	284	179	123
24	7,813	6,763	4,750	2,694	2,109	1,509	1,127	885	640	445	317	191	137
26	8,267	6,816	4,750	2,929	2,327	1,640	1,100	904	677	487	342	194	146
30	8,861	7,400	4,914	3,417	2,619	1,911	1,287	1,005	796	562	387	218	168
40	9,477	9,477	6,321	4,248	3,468	2,590	1,755	1,357	1,172	820	527	349	257
60	9,477	9,477	9,477	6,191	5,166	3,948	2,692	2,059	1,688	1,075	796	528	409
78	9,477	9,477	9,477	7,892	6,652	5,135	3,540	2,700	2,216	1,411	942	594	453
97	11,164	10,149	9,477	9,477	8,037	6,243	4,465	3,420	2,707	1,725	1,151	726	554

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 differant 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	2	2	2	2	2	2	2	2	2

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 - 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	1,000	1,200	1,400	1,600
6	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
8	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
10	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
18	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
24	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
30	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
40	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
60	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
77	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80

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	1,000	1,200	1,400	1,600
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	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
77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
6	0.87	1.00	0.87	0.83	0.88	0.91	1.00	0.78	0.60	0.58	0.66	0.48	0.37	0.33	0.38	0.52	0.52
8	1.00	0.77	0.94	0.90	0.96	0.53	1.00	0.81	0.81	0.83	0.77	0.73	0.81	0.85	0.85	0.83	1.00
10	0.83	0.90	1.00	1.00	1.00	0.63	0.87	0.77	0.70	0.82	0.61	0.74	0.71	0.77	0.77	0.83	1.00
18	0.83	0.85	1.00	1.00	0.87	0.68	0.73	0.79	0.73	0.77	0.68	0.65	0.62	0.81	0.87	1.00	1.00
24	0.96	0.97	1.00	0.80	0.70	0.67	0.69	0.73	0.71	0.70	0.70	0.77	0.75	0.74	0.88	1.00	1.00
30	1.00	1.00	1.00	0.79	0.73	0.62	0.73	0.80	0.78	0.74	0.77	0.76	0.75	0.71	0.79	1.00	1.00
40	1.00	1.00	1.00	1.00	0.88	0.66	0.80	0.78	0.77	0.72	0.68	0.73	0.81	0.76	0.95	1.00	1.00
60	1.00	1.00	1.00	1.00	0.96	0.70	1.00	0.86	0.75	1.00	0.88	0.86	1.00	0.89	0.92	1.00	1.00
77	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
6	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
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
10	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
18	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
24	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
30	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
40	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
60	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
77	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

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	1,000	1,200	1,400	1,600
6	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
8	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
18	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
24	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
30	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
40	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
60	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
77	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10

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	1,000	1,200	1,400	1,600
6	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
8	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
18	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
24	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
30	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
40	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
60	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
77	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10

Initial Supporting table - RandomAFM_Decl

Description: Used for P0300 - P0308, Mulitplier to 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	1,000	1,200	1,400	1,600	1,800	2,200	2,400	2,600	2,800
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	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
77	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	1,000	1,200	1,400	1,600	1,800	2,200	2,400	2,600	2,800
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	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
77	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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
6	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
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
10	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
18	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
24	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
30	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
40	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
60	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
77	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

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	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
6	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
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
10	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
18	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
24	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
30	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
40	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
60	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
77	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

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	3,000	3,500	4,000	4,500	5,000	5,500	6,000	7,000	8,000
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	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
77	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	1,000	1,200	1,600	2,000	2,600	3,500	4,500	5,500	6,500
1	1.40	1.30	1.20	1.20	1.20	1.20	1.20	1.20	1.20

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 (usec)
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	3,500	4,000	4,500	5,000	5,500	6,000	6,500	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	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	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	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	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	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	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	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	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	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	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	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	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	32,767	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
78	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	4	4	4	4	4	4	4	4	4

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 (usec)
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	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
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
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
78	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 (usec)
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	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
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
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
78	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 ddt_jerk 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	1,000	1,200	1,600	2,000	2,600	3,500	4,500	5,500	6,500
0	2.90	2.20	2.00	2.00	2.00	1.00	1.00	1.00	1.00
1	2.20	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
1	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
1	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
1	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
2	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
2	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
4	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
8	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00

Initial Supporting table - TOSSRoughRoadThres

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	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

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	-3.25	-3.25	-3.25	-3.25	-3.25	-3.00	-2.25	-1.50	-1.50	-0.75	-0.75	-0.75	-0.37
75	-2.50	-2.50	-2.50	-2.50	-2.00	-1.75	-1.37	-1.00	-0.75	-0.25	-0.25	-0.37	-0.12
85	-2.50	-2.50	-2.50	-2.50	-2.00	-1.75	-1.37	-1.00	-0.75	-0.25	-0.25	-0.37	-0.12
95	-0.50	-0.50	-0.50	-0.50	-0.50	0.00	0.25	0.50	0.50	0.50	0.50	0.50	0.50
105	-0.50	-0.50	-0.50	-0.50	-0.50	0.00	0.25	0.50	0.50	0.50	0.50	0.50	0.50

ZeroTorqueAFM - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
65	-0.12	0.25	0.12	0.00	-1.25	0.59	2.54	4.49	6.44	8.39	10.34	12.29	14.50
75	0.12	0.50	0.25	0.00	-1.00	1.03	2.97	4.93	6.87	8.83	10.77	12.73	14.50
85	0.12	0.50	0.25	0.00	-1.00	1.03	2.97	4.93	6.87	8.83	10.77	12.73	14.50
95	0.50	0.50	0.25	0.25	0.00	1.73	3.53	5.32	7.12	8.92	10.72	12.52	14.50
105	0.50	0.50	0.25	0.25	0.00	1.73	3.53	5.32	7.12	8.92	10.72	12.52	14.50

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	-3.25	-3.25	-3.25	-3.25	-3.25	-3.00	-2.75	-2.50	-2.50	-1.00	-0.50	-1.00	-1.25
75	-2.50	-2.50	-2.50	-2.50	-2.00	-1.75	-1.75	-1.75	-1.75	-1.25	-0.75	-0.75	-0.75
85	-2.50	-2.50	-2.50	-2.50	-2.00	-1.75	-1.75	-1.75	-1.75	-1.25	-0.75	-0.75	-0.75
95	-0.50	-0.50	-0.50	-0.50	-0.50	0.00	0.00	-0.25	-0.25	-0.25	1.00	0.50	0.37
105	-0.50	-0.50	-0.50	-0.50	-0.50	0.00	0.00	-0.25	-0.25	-0.25	1.00	0.50	0.37

ZeroTorqueEngLoad - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
65	-1.25	-0.50	-0.50	-1.25	-1.25	0.59	2.54	4.49	6.44	8.39	10.34	12.29	14.50
75	-0.75	-0.75	-0.75	-0.75	-1.00	1.03	2.97	4.93	6.87	8.83	10.77	12.73	14.50
85	-0.75	-0.75	-0.75	-0.75	-1.00	1.03	2.97	4.93	6.87	8.83	10.77	12.73	14.50
95	0.50	0.00	0.00	0.12	0.00	1.73	3.53	5.32	7.12	8.92	10.72	12.52	14.50
105	0.50	0.00	0.00	0.12	0.00	1.73	3.53	5.32	7.12	8.92	10.72	12.52	14.50

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: Temperature
Y Units: Oil Temperature- C

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	300.0	300.0	7.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Initial Supporting table - P0024_P05CF_StablePositionTimeEc2

Description: P0024 - Delay after transient move

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

Unique 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	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
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

Unique 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	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
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

Unique Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

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

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
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

Unique 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	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
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

Unique 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	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
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

Unique 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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Unique 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	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P2160 range change delay time

Description: Delay time when a transmission range change or transfer case range change occures before the fail time can update. Thresholds are a function of transmission fliud temperature. Table axis is transmission fliud temperature (DegC) and table output is delay time (seconds).

y/x	-40.00	0.00	40.00
1	5.00	5.00	5.00

Initial Supporting table - P2161 range change delay time

Description: Delay time when a transmission range change or transfer case range change occures before the fail time can update. Thresholds are a function of transmission fliud temperature. Table axis is transmission fliud temperature (DegC) and table output is delay time (seconds).

y/x	-40.00	-20.00	40.00
1	5.00	5.00	5.00

Initial Supporting table - P279A P279B P279C Transfer Case Control Module Transfer Case Command State Rationality (weighting factor)

Description: KtFWDD_Cnt_SampleWeigthting: Calibration table that defines the weighting factor used in a sample of the measured transfer case ratio for full range diagnostics, based on vehicle speed and axle torque.

KnFWDD_v_TCaseRatioMarginSpd
KnFWDD_M_TCaseRatioMarginTrq

y/x	0.00	3.00	5.00	5.10	12.00	15.00	18.00	21.00	24.00
-200.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-150.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-100.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-50.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.00	0.0000	0.0000	0.0000	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
50.00	0.0000	0.0000	0.0000	0.0005	0.0249	0.0249	0.0249	0.0249	0.0249
100.00	0.0000	0.0000	0.0000	0.0005	0.0249	0.0249	0.0249	0.0249	0.0249
150.00	0.0000	0.0000	0.0000	0.0005	0.0249	0.0249	0.0249	0.0249	0.0249
200.00	0.0000	0.0000	0.0000	0.0005	0.0249	0.0249	0.0249	0.0249	0.0249

Initial Supporting table - P279A Transfer Case Control Module Transfer Case Command State Rationality (margin of error high)

Description: LeFWDD_r_RatioHiBound_P279A = KeFWDD_r_TCaseHiRange + KtFWDD_r_TCaseHiRatioMargin

KnFWDD_v_TCaseRatioMarginSpd
KnFWDD_M_TCaseRatioMarginTrq

y/x	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
2.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
3.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
4.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
5.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
6.00	8.9999	8.9999	8.9999	8.9999	1.3000	1.3000	1.3000	1.3000	1.3000
7.00	8.9999	8.9999	8.9999	8.9999	1.3000	1.3000	1.3000	1.3000	1.3000
8.00	8.9999	8.9999	8.9999	8.9999	1.3000	1.3000	1.3000	1.3000	1.3000
9.00	8.9999	8.9999	8.9999	8.9999	1.3000	1.3000	1.3000	1.3000	1.3000

Initial Supporting table - P279A Transfer Case Control Module Transfer Case Command State Rationality (margin of error low)

Description: LeFWDD_r_RatioLoBound_P279A = KeFWDD_r_TCaseHiRange - KtFWDD_r_TCaseHiRatioMargin

KnFWDD_v_TCaseRatioMarginSpd
KnFWDD_M_TCaseRatioMarginTrq

y/x	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
2.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
3.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
4.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
5.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
6.00	-6.9999	-6.9999	-6.9999	-6.9999	0.7000	0.7000	0.7000	0.7000	0.7000
7.00	-6.9999	-6.9999	-6.9999	-6.9999	0.7000	0.7000	0.7000	0.7000	0.7000
8.00	-6.9999	-6.9999	-6.9999	-6.9999	0.7000	0.7000	0.7000	0.7000	0.7000
9.00	-6.9999	-6.9999	-6.9999	-6.9999	0.7000	0.7000	0.7000	0.7000	0.7000

Initial Supporting table - P279B Transfer Case Control Module Transfer Case Command State Rationality (margin of error high)

Description: LeFWDD_r_RatioHiBound_P279B = KeFWDD_r_TCaseLoRange + KtFWDD_r_TCaseLoRatioMargin

KnFWDD_v_TCaseRatioMarginSpd
KnFWDD_M_TCaseRatioMarginTrq

y/x	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
2.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
3.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
4.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
5.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
6.00	10.7098	10.7098	10.7098	10.7098	3.0100	3.0100	3.0100	3.0100	3.0100
7.00	10.7098	10.7098	10.7098	10.7098	3.0100	3.0100	3.0100	3.0100	3.0100
8.00	10.7098	10.7098	10.7098	10.7098	3.0100	3.0100	3.0100	3.0100	3.0100
9.00	10.7098	10.7098	10.7098	10.7098	3.0100	3.0100	3.0100	3.0100	3.0100

Initial Supporting table - P279B Transfer Case Control Module Transfer Case Command State Rationality (margin of error low)

Description: LeFWDD_r_RatioLoBound_P279B = KeFWDD_r_TCaseLoRange - KtFWDD_r_TCaseLoRatioMargin

KnFWDD_v_TCaseRatioMarginSpd
KnFWDD_M_TCaseRatioMarginTrq

y/x	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
2.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
3.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
4.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
5.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
6.00	-5.2899	-5.2899	-5.2899	-5.2899	2.4099	2.4099	2.4099	2.4099	2.4099
7.00	-5.2899	-5.2899	-5.2899	-5.2899	2.4099	2.4099	2.4099	2.4099	2.4099
8.00	-5.2899	-5.2899	-5.2899	-5.2899	2.4099	2.4099	2.4099	2.4099	2.4099
9.00	-5.2899	-5.2899	-5.2899	-5.2899	2.4099	2.4099	2.4099	2.4099	2.4099

Initial Supporting table - P279C Transfer Case Control Module Transfer Case Command State Rationality (margin of error high 1)

Description: LeFWDD_r_RatioHiBound1_P279C = KeFWDD_r_TCaseHiRange + KtFWDD_r_TCaseNeutRatioMargin

KnFWDD_v_TCaseRatioMarginSpd
KnFWDD_M_TCaseRatioMarginTrq

y/x	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
2.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
3.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
4.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
5.00	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999	8.9999
6.00	8.9999	8.9999	8.9999	8.9999	5.0000	5.0000	3.0000	3.0000	3.0000
7.00	8.9999	8.9999	8.9999	8.9999	3.0000	3.0000	2.0000	2.0000	2.0000
8.00	8.9999	8.9999	8.9999	8.9999	2.0000	2.0000	1.5000	1.5000	1.5000
9.00	8.9999	8.9999	8.9999	8.9999	1.1000	1.1000	1.1000	1.1000	1.1000

Initial Supporting table - P279C Transfer Case Control Module Transfer Case Command State Rationality (margin of error high 2)

Description: LeFWDD_r_RatioHiBound2_P279C = KeFWDD_r_TCaseLoRange + KtFWDD_r_TCaseNeutRatioMargin

KnFWDD_v_TCaseRatioMarginSpd
KnFWDD_M_TCaseRatioMarginTrq

y/x	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
2.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
3.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
4.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
5.00	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098	10.7098
6.00	10.7098	10.7098	10.7098	10.7098	6.7100	6.7100	4.7100	4.7100	4.7100
7.00	10.7098	10.7098	10.7098	10.7098	4.7100	4.7100	3.7100	3.7100	3.7100
8.00	10.7098	10.7098	10.7098	10.7098	3.7100	3.7100	3.2100	3.2100	3.2100
9.00	10.7098	10.7098	10.7098	10.7098	2.8099	2.8099	2.8099	2.8099	2.8099

Initial Supporting table - P279C Transfer Case Control Module Transfer Case Command State Rationality (margin of error low 1)

Description: LeFWDD_r_RatioLoBound1_P279C = KeFWDD_r_TCaseHiRange - KtFWDD_r_TCaseNeutRatioMargin

KnFWDD_v_TCaseRatioMarginSpd
KnFWDD_M_TCaseRatioMarginTrq

y/x	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
2.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
3.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
4.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
5.00	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999	-6.9999
6.00	-6.9999	-6.9999	-6.9999	-6.9999	-3.0000	-3.0000	-1.0000	-1.0000	-1.0000
7.00	-6.9999	-6.9999	-6.9999	-6.9999	-1.0000	-1.0000	0.0000	0.0000	0.0000
8.00	-6.9999	-6.9999	-6.9999	-6.9999	0.0000	0.0000	0.5000	0.5000	0.5000
9.00	-6.9999	-6.9999	-6.9999	-6.9999	0.9000	0.9000	0.9000	0.9000	0.9000

Initial Supporting table - P279C Transfer Case Control Module Transfer Case Command State Rationality (margin of error low 2)

Description: LeFWDD_r_RatioLoBound2_P279C = KeFWDD_r_TCaseLoRange - KtFWDD_r_TCaseNeutRatioMargin

KnFWDD_v_TCaseRatioMarginSpd
KnFWDD_M_TCaseRatioMarginTrq

y/x	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
2.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
3.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
4.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
5.00	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899	-5.2899
6.00	-5.2899	-5.2899	-5.2899	-5.2899	-1.2900	-1.2900	0.7100	0.7100	0.7100
7.00	-5.2899	-5.2899	-5.2899	-5.2899	0.7100	0.7100	1.7100	1.7100	1.7100
8.00	-5.2899	-5.2899	-5.2899	-5.2899	1.7100	1.7100	2.2100	2.2100	2.2100
9.00	-5.2899	-5.2899	-5.2899	-5.2899	2.6100	2.6100	2.6100	2.6100	2.6100

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_Cell00_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_PurgOnAirMode0 = 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_PurgOffAirMode0 = 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 - Response Cell Enable Table

Description: This table describes the Block learn cells which enable the Pre (Primary) Oxygen sensor response tests.
Note: When the table column heading matches the calibration value below it, that individual cell is enabled.

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

Multiple DTC Use - Response Cell Enable Table - Part 1

y/x	CeFADR_e_Cell00_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR_e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2
1	CeFADR_e_Cell00_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR_e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2

Multiple DTC Use - Response Cell Enable Table - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode 1	CeFADR_e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADR_e_Cell04_PurgOnAirMode 1	CeFADR_e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel

Multiple DTC Use - Response Cell Enable Table - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR_e_Cell10_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2
1	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR_e_Cell10_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2

Multiple DTC Use - Response Cell Enable Table - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode 1	CeFADR_e_Cell13_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADR_e_Cell12_PurgOffAirMode 1	CeFADR_e_Cell13_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel

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 - P0011_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	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
800	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1,200	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1,600	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,000	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,400	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,800	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
3,200	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
3,600	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,000	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,400	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,800	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
5,200	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
5,600	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,000	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,400	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,800	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

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	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
800	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
1,200	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
1,600	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
2,000	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
2,400	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
2,800	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
3,200	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
3,600	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
4,000	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
4,400	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
4,800	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
5,200	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
5,600	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
6,000	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
6,400	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
6,800	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0

Initial Supporting table - P0014_CamPosErrorLimEc1

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

Value Units: Maximum Exhaust 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	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
800	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1,200	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1,600	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,000	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,400	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,800	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
3,200	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
3,600	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,000	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,400	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,800	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
5,200	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
5,600	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,000	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,400	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,800	21.0	21.0	21.0	10.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Initial Supporting table - P0014_P05CE_StablePositionTimeEc1

Description: Minimum time for Exhaust 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	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
800	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
1,200	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
1,600	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
2,000	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
2,400	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
2,800	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
3,200	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
3,600	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
4,000	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
4,400	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
4,800	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
5,200	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
5,600	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
6,000	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
6,400	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0
6,800	30.0	20.0	10.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.0	10.0

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	300	300	160	18	18	18	18	10	3	3	3	3	3	3	3	3	3

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	5.0	10.0	15.0	20.0	25.0	30.0	50.0	80.0
1.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	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	5.0	10.0	15.0	20.0	25.0	30.0	50.0	80.0
1.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
5.0	-5.0	-2.0	-1.0	0.0	1.0	2.0	3.0	4.0	5.0
10.0	-4.0	-1.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0
20.0	-2.0	-1.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0
30.0	-1.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0
40.0	0.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0
50.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0
60.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
70.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0

Initial Supporting table - P00C4 P2261: Compressor Surge Line

Description: Turbo compressor recirculation valve diagnosis surge area limit.

Value Units: [ratio] CRV diagnosis surge area limit.
X Unit: [g/sec[] KnBSTD_dm_AirFlowBP - Air FLow

y/x	11.94	23.08	40.02	55.08	71.72	99.66
1	1.020	1.230	1.900	2.300	2.700	3.218

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

Description: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix - This table describes combinations of individual model failures that will set P0101, P0106, P010B, P0121, P0236 and P1101 on turbocharged applications.

Value Units: Boolean
X Unit: Unitless (See top line for heading information)
Y Units: Unitless

y/x	1	2	3	4	5	6	7	8	9
1	MAF Model	MAP1 Model	MAP2 Model	MAP3 Model	TIAP1 Model	TPS Model	TIAP Correlation	TIAP Correlation	DTC Set
2	Failed	Failed	Failed	Failed	Failed	Failed	Failed	Valid	
3	F	F	F	F	F	F	F	F	No DTC
4	F	F	F	F	F	F	F	T	No DTC
5	F	F	F	F	F	F	T	F	No DTC
6	F	F	F	F	F	F	T	T	No DTC
7	F	F	F	F	F	T	F	F	No DTC
8	F	F	F	F	F	T	F	T	No DTC
9	F	F	F	F	F	T	T	F	No DTC
10	F	F	F	F	F	T	T	T	No DTC
11	F	F	F	F	T	F	F	F	No DTC
12	F	F	F	F	T	F	F	T	No DTC
13	F	F	F	F	T	F	T	F	No DTC
14	F	F	F	F	T	F	T	T	No DTC
15	F	F	F	F	T	T	F	F	P1101
16	F	F	F	F	T	T	F	T	P0121
17	F	F	F	F	T	T	T	F	P1101
18	F	F	F	F	T	T	T	T	P0236
19	F	F	F	T	F	F	F	F	No DTC
20	F	F	F	T	F	F	F	T	P1101
21	F	F	F	T	F	F	T	F	P1101
22	F	F	F	T	F	F	T	T	P1101
23	F	F	F	T	F	T	F	F	P1101
24	F	F	F	T	F	T	F	T	P1101
25	F	F	F	T	F	T	T	F	P1101
26	F	F	F	T	F	T	T	T	P1101
27	F	F	F	T	T	F	F	F	P1101
28	F	F	F	T	T	F	F	T	P1101
29	F	F	F	T	T	F	T	F	P1101
30	F	F	F	T	T	F	T	T	P1101
31	F	F	F	T	T	T	F	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

32	F	F	F	T	T	T	F	T	P1101
33	F	F	F	T	T	T	T	F	P1101
34	F	F	F	T	T	T	T	T	P1101
35	F	F	T	F	F	F	F	F	No DTC
36	F	F	T	F	F	F	F	T	P1101
37	F	F	T	F	F	F	T	F	P1101
38	F	F	T	F	F	F	T	T	P1101
39	F	F	T	F	F	T	F	F	P1101
40	F	F	T	F	F	T	F	T	P1101
41	F	F	T	F	F	T	T	F	P1101
42	F	F	T	F	F	T	T	T	P1101
43	F	F	T	F	T	F	F	F	P1101
44	F	F	T	F	T	F	F	T	P1101
45	F	F	T	F	T	F	T	F	P1101
46	F	F	T	F	T	F	T	T	P1101
47	F	F	T	F	T	T	F	F	P1101
48	F	F	T	F	T	T	F	T	P1101
49	F	F	T	F	T	T	T	F	P1101
50	F	F	T	F	T	T	T	T	P1101
51	F	F	T	T	F	F	F	F	P1101
52	F	F	T	T	F	F	F	T	P1101
53	F	F	T	T	F	F	T	F	P1101
54	F	F	T	T	F	F	T	T	P1101
55	F	F	T	T	F	T	F	F	P1101
56	F	F	T	T	F	T	F	T	P1101
57	F	F	T	T	F	T	T	F	P1101
58	F	F	T	T	F	T	T	T	P1101
59	F	F	T	T	T	F	F	F	No DTC
60	F	F	T	T	T	F	F	T	No DTC
61	F	F	T	T	T	F	T	F	No DTC
62	F	F	T	T	T	F	T	T	No DTC
63	F	F	T	T	T	T	F	F	P1101
64	F	F	T	T	T	T	F	T	P1101
65	F	F	T	T	T	T	T	F	P1101
66	F	F	T	T	T	T	T	T	P1101
67	F	T	F	F	F	F	F	F	No DTC
68	F	T	F	F	F	F	F	T	P1101
69	F	T	F	F	F	F	T	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

70	F	T	F	F	F	F	T	T	P0236
71	F	T	F	F	F	T	F	F	P1101
72	F	T	F	F	F	T	F	T	P0121
73	F	T	F	F	F	T	T	F	P1101
74	F	T	F	F	F	T	T	T	P0236
75	F	T	F	F	T	F	F	F	P1101
76	F	T	F	F	T	F	F	T	P1101
77	F	T	F	F	T	F	T	F	P1101
78	F	T	F	F	T	F	T	T	P0236
79	F	T	F	F	T	T	F	F	P1101
80	F	T	F	F	T	T	F	T	P0121
81	F	T	F	F	T	T	T	F	P1101
82	F	T	F	F	T	T	T	T	P0236
83	F	T	F	T	F	F	F	F	P1101
84	F	T	F	T	F	F	F	T	P1101
85	F	T	F	T	F	F	T	F	P1101
86	F	T	F	T	F	F	T	T	P1101
87	F	T	F	T	F	T	F	F	P1101
88	F	T	F	T	F	T	F	T	P1101
89	F	T	F	T	F	T	T	F	P1101
90	F	T	F	T	F	T	T	T	P1101
91	F	T	F	T	T	F	F	F	P1101
92	F	T	F	T	T	F	F	T	P1101
93	F	T	F	T	T	F	T	F	P1101
94	F	T	F	T	T	F	T	T	P1101
95	F	T	F	T	T	T	F	F	P1101
96	F	T	F	T	T	T	F	T	P1101
97	F	T	F	T	T	T	T	F	P1101
98	F	T	F	T	T	T	T	T	P1101
99	F	T	T	F	F	F	F	F	P1101
100	F	T	T	F	F	F	F	T	P1101
101	F	T	T	F	F	F	T	F	P1101
102	F	T	T	F	F	F	T	T	P1101
103	F	T	T	F	F	T	F	F	P1101
104	F	T	T	F	F	T	F	T	P1101
105	F	T	T	F	F	T	T	F	P1101
106	F	T	T	F	F	T	T	T	P1101
107	F	T	T	F	T	F	F	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

108	F	T	T	F	T	F	F	T	P1101
109	F	T	T	F	T	F	T	F	P1101
110	F	T	T	F	T	F	T	T	P1101
111	F	T	T	F	T	T	F	F	P1101
112	F	T	T	F	T	T	F	T	P1101
113	F	T	T	F	T	T	T	F	P1101
114	F	T	T	F	T	T	T	T	P1101
115	F	T	T	T	F	F	F	F	P0106
116	F	T	T	T	F	F	F	T	P0106
117	F	T	T	T	F	F	T	F	P0106
118	F	T	T	T	F	F	T	T	P0106
119	F	T	T	T	F	T	F	F	P1101
120	F	T	T	T	F	T	F	T	P1101
121	F	T	T	T	F	T	T	F	P1101
122	F	T	T	T	F	T	T	T	P1101
123	F	T	T	T	T	F	F	F	P1101
124	F	T	T	T	T	F	F	T	P1101
125	F	T	T	T	T	F	T	F	P1101
126	F	T	T	T	T	F	T	T	P1101
127	F	T	T	T	T	T	F	F	P1101
128	F	T	T	T	T	T	F	T	P1101
129	F	T	T	T	T	T	T	F	P1101
130	F	T	T	T	T	T	T	T	P1101
131	T	F	F	F	F	F	F	F	No DTC
132	T	F	F	F	F	F	F	T	P1101
133	T	F	F	F	F	F	T	F	P1101
134	T	F	F	F	F	F	T	T	P0236
135	T	F	F	F	F	T	F	F	P1101
136	T	F	F	F	F	T	F	T	P0121
137	T	F	F	F	F	T	T	F	P1101
138	T	F	F	F	F	T	T	T	P0236
139	T	F	F	F	T	F	F	F	P1101
140	T	F	F	F	T	F	F	T	P1101
141	T	F	F	F	T	F	T	F	P1101
142	T	F	F	F	T	F	T	T	P0236
143	T	F	F	F	T	T	F	F	P1101
144	T	F	F	F	T	T	F	T	P0121
145	T	F	F	F	T	T	T	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

146	T	F	F	F	T	T	T	T	P0236
147	T	F	F	T	F	F	F	F	P1101
148	T	F	F	T	F	F	F	T	P1101
149	T	F	F	T	F	F	T	F	P1101
150	T	F	F	T	F	F	T	T	P1101
151	T	F	F	T	F	T	F	F	P1101
152	T	F	F	T	F	T	F	T	P1101
153	T	F	F	T	F	T	T	F	P1101
154	T	F	F	T	F	T	T	T	P1101
155	T	F	F	T	T	F	F	F	P1101
156	T	F	F	T	T	F	F	T	P1101
157	T	F	F	T	T	F	T	F	P1101
158	T	F	F	T	T	F	T	T	P1101
159	T	F	F	T	T	T	F	F	P1101
160	T	F	F	T	T	T	F	T	P1101
161	T	F	F	T	T	T	T	F	P1101
162	T	F	F	T	T	T	T	T	P1101
163	T	F	T	F	F	F	F	F	P1101
164	T	F	T	F	F	F	F	T	P1101
165	T	F	T	F	F	F	T	F	P1101
166	T	F	T	F	F	F	T	T	P1101
167	T	F	T	F	F	T	F	F	P1101
168	T	F	T	F	F	T	F	T	P1101
169	T	F	T	F	F	T	T	F	P1101
170	T	F	T	F	F	T	T	T	P1101
171	T	F	T	F	T	F	F	F	P1101
172	T	F	T	F	T	F	F	T	P1101
173	T	F	T	F	T	F	T	F	P1101
174	T	F	T	F	T	F	T	T	P1101
175	T	F	T	F	T	T	F	F	P1101
176	T	F	T	F	T	T	F	T	P1101
177	T	F	T	F	T	T	T	F	P1101
178	T	F	T	F	T	T	T	T	P1101
179	T	F	T	T	F	F	F	F	P1101
180	T	F	T	T	F	F	F	T	P1101
181	T	F	T	T	F	F	T	F	P1101
182	T	F	T	T	F	F	T	T	P1101
183	T	F	T	T	F	T	F	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

184	T	F	T	T	F	T	F	T	P1101
185	T	F	T	T	F	T	T	F	P1101
186	T	F	T	T	F	T	T	T	P1101
187	T	F	T	T	T	F	F	F	P0101 or P010B
188	T	F	T	T	T	F	F	T	P0101 or P010B
189	T	F	T	T	T	F	T	F	P0101 or P010B
190	T	F	T	T	T	F	T	T	P0101 or P010B
191	T	F	T	T	T	T	F	F	P1101
192	T	F	T	T	T	T	F	T	P1101
193	T	F	T	T	T	T	T	F	P1101
194	T	F	T	T	T	T	T	T	P1101
195	T	T	F	F	F	F	F	F	P1101
196	T	T	F	F	F	F	F	T	P1101
197	T	T	F	F	F	F	T	F	P1101
198	T	T	F	F	F	F	T	T	P0236
199	T	T	F	F	F	T	F	F	P1101
200	T	T	F	F	F	T	F	T	P0121
201	T	T	F	F	F	T	T	F	P1101
202	T	T	F	F	F	T	T	T	P0236
203	T	T	F	F	T	F	F	F	P1101
204	T	T	F	F	T	F	F	T	P1101
205	T	T	F	F	T	F	T	F	P1101
206	T	T	F	F	T	F	T	T	P0236
207	T	T	F	F	T	T	F	F	P1101
208	T	T	F	F	T	T	F	T	P0121
209	T	T	F	F	T	T	T	F	P1101
210	T	T	F	F	T	T	T	T	P0236
211	T	T	F	T	F	F	F	F	P1101
212	T	T	F	T	F	F	F	T	P1101
213	T	T	F	T	F	F	T	F	P1101
214	T	T	F	T	F	F	T	T	P1101
215	T	T	F	T	F	T	F	F	P1101
216	T	T	F	T	F	T	F	T	P1101
217	T	T	F	T	F	T	T	F	P1101
218	T	T	F	T	F	T	T	T	P1101
219	T	T	F	T	T	F	F	F	P1101
220	T	T	F	T	T	F	F	T	P1101
221	T	T	F	T	T	F	T	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

222	T	T	F	T	T	F	T	T	P1101
223	T	T	F	T	T	T	F	F	P1101
224	T	T	F	T	T	T	F	T	P1101
225	T	T	F	T	T	T	T	F	P1101
226	T	T	F	T	T	T	T	T	P1101
227	T	T	T	F	F	F	F	F	P1101
228	T	T	T	F	F	F	F	T	P1101
229	T	T	T	F	F	F	T	F	P1101
230	T	T	T	F	F	F	T	T	P1101
231	T	T	T	F	F	T	F	F	P1101
232	T	T	T	F	F	T	F	T	P1101
233	T	T	T	F	F	T	T	F	P1101
234	T	T	T	F	F	T	T	T	P1101
235	T	T	T	F	T	F	F	F	P1101
236	T	T	T	F	T	F	F	T	P1101
237	T	T	T	F	T	F	T	F	P1101
238	T	T	T	F	T	F	T	T	P1101
239	T	T	T	F	T	T	F	F	P1101
240	T	T	T	F	T	T	F	T	P1101
241	T	T	T	F	T	T	T	F	P1101
242	T	T	T	F	T	T	T	T	P1101
243	T	T	T	T	F	F	F	F	P1101
244	T	T	T	T	F	F	F	T	P1101
245	T	T	T	T	F	F	T	F	P1101
246	T	T	T	T	F	F	T	T	P1101
247	T	T	T	T	F	T	F	F	P1101
248	T	T	T	T	F	T	F	T	P1101
249	T	T	T	T	F	T	T	F	P1101
250	T	T	T	T	F	T	T	T	P1101
251	T	T	T	T	T	F	F	F	P1101
252	T	T	T	T	T	F	F	T	P1101
253	T	T	T	T	T	F	T	F	P1101
254	T	T	T	T	T	F	T	T	P1101
255	T	T	T	T	T	T	F	F	P1101
256	T	T	T	T	T	T	F	T	P1101
257	T	T	T	T	T	T	T	F	P1101
258	T	T	T	T	T	T	T	T	P1101

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

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

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
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, 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	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
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, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP3 Residual Weight Factor based on RPM

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

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
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, 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	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
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, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P0236_P1101 TIAP Residual Weight Factor based on RPM

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

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.982	0.920	0.837	0.865	0.819	0.819

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max Air Flow

Value Units: Engine Air Flow (Grams/Second)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	10.0	14.0	23.0	26.0	27.0	20.0	20.0	20.0	20.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max MAP

Value Units: Manifold Pressure (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	95.0	80.0	60.0	50.0	50.0	40.0	30.0	30.0	30.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Offset

Value Units: Pressure Difference (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	3.5	7.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min Air Flow

Value Units: Engine Air Flow (Grams/Second)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	13.0	36.0	70.0	82.0	104.0	115.0	120.0	120.0	120.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min MAP

Value Units: Manifold Pressure (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	115.0	150.0	180.0	180.0	180.0	180.0	180.0	165.0	165.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Offset

Value Units: Pressure Difference (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	1.5	1.5	2.5	3.5	3.8	5.0	6.0	6.0	6.0

Initial Supporting table - P0133_KnEOSD_t_ST_LRC_LimRS1

Description: X Table Axis for P0133

Value Units: Seconds
X Unit: X Table Axis for P0133, L2R Response time breakpoints for table

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.010	0.019	0.028	0.037	0.047	0.057	0.065	0.075	0.084	0.094	0.104	0.112	0.122	0.131	0.141	0.150

Initial Supporting table - P0133_KnEOSD_t_ST_RLC_LimRS1

Description: Y Table Axis for P0133

Value Units: Seconds
Y Units: Y Table Axis for P0133, R2L Response time breakpoints for table

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.008	0.017	0.024	0.032	0.041	0.049	0.057	0.065	0.073	0.081	0.090	0.098	0.105	0.113	0.120	0.130

Initial Supporting table - P0133_O2S Slow Response Bank 1 Sensor 1 Pass/Fail Threshold table

Description: This table discribes the Pass and Fail regions based on the diagnostic test result

Value Units: If the cell contains a "0" then the fault is indicated, if it contains a "1" a fault is not indicated.
X Unit: X axis is Lean to Rich response time (in sec), Please see the table below named "KnEOSD_t_ST_LRC_LimRS1" for the 17 X axis table breakpoints.
Y Units: Y axis is Rich to Lean response time (in sec), Please see the table below named "KnEOSD_t_ST_RLC_LimRS1" for the 17 Y axis table breakpoints.

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
3	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
4	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
5	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
6	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
7	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
8	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
9	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
11	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
12	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
13	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
14	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
15	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0234 P0299: Ambient pressure correction as a function of engine speed and ambient pressure

Description: Additative offset on boost pressure control deviation fail limit.

Value Units: [kPa] Control Deviation - Ambient correction.
X Unit: [kPa] KnBSTD_p_CntrlDevDiagAmbCorrBP - Ambient Air Pressure
Y Units: [rpm] KnBSTD_n_CntrlDevDiagAmbCorrBP - Engine Speed

y/x	60.00	70.00	80.00	90.00	100.00	110.00
2,000	80.00	60.00	40.00	20.00	0.00	0.00
2,500	40.00	30.00	20.00	10.00	0.00	0.00
3,000	15.00	10.00	10.00	0.00	0.00	0.00
4,000	15.00	10.00	10.00	0.00	0.00	0.00
5,000	15.00	10.00	5.00	0.00	0.00	0.00
6,000	15.00	5.00	5.00	0.00	0.00	0.00

Initial Supporting table - P0234 P0299: Boost deviation diagnostic enable delay as a function of engine speed

Description: Timer to stabilize enable conditions for over and underboost diagnosis.

Value Units: [sec] Pressure control deviation diagnosis enable delay.
X Unit: [rpm] KnBSTD_n_CntrlDevDiagEngSpdBP - Engine Speed

y/x	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	6,000
1	8.0000	6.5000	5.0000	3.0000	2.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Initial Supporting table - P0234: Overboost pressure deviation limit as a function of engine speed and desired boost pressure

Description: Negative boost pressure control deviation fail limit.

Value Units: [kPa] Negative boost pressure deviation limit.
X Unit: [kPa] KnBSTD_p_CntrlDevDiagDsrdBP - Boost pressure
Y Units: [rpm] KnBSTD_n_CntrlDevDiagEngSpdBP - Engine speed

y/x	100.00	120.00	140.00	160.00	170.00	180.00	190.00	200.00	210.00	220.00
1,000	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00
1,500	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00
2,000	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00	-20.00
2,500	-30.00	-30.00	-30.00	-30.00	-30.00	-30.00	-30.00	-30.00	-30.00	-30.00
3,000	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00
3,500	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00
4,000	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00
4,500	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00
5,000	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00
6,000	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00	-35.00

Initial Supporting table - P0299: Underboost pressure deviation limit as a function of engine speed and desired boost pressure

Description: Positive boost pressure control deviation fail limit.

Value Units: [kPa] Positive boost pressure deviation limit.
X Unit: [kPa] KnBSTD_p_CntrlDevDiagDsrdBP - Boost pressure
Y Units: [rpm] KnBSTD_n_CntrlDevDiagEngSpdBP - Engine speed

y/x	100.00	120.00	140.00	160.00	170.00	180.00	190.00	200.00	210.00	220.00
1,000	35.00	32.00	30.00	30.00	32.00	37.00	43.00	50.00	50.00	55.00
1,500	35.00	32.00	30.00	30.00	32.00	37.00	43.00	50.00	50.00	55.00
2,000	35.00	32.00	30.00	30.00	32.00	37.00	43.00	50.00	50.00	55.00
2,500	35.00	32.00	30.00	30.00	32.00	37.00	43.00	50.00	50.00	55.00
3,000	35.00	32.00	30.00	30.00	32.00	34.00	43.00	50.00	50.00	55.00
3,500	35.00	32.00	30.00	30.00	32.00	34.00	43.00	50.00	50.00	55.00
4,000	35.00	32.00	30.00	30.00	32.00	34.00	43.00	50.00	50.00	55.00
4,500	35.00	32.00	30.00	30.00	32.00	34.00	43.00	50.00	50.00	55.00
5,000	35.00	32.00	30.00	30.00	32.00	37.00	43.00	50.00	50.00	55.00
6,000	35.00	32.00	30.00	30.00	32.00	37.00	43.00	50.00	50.00	55.00

Initial Supporting table - P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit

Description: Exit Catalyst Warm-up mode if Engine Run Time is greater than this value. This table is based on percent ethanol (x-axis) and catmon's NormRatio_EWMA value (y-axis). The NormRatio_EWMA value determines the state of the catalyst. Typically, NormRatio_EWMA values below 0.35 (0 is bad and 1 is good) represent catalysts that have degraded. The emission performance of these degraded catalysts can be improved by extending catalyst light off of GetE85R_Pct_FFS_CompAtEngFloat.

y/x	0	25	50	75	100
0.000	45	45	45	45	45
0.125	45	45	45	45	45
0.250	45	45	45	45	45
0.375	45	45	45	45	45
0.500	32	32	32	32	32
0.625	32	32	32	32	32
0.750	32	32	32	32	32
0.875	32	32	32	32	32
1.000	32	32	32	32	32

Initial Supporting table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTime

Description: Quality weight-based on engine run time. This allows adjustment of the weighting factors at various engine run times in order to prevent the updating of the cumulative quality timer or to change the value of the average qualified residual energy calculation to prevent false Fails of the diagnostic under circumstances inappropriate to update the calculation of the average qualified residual value.

y/x	0	1	2	2	3	10	15	20	30
1	0	0	1	1	1	1	1	1	1

Initial Supporting table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis

Description: This is the x-axis for the KtCSED_K_TimeWght calibration table. Refer to the description for KtCSED_K_TimeWght for details.

y/x	1	2	3	4	5	6	7	8	9
1	0	1	2	2	3	10	15	20	30

Initial Supporting table - P1400_EngineSpeedResidual_Table

Description: This 1x17 table of engine exhaust flow values is used to calculate both the desired and the actual engine exhaust flow based on desired and actual engine speed. The desired engine exhaust flow is gathered from the desired engine speed (VeSPDR_n_EngDsrd). The value used for the actual engine exhaust flow is based on the actual engine RPM value.

y/x	0	300	500	700	770	790	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,700	1,800	2,000
1	0	0	0	0	0	6	6	6	6	6	6	6	6	6	6	6	6

Initial Supporting table - P1400_SparkResidual_Table

Description: Predicted engine-out energy potential based on either the desired cold start spark advance value or the actual spark advance value. ExhEngyPerUnitMass calibration is used to calculate both desired exhaust energy and actual energy. The desired and actual exhaust energy per unit mass values are used in part to calculate the desired exhaust energy per unit time and actual exhaust energy per unit time. Both desired and actual go into the residual exhaust energy per unit time calculation.

y/x	-25	-15	-10	-1	1	5	8	10	30
1	5.50	5.50	5.50	5.50	0.13	0.13	0.13	0.13	0.13

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.

y/x	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	100.00
1.00	14.59	23.23	37.01	70.16	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.

y/x	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	100.00
1.00	45.39	48.91	57.40	70.57	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.

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	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00

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.

y/x	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00
1.00	511.99	511.99	511.99	511.99	511.99	511.99	511.99	511.99	511.99

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	150	170	200	230	350
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,600
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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	-5	10	30	45	60	75
1	10,274	8,614	6,954	4,741	3,081	1,421	1,421

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

Description: KtECTR_E_CTR_WrmUpEnrgyLimTest0

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

y/x	-20	-5	10	30	45	60	75
1	12,486	10,730	8,973	6,631	4,875	3,118	3,118

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_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	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_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	500.000	500.000	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_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	5	3	5	3	5	3	5

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	5	5	5	3	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_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	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	23.000	85.000	95.000	105.000	125.000
1.000	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.

y/x	0.00	50.00	100.00	150.00	200.00	300.00
1.00	45.39	45.39	45.39	45.39	45.39	45.39

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	-20.00	-10.00	0.00	50.00	90.00
480.00	72.42	66.97	73.50	81.35	44.86	24.89
580.00	72.42	66.97	73.50	81.35	44.86	24.89
680.00	68.72	64.36	71.51	80.02	41.98	19.27
730.00	70.57	66.14	73.18	81.55	44.36	18.46
780.00	72.42	66.97	73.50	81.35	44.86	17.38
830.00	74.66	67.66	74.16	81.69	45.24	16.24
880.00	77.16	68.26	75.05	82.38	45.54	15.03
980.00	88.44	74.77	77.69	81.74	42.17	10.65
1,100.00	88.07	74.16	76.45	80.07	38.29	11.60
1,200.00	85.73	72.57	75.23	79.23	35.33	13.54
1,500.00	72.66	65.64	64.48	63.61	30.16	22.66
2,000.00	31.67	24.78	20.07	15.71	-12.37	-12.37
2,500.00	-72.34	-72.34	-72.34	-72.34	-72.34	-72.34
3,000.00	-79.57	-79.57	-79.57	-79.57	-79.57	-79.57
4,000.00	-86.81	-86.81	-86.81	-86.81	-86.81	-86.81
5,000.00	-94.04	-94.04	-94.04	-94.04	-94.04	-94.04
6,400.00	-101.28	-101.28	-101.28	-101.28	-101.28	-101.28

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	40	112	184	256	328	400	500	500	500	500	500	500	500	500

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	70	70	70	70	74	82	105	153	320	480	480	480	480	480	480	480	480

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	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
2	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
3	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
4	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
5	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
6	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
7	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
8	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
9	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
10	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
11	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
12	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
13	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
14	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
15	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
16	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2
17	-622.7	-622.7	-622.7	-579.9	-528.8	-443.0	-361.2	-315.0	-313.1	-313.1	-313.1	-295.1	-268.5	-246.2	-246.2	-246.2	-246.2

Initial Supporting table - P0442 Estimate of Ambient Temperature Valid Conditioning Time as a Function of Ign Off Time

Description: EONV estimated ambient temperature valid conditioning time as a function of ignition off time

Value Units: Estimated Ambient Temperature Valid Conditioning Time (seconds)
X Unit: Ignition Off Time (seconds)

P0442 Estimate of Ambient Temperature Valid Conditioning Time as a Function of Ign Off Time - Part 1

y/x	0	600	1,200	1,800	2,400	3,000	3,600	4,200	4,800	5,400	6,000	6,600	7,200	7,800	8,400	9,000	9,600
1	60	150	160	200	250	285	295	295	295	295	240	230	225	215	210	200	190

P0442 Estimate of Ambient Temperature Valid Conditioning Time as a Function of Ign Off Time - Part 2

y/x	10,200	10,800	11,700	12,600	13,500	14,400	15,300	16,200	17,100	18,000	19,200	20,400	21,600	22,800	24,000	25,200	
1	185	175	160	150	140	128	116	105	90	75	60	60	60	60	60	60	

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	55	55	55	55	54	54	54	54	53	53	53	53	52	52	52	52	51

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	600	800	1,000	1,200	1,400	1,600	1,600	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	0.37	0.33	0.25	0.31	0.19	0.15	1.00	0.83	0.64	0.67	0.80	0.60	0.60	0.77	0.60	0.47	0.47
8	0.15	0.15	0.15	0.15	0.10	0.10	0.75	0.75	0.70	0.64	0.71	0.65	0.74	0.77	0.60	0.47	0.47
12	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.75	0.75	0.75	0.75	0.73	0.79	0.71	0.71	0.65	0.63
16	-0.15	0.00	0.00	0.00	0.00	0.00	0.50	0.60	0.60	0.60	0.50	0.60	0.75	0.86	0.80	0.79	0.63
20	-0.20	-0.14	-0.21	0.00	0.00	0.00	0.50	0.50	0.50	0.50	0.50	0.50	0.60	0.70	0.83	0.70	0.63
24	-0.25	-0.22	-0.25	-0.13	0.00	0.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.60	0.50	0.59
30	-0.25	-0.22	-0.25	-0.20	-0.15	-0.15	0.50	0.50	0.50	0.50	0.50	0.50	0.40	0.40	0.40	0.40	0.50
40	-0.25	-0.22	-0.25	-0.25	-0.25	-0.25	0.40	0.50	0.50	0.50	0.50	0.50	0.35	0.30	0.25	0.25	0.25
60	-0.25	-0.22	-0.25	-0.25	-0.25	-0.25	0.40	0.40	0.40	0.40	0.40	0.40	0.30	0.20	0.10	0.10	0.10

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	600	800	1,000	1,200	1,400	1,600	1,600	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	-1.00	-1.00	-1.10	-1.10	-1.33	-1.33	-0.71	-0.70	-0.67	-0.67	-0.67	-0.38	-0.33	-0.30	-0.35	-0.50	-0.75
8	-0.96	-1.00	-1.10	-1.20	-1.33	-1.33	-0.85	-0.75	-0.75	-0.80	-0.79	-0.70	-0.50	-0.50	-0.60	-0.75	-0.67
12	-0.95	-1.10	-1.10	-1.20	-1.33	-1.33	-1.00	-0.85	-0.80	-0.85	-0.87	-0.90	-0.89	-0.78	-0.83	-0.70	-0.71
16	-1.10	-1.18	-1.07	-1.20	-1.20	-1.20	-1.00	-0.90	-0.85	-0.93	-0.95	-1.00	-0.91	-0.79	-0.83	-0.70	-0.67
20	-1.10	-1.15	-1.17	-1.20	-1.20	-1.20	-1.00	-0.95	-0.95	-0.95	-0.95	-0.90	-1.00	-0.95	-1.00	-0.83	-0.77
24	-1.00	-1.12	-1.17	-1.25	-1.25	-1.24	-1.00	-0.95	-0.95	-0.95	-0.95	-1.00	-1.11	-1.11	-1.10	-0.95	-0.77
30	-1.00	-1.12	-1.17	-1.25	-1.25	-1.25	-1.00	-0.95	-1.05	-1.05	-1.05	-1.05	-1.15	-1.14	-1.10	-1.00	-1.00
40	-1.00	-1.12	-1.17	-1.25	-1.25	-1.25	-1.00	-0.95	-1.05	-1.05	-1.10	-1.10	-1.20	-1.14	-1.07	-1.00	-1.00
60	-1.00	-1.12	-1.17	-1.25	-1.30	-1.30	-1.00	-1.00	-1.05	-1.10	-1.10	-1.10	-1.20	-1.14	-1.07	-1.00	-1.00

Initial Supporting table - 1stFireAfterMisJerkAFM

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
2	1	1	1	15	15	15	15	15	15
8	1	1	1	15	15	15	15	15	15
12	1	1	1	15	15	15	15	15	15
16	1	1	1	15	15	15	15	15	15
20	1	1	1	15	15	15	15	15	15
24	1	1	1	15	15	15	15	15	15
30	1	1	1	15	15	15	15	15	15
40	1	1	1	15	15	15	15	15	15
60	1	1	1	15	15	15	15	15	15

Initial Supporting table - 1stFireAftrMisAcelAFM

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
2	1	1	1	15	15	15	15	15	15
8	1	1	1	15	15	15	15	15	15
12	1	1	1	15	15	15	15	15	15
16	1	1	1	15	15	15	15	15	15
20	1	1	1	15	15	15	15	15	15
24	1	1	1	15	15	15	15	15	15
30	1	1	1	15	15	15	15	15	15
40	1	1	1	15	15	15	15	15	15
60	1	1	1	15	15	15	15	15	15

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	3	3	3	3	3	3	3	3	3

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	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

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	3	3	3	3	2	2	2	2	2

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	600	700	800	900	1,000	1,100	1,200	1,400	1,600
2	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
8	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
12	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
16	14.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20	12.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
24	10.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
30	8.50	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
40	7.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
60	3.00	8.50	10.00	15.00	11.50	15.00	15.00	15.00	15.00

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	600	700	800	900	1,000	1,100	1,200	1,400	1,600
2	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
8	10.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
12	7.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
16	5.50	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20	4.50	14.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
24	4.00	12.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
30	3.00	10.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
40	2.50	7.50	11.00	15.00	15.00	15.00	15.00	15.00	15.00
60	1.50	3.00	4.50	8.00	11.00	15.00	15.00	15.00	15.00

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	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	6,500	7,000
2	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
8	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
12	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
16	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
24	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
30	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
40	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
60	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

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	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	6,500	7,000
2	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
8	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
12	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
16	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
24	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
30	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
40	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
60	8.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

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	22.5	22.5	22.5	22.5	20.0	16.7	12.5	5.0
10	22.5	22.5	22.5	20.0	16.7	14.3	10.0	4.6
20	22.5	22.5	20.0	16.7	14.3	10.0	5.0	4.6
30	22.5	20.0	16.7	12.5	10.0	6.3	4.6	4.6
40	20.0	16.7	11.1	9.1	6.7	4.6	4.6	4.6
50	16.7	11.1	6.3	5.0	4.6	4.6	4.6	4.6
60	11.1	6.3	4.6	4.6	4.6	4.6	4.6	4.6
70	6.3	4.6	4.6	4.6	4.6	4.6	4.6	4.6
80	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
90	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
100	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6

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
2	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
8	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
12	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
16	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
20	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
24	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
30	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
40	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
60	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00

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
2	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
8	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
12	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
16	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
20	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
24	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
30	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
40	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
60	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00

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 differant 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	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	6,500	7,000
2	1.00	1.40	1.32	1.25	1.39	1.17	1.27	1.33	1.20	1.09	1.25	1.24	1.13	1.05	0.94	0.94	0.94
8	1.00	1.40	1.32	1.25	1.39	1.17	1.27	1.33	1.20	1.09	1.25	1.24	1.13	1.05	0.94	0.94	0.94
12	1.00	1.40	1.32	1.25	1.39	1.17	1.27	1.33	1.20	1.09	1.25	1.24	1.13	1.05	0.94	0.94	0.94
16	1.00	1.25	1.13	1.07	1.09	0.94	1.04	1.09	1.06	1.00	1.25	1.24	1.13	1.05	0.94	0.94	0.94
20	1.00	1.07	1.00	0.94	1.00	0.87	0.93	0.96	0.90	0.86	1.09	1.25	1.30	1.30	1.20	1.20	1.20
24	1.00	0.94	0.94	0.92	0.86	0.76	0.76	0.83	0.82	0.81	0.89	1.05	1.15	1.30	1.30	1.30	1.30
30	1.00	0.79	0.77	0.73	0.75	0.61	0.58	0.60	0.71	0.82	0.71	0.80	0.95	1.10	1.20	1.20	1.20
40	1.00	0.67	0.56	0.52	0.60	0.70	0.63	0.71	0.71	0.71	0.70	0.80	0.71	0.90	1.00	1.00	1.00
60	1.00	0.75	0.65	0.65	0.65	0.65	0.63	0.71	0.90	0.90	0.82	0.90	0.89	0.90	1.00	1.00	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	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	6,500	7,000
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	1	0	0	0	0	0	0	-1	-1	-1	-1	-1	0	0	0	0	0
30	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0
40	1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0
60	1	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0

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	600	700	800	900	1,000	1,100	1,200	1,400	1,600
2	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
8	1.20	1.07	0.95	0.88	0.83	0.75	0.70	0.80	1.00
12	1.17	1.07	0.95	0.88	0.83	0.75	0.67	0.80	1.00
16	1.36	1.06	1.00	0.96	0.83	0.72	0.67	0.80	0.85
20	1.58	1.20	1.07	1.06	0.89	0.72	0.89	0.89	0.80
24	1.58	1.36	1.11	1.08	0.94	0.71	0.92	0.83	0.71
30	1.58	1.36	1.11	1.08	0.94	0.71	0.96	0.88	0.60
40	1.58	1.36	1.11	1.08	0.94	0.71	0.96	0.70	0.56
60	1.58	1.36	1.11	1.08	0.94	0.71	0.96	0.70	0.56

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	600	700	800	900	1,000	1,100	1,200	1,400	1,600
2	0.10	0.10	0.25	0.50	0.50	0.50	0.50	0.50	0.50
8	-0.06	-0.06	-0.10	-0.13	-0.18	-0.33	-0.60	-0.78	-0.73
12	-0.04	-0.04	-0.08	-0.11	-0.21	-0.33	-0.70	-0.90	-0.89
16	-0.03	-0.03	-0.08	-0.12	-0.20	-0.34	-0.81	-1.19	-1.23
20	-0.02	-0.02	-0.06	-0.12	-0.17	-0.38	-0.63	-1.00	-0.94
24	-0.02	-0.02	-0.05	-0.10	-0.14	-0.54	-0.54	-0.86	-0.90
30	-0.02	-0.02	-0.05	-0.10	-0.14	-0.54	-0.44	-0.69	-0.77
40	-0.02	-0.02	-0.05	-0.10	-0.14	-0.54	-0.44	-0.69	-0.79
60	-0.02	-0.02	-0.05	-0.10	-0.14	-0.54	-0.44	-0.69	-0.79

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
2	1	1	1	15	15	15	15	15	15
8	1	1	1	15	15	15	15	15	15
12	1	1	1	15	15	15	15	15	15
16	1	1	1	15	15	15	15	15	15
20	1	1	1	15	15	15	15	15	15
24	1	1	1	15	15	15	15	15	15
30	1	1	1	15	15	15	15	15	15
40	1	1	1	15	15	15	15	15	15
60	1	1	1	15	15	15	15	15	15

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
2	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
8	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
12	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
16	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
20	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
24	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
30	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
40	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
60	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00

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 (usec)
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	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	250	150	120	95
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	300	180	145	110
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	350	205	155	118
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	400	230	165	120
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	400	250	170	120
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	450	275	185	130
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	500	300	200	140
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	550	325	215	150
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	575	350	225	160
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	600	375	240	175
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	625	400	265	190
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	650	425	285	205
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	700	475	325	240
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	900	600	450	335
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	1,061	750	600	450
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	1,228	869	750	575
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	1,856	1,356	1,169	912

CylModeDecel - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	70	45	38	30	25	25	20	20	23	25	30	35	35
6	85	65	50	43	33	25	15	13	10	10	15	20	20
8	90	70	55	45	35	25	17	13	10	9	8	7	7
10	90	73	55	45	38	28	18	14	11	9	8	6	6
12	90	73	55	45	38	28	19	14	11	10	8	7	7
14	100	80	63	50	40	28	19	14	12	10	8	7	7
16	115	90	68	55	43	30	20	15	12	10	8	7	7
18	120	95	70	60	48	33	21	15	12	10	8	7	7
20	125	98	75	63	50	35	23	16	12	10	8	7	7
22	130	103	83	65	53	38	25	17	13	10	8	6	6
24	145	110	90	70	55	40	28	19	14	11	9	6	6

Initial Supporting table - CylModeDecel

26	160	120	100	80	65	43	30	21	16	12	9	6	6
30	180	140	120	100	85	55	35	25	19	14	10	6	6
40	250	200	175	140	120	85	58	38	28	20	15	10	10
50	338	275	240	190	155	110	73	48	36	26	20	14	14
60	425	350	300	240	190	135	85	55	42	32	25	18	18
97	670	552	488	394	320	227	146	93	72	53	42	30	30

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 (usec)
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	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	225	140	100	80
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	275	180	135	100
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	375	220	165	125
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	475	260	190	145
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	550	310	220	165
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	613	360	260	200
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	675	410	300	235
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	750	460	350	270
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	800	515	388	295
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	850	560	425	320
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	925	595	450	338
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	1,000	625	475	363
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	1,200	700	525	425
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	1,600	900	675	550
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	1,933	1,100	800	650
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	2,306	1,314	950	750
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	3,705	2,080	1,515	1,216

CylModeJerk - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	60	40	30	25	20	20	23	25	25	28	30	35	35
6	75	65	50	38	30	20	19	14	10	10	15	20	20
8	95	80	63	48	35	24	16	13	10	8	6	8	8
10	115	95	75	58	45	28	20	14	11	9	6	6	6
12	130	105	85	65	50	33	23	16	12	10	7	6	6
14	150	115	95	73	55	37	25	18	14	12	8	6	6
16	175	135	105	80	60	41	28	19	15	13	9	6	6
18	200	150	115	88	65	45	28	20	16	14	10	6	6
20	215	165	125	95	73	50	30	23	17	15	11	7	7
22	230	175	130	100	80	55	33	25	18	16	12	8	8
24	245	185	135	108	85	60	36	27	20	17	13	9	9

Initial Supporting table - CylModeJerk

26	260	200	150	115	90	65	40	30	23	18	14	10	10
30	300	225	175	135	105	75	50	35	25	20	16	12	12
40	375	275	220	175	140	100	70	50	35	28	21	14	14
50	450	320	250	210	170	125	90	63	45	36	26	17	17
60	525	360	280	240	200	150	110	75	55	42	31	20	20
97	831	545	430	380	323	244	183	125	90	68	50	32	32

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 (usec)
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
2	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0

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 (usec)
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
2	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0

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	6,500	6,500	6,500	6,500	6,500	6,500	6,500

EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGr10	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrRvrs	CeTGRR_e_TransGrPark	CeTGRR_e_TransGr7	CeTGRR_e_TransGr8	
1	6,500	4,000	4,000	4,000	6,500	6,500	

Initial Supporting table - IdleCyl_Decel

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

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

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,509	250	200	150	120
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,534	300	240	180	145
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,559	350	278	205	155
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,584	400	315	230	165
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,584	400	325	250	170
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,609	450	363	275	185
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,634	500	400	300	200
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,659	550	438	325	215
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,671	575	463	350	225
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,684	600	488	375	240
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,696	625	513	400	265
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,709	650	538	425	285
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,734	700	588	475	325
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,834	900	750	600	450
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,914	1,061	906	750	600
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,998	1,228	1,049	869	750
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	17,312	1,856	1,606	1,356	1,169

Initial Supporting table - IdleCyl_Jerk

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

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

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,496	225	183	140	100
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,521	275	228	180	135
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,571	375	298	220	165
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,621	475	368	260	190
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,659	550	430	310	220
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,690	613	487	360	260
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,721	675	543	410	300
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,759	750	605	460	350
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,784	800	658	515	388
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,809	850	705	560	425
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,846	925	760	595	450
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,884	1,000	813	625	475
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	16,984	1,200	950	700	525
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	17,184	1,600	1,250	900	675
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	17,350	1,933	1,517	1,100	800
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	17,537	2,306	1,810	1,314	950
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	18,236	3,705	2,893	2,080	1,515

Initial Supporting table - IdleSCD_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold while in SCD mode. 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 (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	1,200	750	500	300	210	160	120	100	85	70	60	50	30
6	1,228	950	600	400	275	190	140	115	98	80	67	53	32
8	1,420	1,025	650	450	300	210	160	130	108	85	70	55	35
10	1,612	1,100	700	475	325	230	180	145	118	90	74	58	38
12	1,803	1,200	700	475	340	250	200	160	128	95	78	60	42
14	1,995	1,300	775	500	350	275	225	175	138	100	82	63	45
16	2,186	1,400	850	550	375	300	250	190	150	110	88	65	48
18	2,378	1,500	925	625	400	325	275	205	163	120	95	70	50
20	2,569	1,582	1,000	700	450	365	300	213	172	130	103	75	50
22	2,761	1,675	1,100	800	525	400	325	220	178	135	108	80	50
24	2,952	1,768	1,175	900	600	450	350	228	184	140	113	85	55
26	3,144	1,861	1,225	975	625	500	375	235	190	145	118	90	60
30	3,527	2,047	1,328	1,019	658	533	427	260	210	160	128	95	70
40	4,485	2,511	1,649	1,302	832	690	557	343	272	200	163	125	90
50	5,442	2,975	1,969	1,585	1,006	847	686	419	333	247	201	155	135
60	6,400	3,440	2,290	1,868	1,179	1,003	815	494	392	290	235	179	160
97	9,992	5,181	3,492	2,929	1,830	1,592	1,300	779	616	454	366	278	235

Initial Supporting table - IdleSCD_Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold while in SCD mode. 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 (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	1,650	650	425	250	175	125	110	100	80	70	60	50	25
6	2,099	1,000	625	400	275	180	150	115	90	80	67	53	30
8	2,757	1,300	800	490	340	240	180	130	100	85	72	58	35
10	3,415	1,600	1,000	575	400	300	220	145	110	90	75	60	40
12	4,073	1,900	1,200	675	475	360	260	160	120	95	80	65	43
14	4,731	2,200	1,450	825	550	425	295	175	135	105	87	68	48
16	5,388	2,500	1,675	1,000	645	490	325	200	150	113	90	70	55
18	6,046	2,750	1,900	1,175	740	550	360	220	168	120	98	75	60
20	6,704	3,072	2,100	1,350	825	600	395	240	183	128	105	85	67
22	7,362	3,366	2,300	1,500	900	650	430	260	198	135	115	95	75
24	8,020	3,661	2,500	1,650	975	700	465	280	213	145	125	105	80
26	8,678	3,956	2,729	1,800	1,050	750	500	300	228	155	135	115	90
30	9,994	4,545	3,155	2,066	1,213	881	573	340	260	180	155	130	100
40	13,283	6,018	4,222	2,798	1,613	1,169	751	457	359	260	215	170	120
50	16,573	7,491	5,289	3,531	2,013	1,458	928	569	452	335	278	220	175
60	19,862	8,965	6,355	4,263	2,414	1,746	1,106	681	542	403	332	262	225
97	20,000	14,489	10,355	7,010	3,914	2,828	1,771	1,101	885	670	548	426	326

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 differant 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	-32	-24	-16	-12	-8	0	8	16	20	24	32	40	48	64	80	96
1	12.0	12.0	11.5	9.0	9.0	7.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0

Initial Supporting table - P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High 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: Ethanol Precent (%)
Y Units: Coolant Temperature (Deg C)

y/x	-40	-32	-24	-16	-12	-8	0	8	16	20	24	32	40	48	64	80	96
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: Ethanol Precent (%)
Y Units: Coolant Temperature (Deg C)

y/x	-40	-32	-24	-16	-12	-8	0	8	16	20	24	32	40	48	64	80	96
0	2.0	2.0	2.0	2.0	2.0	2.0	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	2.0	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	2.0	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	2.0	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	2.0	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	2.0	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	2.0	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	2.0	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	2.0	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: Ethanol Precent (%)
Y Units: Coolant Temperature (Deg C)

y/x	-40	-32	-24	-16	-12	-8	0	8	16	20	24	32	40	48	64	80	96
0	20.0	20.0	20.0	15.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	12.0
13	20.0	20.0	20.0	15.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	12.0
25	20.0	20.0	20.0	15.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	12.0
38	20.0	20.0	20.0	15.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	12.0
50	20.0	20.0	20.0	15.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	12.0
63	20.0	20.0	20.0	15.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	12.0
75	20.0	20.0	20.0	15.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	12.0
88	20.0	20.0	20.0	15.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	12.0
100	20.0	20.0	20.0	15.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	12.0

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	0.75	0.75	0.75	0.75	0.79	0.82	0.86	0.92	0.95

Initial Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Closing Time

Description: Maximum injector closing time function of measured fuel rail pressure

Value Units: Injector Closing Time (us)
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	18.00	20.00	24.00
1.00	389	433	432	429	426	422	421	417	417	415	413	411	410	414	406	399	389

Initial Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude

Description: Maximum injector opening Magnitude voltage function of measured fuel rail pressure

Value Units: Opening Magnitude Voltage
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	18.00	20.00	24.00
1.00	594	580	574	578	570	569	574	571	571	568	568	575	577	572	586	594	572

Initial Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time

Description: Minimum injector closing time function of measured fuel rail pressure

Value Units: Injector Closing Time (us)
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	18.00	20.00	24.00
1.00	389	433	432	429	426	422	421	417	417	415	413	411	410	414	406	399	389

Initial Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude

Description: Minimum injector opening Magnitude voltage function of measured fuel rail pressure

Value Units: Opening Magnitude Voltage
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	18.00	20.00	24.00
1.00	256	325	327	318	323	321	312	312	309	307	306	298	293	296	275	256	258

Initial Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width

Description: Minimum injection pulse width function of measured fuel rail pressure where the voltage feedback measured from the analog to digital converter is rationalized

Value Units: Pulse Width (ms)
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	18.00	20.00	24.00
1.00	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

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	2.48	2.76	3.05	3.33	3.62	3.90	4.19	4.48	4.76	5.05	5.33	5.62	5.90	6.19	6.48	6.76	7.05
602.00	0.95	0.92	0.80	0.75	0.55	0.52	0.51	0.33	0.32	0.28	0.31	0.26	0.25	0.17	0.16	0.16	0.16
638.00	1.02	0.95	0.82	0.76	0.57	0.56	0.54	0.51	0.45	0.31	0.31	0.27	0.26	0.19	0.18	0.18	0.18
674.00	1.03	0.96	0.82	0.76	0.69	0.68	0.62	0.60	0.46	0.37	0.34	0.28	0.27	0.19	0.19	0.19	0.19
710.00	1.04	0.96	0.83	0.76	0.69	0.68	0.62	0.60	0.47	0.41	0.38	0.33	0.32	0.20	0.20	0.20	0.19
746.00	1.05	0.96	0.82	0.77	0.69	0.69	0.63	0.60	0.50	0.42	0.39	0.33	0.32	0.21	0.20	0.20	0.19
782.00	1.06	0.96	0.83	0.79	0.69	0.68	0.64	0.60	0.50	0.43	0.41	0.33	0.32	0.22	0.22	0.21	0.20
818.00	1.07	0.96	0.85	0.79	0.69	0.68	0.64	0.60	0.50	0.44	0.41	0.33	0.32	0.25	0.25	0.25	0.24
854.00	1.08	0.96	0.89	0.79	0.70	0.69	0.64	0.60	0.50	0.45	0.42	0.33	0.32	0.26	0.26	0.26	0.25
891.00	1.09	0.97	0.92	0.80	0.69	0.69	0.64	0.60	0.50	0.46	0.44	0.36	0.35	0.27	0.26	0.26	0.25

Initial Supporting table - P0420_WorstPassingOSCTableB1

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	2.48	2.76	3.05	3.33	3.62	3.90	4.19	4.48	4.76	5.05	5.33	5.62	5.90	6.19	6.48	6.76	7.05
602.00	1.58	1.35	1.11	0.99	0.77	0.74	0.74	0.73	0.62	0.61	0.52	0.48	0.48	0.40	0.38	0.38	0.37
638.00	1.59	1.36	1.12	1.02	0.78	0.75	0.74	0.74	0.63	0.62	0.52	0.49	0.48	0.41	0.39	0.38	0.37
674.00	1.60	1.36	1.13	1.05	0.78	0.74	0.74	0.73	0.63	0.63	0.53	0.48	0.48	0.41	0.39	0.38	0.37
710.00	1.61	1.37	1.14	1.06	0.77	0.75	0.74	0.73	0.64	0.63	0.53	0.48	0.48	0.41	0.39	0.38	0.38
746.00	1.62	1.38	1.16	1.07	0.78	0.75	0.74	0.74	0.64	0.63	0.53	0.48	0.47	0.41	0.39	0.39	0.38
782.00	1.68	1.39	1.18	1.08	0.80	0.77	0.77	0.77	0.64	0.63	0.54	0.48	0.47	0.41	0.40	0.39	0.38
818.00	1.69	1.41	1.19	1.09	0.85	0.81	0.80	0.80	0.65	0.64	0.60	0.48	0.47	0.41	0.40	0.39	0.38
854.00	1.72	1.43	1.21	1.11	0.88	0.86	0.86	0.85	0.69	0.69	0.68	0.47	0.47	0.45	0.43	0.43	0.42
891.00	1.73	1.45	1.21	1.12	0.94	0.92	0.91	0.90	0.81	0.81	0.80	0.50	0.50	0.49	0.48	0.47	0.47

Initial Supporting table - P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit

Description: Minimum Small Pulse Compensation Fail Limit function of Pulse Width and Pressure

Value Units: Minimum Small Pulse Compensation Fail Limit (ms)
X Unit: Measrured Fuel Rail Pressure (MPa)
Y Units: Injection Pulse With (ms)

P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit - Part 1

y/x	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.04
0.40	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
4.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
5.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
6.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
7.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
8.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
9.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
10.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
11.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
12.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
13.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
14.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
15.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
16.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
18.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
20.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
24.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04

P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit - Part 2

y/x	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.10
0.40	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
4.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
5.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
6.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
7.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
8.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
9.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
10.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.14
11.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
12.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
13.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04

Initial Supporting table - P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit

14.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
15.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
16.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
18.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
20.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
24.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04

P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit - Part 3

y/x	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	1.00	1.50
0.40	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
4.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
5.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
6.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
7.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
8.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
9.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
10.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
11.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
12.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
13.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
14.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
15.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
16.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
18.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
20.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
24.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14

Initial Supporting table - P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit

Description: Maximum Small Pulse Compensation Fail Limit function of Pulse Width and Pressure

Value Units: Maximum Small Pulse Compensation Fail Limit (ms)
X Unit: Measrured Fuel Rail Pressure (MPa)
Y Units: Injection Pulse With (ms)

P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit - Part 1

y/x	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.04
0.40	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
4.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
5.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
6.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
7.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
8.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
9.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
10.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
12.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
15.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
16.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
24.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06

P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit - Part 2

y/x	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.10
0.40	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
4.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
5.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
6.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
7.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
8.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
9.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
10.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.14
11.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
12.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06

Initial Supporting table - P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit

14.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
15.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
16.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
24.00	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06

P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit - Part 3

y/x	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	1.00	1.50
0.40	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
4.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
5.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
6.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
7.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
8.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
9.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
10.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
11.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
13.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
14.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
15.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
16.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
18.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
20.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
24.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14

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	5	5	5	5	5

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	-4.00	-4.00	-4.00	-4.00

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 / sec
X Unit: kPa [desired fuel pressure]
Y Units: Volts [device supply]

y/x	200.0	250.0	300.0	350.0	400.0	450.0	500.0	550.0	600.0
4.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
6.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
7.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
9.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
10.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
12.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
13.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
15.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
16.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
18.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
19.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
21.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
22.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
24.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
25.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
27.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
28.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0

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: kPa
X Unit: kPa [desired fuel pressure]
Y Units: grams / sec [fuel flow]

y/x	200.0	250.0	300.0	350.0	400.0	450.0	500.0	550.0	600.0
0.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
1.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
3.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
4.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
6.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
7.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
9.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
10.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
12.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
13.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
15.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
16.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
18.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
19.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
21.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
22.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
24.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
25.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
27.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
28.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
30.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
31.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
33.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
34.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
36.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
37.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
39.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
40.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
42.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
43.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
45.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0

Initial Supporting table - P2635 Threshold High

46.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
48.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0

Initial Supporting table - P2635 Threshold Low

Description: P2635 Filtered Pressure Error Low Threshold [over-performing pump]
Instantaneously calculated filtered fuel pressure error

Value Units: kPa
X Unit: kPa [desired fuel pressure]
Y Units: grams / sec [fuel flow]

y/x	200.0	250.0	300.0	350.0	400.0	450.0	500.0	550.0	600.0
0.0	-260.0	-210.0	-160.0	-110.0	-60.0	-67.5	-75.0	-82.5	-90.0
1.5	-145.0	-125.0	-102.5	-81.3	-60.0	-67.5	-75.0	-82.5	-90.0
3.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
4.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
6.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
7.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
9.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
10.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
12.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
13.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
15.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
16.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
18.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
19.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
21.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
22.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
24.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
25.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
27.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
28.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
30.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
31.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
33.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
34.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
36.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
37.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
39.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
40.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
42.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
43.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
45.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0

Initial Supporting table - P2635 Threshold Low

46.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
48.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0

P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude M

Description: Opening Magnitude threshold to detect missing injection pulse

Value Units: Opening Magnitude Voltage
X Unit: Measured Fuel Rail Pressure

y/x	0.40	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	18.00	20.00	24.00
1.00	0.00	0.00	0.00	0.00	0.00	0.00	421.91	308.30	202.09	139.70	129.09	127.59	99.41	131.59	236.00	226.70	202.59

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	600	700	800	900	1,000	1,100	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	0.68	0.86	0.90	0.96	0.96	0.95	0.93	1.00	1.00
12	0.65	0.86	0.90	0.88	0.96	0.95	0.97	1.00	1.00
16	0.64	0.82	1.00	1.00	1.00	0.97	1.00	0.89	0.87
20	0.76	0.83	1.00	1.00	1.00	1.00	0.96	0.90	0.83
24	0.76	0.89	0.89	1.00	1.00	1.00	0.80	0.83	0.88
30	0.76	0.89	0.89	1.00	1.00	0.80	0.80	0.80	0.90
40	0.76	0.89	0.89	1.00	1.00	0.80	0.80	0.80	0.90
60	0.76	0.89	0.89	1.00	1.00	0.80	0.80	0.80	0.90

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	600	700	800	900	1,000	1,100	1,200	1,400	1,600
2	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
8	1.08	1.10	1.30	1.30	1.30	1.30	1.50	1.50	1.50
12	0.75	0.90	1.20	1.26	1.28	1.30	1.50	1.50	1.50
16	0.72	0.82	1.20	1.30	1.33	1.40	1.50	1.50	1.50
20	0.78	0.81	1.04	1.33	1.42	1.45	1.50	1.50	1.45
24	0.78	0.84	0.97	1.33	1.50	1.40	1.30	1.35	1.40
30	0.78	0.84	0.97	1.33	1.50	1.25	1.10	1.25	1.40
40	0.78	0.84	0.97	1.33	1.50	1.25	1.10	1.25	1.40
60	0.78	0.84	0.97	1.33	1.50	1.25	1.10	1.25	1.40

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	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	6,500	7,000
2	1.00	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
8	1.00	0.70	0.74	0.75	0.72	0.69	0.70	0.67	0.65	0.67	1.00	1.00	1.00	1.00	1.00	1.20	1.20
12	1.00	0.70	0.74	0.75	0.72	0.69	0.70	0.67	0.65	0.67	0.68	0.69	0.74	0.79	0.75	1.00	1.00
16	1.00	0.70	0.71	0.70	0.74	0.72	0.74	0.66	0.66	0.67	0.68	0.69	0.74	0.79	0.75	0.75	0.75
20	1.00	0.86	0.96	0.92	0.88	0.87	0.87	0.76	0.76	0.69	0.70	0.72	0.79	0.79	0.75	0.75	0.75
24	1.00	0.91	0.98	0.97	0.97	0.95	0.88	0.88	0.80	0.68	0.65	0.68	0.68	0.77	0.76	0.76	0.76
30	1.00	1.00	0.98	0.94	0.97	0.93	0.88	0.80	0.71	0.68	0.60	0.60	0.63	0.71	0.80	0.80	0.80
40	1.00	1.00	0.87	0.84	0.75	0.70	0.70	0.65	0.63	0.59	0.52	0.53	0.54	0.60	0.67	0.67	0.67
60	1.00	1.00	0.87	0.70	0.65	0.65	0.60	0.56	0.54	0.52	0.54	0.54	0.54	0.54	0.54	0.54	0.54

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	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	6,500	7,000
2	1.00	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
8	1.00	1.20	1.10	0.93	0.95	0.95	0.94	0.92	0.95	0.98	1.50	1.50	1.50	1.50	1.50	1.50	1.50
12	1.00	1.00	0.95	0.93	0.95	0.95	0.94	0.92	0.90	0.98	1.00	1.00	1.10	1.10	1.09	1.09	1.50
16	1.00	1.00	0.95	0.94	0.90	0.96	0.95	0.92	0.90	0.98	1.00	1.00	1.10	1.10	1.09	1.09	1.09
20	1.00	1.17	1.11	1.00	1.00	1.03	1.04	1.05	1.00	0.96	1.00	1.00	1.00	1.00	1.09	1.09	1.09
24	1.00	1.23	1.16	1.10	1.14	1.14	1.11	1.10	1.00	0.90	0.90	0.95	1.00	1.00	1.00	1.00	1.00
30	1.00	1.30	1.22	1.06	1.17	1.16	1.10	1.10	1.05	0.90	0.84	0.91	0.91	0.95	1.00	1.00	1.00
40	1.00	1.33	1.16	1.02	1.10	1.10	1.10	1.05	1.07	1.00	0.86	0.80	0.91	0.89	0.95	0.95	0.95
60	1.00	1.33	1.16	1.02	1.00	1.00	1.00	1.00	1.00	0.93	0.86	0.86	0.91	0.83	0.90	0.90	0.90

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	600	700	800	900	1,000	1,100	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.15	1.15	1.10	1.10	1.10	1.00	1.00	1.00	1.00
12	1.45	1.45	1.35	1.35	1.35	1.20	1.00	1.00	1.00
16	1.45	1.75	1.75	1.75	1.70	1.40	1.15	1.10	1.05
20	1.45	2.00	2.00	2.00	1.75	1.45	1.20	1.20	1.20
24	1.45	2.00	2.00	2.00	1.75	1.45	1.30	1.20	1.20
30	1.45	2.00	2.00	2.00	1.75	1.50	1.30	1.25	1.35
40	1.45	2.00	2.00	2.00	1.75	1.50	1.39	1.40	1.50
60	1.45	2.00	2.00	2.00	1.75	1.50	1.39	1.40	1.60

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	600	700	800	900	1,000	1,100	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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

Initial Supporting table - RandomAFM_Decl

Description: Used for P0300 - P0308, Mulitplier to 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
2	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
8	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
12	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
16	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
20	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
24	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
30	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
40	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
60	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00

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
2	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
8	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
12	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
16	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
20	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
24	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
30	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
40	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00
60	1.00	1.00	1.00	15.00	15.00	15.00	15.00	15.00	15.00

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	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	6,500	7,000
2	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
8	1.00	1.10	1.05	1.00	1.00	1.10	1.10	1.10	1.05	1.03	1.03	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.15	1.20	1.25	1.25	1.35	1.35	1.30	1.20	1.20	1.20	1.20	1.20	1.11	1.06	1.06	1.06
16	1.00	1.40	1.40	1.45	1.50	1.44	1.56	1.45	1.45	1.45	1.45	1.45	1.39	1.26	1.25	1.25	1.25
20	1.00	1.50	1.70	1.72	1.60	1.64	1.76	1.76	1.70	1.57	1.52	1.56	1.67	1.47	1.50	1.50	1.50
24	1.00	1.60	1.70	1.80	1.72	1.79	1.72	1.71	1.73	1.63	1.45	1.45	1.61	1.68	1.65	1.65	1.65
30	1.00	1.60	1.54	1.80	1.80	1.79	1.54	1.55	1.53	1.55	1.57	1.50	1.58	1.61	1.75	1.75	1.75
40	1.00	1.60	1.61	1.64	1.60	1.60	1.43	1.50	1.50	1.29	1.30	1.33	1.34	1.50	1.50	1.50	1.50
60	1.00	1.60	1.53	1.48	1.48	1.43	1.42	1.38	1.37	1.26	1.29	1.36	1.31	1.41	1.40	1.40	1.40

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	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	6,500	7,000
2	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
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	1.00	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	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	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	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	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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	3,000	3,500	4,000	4,500	5,000	5,500	6,000	7,000	8,000
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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

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	1,000	1,600	1,600	2,000	2,400	3,000	4,000	5,000	6,000
1	2.45	2.92	3.79	3.80	3.98	4.12	3.79	3.60	3.39

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 (usec)
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	3,500	4,000	4,500	5,000	5,500	6,000	6,500	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	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	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	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	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	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	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	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	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	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	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	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	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	32,767	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
50	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	4	4	4	4	4	4	4	4	4

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

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	1,200	750	500	300	210	160	115	80	67	53	43	33	30
6	1,228	950	600	400	275	190	130	90	74	58	47	35	32
8	1,420	1,025	650	450	300	200	150	100	82	63	50	38	35
10	1,612	1,100	700	475	325	200	150	110	89	68	54	40	38
12	1,803	1,200	700	475	340	240	180	120	98	75	60	45	42
14	1,995	1,300	775	500	350	275	220	140	114	88	72	55	45
16	2,186	1,400	850	550	375	300	250	165	133	100	83	65	48
18	2,378	1,500	925	625	400	325	275	185	148	110	90	70	50
20	2,569	1,582	1,000	700	450	365	300	198	158	118	97	75	50
22	2,761	1,675	1,100	800	525	400	325	210	168	125	103	80	50
24	2,952	1,768	1,175	900	600	450	350	223	178	133	109	85	55
26	3,144	1,861	1,225	975	625	500	375	235	189	143	117	90	60
30	3,527	2,047	1,328	1,019	658	533	427	260	210	160	128	95	70
40	4,485	2,511	1,649	1,302	832	690	557	343	272	200	163	125	90
50	5,442	2,975	1,969	1,585	1,006	847	686	419	333	247	201	155	135
60	6,400	3,440	2,290	1,868	1,179	1,003	815	494	392	290	235	179	160
97	9,992	5,181	3,492	2,929	1,830	1,592	1,300	779	616	454	366	278	235

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

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	1,650	650	425	250	175	125	100	70	58	45	38	30	25
6	2,099	1,000	625	400	275	180	140	90	73	55	44	33	30
8	2,757	1,300	800	490	340	240	180	100	80	60	48	35	35
10	3,415	1,600	1,000	575	400	300	220	110	89	68	54	40	40
12	4,073	1,900	1,200	675	475	360	260	130	104	78	62	45	43
14	4,731	2,200	1,450	825	550	425	295	160	124	88	72	55	48
16	5,388	2,500	1,675	1,000	645	490	325	185	145	105	85	65	55
18	6,046	2,750	1,900	1,175	740	550	360	215	165	115	95	75	60
20	6,704	3,072	2,100	1,350	825	600	395	240	183	125	105	85	67
22	7,362	3,366	2,300	1,500	900	650	430	260	198	135	115	95	75
24	8,020	3,661	2,500	1,650	975	700	465	280	213	145	125	105	80
26	8,678	3,956	2,729	1,800	1,050	750	500	300	228	155	135	115	90
30	9,994	4,545	3,155	2,066	1,213	881	573	340	260	180	155	130	100
40	13,283	6,018	4,222	2,798	1,613	1,169	751	457	359	260	215	170	120
50	16,573	7,491	5,289	3,531	2,013	1,458	928	569	452	335	278	220	175
60	19,862	8,965	6,355	4,263	2,414	1,746	1,106	681	542	403	332	262	225
97	20,000	14,489	10,355	7,010	3,914	2,828	1,771	1,101	885	670	548	426	326

Initial Supporting table - SnapDecayAfterMisfire

Description: Used for P0300 - P0308, multiplier times the ddt_jerk 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	1,000	1,600	1,600	2,000	2,400	3,000	4,000	5,000	6,000
0	4.00	5.00	3.10	3.60	3.94	4.28	4.00	3.79	3.79
1	4.00	5.00	3.10	3.60	3.94	4.28	4.00	3.79	3.79
1	3.00	5.00	3.17	2.50	2.50	3.29	3.29	3.16	3.79
1	2.50	4.00	2.34	2.00	2.25	2.65	2.85	3.40	3.79
2	2.77	3.41	1.92	1.84	2.00	2.00	2.86	2.94	3.33
3	2.70	2.70	1.85	1.85	2.00	2.00	2.08	2.25	2.58
5	2.44	2.44	1.86	1.85	1.85	2.00	2.00	2.00	2.00
7	2.86	2.86	2.50	2.30	2.33	2.30	1.75	2.00	2.00
8	2.86	2.86	2.50	2.30	2.33	2.30	1.75	2.00	2.00

Initial Supporting table - TOSSRoughRoadThres

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	0.30005	0.44995	0.59998	0.65002	0.69995	0.75000	0.80005	0.84998	0.90002	0.91003	0.92004	0.93005	0.93994	0.94995	0.95996	0.96997	0.97998

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	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25
75	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25
85	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25
95	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25
105	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25

ZeroTorqueAFM - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
65	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50
75	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50
85	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50
95	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50
105	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50

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	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25
75	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25
85	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25
95	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25
105	-2.00	-2.50	-2.75	-2.75	-2.75	-2.75	-2.50	-2.00	-1.50	-0.50	0.00	0.25	0.25

ZeroTorqueEngLoad - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
65	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50
75	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50
85	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50
95	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50
105	0.00	-0.37	-0.75	-1.12	-1.50	-0.25	1.00	2.25	3.50	4.75	6.00	7.25	8.50

Initial Supporting table - P057B KtBRKI_K_CmpltTestPointWeight

Description:

y/x	0.000	0.005	0.010	0.020	0.023	0.040	0.050	0.100	1.000
1	0	0	0	0	1	1	1	1	1

Initial Supporting table - P057B KtBRKI_K_FastTestPointWeight

Description:

y/x	0.000	0.003	0.005	0.010	0.023	0.030	0.040	0.200	1.000
1	0	0	0	0	1	1	1	1	1

Initial Supporting table - CalculatedPerfMaxEc1

Description: Maximum desired camshaft position for Exhaust CAM - Bank1

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	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
2	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
3	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
4	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
5	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
6	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
7	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
8	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
9	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
10	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
11	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
12	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
13	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
14	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
15	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
16	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
17	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5

Initial Supporting table - CalculatedPerfMaxIc1

Description: Maximum desired camshaft position for Intake CAM - Bank1

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	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
2	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
3	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
4	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
5	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
6	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
7	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
8	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
9	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
10	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
11	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
12	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
13	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
14	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
15	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
16	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
17	11.5	11.5	11.5	22.5	24.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5

Initial Supporting table - P0234: Overboost pressure limit below basic pressure as a function of engine speed and ambient pressure

Description: Overboost under basic pressure (open loop pressure control) diagnose failure limit.

Value Units: [kPa] Overboost under basic pressure fail limit.
X Unit: [kPa] KnBSTD_p_CntrlDevDiagAmbCorrBP - Ambient Air Pressure
Y Units: [rpm] KnBSTD_n_CntrlDevDiagAmbCorrBP - Engine Speed

y/x	60.00	70.00	80.00	90.00	100.00	110.00
2,000.00	62.000	52.000	32.000	30.000	30.000	30.000
2,500.00	62.000	38.500	20.000	20.000	20.000	20.000
3,000.00	42.000	25.000	10.000	10.000	10.000	10.000
4,000.00	30.000	10.000	10.000	10.000	10.000	10.000
5,000.00	30.000	10.000	10.000	10.000	10.000	10.000
6,000.00	30.000	10.000	10.000	10.000	10.000	10.000

Initial Supporting table - P0299: Underboost high rate limit as a function of engine speed

Description: Allowed positive rate limit on desired boost pressure. In allowed kPa per 100 ms.

Value Units: [kPa] Allowed positive rate limit
X Unit: [rpm] KnBSTD_n_CntrlDevDiagEngSpdBP - Engine Speed

y/x	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	6,000
1	2.000	2.500	2.700	2.900	3.000	3.000	3.100	3.200	3.500	4.000

Initial Supporting table - P0299: Underboost low rate limit as a function of engine speed

Description: Allowed negative rate limit on desired boost pressure. In allowed kPa per 100 ms.

Value Units: [kPa] Allowed negative rate limit.
X Unit: [rpm] KnBSTD_n_CntrlDevDiagEngSpdBP - Engine Speed

y/x	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	6,000
1	-200.00	-200.00	-200.00	-200.00	-200.00	-200.00	-200.00	-200.00	-200.00	-200.00

Initial Supporting table - P0521_LowMinOilPresFail - Two Stage Oil Pump

Description: Minimum expected oil presure readings

Value Units: Min oil pressure (kPa)
X Unit: Engine speed (RPM)

y/x	1,000.0	1,500.0	2,000.0	2,500.0	3,000.0	3,500.0	4,000.0	4,500.0	5,000.0
1.0	50.0	64.0	76.0	90.0	103.0	117.0	129.0	135.0	142.0

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 (deg C)

y/x	0.0	20.0	40.0	60.0	80.0	90.0	100.0	110.0	120.0
1,000.0	466.0	431.0	423.0	399.0	360.0	324.0	280.0	263.0	200.0
1,250.0	472.0	444.0	431.0	417.0	390.0	372.0	339.0	303.0	252.0
1,500.0	475.0	451.0	431.0	430.0	410.0	397.0	382.0	367.0	310.0
2,000.0	492.0	457.0	442.0	445.0	430.0	420.0	408.0	391.0	327.0
2,500.0	489.0	473.0	459.0	455.0	444.0	436.0	426.0	412.0	398.0
3,000.0	501.0	469.0	463.0	469.0	458.0	452.0	442.0	427.0	413.0
3,500.0	540.0	468.0	466.0	482.0	472.0	464.0	452.0	436.0	420.0
4,000.0	540.0	466.0	463.0	485.0	477.0	470.0	460.0	443.0	426.0
4,500.0	540.0	464.0	460.0	489.0	481.0	476.0	467.0	450.0	432.0

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	0.0	100.0	150.0	150.0	150.0	150.0	150.0	100.0	0.0

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	20.0	20.0	20.0	20.0	20.0	0.0	0.0

Initial Supporting table - P06DD_P06DE_MinOilPressT□res□

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	0	20	40	60	80	90	100	110	120
1,000	165	165	165	165	165	165	165	165	1,005
1,250	165	165	165	165	165	165	165	165	1,005
1,500	165	165	165	165	165	165	165	165	1,005
2,000	165	165	165	165	165	165	165	165	1,005
2,500	165	165	165	165	165	165	165	165	1,005
3,000	165	165	165	165	165	165	165	165	1,005
3,500	165	165	165	165	165	165	165	165	1,005
4,000	165	165	165	165	165	165	165	165	1,005
4,500	165	165	165	165	165	165	165	165	1,005

Initial Supporting table - 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	0	20	40	60	80	90	100	110	120
1,000	267	248	238	227	217	211	206	198	188
1,250	272	251	240	233	225	220	215	209	197
1,500	275	255	241	237	231	227	223	217	206
2,000	284	260	248	242	238	234	229	226	223
2,500	281	263	252	247	242	239	235	233	231
3,000	291	267	251	252	247	245	240	237	235
3,500	280	265	253	254	249	247	243	241	238
4,000	280	266	254	255	252	249	245	239	234
4,500	280	268	255	257	254	251	247	238	229

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	0.0	20.0	40.0	60.0	80.0	90.0	100.0	110.0	120.0
1,000.0	100.0	92.0	93.0	86.0	55.0	45.0	35.0	20.0	6.0
1,250.0	103.0	96.0	95.0	92.0	83.0	58.0	40.0	30.0	10.0
1,500.0	105.0	98.0	95.0	97.0	90.0	85.0	82.0	68.0	53.0
2,000.0	108.0	103.0	102.0	100.0	96.0	93.0	90.0	82.0	68.0
2,500.0	114.0	105.0	104.0	104.0	101.0	98.0	96.0	89.0	78.0
3,000.0	117.0	110.0	109.0	109.0	105.0	101.0	97.0	91.0	87.0
3,500.0	120.0	115.0	114.0	114.0	111.0	105.0	98.0	92.0	88.0
4,000.0	120.0	116.0	115.0	115.0	113.0	108.0	99.0	93.0	90.0
4,500.0	120.0	116.0	116.0	116.0	114.0	112.0	100.0	95.0	90.0

Initial Supporting table - P171D hydraulic pressure delay

Description: Time to delay the initial x of y counter due to hydraulic transients. Thresholds are a function of transmission fluid temperature. Horizontal axis is transmission fluid temperature (DegC) and table output is delay time (seconds).

Value Units: delay time seconds
X Unit: transmission fluid temperature DegC

y/x	-40	0	20	30	40	50	60
1	0.090	0.090	0.080	0.075	0.075	0.075	0.075

Initial Supporting table - P171D predicted turbine speed error

Description: Predicted turbine speed vs actual turbine speed error. Thresholds are a function of engine speed and transmission fliud temperature. Diagnostic is considered failing above these values. Table vertical axis is engine speed (RPM), horizontal axis is transmission fluid temperature (DegC) and table output is predicted turbine speed error (RPM).

Value Units: turbine speed RPM error
X Unit: transmission fluid temperature DegC
Y Units: engine speed RPM

y/x	-40	0	10	20	40
0	350	350	350	350	350
500	350	350	350	350	350
1,100	350	350	350	350	350
1,500	350	350	350	350	350
2,500	350	350	350	350	350

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_Cell00_PurgOnAirMode5	CeFADR_e_Cell01_PurgOnAirMode4	CeFADR_e_Cell02_PurgOnAirMode3	CeFADR_e_Cell03_PurgOnAirMode2
1	220	40	40	40

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode1	CeFADR_e_Cell05_PurgOnAirMode0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	40	40	0	0

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode5	CeFADR_e_Cell09_PurgOffAirMode4	CeFADR_e_Cell10_PurgOffAirMode3	CeFADR_e_Cell11_PurgOffAirMode2
1	440	150	150	150

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode1	CeFADR_e_Cell13_PurgOffAirMode0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	150	150	0	0

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_Cell00_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR_e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2
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_PurgOnAirMode 1	CeFADR_e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_NonSelectedCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR_e_Cell10_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2
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_PurgOffAirMode 1	CeFADR_e_Cell13_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_NonSelectedCell

Initial Supporting table - P219A Normalizer Bank1 Table

Description: Bank 1 Normalizer table 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	1,000	1,220	1,440	1,655	1,875	2,095	2,315	2,530	2,750	2,970	3,190	3,400	3,625	3,845	4,060	4,280	4,500
40	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
80	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
120	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
160	9,999.00	9,999.00	6.00	6.00	6.50	3.00	2.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
200	9,999.00	9,999.00	6.00	6.00	6.50	3.00	2.00	1.50	1.75	1.50	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
240	9,999.00	9,999.00	7.00	7.00	7.50	5.75	2.00	1.50	1.75	1.50	1.25	1.25	1.25	1.25	9,999.00	9,999.00	9,999.00
280	9,999.00	9,999.00	6.00	6.00	10.00	12.50	9.75	6.25	3.00	2.75	1.25	1.25	1.25	1.25	9,999.00	9,999.00	9,999.00
320	9,999.00	9,999.00	15.50	15.50	11.50	14.50	10.25	12.50	4.25	3.50	3.25	3.00	3.00	1.25	9,999.00	9,999.00	9,999.00
360	9,999.00	9,999.00	19.75	19.75	18.50	18.00	8.50	9.75	7.50	4.00	6.00	6.00	3.00	9,999.00	9,999.00	9,999.00	9,999.00
400	9,999.00	9,999.00	25.00	25.00	27.00	15.00	14.50	11.00	6.50	5.50	6.25	6.25	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
440	9,999.00	9,999.00	49.50	49.50	30.00	34.00	19.50	4.50	10.00	5.50	6.25	6.25	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
480	9,999.00	9,999.00	49.50	49.50	30.00	15.50	19.50	4.50	10.00	10.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
520	9,999.00	9,999.00	9,999.00	9,999.00	15.50	15.50	15.50	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
560	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
640	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
720	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
800	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00

Initial Supporting table - P219A Quality Factor Bank1 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	1,000	1,220	1,440	1,655	1,875	2,095	2,315	2,530	2,750	2,970	3,190	3,400	3,625	3,845	4,060	4,280	4,500
40	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
80	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
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	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
240	0.00	0.00	0.00	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	0.00
280	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
320	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	0.00
360	0.00	0.00	0.00	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
400	0.00	0.00	0.00	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
440	0.00	0.00	0.00	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	0.00
480	0.00	0.00	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
520	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
560	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
640	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
720	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 - P219A Variance Threshold Bank1 Table

Description: Bank 1 lookup table of Variance metric used to calculate the Ratio for the current sample period

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

y/x	1,000	1,220	1,440	1,655	1,875	2,095	2,315	2,530	2,750	2,970	3,190	3,400	3,625	3,845	4,060	4,280	4,500
40	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
80	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
120	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
160	9,999.00	9,999.00	8.00	8.00	6.50	4.75	4.75	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
200	9,999.00	9,999.00	8.00	8.00	6.50	4.75	5.00	4.25	3.25	3.25	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
240	9,999.00	9,999.00	10.00	10.00	8.50	6.25	5.00	4.25	3.25	3.25	2.75	3.50	2.75	2.75	9,999.00	9,999.00	9,999.00
280	9,999.00	9,999.00	12.50	12.50	10.00	8.00	6.25	5.25	4.00	3.25	2.75	3.50	2.75	2.75	9,999.00	9,999.00	9,999.00
320	9,999.00	9,999.00	12.50	12.50	10.50	9.50	7.25	6.00	4.75	3.50	3.50	4.00	2.75	2.75	9,999.00	9,999.00	9,999.00
360	9,999.00	9,999.00	14.25	14.25	11.50	8.50	15.00	6.75	5.50	5.50	4.50	4.00	4.00	9,999.00	9,999.00	9,999.00	9,999.00
400	9,999.00	9,999.00	16.50	16.50	12.50	15.00	13.50	9.00	9.50	7.50	7.25	7.25	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
440	9,999.00	9,999.00	14.50	14.50	13.50	16.00	15.50	17.50	13.00	7.50	7.25	7.25	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
480	9,999.00	9,999.00	14.50	14.50	13.50	19.50	15.50	17.50	13.00	13.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
520	9,999.00	9,999.00	9,999.00	9,999.00	19.50	19.50	19.75	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
560	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
640	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
720	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
800	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00

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	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	100.00
1.00	14.59	23.23	37.01	70.16	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	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	100.00
1.00	45.39	48.91	57.40	70.57	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	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00

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	511.99	511.99	511.99	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

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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	0.352	0.352	0.352	0.352	0.401	0.768	1.052	1.273	1.485	1.642	1.783	1.881	1.948	1.953	1.953	1.948	1.948

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_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	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_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	500.000	500.000	1,000.000	8,191.875	8,191.875	8,191.875	

Initial Supporting table - P0606_Program Sequence Watch Enable f(Core, Loop Time)

Description: The enabling flags for the program sequence watch as a function of processor core and operating loop time sequence.

Value Units: PSW enable flag (boolean)
X Unit: Processor Core (enum)
Y Units: Operating Loop Time Sequence (enum)

y/x	CeTSKR_e_CPU	CeTSKR_e_CPU2	CeTSKR_e_CPU3	CeTSKR_e_CPU4
CePISR_e_5msSeq	0	0	0	0
CePISR_e_6p25msSeq	1	1	0	0
CePISR_e_10msSeq	0	0	0	0
CePISR_e_12p5msSeq	1	1	0	0
CePISR_e_20msSeq	0	0	0	0
CePISR_e_25msSeq	1	1	0	0
CePISR_e_40msSeq	0	0	0	0
CePISR_e_50msSeq	0	0	0	0
CePISR_e_80msSeq	0	0	0	0
CePISR_e_100msSeq	0	0	0	0
CePISR_e_EventA_Seq	0	1	0	0
CePISR_e_EventB_Seq	0	0	0	0
CePISR_e_EventC_Seq	0	0	0	0

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_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	5	3	5	3	5	3	5

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	5	5	5	3	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_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	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	45.39	45.39	45.39	45.39	45.39	45.39

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	-20.00	-10.00	0.00	50.00	90.00
480.00	72.42	66.97	73.50	81.35	44.86	24.89
580.00	72.42	66.97	73.50	81.35	44.86	24.89
680.00	68.72	64.36	71.51	80.02	41.98	19.27
730.00	70.57	66.14	73.18	81.55	44.36	18.46
780.00	72.42	66.97	73.50	81.35	44.86	17.38
830.00	74.66	67.66	74.16	81.69	45.24	16.24
880.00	77.16	68.26	75.05	82.38	45.54	15.03
980.00	88.44	74.77	77.69	81.74	42.17	10.65
1,100.00	88.07	74.16	76.45	80.07	38.29	11.60
1,200.00	85.73	72.57	75.23	79.23	35.33	13.54
1,500.00	72.66	65.64	64.48	63.61	30.16	22.66
2,000.00	31.67	24.78	20.07	15.71	-12.37	-12.37
2,500.00	-72.34	-72.34	-72.34	-72.34	-72.34	-72.34
3,000.00	-79.57	-79.57	-79.57	-79.57	-79.57	-79.57
4,000.00	-86.81	-86.81	-86.81	-86.81	-86.81	-86.81
5,000.00	-94.04	-94.04	-94.04	-94.04	-94.04	-94.04
6,400.00	-101.28	-101.28	-101.28	-101.28	-101.28	-101.28

Initial Supporting table - P0324_PerCyl_ExcessiveKnock_Threshold

Description: Fail threshold for the Knock Performance per-cylinder Excessive Knock Diagnostic

Value Units: Filtered Knock Intensity. Unit-less term scaled from 0.0 (no knock) to 5.0 (maximum/large knock)
X Unit: Engine Speed (RPM)
Y Units: N/A

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	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94	15.94

Initial Supporting table - P0325_P0330_OpenCktThrshMax (20 kHz)

Description: Knock Open Circuit Diagnostic Maximum Threshold when using the 20 kHz method (see "OpenMethod" description)

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine Speed (RPM).
Y Units: N/A

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	3.9746	3.9746	3.9512	3.9512	3.9316	3.8965	3.8867	3.8887	3.8867	3.5352	3.2363	2.9375	2.7422	2.7422	2.7422	2.7422	2.7422

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).

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

Initial Supporting table - P0325_P0330_OpenCktThrshMin (20 kHz)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the 20 kHz method (see "OpenMethod" description)

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine (RPM)
Y Units: N/A

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	1.3535	1.3535	1.3438	1.3438	1.3223	1.3184	1.3203	1.3223	1.3242	1.2285	1.1348	1.0273	0.9785	0.9785	0.9785	0.9785	0.9785

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).

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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.

Value Units: Identifies one of two diagnostic methods (either 20 kHz or Normal Noise) used (as a function of engine speed) for Open Circuit detection
X Unit: Engine Speed Index, 500 to 8500 (RPM) by 500 rpm increments (Index 0, 1, 2.... 16 = 500, 1000, 1500.... 8500 RPM)
Y Units: N/A

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)

Value Units: Boolean that indicates which engine cylinders are being used for the per-sensor Knock Performance diagnostic (0 = not used, 1 = used)
X Unit: Cylinder number in firing order (i.e. Cyl 0 = first cylinder in firing order, Cyl 1 = second cylinder in firing order....)
Y Units: N/A

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

Initial Supporting table - P0326_P0331_AbnormalNoise_Threshold

Description: Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine is NOT in AFM mode

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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	0.352	0.352	0.352	0.352	0.401	0.768	1.052	1.273	1.485	1.642	1.783	1.881	1.948	1.953	1.953	1.948	1.948

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.

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

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	0.090	0.090	0.090	0.094	0.131	0.123	0.139	0.150	0.164	0.221	0.260	0.264	0.338	0.338	0.338	0.338	0.338

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.

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine Speed (RPM).
Y Units: N/A

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	0.031	0.031	0.031	0.035	0.039	0.047	0.055	0.061	0.066	0.094	0.111	0.113	0.154	0.154	0.154	0.154	0.154

Bundle Name: 5VoltReferenceB_FA
P0651
Bundle Name: 5VoltReferenceMAP_OOR_Flt
P0697
Bundle Name: A/F Imbalance Bank1
P219A
Bundle Name: AAP_SnsrCktFA
Naturally aspirated: P2228, P2229. Turbocharged: P0237, P0238
Bundle Name: AAP_SnsrCktFP
Naturally aspirated: P2228, P2229. Turbocharged: P0237, P0238
Bundle Name: AAP_SnsrFA
Naturally Aspirated: P2227, P2228, P2229, P2230. Turbocharged: P0237, P0238.
Bundle Name: AAP2_SnsrCktFA
P2228, P2229
Bundle Name: AAP2_SnsrCktFP
P2228, P2229
Bundle Name: AAP2_SnsrFA
P2227, P2228, P2229, P2230
Bundle Name: AccCktLo_FA
P2537
Bundle Name: AcceleratorPedalFailure
P2122, P2123, P2127, P2128, P2138, P0697, P06A3
Bundle Name: AfterThrottlePressureFA
Naturally Aspirated or Turbocharged: P0106, P0107, P0108. Supercharged: P012B, P012C, P012D.
Bundle Name: AIR System FA
P0411, P2440, P2444
Bundle Name: AmbientAirDefault
Baro Sensor Present: P2227, P2228, P2229, P2230. No Baro Sensor Present: P0101, P0102, P0103, P0106, P0107, P0108, P0111, P0112, P0113, P0114, P0121, P0122, P0123, P012B, P012C, P012D, P0222, P0223, P1221
Bundle Name: AmbPresDfltdStatus
Baro Sensor Present: P2227, P2228, P2229, P2230. No Baro Sensor Present: P0101, P0102, P0103, P0106, P0107, P0108, P0111, P0112, P0113, P0114, P0121, P0122, P0123, P012B, P012C, P012D, P0222, P0223, P1221
Bundle Name: AmbPresSnsrCktFA
P2228, P2229
Bundle Name: AnyCamPhaser_FA
P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024, P2088, P2089, P2090, P2091, P2092, P2093, P2094, P2095, P05CC, P05CD, P05CE, P05CF,

Bundle Name: AnyCamPhaser_TFTKO
P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024, P2088, P2089, P2090, P2091, P2092, P2093, P2094, P2095, P05CC, P05CD, P05CE, P05CF,
Bundle Name: BrakeBoosterSensorCktFA
P0557, P0558
Bundle Name: BSTR_b_BoostSnsrFA
P0106, P0107, P0108, P2228, P2229, P0236
BSTR_b_BoostSnsrFA - Other Definitions: Turbo Charger: P2228, P2229, P0236 Super Charger: P0106, P0107, P0108
Bundle Name: BSTR_b_PCA_CktFA
P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P0247, P0249, P0250
Bundle Name: BSTR_b_PCA_TFTKO
P0234, P0299, P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P2261, P0247, P0249, P0250
Bundle Name: BSTR_b_TurboBypassCktFA
P0033, P0034, P0035, P00C0, P00C1, P00C2
Bundle Name: CamLctnExhFA
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: CamLctnIntFA
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: CamSensorAnyLctnTFTKO
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensorAnyLocationFA
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: ClutchPstnSnsr FA
P08A8, P0806(pre2018), P08A9, P0807(Pre2018), P08AA, P0808(Pre2018)
Bundle Name: CrankSensor_FA
P0335, P0336
Bundle Name: CrankSensor_TFTKO
P0335, P0336
Bundle Name: ECT_Sensor_Ckt_FA
P0117, P0118
Bundle Name: ECT_Sensor_Ckt_FP
P0117, P0118
Bundle Name: ECT_Sensor_Ckt_TFTKO
P0117, P0118
Bundle Name: ECT_Sensor_DefaultDetected
P0116, P0117, P0118, P0119, P111E
Bundle Name: ECT_Sensor_FA

P0116, P0117, P0118, P0119, P0128, P111E
Bundle Name: ECT_Sensor_Perf_FA
P0116, P111E
Bundle Name: EGRValve_FP
P0405, P0406, P042E
Bundle Name: EGRValveCircuit_FA
P0403, P0404, P0405, P0406, P0489, P0490, P042E, P1426, P1437
Bundle Name: EGRValvePerformance_FA
P0404, P042E, P0401
Bundle Name: EngineMisfireDetected_FA
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308
Bundle Name: EngineModeNotRunTimer_FA
P2610
Bundle Name: EngineModeNotRunTimerError
P2610
Bundle Name: EnginePowerLimited
P0068, P00C8, P00C9, P00CA, P0090, P0091, P0092, P0122, P0123, P0191, P0192, P0193, P0222, P0223, P0601, P0604, P0606, P0697, P06A3, P06DB, P06D2, P06DE, P0A1D, P1104, P127A, P127C, P127D, P135A, P135B, P15F2, P160D, P160E, P1682, P16A0, P16A1, P16A2, P16A7, P16F3, P2100, P2101, P2102, P2103, P2122, P2123, P2127, P2128, P2135, P2138, P215B, P2176, P228C, P228D, U0073, U0074, U0293, U1817
Bundle Name: EngineTorqueEstInaccurate
EngineMisfireDetected_FA, FuelInjedtorCircuit_FA, FuelInjedtorCircuit_TFTKO, FuelTrimSystemB1_FA, FuelTrimSystemB2_FA, MAF_SensorTFTKO, MAP_SensorTFTKO, EGRValvePerformance_FA, P16F3
EngineTorqueEstInaccurate - Other Definitions: P16F3 with GetXOYR_b_SecurityFlt (CeXOYR_e_MAPR_AfterThrotPresFlt, CeXOYR_e_MAPR_EngineVacuumFlt, CeXOYR_e_MAPR_IntkMnfdPresFlt, CeXOYR_e_MAFR_Ahead1vs2FinalFlt)
Bundle Name: EngOilPressureSensorCktFA
P0522, P0523
Bundle Name: EngOilPressureSensorFA
P0521, P0522, P0523
Bundle Name: EngOilTempFA
EngOilTempSensorCircuitFA, EngOilModeledTempValid, P16F3
EngOilTempFA - Other Definitions: P16F3 with GetXOYR_b_SecurityFlt(CeXOYR_e_EOTR_SecurityFlt)
Bundle Name: Ethanol Composition Sensor FA
P0178, P0179, P2269
Bundle Name: EvapEmissionSystem_FA
P0455, P0446
Bundle Name: EvapExcessPurgePsbl_FA
ELCP sealed/vented fuel system, P0442, P0455, P0458 OR Conventional fuel system, P0442, P0455, P0458, P0496

Bundle Name: EvapFlowDuringNonPurge_FA
P0496
Bundle Name: EvapPurgeSolenoidCircuit_FA
P0443, P0458, P0459
Bundle Name: EvapSmallLeak_FA
P0442
Bundle Name: EvapVentSolenoidCircuit_FA
P0449, P0498, P0499
Bundle Name: FHPR_b_FRP_SnsrCkt_FA
P0192, P0193, P127C, P127D, P16E4, P16E5, P128A, P128B, 128F
Bundle Name: FHPR_b_FRP_SnsrCkt_TFTKO
P0192, P0193, , P127C, P127D, P16E4, P16E5, P128A, P128B, 128F
Bundle Name: FHPR_b_PumpCkt_FA
P0090, P0091, P0092, P00C9, P00CA, P10E8
Bundle Name: FHPR_b_PumpCkt_TFTKO
P0090, P0091, P0092, P00C9, P00CA, P10E8
Bundle Name: FuelInjectorCircuit_FA
PFI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283 SIDI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F
Bundle Name: FuelInjectorCircuit_TFTKO
PFI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283 SIDI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F
Bundle Name: FuelLevelDataFault
P0461, P0462, P0463, P2066, P2067, P2068
FuelLevelDataFault - Other Definitions: AccCktLo_FA
Bundle Name: FuelPumpRlyCktFA
P0627, P0628, P0629
Bundle Name: FuelTankPressureSnsrCkt_FA
P0452, P0453
Bundle Name: FuelTrimSystemB1_FA
P0171, P0172, P11E9, P11EA, P2178
Bundle Name: FuelTrimSystemB2_FA
P0174, P0175, P11EB, P11EC, P2179
Bundle Name: FULR_b_FPV_MeasDiag_TFTKO

P02EE, P02EF, P02F0, P02F1, P02F2, P02F3, P02F4, P02F5, P30D4
Bundle Name: HumTempSnsrCktFA
P0097, P0098
Bundle Name: IAC_SystemRPM_FA
P0506, P0507
Bundle Name: IAT_SensorCircuitFA
P0112, P0113
Bundle Name: IAT_SensorCircuitFP
P0112, P0113
Bundle Name: IAT_SensorFA
P0111, P0112, P0113, P0114
Bundle Name: IAT_SensorTFTKO
P0111, P0112, P0113, P0114
Bundle Name: IgnitionOffTimeValid
P2610
Bundle Name: IgnitionOutputDriver_FA
P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, P2316, P2318, P2319, P2321, P2322
Bundle Name: MAF_SensorCircuitFA
P0102, P0103, P010C, P010D
Bundle Name: MAF_SensorFA
P0101, P0102, P0103, P010B, P010C, P010D
Bundle Name: MAF_SensorTFTKO
P0101, P0102, P0103, P010B, P010C, P010D
Bundle Name: MAP_EngineVacuumStatus
P0106, P0107, P0108 Fault Active OR P0107, P0108 Fault Pending
Bundle Name: MAP_SensorCircuitFA
P0107, P0108
Bundle Name: MAP_SensorCircuitFP
P0107, P0108
Bundle Name: MAP_SensorFA
P0106, P0107, P0108
Bundle Name: MAP_SensorTFTKO
P0106, P0107, P0108
Bundle Name: MnfdTempSensorCktFA
Turbocharged or Supercharged, with Humidity sensor: P00EA, P00EB. Turbocharged or Supercharged, without Humidity sensor: P0097, P0098. Naturally Aspirated: P0112, P0113.
Bundle Name: MnfdTempSensorCktFP
Turbocharged or Supercharged, with Humidity sensor: P00EA, P00EB. Turbocharged or Supercharged, without Humidity sensor: P0097, P0098. Naturally Aspirated: P0112, P0113.

Bundle Name: MnfdTempSensorFA
Turbocharged or Supercharged, with Humidity sensor: P00E9, P00EA, P00EB, P00EC. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.
Bundle Name: O2S_Bank_ 1_TFTKO
P0131, P0132, P0134, P2195, P2196, P2A00 (With WRAF sensor add: P0030, P0031, P0032, P064D, P0135, P2237, P223C, P223E, P2243, P2251, P2626)
Bundle Name: O2S_Bank_ 2_TFTKO
P0151, P0152, P0154, P2197, P2198, P2A03 (With WRAF sensor add: P0050, P0051, P0052, P064E, P0155, P223D, P223F, P2240, P2247, P2254, P2629)
Bundle Name: O2S_Bank_1_Sensor_1_FA
P2A00, P0131, P0132, P0133, P0134, P0135, P0053, P1133, P015A, P015B, P0030
Bundle Name: O2S_Bank_1_Sensor_2_FA
P013A, P013B, P013E, P013F, P2270, P2271, P0137, P0138, P0140, P0141, P0054, P0036
Bundle Name: O2S_Bank_2_Sensor_1_FA
P2A03, P0151, P0152, P0153, P0154, P0155, P0059, P1153, P015C, P015D, P0050
Bundle Name: O2S_Bank_2_Sensor_2_FA
P013C, P013D, P014A, P014B, P2272, P2273, P0157, P0158, P0160, P0161, P0060, P0056
Bundle Name: OAT_PtEstFiltFA
ECM OAT: P0071, P0072, P0073, P0074, EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected, MAF_SensorFA. VIMC OAT: P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: VehicleSpeedSensor_FA, IAT_SensorFA, MAF_SensorFA. All other cases: EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected.
Bundle Name: OAT_PtEstRawFA
ECM OAT: P0071, P0072, P0073, P0074. VIMC OAT: P0071, P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: IAT_SensorFA. All other cases: IAT_SensorFA, ECT_Sensor_DefaultDetected.
Bundle Name: OilPmpTFTKO
P06DA, P06DB, P06DC, P06DD, P06DE
OilPmpTFTKO - Other Definitions: TFTKO only for Output Driver and rationality
Bundle Name: PowertrainRelayFault
P1682, P16A7, P16BC
Bundle Name: PowertrainRelayStateOn_FA
P0685, P0686, P0687
Bundle Name: TC_BoostPresSnsrCktFA
P0237, P0238
Bundle Name: TC_BoostPresSnsrFA
P0236, P0237, P0238
Bundle Name: THMR_AHV_FA
P2681, P26A3, P26A6, P26A7, P26A9
THMR_AHV_FA - Other Definitions:
Bundle Name: THMR_AWP_AuxPumpFA

B269A, B269C, B269D
Bundle Name: THMR_RCT_Sensor_Ckt_FA
P00B3, P00B4
Bundle Name: THMR_SWP_Control_FA
P261A, P261D, P261C
Bundle Name: THMR_SWP_FlowStuckOn_FA
P261A, P261D, P261E
Bundle Name: THMR_SWP_NoFlow_FA
P261B, P261C
Bundle Name: TPS_FA
P0122, P0123, P0222, P0223, P16A0, P16A1, P16A2, P2135
Bundle Name: TPS_Performance_FA
P0068, P0121, P1104, P2100, P2101, P2102, P2103
Bundle Name: TPS_ThrottleAuthorityDefaulted
P0068, P0122, P0123, P0222, P0223, P16F3, P16A0, P16A1, P16A2, P1104, P2100, P2101, P2102, P2103, P2135
Bundle Name: Transmission Oil Temperature Validity
P0667, P0668, P0669, P0711, P0712, P0713
Bundle Name: Transmission Output Shaft Angular Velocity Validity
P0722, P0723, P077C, P077D
Bundle Name: Transmission Turbine Angular Velocity Validity
P0716, P0717, P07BF, P07C0
Bundle Name: TransmissionEngagedState_FA
P1824, P182A, P182B, P182C, P182D, P182E, P182F, P1838, P1839, P1840, P1841, P18B5, P18B6, P18B7, P18B8, P18B9, P18BA, P18BB, P18BC, P18BD, P18BE, P18BF, P18C0, P18C1, P18C2, P18C3, P1915
Bundle Name: VehicleSpeedSensor_FA
P0502, P0503, P0722, P0723
Bundle Name: WRAF_Bank_1_FA
P0131, P0132, P064D, P223C, P223E, P2626(P2237, P2243, P2251 added in 18.18.123)
Bundle Name: WRAF_Bank_2_FA
P0151, P0152, P064E, P223D, P223F, P2629(P2240, P2247, P2254 added in 18.18.123)

Bundle Name: A/F Imbalance Bank2
P219B
Bundle Name: AAP3_SnsrCktFA
P222C, P222D
Bundle Name: AAP3_SnsrCktFP
P222C, P222D
Bundle Name: AmbPresSnsr2_CktFA
P222C, P222D
Bundle Name: AIRPumpControlCircuit FA
P0418, P2257, P2258
Bundle Name: AIRSystemPressureSensor FA
P2430, P2431, P2432, P2433, P2435, P2436, P2437, P2438
Bundle Name: AIRValveControlCircuit FA
P0412, P041F, P044F
Bundle Name: CatalystSysEfficiencyLoB1_FA
P0420
Bundle Name: CatalystSysEfficiencyLoB2_FA
P0430
Bundle Name: ClutchPstnSnsrCktHi FA
P0808, P08AA
Bundle Name: ClutchPstnSnsrCktLo FA
P0807, P08A9
Bundle Name: ClutchPstnSnsrNotLearned
P080A
Bundle Name: MAF_Snsr2_FA
P010B, P010C, P010D
Bundle Name: SCIAP_SensorCircuitFA
P012C, P012D
Bundle Name: SCIAP_SensorCircuitFP
P012C, P012D
Bundle Name: SCIAP_SensorFA
P012B, P012C, P012D
Bundle Name: TransmissionOutputRotationalStatusValidity
P0722, P0723, P077C, P077D
Bundle Name: UCAP_RmdlActFltFA
P01067, P1068, P1069, P106A, P106B, P106C, P106E, P106F, P1070, P1071, P1072, P1073, P1074, P1075, P1076, P1077, P1078, P1079, P107A, P107B, P107C, P107E, P107F, P1080, P1081, P108A, P108B, P108C, P108D, P108E, P108F, P1090, P1091
Bundle Name: UCAP_TempOOR_FA

P105B, P0105C, P005E, P105F, P1061, P1062
Bundle Name: UCAP_TempRatFA
P105D, P1060, P1063

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Fuel Rail Pressure (FRP) Sensor Performance (rationality)	P018B	This DTC detects a fuel pressure sensor response stuck within the normal operating range	Absolute value of fuel pressure change as sensed during intrusive test.	<= 30 kPa	1. FRP Circuit Low DTC (P018C) 2. FRP Circuit High DTC (P018D) 3. FuelPump Circuit Low DTC (P0231) 4. FuelPump Circuit High DTC (P0232) 5. FuelPump Circuit Open DTC (P023F) 6. Reference Voltage DTC (P0641) 7. Fuel Pump Control Module Driver Over-temperature DTC (P064A) 8. Control Module Internal Performance DTC (P0606) 9. Engine run time 10. Emissions fuel level low (PPEI $3FB) 11. Fuel pump control 12. Fuel pump control state 13. Engine fuel flow 14. ECM fuel control system failure (PPEI $1E7)	1. Not active 2. Not active 3. Not active 4. Not active 5. Not active 6. Not active 7. Not active 8. Not active 9. >=5 seconds 10. Not low 11. Enabled 12. Normal or FRP rationality control 13. > 0.047 g/s 14. Not failed	Frequency: Continuous; 12.5 ms loop. 60 seconds between intrusive tests that pass Intrusive test requested if fuel system is clamped for >= 5 seconds or fuel pressure error variance <= typically (0.3 to 0.6) (calculated over a 2.5sec period); otherwise report Duration of intrusive test is fueling related (5 to 12 seconds). Intrusive test is run when fuel flow is below Max allowed fuel flow rate (Typical values in the range of 11 to 50 g/s)	DTC Type B 2 trips
Fuel Rail Pressure (FRP) Sensor Circuit Low Voltage	P018C	This DTC detects if the fuel pressure sensor circuit is shorted low	FRP sensor voltage	< 0.14 V	Ignition	Run or Crank	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Fuel Rail Pressure (FRP) Sensor Circuit High Voltage	P018D	This DTC detects if the fuel pressure sensor circuit is shorted high	FRP sensor voltage	> 4.86 V	Ignition	Run or Crank	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type B 2 trips
Fuel Pump Control Circuit Low Voltage	P0231	This DTC detects if the fuel pump control circuit is shorted to low	Fuel Pump Current	> 14.48A	Ignition switch OR Ignition switch OR Fuel Pump Control AND Ignition Run/Crank Voltage	Run or Crank Accessory enabled 9V < voltage < 32V	72 test failures in 80 test samples if Fuel Pump Current <100A 1 sample/12.5 ms	DTC Type A 1 trip
Fuel Pump Control Circuit High Voltage	P0232	This DTC detects if the fuel pump control circuit is shorted to high	Voltage measured at fuel pump circuit	> 3.86 V	Commanded fuel pump output Fuel pump control enable Time that above conditions are met	0% duty cycle (off) False >=4.0 seconds	36 test failures in 40 test samples; 1 sample/12.5ms Pass/Fail determination made only once per trip	DTC Type B 2 trips
Fuel Pump Control Circuit (Open)	P023F	This DTC detects if the fuel pump control circuit is open	Fuel Pump Current AND Fuel Pump Duty Cycle	<=0.5A >20%	Ignition switch OR Ignition switch OR Fuel Pump Control AND Ignition Run/Crank Voltage	Run or Crank Accessory enabled 9V < voltage < 32V	72 test failures in 80 test samples; 1 sample/12.5ms	DTC Type A 1 trip
Fuel System Control Module Enable Control Circuit	P025A	This DTC detects if there is a fault in the fuel pump control enable circuit	PPEI (Powertrain Platform Electrical Interface) Fuel System Request ($1E7)	≠ Fuel Pump Control Module Enable Control Circuit	Ignition AND PPEI Fuel System Request ($1E7)	Run or Crank valid	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type A 1 trip
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if any software or calibration check sum is incorrect	Calculated Checksum (CRC16)	≠ stored checksum for any of the parts (boot, software, application calibration, system calibration)	Ignition switch OR	Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle, otherwise 5 failures Frequency: Runs continuously in the background	DTC Type A 1 trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					Ignition switch	Accessory		
Control Module Not Programmed	P0602	Indicates that the ECU needs to be programmed	Calibration KeMEMD_b_NoStartCal	= TRUE	Ignition switch OR Ignition switch	Run or Crank Accessory	Runs once at power up	DTC Type A 1 trip
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error at controller power-up	Checksum at power-up	≠ checksum at power-down	Ignition switch OR Ignition switch	Run or Crank Accessory	1 failure Frequency: Once at power-up	DTC Type A 1 trip
Control Module Random Access Memory (RAM)	P0604	Indicates that control module is unable to correctly write and read data to and from RAM	Data read	≠ Data written	Ignition switch OR Ignition switch	Run or Crank Accessory	1 failure if it occurs during the first RAM test of the ignition cycle, otherwise 5 failures Frequency: Runs continuously in the background.	DTC Type A 1 trip
Control Module Internal Performance	P0606	Indicates the ECU has detected an internal processor fault or external watchdog fault (PID $2032 discriminates the source of fault)			Ignition switch OR Ignition switch	(Run or Crank) OR Accessory		DTC Type A 1 trip
1. Main Processor Configuration Register Test			1. I/O configuration register faults: •Register contents	 =Incorrect value	1. For all I/O configuration register faults: Calibration •KeMEMD_b_ProcFltCfgRegEnbl	 TRUE	1. 1 failure Frequency: Continuously (12.5ms)	
2. Processor clock test			2. Processor Clock Fault: • EE latch flag in EEPROM OR • RAM latch flag.	 0x5A5A 0x5A	2. For Processor Clock Fault: Calibration •KeMEMD_b_ProcFltCLKDiagEnbl	 TRUE	2. 1 failure Frequency: Continuously (12.5ms)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
3. External watchdog test			3. External Watchdog Fault: • Software control of fuel pump driver	Control Lost	3. For External Watchdog Fault: Calibration •KeFRPD_b_FPExtWDogDiagEnbl AND •Control Module ROM(P0601) AND •Control Module RAM(P0604)	TRUE Not active Not active	3. 3 failures out of 15 samples 1 sample/12.5 ms	
Control Module Long Term Memory (EEPROM) Performance	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write	Did not complete	Ignition switch OR Ignition switch	(Run or Crank) OR Accessory	1 test failure Once on controller power-up	DTC Type B 2 trips
5Volt Reference Circuit (Short High/Low/Out of Range)	P0641	Detects continuous short or out of range on the #1 5V sensor reference circuit	(Reference voltage AND Output) OR (Reference voltage AND Output) OR (Reference voltage AND Output) OR	(>= 0.5V inactive) (>= 5.5V active) (<= 4.5V active)	Ignition	Run or Crank	15 failures out of 20 samples 1 sample/12.5 ms	DTC Type A 1 trip
			Reference voltage	> 105% nominal OR < 95% nominal (i.e., > 5.25v OR < 4.75v)				
Fuel Pump Control Module Driver 1 Over-temperature	P064A	Detects if an internal fuel pump driver overtemperature condition exists under normal operating conditions	Pump Driver Temp	> 150C	Ignition switch OR Ignition switch	(Run or Crank) OR Accessory	3 failures out of 15 samples 1 sample/12.5 ms	DTC Type B 2 trips
					KeFRPD_b_FPOverTempDiagEnbl	TRUE		
					Ignition Run_Crank terminal	9V<voltage<32V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Cylinder Deactivation Exhaust Flow Valve Control Circuit/Open	P12E3	Monitors for open circuit faults in the AFM valve PWM control circuit	Open circuit fault status AFM_VlvCntrlCktOpenFlt	== Faulted	1. Diagnostic enabled (K_b_AFM_VlvCntrlOpenEnbl) AND 2. Diagnostic system disablement not requested (DiagSystemDisable) AND 3. AFM Valve Initialization complete (AFM_ValveInitDlyCmpt) AND 4. AFM exhaust valve control not disabled remainder of trip due to output driver short circuit fault (AFMV_FaultTripDsbl) AND 5. AFM control circuit Open circuit fault status (AFM_VlvCntrlCktOpenFlt)	1. = TRUE AND 2. <> TRUE AND 3. = TRUE AND 4. <> TRUE AND 5. <> INDETERMINATE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Control Circuit Low	P12E4	Monitors for short-to-ground faults in the AFM valve PWM control circuit	Short-to-ground fault status AFM_VlvCntrlCktGshtFlt	== Faulted	1. Diagnostic enabled (K_b_AFM_VlvCntrlGshtEnbl) AND 2. Diagnostic system disablement not requested (DiagSystemDisable) AND 3. AFM Valve Initialization complete (AFM_ValveInitDlyCmpt) AND 4. AFM exhaust valve control not disabled for remainder of trip due to output driver short circuit fault (AFMV_FaultTripDsbl) AND 5. AFM control circuit Short-to-ground fault status not indeterminate (AFM_VlvCntrlCktGshtFlt)	1. = TRUE AND 2. <> TRUE AND 3. = TRUE AND 4. <> TRUE AND 5. <> INDETERMINATE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Cylinder Deactivation Exhaust Flow Valve Control Circuit High	P12E5	Monitors for short-to-power faults in the AFM valve PWM control circuit	Short-to-power fault status AFM_VlvCntrlCktPshtFlt	== Faulted	1. Diagnostic enabled (K_b_AFM_VlvCntrlPshtEnbl) AND 2. Diagnostic system disablement not requested (DiagSystemDisable) AND 3. AFM Valve Initialization complete (AFM_ValveInitDlyCmpt) AND 4. AFM exhaust valve control not disabled remainder of trip due to output driver short circuit fault (AFMV_FaultTripDsbl) AND 5. AFM control circuit Short-to-power fault status not indeterminate (AFM_VlvCntrlCktPshtFlt)	1. = TRUE AND 2. <> TRUE AND 3. = TRUE AND 4. <> TRUE AND 5. <> INDETERMINATE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Feeback Circuit Low Duty Cycle (Bank 1)	P12E7	Monitors for out-of-range low duty cycle values on the AFM valve 1 diagnostic PWM feedback signal	AFM valve 1 diagnostic PWM feedback signal AFM_Valve1FdbkDC	< K_Pct_AFM_Vlv1PstnLoThrsh)	1. Diagnostic enabled (K_b_AFM_Vlv1PstnLoDiagEnbl) AND 2. AFM valve initialization complete (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Feedback Circuit High Duty Cycle (Bank 1)	P12E8	Monitors for out-of-range high duty cycle values on the AFM valve 1 diagnostic PWM feedback signal	AFM valve 1 diagnostic PWM feedback signal AFM_Valve1FdbkDC	> K_Pct_AFM_Vlv1PstnHiThrsh	1. Diagnostic enabled (K_b_AFM_Vlv1PstnHiDiagEnbl) AND 2. AFM valve initialization completed (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Cylinder Deactivation Exhaust Flow Valve Open Position (Bank 1)	P12E9	Monitors the sensed AFM valve 1 position for values that are out-of-range low	AFM_Valve1State	<= ValvePstnOOR_Low)	1. Diagnostic enabled (K_b_AFM_Vlv1PstnOOR_LoEnbl) AND 2. AFM valve initialization period completed (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable) AND 4. AFM valve 1 position sensor circuit low diagnostic not faulted (AFM_Valve1PstnLoFP) AND 5. AFM valve 1 position sensor circuit high diagnostic not faulted (AFM_Valve1PstnHiFP)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE AND 4. <> TRUE AND 5. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Closed Position (Bank 1)	P12EA	Monitors the sensed AFM valve 1 position for values that are out-of-range high	AFM_Valve1State	>= ValvePstnOOR_High)	1. Diagnostic enabled (K_b_AFM_Vlv1PstnOOR_LoEnbl) AND 2. AFM valve initialization completed (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable) AND 4. AFM valve 1 position sensor circuit low diagnostic not faulted (AFM_Valve1PstnLoFP) AND 5. AFM valve 1 position sensor circuit high diagnostic not faulted (AFM_Valve1PstnHiFP)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE AND 4. <> TRUE AND 5. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Feedback Circuit Low Frequency (Bank 1)	P12EB	Monitors for out-of-range high period (i.e. out-of-range low frequency) values on the AFM valve 1 diagnostic PWM feedback signal	Diagnostic PWM feedback signal_AFM_Valve1DiagFdbkSt	>= DiagFdbkPrdHigh)	1. Diagnostic enabled (K_b_AFM_Vlv1FdbkHiDiagEnbl) AND 2. AFM valve initialization completed (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Cylinder Deactivation Exhaust Flow Valve Feedback Circuit High Frequency (Bank 1)	P12EC	Monitors for out-of-range low period (i.e. out-of range high frequency) values on the AFM valve 1 diagnostic PWM feedback signal	Diagnostic PWM feedback signal_AFM_Valve1DiagFdbkSt	< = DiagFdbkPrdLow)	1. Diagnostic enabled (K_b_AFM_Vlv1FdbkLoDiagEnbl) AND 2. AFM valve initialization completed (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Feedback Circuit Incorrect Frequency (Bank 1)	P12ED	Monitors for in-range errors that result when the sensed period of the diagnostic PWM feedback signal for AFM valve 1 is neither out-of-range low nor out-of-range high and does not fall within any of the calibrated ranges defined for diagnostic feedback data	Diagnostic PWM feedback signal_AFM_Valve1DiagFdbkSt	= DiagFdbkPrdInRngErr)	1. Diagnostic enabled (K_b_AFMV1FdbkInvldDiagEnbl) AND 2. AFM valve initialization completed (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Stuck Closed (Bank 1)	P12EF	Monitors position feedback to determine if AFM valve 1 is stuck in the closed position	Position feedback AFM_Valve1State	<> AFM_ValveCmd	1. AFM valve1 stuck diagnostics enabled (K_b_AFM_Vlv1StuckDiagEnbl) AND 2. Ignition voltage (IgnitionVoltage) AND 3. AFM Valve initialization (AFM_ValveInitDlyCmpt) AND 4. AFM valve control circuit short-to-power diagnostic fault not active (AFM_VlvCntrlPshtFA) AND 5. AFM valve control circuit short-to-ground diagnostic fault not active (AFM_VlvCntrlGshtFA) AND 6. AFM valve control circuit open diagnostic fault not active (AFM_VlvCntrlOpenFA) AND	1. = TRUE AND 2. >= 10.2V AND 3. = TRUE AND 4. <> TRUE AND 5. <> TRUE AND 6. <> TRUE AND	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					7. AFM valve1 position sensor circuit low diagnostic fault not active (AFM_Valve1PstnLoFA) AND	7. <> TRUE AND		
					8. AFM valve1 position sensor circuit high diagnostic fault not active (AFM_Valve1PstnHiFA) AND	8. <> TRUE AND		
					9. AFM valve1 position out-of-range low diagnostic fault not active (AFM_Vlv1PstnOOR_LoFA) AND	9. <> TRUE AND		
					10. AFM valve1 position out-of-range high diagnostic fault not active (AFM_Vlv1PstnOOR_HiFA) AND	10. <> TRUE AND		
					11. Diagnostic system disablement (DiagSystemDisable) AND	11. <> TRUE AND		
					12. AFM exhaust valve control not disabled for remainder of trip due to output driver short circuit fault (AFMV_FaultTripDsbl) AND	12. <> TRUE AND		
					13. AFM valve command (AFM_ValveCmd) AND	13. (= OPEN OR = CLOSED) AND		
					14. AFM valve command not changed (AFM_ValveCmd) AND	14. = AFM_ValveCmdPrev AND		
					15. AFM valve response time (AFM_Valve1ResponseTmr ≥ Ke_t_AFM_Valve1ResponseTm) AND	15. >= 1 sec AND		
					16. AFM valve position not out-of-range (AFM_Valve1State)	16. (<> ValvePstnOOR_Low AND <> ValvePstnOOR_High)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Cylinder Deactivation Exhaust Flow Valve Stuck Open (Bank 1)	P12F0	Monitors position feedback to determine if AFM valve 1 is stuck in an open position	1. (AFM valve command AND AFM_Valve1State) OR 2. (AFM valve command AND AFM_Valve1State) OR 3. (AFM valve command AND AFM_Valve1State)	1. (= Open AND =ValveInTransition) OR 2. (= Closed AND = ValvePositionOpen) OR 3. (= Closed AND =ValveInTransition)	1. The AFM valve 1 stuck diagnostics are enabled through calibration (K_b_AFM_Vlv1StuckDiagEnbl = TRUE) AND	1. = TRUE AND	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
					2. Ignition voltage is greater than or equal to the minimum value required to enable diagnostic execution (IgnitionVoltage ≥ K_U_AFM_Vlv1StuckMinVolt) AND	2. >= 10.2 V		
					3. Sufficient time has been allowed for initialization of the AFM valve (AFM_ValveInitDlyCmpt = TRUE) AND	3. = TRUE AND		
					4. An AFM valve control circuit short-to-power diagnostic fault is not active (AFM_VlvCntrlPshtFA = FALSE) AND	4. <> TRUE AND		
					5. An AFM valve control circuit short-to-ground diagnostic fault is not active (AFM_VlvCntrlGshtFA = FALSE) AND	5. <> TRUE AND		
					6. An AFM valve control circuit open diagnostic fault is not active (AFM_VlvCntrlOpenFA = FALSE) AND	6. <> TRUE AND		
					7. An AFM valve 1 position sensor circuit low diagnostic fault is not active (AFM_Valve1PstnLoFA = FALSE) AND	7. <> TRUE AND		
					8. An AFM valve 1 position sensor circuit high diagnostic fault is not active (AFM_Valve1PstnHiFA = FALSE) AND	8. <> TRUE AND		
					9. An AFM valve 1 position out-of-range low diagnostic fault is not active (AFM_Vlv1PstnOOR_LoFA = FALSE) AND	9. <> TRUE AND		
					10. An AFM valve 1 position out-of-range high diagnostic fault is not active (AFM_Vlv1PstnOOR_HiFA = FALSE) AND	10. <> TRUE AND		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					11. Diagnostic system disablement is not being requested (DiagSystemDisable = FALSE) AND	11. <> TRUE AND		
					12. Control of the AFM exhaust valve has not been disabled for the remainder of the trip due to an output driver short circuit fault (AFMV_FaultTripDsbl = FALSE) AND	12. <> TRUE AND		
					13. The AFM valve is currently being commanded to the open or closed state (AFM_ValveCmd = Open OR AFM_ValveCmd = Closed) AND	13. (= OPEN OR = CLOSED) AND		
					14. The commanded state of the AFM valve has not changed (AFM_ValveCmd = AFM_ValveCmdPrev) AND	14. <> AFM_ValveCmdPrev AND		
					15. Sufficient time has been allowed for the AFM valve to respond to a change in the commanded AFM valve state (AFM_Valve1ResponseTmr ≥ Ke_t_AFM_Valve1ResponseTm) AND	15. >= 1 sec AND		
					16. The sensed position of the AFM valve is not out-of-range (AFM_Valve1State ≠ ValvePstnOOR_Low AND AFM_Valve1State ≠ ValvePstnOOR_High)	16. (<> ValvePstnOOR_Low AND <> ValvePstnOOR_High)		
Cylinder Deactivation Exhaust Flow Valve Position Not Learned (Bank 1)	P12F1	Monitors diagnostic feedback from AFM valve 1 to determine if the valve end stops have not been learned	AFM valve diagnostic feedback status (AFM_Valve1DiagFdbkSt)	= AlignmentNotComplete	1. Diagnostic enabled (K_b_AFM_Vlv1NotLrndEnbl) AND	1. = TRUE AND	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
					2. AFM valve initialization completed (AFM_ValveInitDlyCmpt) AND	2. = TRUE AND		
					3. Diagnostic system disablement Not requested (DiagSystemDisable) AND	3. <> TRUE AND		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					4. Diagnostic PWM feedback signal AFM valve1 Not out-of-range low (AFM_Valve1DiagFdbkSt) AND	4. <> DiagFdbkPrdLow AND		
					5. Diagnostic PWM feedback signal AFM valve1 Not out-of-range high (AFM_Valve1DiagFdbkSt) AND	5. <> DiagFdbkPrdHigh AND		
					6. Diagnostic PWM feedback signal Not out-of-range low, Not out-of-range high AND andNot within any calibrated feedback data range (AFM_Valve1DiagFdbkSt) AND	6. <> DiagFdbkPrdInRngErr AND		
					7. AFM valve state (AFM_Valve1DiagFdbkSt)	7. <> ActuatorFaulted		
Cylinder Deactivation Exhaust Flow Valve Actuator Performance (Bank1)	P12F2	Monitors diagnostic feedback from AFM valve 1 to determine if an internal actuator fault is present or if the AFM valve is stuck in the end stop learning mode	AFM valve command (AFM_ValveCmd) AND Position feedback (AFM_Valve1State)	(= Closed AND = ValveInTransition)	1. Diagnostic enabled (K_b_AFM_Vlv1PerfDiagEnbl) AND	1. = TRUE AND	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
					2. AFM valve initialization completed (AFM_ValveInitDlyCmpt) AND	2. = TRUE AND		
					3. Diagnostic system disablement Not requested (DiagSystemDisable) AND	3. <> TRUE AND		
					4. AFM exhaust valve control Not disabled for remainder of trip due to output driver short circuit fault (AFMV_FaultTripDsbl) AND	4. <> TRUE AND		
					5. Diagnostic PWM feedback signal AFM valve1 not out-of-range low (AFM_Valve1DiagFdbkSt) AND	5. <> DiagFdbkPrdLow AND		
					6. Diagnostic PWM feedback signal AFM valve1 Not out-of-range high (AFM_Valve1DiagFdbkSt) AND	6. <> DiagFdbkPrdHigh AND		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					7. Diagnostic PWM feedback signal Not out-of-range low, Not out-of-range high AND Not in any calibrated feedback data range (AFM_Valve1DiagFdbkSt) AND 8. AFM valve fault state (AFM_Valve1DiagFdbkSt)	7. <> DiagFdbkPrdInRngErr AND 8. <> FaultStIndeterminate		
Cylinder Deactivation Exhaust Flow Valve Feedback Circuit Low Duty Cycle (Bank 2)	P12F4	Monitors for out-of-range low duty cycle values on the AFM valve 2 diagnostic PWM feedback signal	AFM valve 2 diagnostic PWM feedback signal AFM_Valve2FdbkDC	< K_Pct_AFM_Vlv2PstnLoThrsh)	1. Diagnostic enabled (K_b_AFM_Vlv2PstnLoDiagEnbl) AND 2. AFM valve initialization completed (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Feedback Circuit High Duty Cycle (Bank 2)	P12F5	Monitors for out-of-range high duty cycle values on the AFM valve 2 diagnostic PWM feedback signal	AFM valve 2 diagnostic PWM feedback signal AFM_Valve2FdbkDC	> K_Pct_AFM_Vlv2PstnHiThrsh)	1. Diagnostic enabled (K_b_AFM_Vlv2PstnHiDiagEnbl) AND 2. AFM valve initialization complete (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Open Position (Bank 2)	P12F6	Monitors the sensed AFM valve 2 position for values that are out-of-range low	AFM_Valve2State	= ValvePstnOOR_Low	1. Diagnostic enabled (K_b_AFM_Vlv2PstnOOR_LoEnbl) AND 2. AFM valve initialization complete (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable) AND 4. AFM valve 2 position sensor circuit low diagnostic not faulted (AFM_Valve2PstnLoFP) AND 5. AFM valve2 position sensor circuit high diagnostic unfaulted (AFM_Valve2PstnHiFP)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE AND 4. <> TRUE AND 5. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Cylinder Deactivation Exhaust Flow Valve Closed Position (Bank 2)	P12F7	Monitors the sensed AFM valve 2 position for values that are out-of-range high	AFM_Valve2State	= ValvePstnOOR_High	1. Diagnostic enabled (K_b_AFM_Vlv2PstnOOR_HiEnbl) AND 2. AFM valve initialization complete (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable) AND 4. AFM valve 2 position sensor circuit low diagnostic unfaulted (AFM_Valve2PstnLoFP) AND 5. AFM valve 2 position sensor circuit high diagnostic unfaulted (AFM_Valve2PstnHiFP)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE AND 4. <> TRUE AND 5. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Feedback Circuit Low Frequency (Bank 2)	P12F8	Monitors for out-of-range high period (i.e. out-of-range low frequency) values on the AFM valve 2 diagnostic PWM feedback signal	Diagnostic PWM feedback signal AFM_Valve2DiagFdbkSt	>= DiagFdbkPrdHigh)	1. Diagnostic enabled (K_b_AFM_Vlv2FdbkHiDiagEnbl) AND 2. AFM valve initialization complete (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Feedback Circuit High Frequency (Bank 2)	P12F9	Monitors for out-of-range low period (i.e. out-of-range high frequency) values on the AFM valve 2 diagnostic PWM feedback signal	Diagnostic PWM feedback signal AFM_Valve2DiagFdbkSt	< DiagFdbkPrdLow)	1. Diagnostic enabled through calibration (K_b_AFM_Vlv2FdbkLoDiagEnbl) AND 2. AFM valve initialization period has completed (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement is not being requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Cylinder Deactivation Exhaust Flow Valve Feedback Circuit Incorrect Frequency (Bank 2)	P12FA	Monitors for in-range errors that result when the sensed period of the diagnostic PWM feedback signal for AFM valve 2 is neither out-of-range low nor out-of-range high and does not fall within any of the calibrated ranges defined for diagnostic feedback data	Diagnostic PWM feedback signal_AFM_Valve2DiagFdbkSt	= DiagFdbkPrdInRngErr)	1. Diagnostic enabled (K_b_AFMV2FdbkInvldDiagEnbl) AND 2. AFM valve initialization period complete (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Stuck Closed (Bank 2)	P12FC	Monitors position feedback to determine if AFM valve 2 is stuck in the closed position	AFM valve command AND AFM Valve2 State (AFM_ValveCmd AND AFM_Valve2State)	(= Open AND = ValvePstnClosed)	1. AFM valve2 stuck diagnostics enabled (K_b_AFM_Vlv2StuckDiagEnbl) AND	1. = TRUE AND	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
					2. IgnitionVoltage ≥ K_U_AFM_Vlv2StuckMinVolt AND	2. V >= 10.2 V AND		
					3. AFM valve initialized (AFM_ValveInitDlyCmplt) AND	3. = TRUE AND		
					4. AFM valve control circuit short-to-power diagnostic fault (AFM_VlvCntrlPshtFA) AND	4. <> TRUE AND		
					5. AFM valve control circuit short-to-ground diagnostic fault (AFM_VlvCntrlGshtFA) AND	5. <> TRUE AND		
					6. AFM valve control circuit open diagnostic fault (AFM_VlvCntrlOpenFA) AND	6. <> TRUE AND		
					7. AFM valve2 position sensor circuit low diagnostic fault (AFM_Valve2PstnLoFA) AND	7. <> TRUE AND		
					8. AFM valve2 position sensor circuit high diagnostic fault (AFM_Valve2PstnHiFA) AND	8. <> TRUE AND		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					9. AFM valve2 position out-of-range low diagnostic fault (AFM_Vlv2PstnOOR_LoFA) AND	9. <> TRUE AND		
					10. AFM valve2 position out-of-range high diagnostic fault (AFM_Vlv2PstnOOR_HiFA) AND	10. <> TRUE AND		
					11. Diagnostic system disablement Not requested (DiagSystemDisable) AND	11. <> TRUE AND		
					12. AFM exhaust valve control Not disabled for remainder of trip due to output driver short circuit fault (AFMV_FaultTripDsbl) AND	12. <> TRUE AND		
					13. AFM valve command (AFM_ValveCmd) AND	13. (= Open OR = Closed) AND		
					14. AFM valve command Not changed (AFM_ValveCmd) AND	14. = AFM_ValveCmdPrev AND		
					15. AFM valve response time (AFM_Valve2ResponseTmr) AND	15. >= 1 sec AND		
					16. AFM valve position Not out-of-range (AFM_Valve2State AND AFM_Valve2State)	16. (<> ValvePstnOOR_Low AND <> ValvePstnOOR_High)		
Cylinder Deactivation Exhaust Flow Valve Stuck Open (Bank 2)	P12FD	Monitors position feedback to determine if AFM valve 2 is stuck in an open position	1. (AFM_ValveCmd AND AFM_Valve2State) OR 2. (AFM_ValveCmd AND AFM_Valve2State) OR 3. (AFM_ValveCmd AND AFM_Valve2State)	1. (= Open AND = ValveInTransition) OR 2. (= Closed AND = ValvePstnOpen) OR 3. (= Closed AND = ValveInTransition)	1. AFM valve2 stuck diagnostics enabled (K_b_AFM_Vlv2StuckDiagEnbl) AND	1. = TRUE AND	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
					2. Ignition voltage (IgnitionVoltage) AND	2. V >= 10.2 V AND		
					3. AFM valve initialization time complete (AFM_ValveInitDlyCmpt) AND	3. = TRUE AND		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					4. AFM valve control circuit short-to-power diagnostic fault (AFM_VlvCntrlPshtFA) AND	4. <> TRUE AND		
					5. AFM valve control circuit short-to-ground diagnostic fault (AFM_VlvCntrlGshtFA) AND	5. <> TRUE AND		
					6. AFM valve control circuit open diagnostic fault (AFM_VlvCntrlOpenFA) AND	6. <> TRUE AND		
					7. AFM valve2 position sensor circuit low diagnostic fault (AFM_Valve2PstnLoFA) AND	7. <> TRUE AND		
					8. AFM valve2 position sensor circuit high diagnostic fault (AFM_Valve2PstnHiFA) AND	8. <> TRUE AND		
					9. AFM valve2 position out-of-range low diagnostic fault (AFM_Vlv2PstnOOR_LoFA) AND	9. <> TRUE AND		
					10. AFM valve2 position out-of-range high diagnostic fault (AFM_Vlv2PstnOOR_HiFA) AND	10. <> TRUE AND		
					11. Diagnostic system disablement (DiagSystemDisable) AND	11. <> TRUE AND		
					12. AFM exhaust valve control not disabled for remainder of trip due to output driver short circuit fault (AFMV_FaultTripDsbl) AND	12. <> TRUE AND		
					13. AFM valve command (AFM_ValveCmd) AND	13. (= Open OR = Closed) AND		
					14. AFM valve command unchanged (AFM_ValveCmd) AND	14. = AFM_ValveCmdPrev AND		
					15. AFM valve command response time (AFM_Valve2ResponseTmr) AND	15. >= 1 sec AND		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					16. AFM valve position not out-of-range (AFM_Valve2State)	16. (<> ValvePstnOOR_Low AND <> ValvePstnOOR_High)		
Cylinder Deactivation Exhaust Flow Valve Position Not Learned (Bank 2)	P12FE	Monitors diagnostic feedback from AFM valve 2 to determine if the valve end stops have not been learned	AFM Valve Diagnostic Status enumeration (AFM_Valve2DiagFdbkSt)	= AlignmentNotComplete)	1. Diagnostic enabled (K_b_AFM_Vlv2NotLrndEnbl) AND 2. AFM valve initialization complete (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement not requested (DiagSystemDisable) AND 4. AFM Valve2 diagnostic PWM feedback not out-of-range low (AFM_Valve2DiagFdbkSt) AND 5. AFM Valve2 diagnostic PWM feedback signal not out-of-range high (AFM_Valve2DiagFdbkSt) AND 6. AFM Valve2 diagnostic PWM feedback signal Not out-of-range low, Not out-of-range high AND Not in any calibrated feedback data range (AFM_Valve1DiagFdbkSt) AND 7. AFM valve diagnostic feedback state (AFM_Valve2DiagFdbkSt)	1. = TRUE AND 2. = TRUE AND 3. <> TRUE AND 4. <> DiagFdbkPrdLow AND 5. <> DiagFdbkPrdHigh AND 6. <> DiagFdbkPrdInRngErr AND 7. <> Actuator Faulted	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips
Cylinder Deactivation Exhaust Flow Valve Actuator Performance (Bank2)	P12FF	Monitors diagnostic feedback from AFM valve 2 to determine if an internal actuator fault is present or if the AFM valve is stuck in the end stop learning mode	1. AFM Valve2 Diagnostic Status (AFM_Valve2DiagFdbkSt) OR 2. (AFM Valve2 Diagnostic Status AND AFM Valve Command) OR 3. (AFM Valve2 Diagnostic Status AND AFM Valve Command)	1. = Faulted OR 2. (= OpenEndStopLearned AND <> OpenEndStopLearn) OR 3. (= ClosedEndStopLearned AND <> ClosedEndStopLearn)	1. Diagnostic enabled (K_b_AFM_Vlv2PerfDiagEnbl) AND 2. AFM valve initialization completed (AFM_ValveInitDlyCmpt) AND 3. Diagnostic system disablement (DiagSystemDisable) AND	1. = TRUE AND 2. = TRUE AND 3. <> TRUE AND	20 failures out of 40 samples 1 sample/25 ms	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					4. AFM exhaust valve control not disabled for remainder of trip due to output driver short circuit fault (AFMV_FaultTripDsbl) AND	4. <> TRUE AND		
					5. Diagnostic PWM feedback signal AFM Valve2 not out-of-range low (AFM_Valve2DiagFdbkSt) AND	5. <> DiagFdbkPrdLow AND		
					6. Diagnostic PWM feedback signal AFM Valve2 not out-of-range high (AFM_Valve2DiagFdbkSt) AND	6. <> DiagFdbkPrdHigh AND		
					7. Δiagnostic PWM feedback Not out-of-range low, Not out-of-range high AND not within any of the calibrated feedback data range (AFM_Valve2DiagFdbkS) AND	7. <> DiagFdbkPrdInRngErr AND		
					8. AFM valve fault state (AFM_Valve2DiagFdbkSt)	8. <> FaultStIndeterminate		
Ignition 1 Switch Circuit Low Voltage	P2534	Detects if the Ignition1 Switch circuit is shorted to low or open	Ignition 1 voltage	<= 6 V	Engine	Running	180 failures out of 200 samples 1 sample/25.0 ms	DTC Type A 1 trip
Ignition 1 Switch Circuit High Voltage	P2535	Detects if the Ignition1 Switch circuit is shorted to vehicle supply voltage	Ignition 1 voltage	> 11.7 V	Ignition Run_Crank terminal	Off	180 failures out of 200 samples 1 sample/25.0 ms	DTC Type A 1 trip
Fuel Pump Flow Performance (rationality)	P2635	Detects degradation in the performance of the electronically regulated fuel system	Filtered fuel rail pressure error	<= Low Threshold (tabulated function of desired fuel rail pressure and fuel flow rate -- 15% of requested Target Pressure) OR >= High Threshold (tabulated function of desired fuel rail pressure and fuel flow rate -- 15% of requested Target Pressure) **(See Supporting**			Filtered fuel rail pressure error Time Constant = 12.5 seconds Frequency: Continuous 12.5 ms loop	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					1. FRP Circuit Low DTC (P018C)	1. Not active		
					2. FRP Circuit High DTC (P018D)	2. Not active .		
					3. Fuel Rail Pressure Sensor Performance DTC (P018B)	3. Not active		
					4. FuelPump Circuit Low DTC (P0231)	4. Not active		
					5. FuelPump Circuit High DTC (P0232)	5. Not active		
					6. FuelPump Circuit Open DTC (P023F)	6. Not active		
					7. Reference Voltage DTC (P0641)	7. Not active		
					8. Fuel Pump Control Module Driver Over-temperature DTC's (P064A)	8. Not active		
					9. Control Module Internal Performance DTC (P0606)	9. Not active		
					10. ECM fuel control system failure (PPEI $1E7)	10. Not occurred		
					11. Barometric pressure signal (PPEI $4C1)	11. Valid (for absolute fuel pressure sensor)		
					12. Engine run time	12. >= 30 seconds		
					13. Emissions fuel level (PPEI $3FB)	13. Not low		
					14. Fuel pump control	14. Enabled		
					15. Fuel pump control state	15. Normal		
					16. Battery Voltage	16. 11V<=voltage=<32V		
					17. Fuel flow rate **(See Supporting Tables tab)**	17. > 0.047 g/s **AND** <= Max allowed fuel flow rate as a function of desired rail pressure & Vbatt (Typical values in the range of 11 to 50 g/s)		
					18. Fuel Pressure Control System	18. Is not responding to an over-pressurization due to pressure build during DFCO or a decreasing desired pressure command.		
Control Module Communication Bus "A" Off	U0073	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off	Bus Status	Off	Power mode	Run/Crank	5 failures out of 5 samples (5 seconds)	DTC Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Lost Communication With ECM/PCM “A”	U0100	Detects that CAN serial data communication has been lost with the ECM	Message $0C9	Undetected	1. Power mode	Run/Crank	12 failures out of 12 samples (12 seconds)	DTC Type B 2 trips
					2. Ignition Run/Crank Voltage	11V<voltage<32V		
					3. U0073	not active		

P2635 Fuel Pump Performance Maximum Fuel Flow map (grams / s)

X-axis= Desired Fuel Pressure (kiloPascals)
Y-axis= Battery voltage (volts)

	200	250	300	350	400	450	500	550	600
4.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
6	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
7.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
9	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
10.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
12	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
13.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
15	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
16.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
18	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
19.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
21	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
22.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
24	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
25.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
27	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
28.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5

P2635 Fuel Pump Performance Filtered Pressure Error Fault Threshold High map (kiloPascals)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

	200	250	300	350	400	450	500	550	600
0	30	37.5	45	52.5	60	67.5	75	82.5	90
1.5	30	37.5	45	52.5	60	67.5	75	82.5	90
3	30	37.5	45	52.5	60	67.5	75	82.5	90
4.5	30	37.5	45	52.5	60	67.5	75	82.5	90
6	30	37.5	45	52.5	60	67.5	75	82.5	90
7.5	30	37.5	45	52.5	60	67.5	75	82.5	90
9	30	37.5	45	52.5	60	67.5	75	82.5	90
10.5	30	37.5	45	52.5	60	67.5	75	82.5	90

P2635 Fuel Pump Performance Filtered Pressure Error Fault Threshold High map (kiloPascals) Continued….

X-axis= Target Fuel Pressure (kiloPascals)

Y-axis= Fuel Flow (grams / s)

12	30	37.5	45	52.5	60	67.5	75	82.5	90
13.5	30	37.5	45	52.5	60	67.5	75	82.5	90
15	30	37.5	45	52.5	60	67.5	75	82.5	90
16.5	30	37.5	45	52.5	60	67.5	75	82.5	90
18	30	37.5	45	52.5	60	67.5	75	82.5	90
19.5	30	37.5	45	52.5	60	67.5	75	82.5	90
21	30	37.5	45	52.5	60	67.5	75	82.5	90
22.5	30	37.5	45	52.5	60	67.5	75	82.5	90
24	30	37.5	45	52.5	60	67.5	75	82.5	90
25.5	30	37.5	45	52.5	60	67.5	75	82.5	90
27	30	37.5	45	52.5	60	67.5	75	82.5	90
28.5	30	37.5	45	52.5	60	67.5	75	82.5	90
30	30	37.5	45	52.5	60	67.5	75	82.5	90
31.5	30	37.5	45	52.5	60	67.5	75	82.5	90
33	30	37.5	45	52.5	60	67.5	75	82.5	90
34.5	30	37.5	45	52.5	60	67.5	75	82.5	90
36	30	37.5	45	52.5	60	67.5	75	82.5	90
37.5	30	37.5	45	52.5	60	67.5	75	82.5	90
39	30	37.5	45	52.5	60	67.5	75	82.5	90
40.5	30	37.5	45	52.5	60	67.5	75	82.5	90
42	30	37.5	45	52.5	60	67.5	75	82.5	90
43.5	30	37.5	45	52.5	60	67.5	75	82.5	90
45	30	37.5	45	52.5	60	67.5	75	82.5	90
46.5	30	37.5	45	52.5	60	67.5	75	82.5	90
48	30	37.5	45	52.5	60	67.5	75	82.5	90

P2635 Fuel Pump Performance Filtered Pressure Error Fault RePass Threshold High map (kiloPascals)

X-axis= Target Fuel Pressure (kiloPascals)

Y-axis= Fuel Flow (grams / s)

	200	250	300	350	400	450	500	550	600
0	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
1.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
3	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5

P2635 Fuel Pump Performance Filtered Pressure Error Fault RePass Threshold High map (kiloPascals) Continued…..

X-axis= Target Fuel Pressure (kiloPascals)

Y-axis= Fuel Flow (grams / s)

4.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
6	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
7.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
9	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
10.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
12	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
13.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
15	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
16.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
18	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
19.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
21	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
22.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
24	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
25.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
27	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
28.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
30	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
31.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
33	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
34.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
36	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
37.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
39	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
40.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
42	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
43.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
45	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
46.5	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5
48	25.5	31.875	38.25	44.625	51	57.375	63.75	70.125	76.5

P2635 Fuel Pump Performance Filtered Pressure Error Fault Threshold Low map (kiloPascals)

X-axis= Target Fuel Pressure (kiloPascals)

Y-axis= Fuel Flow (grams / s)

	200	250	300	350	400	450	500	550	600
0	-260	-210	-160	-110	-60	-67.5	-75	-82.5	-90
1.5	-145	-125	-102.5	-81.25	-60	-67.5	-75	-82.5	-90
3	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
4.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
6	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
7.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
9	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
10.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
12	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
13.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
15	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
16.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
18	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
19.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
21	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
22.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
24	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
25.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
27	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
28.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
30	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
31.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
33	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
34.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
36	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
37.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
39	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
40.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
42	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
43.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
45	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
46.5	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90
48	-30	-37.5	-45	-52.5	-60	-67.5	-75	-82.5	-90

P2635 Fuel Pump Performance Filtered Pressure Error Fault RePass Threshold Low map (kiloPascals)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

	200	250	300	350	400	450	500	550	600
0	-221	-178.5	-136	-93.5	-51	-57.375	-63.75	-70.125	-76.5
1.5	-123.25	-106.25	-87.125	-69.0625	-51	-57.375	-63.75	-70.125	-76.5
3	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
4.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
6	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
7.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
9	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
10.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
12	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
13.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
15	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
16.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
18	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
19.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
21	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
22.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
24	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
25.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
27	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
28.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
30	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
31.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
33	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
34.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
36	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
37.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
39	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
40.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
42	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
43.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
45	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
46.5	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5
48	-25.5	-31.875	-38.25	-44.625	-51	-57.375	-63.75	-70.125	-76.5

P2635 - Calculation of fault thresholds

Calculation of Fault Thresholds:

Givens: Measured values observed at a typical operating point for an 80mph roadload --
Engine rpm = 1900 rev/min, Instantaneous Fuel Flow = 1.265 g/s, Fuel Line Pressure = 304 kPa (gage)

Example : Pressure Error Fault Threshold Low at chosen operating point:

Min Injector Flow [g/s] = Minimum Injector Pulse Width [ms] * Injector Slope[mg/ms/inj] * Number of Fuel Injectors / 2 [inj/rev] * Engine Speed [rev/min] * 1/60 [min/s] * 1/1000 [g/mg]

Min Injector Flow = 0.25 * 1.565918* 4 / 2 * 1900 / 60 / 1000 = 0.0247 g/s

Max Overfueling Error [] = (Instantaneous Injector Flow [g/s] / Min Injector Flow [g/s])
= 1.265 (g/s) / 0.0247 (g/s)
= 51.2147 / 100 (decimal conversion)
= 0.512147 (51 %)

The overfuelling fuel flow error is limited to the range of between 105% and 115% overfuelling depending on the actual fuel flow. The MaxOverfuelingError calculated above is **outside the scaling range**; therefore, the overperformance fault threshold for this operating point is then calculated using the limited value (105% or 1.05) as follows:

Pressure Error Fault Threshold Low[kPa]
= Injector Pressure Drop [kPa] *(1 -(Max Overfueling Error)^2)
= 304 * (1-(1.05 * 1.05))
= **-31.16 kPa**

Example : Pressure Error Fault Threshold High at same given operating point as the above example:

Max Injector Flow[g/s] = Injector Slope[mg/ms/inj] * Number of Fuel Injectors [inj] * 1/1000 [g/mg] * 1000 [ms/s]

Max Injector Flow[g/s] = 1.565918 * 4 *1/1000 *1000 = 6.26 g/s

Max Underfueling Error [] = (Instantaneous Injector Flow [g/s] / Max Injector Flow [g/s])
= 1.265 (g/s) / 6.26 (g/s)
= 0.202 (20%)

The underfuelling fuel flow error is limited to the range between 85% and 95% overfuelling depending on the actual fuel flow. The MaxUnderfuelingError calculated above falls **below limited range,** therefore it is **limited** to;

Max Underfueling Error [] = 0.85

The underperformance fault threshold for this operating point is then calculated as:

Pressure Error Fault Threshold High [kPa]
= Injector Pressure Drop [kPa] *(1 -(Max Underfueling Error)^2)
= 304 * (1-(0.85*0.85))
= **84.36 kPa**