| 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.<br><br>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<br>Engine Speed | = Crank or Run<br>> 11.0 volts<br>> 400 RPM | 20 failures out of 25 samples<br><br>250 ms / sample<br><br>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.<br><br>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<br>Engine Speed | = Crank or Run<br>> 11.0 volts<br>> 400 RPM | 20 failures out of 25 samples<br><br>250 ms / sample<br><br>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.<br><br>This fault is set if the heater resistance is outside the expected range. | Heater Resistance outside of the expected range of | 3.1 < ohms < 8.4 | No Active DTC's<br><br>Coolant – IAT Engine Soak Time<br>Coolant Temp<br>Ignition Voltage<br>Engine Run time | ECT_Sensor_FA<br>P262B<br>IAT_SensorFA<br>< 8.0 ºC<br>> 28,800 seconds<br>≥ -30.0 ºC<br>< 32.0 volts<br>< 0.04 seconds | Once per valid cold start | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>This fault is set if the heater resistance is outside the expected range. | Heater Resistance outside of the expected range of | 3.1 < ohms < 8.4 | No Active DTC's<br><br>Coolant – IAT<br>Engine Soak Time<br>Coolant Temp<br>Ignition Voltage<br>Engine Run time | ECT_Sensor_FA<br>P262B<br>IAT_SensorFA<br>< 8.0 ºC<br>> 28,800 seconds<br>≥ -30.0 ºC<br>< 32.0 volts<br>< 0.04 seconds | Once per valid cold start | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>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<br>Engine Speed | = Crank or Run<br>> 11.0 volts<br>> 400 RPM | 20 failures out of 25 samples<br><br>250 ms / sample<br><br>Continuous | Type B, 2 Trips<br>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.<br><br>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<br>Engine Speed | = Crank or Run<br>> 11.0 volts<br>> 400 RPM | 20 failures out of 25 samples<br><br>250 ms / sample<br><br>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.<br><br>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<br>Engine Speed | = Crank or Run<br>> 11.0 volts<br>> 400 RPM | 20 failures out of 25 samples<br><br>250 ms / sample<br><br>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.<br><br>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<br><br>Coolant – IAT<br>Engine Soak Time<br>Coolant Temp<br>Ignition Voltage<br>Engine Run time | ECT_Sensor_FA<br>P262B<br>IAT_SensorFA<br>< 8.0 ºC<br>> 28,800 seconds<br>≥ -30.0 ºC<br>< 32.0 volts<br>< 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.<br><br>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<br><br>Coolant – IAT<br>Engine Soak Time<br>Coolant Temp<br>Ignition Voltage<br>Engine Run time | ECT_Sensor_FA<br>P262B<br>IAT_SensorFA<br>< 8.0 ºC<br>> 28,800 seconds<br>≥ -30.0 ºC<br>< 32.0 volts<br>< 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. |
|---|---|---|---|---|---|---|---|---|
| MAP / MAF / Throttle Position Correlation | P0068 | Detect when MAP and MAF do not match estimated engine airflow as established by the TPS | Difference between MAP and estimated MAP exceeds threshold (kPa), or P0651 (5 Volt Ref), or P0107 (MAP circuit low), or P0108 (MAP circuit high) have failed this key cycle, then MAP portion of diagnostic fails | Table, f(TPS). See supporting tables: **P0068_Delta MAP Threshold f(TPS)** | Engine Speed<br><br>Run/Crank voltage | > 800 RPM<br><br>> 6.41 Volts | Continuously fail MAP and MAF portions of diagnostic for 0.1875 s<br><br>Continuous in MAIN processor | Type A, 1 Trips |
| | | | 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 MAF Threshold f(TPS)**<br><br>Table, f(RPM). See supporting tables: **P0068_Maximum MAF f(RPM)**<br><br>Table, f(Volts). See supporting tables: **P0068_Maximum MAF f(Volts)** | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>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.<br><br>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.<br><br>For applications that have ability to move without engaging the internal combustion | **<u>Engine Off:</u>**<br><br>If IAT >= OAT:<br>IAT - OAT<br><br>If IAT < OAT:<br>OAT - IAT<br><br>If either of the following conditions are met, this diagnostic will pass:<br><br>If IAT >= OAT:<br>IAT - OAT<br><br>If IAT < OAT:<br>OAT - IAT | <br><br><br>> 15.0 deg C<br><br><br>> 15.0 deg C<br><br><br><br><br><br><= 15.0 deg C<br><br><br><= 15.0 deg C | Time between current ignition cycle and the last time the engine was running<br><br>Engine is not running<br><br>Vehicle Speed<br><br>Coolant Temperature - IAT<br><br>IAT - Coolant Temperature<br><br>OAT-to-IAT engine off equilibrium counter<br><br>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**<br><br>No Active DTCs: | >= 28,800.0 seconds<br><br><br>>= 15.5 MPH<br><br>< 15.0 deg C<br><br>< 15.0 deg C<br><br>>= 300.0 counts<br><br><br><br>VehicleSpeedSensor_FA<br>IAT_SensorFA<br>ECT_Sensor_Ckt_FA<br>MAF_SensorFA<br>EngineModeNotRunTimer Error | Executed every 100 msec until a pass or fail decision is made | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | 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.<br><br>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. | **<u>Engine Running:</u>** | | Time between current ignition cycle and the last time the engine was running | >= 28,800.0 seconds | Executed every 100 msec until a pass or fail decision is made | |
| | | | If IAT >= OAT:<br>IAT - OAT | > 15.0 deg C | Engine is running | | | |
| | | | If IAT < OAT:<br>OAT - IAT | > 15.0 deg C | Vehicle Speed | >= 15.5 MPH | | |
| | | | If either of the following conditions are met, this diagnostic will pass: | | Engine air flow | >= 10.0 grams/second | | |
| | | | If IAT >= OAT:<br>IAT - OAT | <= 15.0 deg C | OAT-to-IAT engine running equilibrium counter | >= 300.0 counts | | |
| | | | If IAT < OAT:<br>OAT - IAT | <= 15.0 deg C | The "OAT-to-IAT engine running equilibrium counter" is a counter that is incremented or decremented based on vehicle speed and engine air flow when the engine is running. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. The value that is added or subtracted to the counter every 100 msec is contained in table **P0071: OAT Performance Drive Equilibrium Engine Running** | | | |
| | | | | | No Active DTCs: | VehicleSpeedSensor_FA<br>IAT_SensorFA<br>ECT_Sensor_Ckt_FA<br>MAF_SensorFA<br>EngineModeNotRunTimer Error | | |

| 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.<br><br>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.<br><br>While the "OAT-to-IAT engine running equilibrium counter" is counting, IAT and OAT are monitored for | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | 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 | <= 46 Ohms (~150 deg C) | None | | 40 failures out of 50 samples<br><br>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 | >= 427,757 Ohms (~-60 deg C) | None | | 40 failures out of 50 samples<br><br>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.<br><br>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”.<br><br>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<br><br>Where:<br><br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current OAT reading - OAT reading from 100 milliseconds previous) | > 100 deg C<br><br>10 consecutive OAT readings | None | | 4 failures out of 5 samples<br><br>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<br><br>OR<br><br>High Pressure Fuel Pump Delivery Angle | >= 124 °<br><br><br><br><= 0 ° | High Pressure Pump Performance Diagnostic Enable<br><br>Battery Voltage<br><br>Low Side Fuel Pressure<br><br><br><br><br><br>Barometric Pressure<br>Inlet Air Temp<br><br>Fuel Temp<br><br>Additional Enable Conditions:<br>All must be true<br>(High Pressure Pump is enabled and<br>High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and<br>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<br>Green Engine (In | True<br><br><br><br>>= 11 Volts<br><br>> 0.275 MPa<br><br><br>Enabled when a code clear is not active or not exiting device control<br><br>Engine is not cranking<br><br><br>>= 70.0 KPA<br>>= -40.0 degC<br><br><br>-40 <= Temp degC <= 132 | Windup High/ Low<br><br>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<br>Not if low fuel condition and<br>Low side Fuel Pump is on and<br>Injector Flow Test is not active and<br>Device control commanded pressure is false and<br>Device control pump ckt enabled on is false and<br>Engine movement detected is true andManufacturers enable counter is 0)<br>Flex Fuel Sensor Not FA<br>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.<br><br>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<br><br>Battery Voltage | >= 50 RPM<br><br>>= 11 Volts<br><br>Not in pump device control<br>Enabled when a code clear is not active or not exiting device control | 20 failures out of 40 samples<br>100 ms /sample<br>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.<br><br>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<br><br>Battery Voltage | >= 50 RPM<br><br>>= 11 Volts<br><br>Not in pump device control<br>Enabled when a code clear is not active or not exiting device control | 20 failures out of 40 samples<br>100 ms /sample<br>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.<br><br>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<br><br>Battery Voltage | >= 50 RPM<br><br>>= 11 Volts<br><br>Not in pump device control<br>Enabled when a code clear is not active or not exiting device control | 20 failures out of 40 samples<br>100 ms /sample<br>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, but no manifold temperature sensor) | P0096 | Detects an Intake Air Temperature 2 (IAT2) sensor value that is stuck in range by comparing the IAT2 sensor value against the IAT and coolant temperature sensor values and failing the diagnostic if the IAT2 value is more different than the IAT and coolant temperature values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled.<br><br>The diagnostic will fail if the IAT and coolant temperature values are similar, and the IAT2 value is not similar to the IAT and coolant temperature values.<br><br>This diagnostic is executed once per ignition cycle if the enable conditions are met. | ABS(Power Up IAT - Power Up IAT2)<br><br>AND<br><br>ABS(Power Up ECT – Power Up IAT2)<br>>=<br>ABS(Power Up ECT – Power Up IAT) | > 25 deg C | Time between current ignition cycle and the last time the engine was running<br><br>Powertrain Relay Voltage for a time<br><br>If application has a LIN MAF:<br>LIN Communications established with MAF<br><br>No Active DTCs: | > 28,800 seconds<br><br>>= 11.0 Volts<br>>= 0.9 seconds<br><br><br><br><br>PowertrainRelayFault<br>ECT_Sensor_Ckt_FA<br>IAT_SensorCircuitFA<br>HumTempSnsrCktFA<br>EngineModeNotRunTimer Error | Executes once at the beginning of each ignition cycle if enable conditions are met | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit 2 Low (applications with LIN MAF) | P0097 | Detects an erroneously low value being reported over the LIN serial connection from the Intake Air Temperature 2 (IAT2) sensor. The diagnostic monitors the IAT2 sensor output temperature and fails the diagnostic when the IAT2 temperature is too low.<br><br>The IAT2 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol. | IAT 2 Temperature | < -60 degrees C | Powertrain Relay Voltage for a time<br><br>LIN Communications established with MAF<br><br>No Active DTCs: | >= 11.0 Volts<br>>= 0.9 seconds<br><br><br><br>PowertrainRelayFault | 40 failures out of 50 samples<br><br>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 LIN MAF) | P0098 | Detects an erroneously high value being reported over the LIN serial connection from the Intake Air Temperature 2 (IAT2) sensor. The diagnostic monitors the IAT2 sensor output temperature and fails the diagnostic when the IAT2 temperature is too high.<br><br>The IAT2 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol. | IAT 2 Temperature | > 150 degrees C | Powertrain Relay Voltage for a time<br><br>LIN Communications established with MAF<br><br>No Active DTCs: | >= 11.0 Volts<br>>= 0.9 seconds<br><br><br><br>PowertrainRelayFault | 40 failures out of 50 samples<br><br>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.<br><br>When the value of the IAT2 signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of IAT2 readings. The result of this summation is called a “string length”. Since the IAT2 signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT2 signal. The diagnostic will fail if the string length is too high. | String Length<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current IAT 2 reading - IAT 2 reading from 100 milliseconds previous) | > 100.00 deg C<br><br>10 consecutive IAT 2 readings | Powertrain Relay Voltage for a time<br><br>If application has a LIN MAF:<br>LIN Communications established with MAF<br><br>No Active DTCs: | >= 11.0 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault | 4 failures out of 5 samples<br><br>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<br><br>Pressure Rise Test: Sensed High Pressure Fuel Rail Pressure value<br><br>Pressure Fall Test: Sensed High Pressure Fuel Rail Pressure value | <<br>**P00C6 - Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery**<br>(see Supporting Table)<br><br><=<br>**P00C6 - Minimum acceptable value of fuel rail pressure after High Pressure Start**<br>(see Supporting Table) | High Pressure Rise Diagnostic During Start<br><br>High Pressure Fall Diagnostic During Start<br><br>Low side feed fuel pressure<br><br>Engine Run Time<br>Run/Crank Voltage<br>Engine Coolant<br><br>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<br>The pressure fall runs when the engine is cranking. | Enabled<br><br>Disabled<br><br>>= 0 KPA<br><br>< = 0 sec<br>> 8 Volts<br>-100 <= °C <= 132<br><br>All must be true<br>(High Pressure Pump is enabled and<br>High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and<br>High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and<br>Cam or Crank Sensor Not FA and<br>IAT, IAT2 and ECT Not FA and<br>Low side Fuel Pump Relay ckt Not FA and<br>Estimate fuel rail pressure is valid and<br>Green Engine (In assembly plant) is not enabled and<br>Not if low fuel condition and<br>Low side Fuel Pump is on and<br>Injector Flow Test is not active and<br>Device control | Pressure Rise Test:<br>Crank Time >= **P00C6 - High Pressure Pump Control Mode timeout**<br>(see Supporting Table)<br>6.25 ms per sample<br><br>Pressure Fall Test:<br>Injected cylinder events >= **P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start**<br>(see Supporting Table)<br><br>8 samples per engine rotation | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | commanded pressure is false and<br>Device control pump ckt enabled on is false and<br>Engine movement detected is true and<br>Manufacturers enable counter is 0)<br>Flex Fuel Sensor Not FA<br>Ignition voltage out of correlation error(P1682) not active | | |
| | | | | | Barometric Pressure<br>Inlet Air Temp | >= 70.0 KPA<br>>= -40.0 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 (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.<br><br>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.<br><br>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<br><br>Engine is not rotating<br><br>Manifold Pressure<br>Manifold Pressure<br>Baro Pressure<br>Baro Pressure<br><br>If application has a LIN MAF:<br>LIN Communications established with MAF<br><br>No Active DTCs:<br><br><br><br><br>No Pending DTCs: | > 5.0 seconds<br><br><br>>= 50.0 kPa<br><= 115.0 kPa<br>>= 50.0 kPa<br><= 115.0 kPa<br><br><br><br>EngineModeNotRunTimerError<br>MAP_SensorFA<br>AAP_SnsrFA<br>AAP_LIN1_SnsrCktFA<br><br>MAP_SensorCircuitFP<br>AAP_SnsrCktFP<br>AAP_LIN1_SnsrCktFP | 4 failures out of 5 samples<br><br>1 sample every 12.5 msec for applications without LIN MAF<br><br>1 sample every 25 msec for applications with LIN MAF | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. | <br><br><br><br><br><br><= 1.1 or 15 Amps selectable thershold based on High pressure Pump. | Engine Speed<br>Battery Voltage | >= 50 RPM<br>>= 11 Volts<br><br>Not in pump device control<br>Enabled when a code clear is not active or not exiting device control | 20<br>failures out of<br>40<br>samples<br>100 ms /sample<br>Continuous | Type A,<br>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.<br><br>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<br>Battery Voltage | >= 50 RPM<br>>= 11 Volts<br><br>Not in pump device control<br>Enabled when a code clear is not active or not exiting device control | 20<br>failures out of<br>40<br>samples<br>100 ms /sample<br>Continuous | Type A,<br>1 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Humidity Sensor Circuit Low (applications with LIN MAF) | P00F4 | Detects an eroneously low value being reported over the LIN serial connection from the humidity sensor. The diagnostic monitors the humidity sensor relative humidity output and fails the diagnostic when the humidity percentage is too low.<br><br>The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity percentage value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol. | Relative Humidity | <= -6.25 % | Powertrain Relay Voltage for a time<br><br>LIN Communications established with MAF<br><br>No Active DTCs: | >= 11.0 Volts<br>>= 0.9 seconds<br><br><br><br>PowertrainRelayFault | 40 failures out of 50 samples<br><br>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 (applications with LIN MAF) | P00F5 | Detects an eroneously high value being reported over the LIN serial connection from the humidity sensor. The diagnostic monitors the humidity sensor relative humidity output and fails the diagnostic when the humidity percentage is too high.<br><br>The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity percentage value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol. | Relative Humidity | >= 106.25 % | Powertrain Relay Voltage for a time<br><br>LIN Communications established with MAF<br><br>No Active DTCs: | >= 11.0 Volts<br>>= 0.9 seconds<br><br><br><br>PowertrainRelayFault | 40 failures out of 50 samples<br><br>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.<br><br>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”.<br><br>Since the humidity signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic humidity signal. The diagnostic will fail if the string length is too high. | String Length<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current Humidity reading - Humidity reading from 100 milliseconds previous) | > 80 %<br><br>10 consecutive Humidity readings | Powertrain Relay Voltage for a time<br><br>If application has a LIN MAF:<br>LIN Communications established with MAF<br><br>No Active DTCs: | >= 11.0 Volts<br>>= 0.9 seconds<br><br><br><br><br>PowertrainRelayFault | 4 failures out of 5 samples<br><br>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 (naturally aspirated) | P0101 | Detects a performance failure in the Mass Air Flow (MAF) sensor, such as when a MAF value is stuck in range.<br><br>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).<br><br>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<br>AND<br>ABS(Measured Flow – Modeled Air Flow) Filtered<br>AND<br>ABS(Measured MAP – MAP Model 2) Filtered | <= 300 kPa*(g/s)<br><br>> 25.0 grams/sec<br><br>> 22.0 kPa | Engine Speed<br>Engine Speed<br><br>(Coolant Temp<br>OR<br>OBD Coolant Enable Criteria<br><br>(Coolant Temp<br>OR<br>OBD Max Coolant Achieved<br><br>Intake Air Temp<br>Intake Air Temp<br><br>Minimum total weight factor (all factors multiplied together)<br><br>See Residual Weight Factor tables. | >= 400 RPM<br><= 4,230 RPM<br><br>>= -9 Deg C<br><br>= TRUE)<br><br><= 130 Deg C<br><br>= FALSE)<br><br>>= -20 Deg C<br><= 129 Deg C<br><br>>= 0.50<br><br>Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM**<br><br>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<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | MAP Model 2 Erro multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** | | |
| | | | | | No Active DTCs: | MAP_SensorCircuitFA<br>EGRValvePerformance_FA<br>MAF_SensorCircuitFA<br>CrankSensor_FA<br>ECT_Sensor_FA<br>IAT_SensorFA | | |
| | | | | | No Pending DTCs: | EGRValve_FP<br>ECT_Sensor_Ckt_FP<br>IAT_SensorCircuitFP | | |
| | | | | | | | | |

| 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 (Continental MAF) | P0102 | Detects a continuous short to ground in the MAF sensor circuit or a MAF sensor that is outputting a frequency that is too low. The diagnostic monitors the MAF sensor frequency output and fails the diagnostic when the MAF frequency is too low. A low MAF frequency is associated with a high engine air flow.<br><br>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 mass air flow across the sensor. 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 | <= 850 Hertz<br>(>= 393.7 gm/sec) | Engine Run Time<br>Engine Speed<br>Powertrain Relay Voltage<br>Above criteria present for a period of time | > 0.0 seconds<br>>= 300 RPM<br>>= 9.1 Volts<br><br>>= 0.5 seconds | 400 failures out of 500 samples<br><br>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 (Continental MAF) | P0103 | Detects a MAF sensor that is outputting a frequency signal that is too high. The diagnostic monitors the MAF sensor frequency output and fails the diagnostic when the MAF frequency is too high. A high MAF frequency is associated with a low engine air flow.<br><br>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 mass air flow across the sensor. 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<br>(<= 0.00 gm/sec) | Engine Run Time<br>Engine Speed<br>Powertrain Relay Voltage<br>Above criteria present for a period of time | > 0.0 seconds<br>>= 300 RPM<br>>= 9.1 Volts<br><br>>= 0.5 seconds | 400 failures out of 500 samples<br><br>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 (naturally aspirated) | P0106 | Detects a performance failure in the Manifold Pressure (MAP) sensor, such as when a MAP value is stuck in range.<br><br>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.<br><br>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).<br><br>These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model | **Engine Running:**<br><br>Filtered Throttle Model Error<br>AND<br>ABS(Measured MAP – MAP Model 1) Filtered<br>AND<br>ABS(Measured MAP – MAP Model 2) Filtered | <br><br><= 300 kPa*(g/s)<br><br>> 22.0 kPa<br><br>> 22.0 kPa | Engine Speed<br>Engine Speed<br><br>(Coolant Temp<br>OR<br>OBD Coolant Enable Criteria<br><br>(Coolant Temp<br>OR<br>OBD Max Coolant Achieved<br><br>Intake Air Temp<br>Intake Air Temp<br><br>Minimum total weight factor (all factors multiplied together)<br><br>See Residual Weight Factor tables.<br><br><br><br><br><br><br><br><br><br>No Active DTCs: | >= 400 RPM<br><= 4,230 RPM<br><br>>= -9 Deg C<br><br>= TRUE)<br><br><= 130 Deg C<br><br>= FALSE)<br><br>>= -20 Deg C<br><= 129 Deg C<br><br>>= 0.50<br><br>Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM**<br><br>MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM**<br><br>MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM**<br><br>MAP_SensorCircuitFA | Continuous<br><br>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. | | | | EGRValvePerformance_FA<br>MAF_SensorCircuitFA<br>CrankSensor_FA<br>ECT_Sensor_FA<br>IAT_SensorFA<br><br>EGRValve_FP<br>ECT_Sensor_Ckt_FP<br>IAT_SensorCircuitFP | | |
| | | | **Engine Not Rotating:**<br><br>Manifold Pressure<br>OR<br>Manifold Pressure | <br><br>< 50.0 kPa<br><br>> 115.0 kPa | Time between current ignition cycle and the last time the engine was running<br><br>Engine is not rotating<br><br>If application has a LIN MAF:<br>LIN Communications established with MAF<br><br>No Active DTCs:<br><br>No Pending DTCs: | <br><br>> 5.0 seconds<br><br><br><br><br><br>EngineModeNotRunTimerError<br>MAP_SensorCircuitFA<br>AAP_SnsrCktFA<br>AAP_LIN1_SnsrCktFA<br><br>MAP_SensorCircuitFP<br>AAP_SnsrCktFP<br>AAP_LIN1_SnsrCktFP | 4 failures out of 5 samples<br><br>1 sample every 12.5 msec for applications without LIN MAF<br><br>1 sample every 25 msec for applications with LIN MAF | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Manifold Absolute Pressure Sensor Circuit Low | P0107 | Detects a continuous short to ground in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too low. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure. | MAP Voltage | < 3.0 % of 5 Volt Range<br>(This is equal to 6.1 kPa) | None | | 320 failures out of 400 samples<br><br>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 | P0108 | Detects a continuous short to power or open circuit in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too high. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure. | MAP Voltage | > 90.0 % of 5 Volt Range<br>(This is equal to 115.1 kPa) | None | | 320 failures out of 400 samples<br><br>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, but no manifold temperature sensor) | P0111 | Detects an Intake Air Temperature (IAT) sensor value that is stuck in range by comparing the IAT sensor value against the IAT2 and coolant temperature sensor values and failing the diagnostic if the IAT value is more different than the IAT2 and coolant temperature values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled.<br><br>The diagnostic will fail if the IAT2 and coolant temperature values are similar, and the IAT value is not similar to the IAT2 and coolant temperature values.<br><br>This diagnostic is executed once per ignition cycle if the enable conditions are met. | ABS(Power Up IAT - Power Up IAT2)<br><br>AND<br><br>ABS(Power Up ECT – Power Up IAT) > ABS(Power Up ECT – Power Up IAT2) | > 25 deg C | Time between current ignition cycle and the last time the engine was running<br><br>Powertrain Relay Voltage for a time<br><br>If application has a LIN MAF:<br>LIN Communications established with MAF<br><br>No Active DTCs: | > 28,800 seconds<br><br>>= 11.0 Volts<br>>= 0.9 seconds<br><br><br><br><br>PowertrainRelayFault<br>ECT_Sensor_Ckt_FA<br>IAT_SensorCircuitFA<br>HumTempSnsrCktFA<br>EngineModeNotRunTimer Error | Executes once at the beginning of each ignition cycle if enable conditions are met | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit Low (applications with LIN MAF) | P0112 | Detects an erroneously low value being reported over the LIN serial connection from the Intake Air Temperature (IAT) sensor. The diagnostic monitors the IAT sensor output temperature and fails the diagnostic when the IAT temperature is too low.<br><br>The IAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol. | IAT Temperature | < -60 degrees C | LIN Communications established with MAF | | 40 failures out of 50 samples<br><br>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 (applications with LIN MAF) | P0113 | Detects an erroneously high value being reported over the LIN serial connection from the Intake Air Temperature (IAT) sensor. The diagnostic monitors the IAT sensor output temperature and fails the diagnostic when the IAT temperature is too high.<br><br>The IAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol. | IAT Temperature | > 150 degrees C | LIN Communications established with MAF | | 40 failures out of 50 samples<br><br>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.<br><br>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”.<br><br>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<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous) | > 80.00 deg C<br><br>10 consecutive IAT readings | If application has a LIN MAF:<br>LIN Communications established with MAF | | 4 failures out of 5 samples<br><br>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 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:<br><br>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).<br><br>2) ECT at power up > IAT at power up by 19.3ºC<br><br>after a minimum 28,800 second soak and a block heater has not been detected.<br>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<br><br>= False | No Active DTC's<br><br>Non-volatile memory initization<br><br>Test complete this trip<br>Test aborted this trip<br>IAT is<br>IAT<br>LowFuelCondition<br>Diag<br><br>==========<br>Block Heater detection is enabled when either of the following occurs:<br><br>1) ECT at power up > IAT at power up by<br><br>2) Cranking time<br><br>==========<br><br>Block Heater is detected and diagnostic is aborted when 1) or 2) occurs:<br>1a) Vehicle drive time<br>1b) Vehicle speed<br>1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows:<br><br>1d) IAT drops from power | VehicleSpeedSensor_FA<br>IAT_SensorFA<br>ECT_Sensor_Ckt_FA<br>IgnitionOffTimeValid<br>TimeSinceEngineRunning Valid<br><br>= Not occurred<br><br>= False<br>= False<br>= Availible<br>≥ -9 ºC<br><br>= False<br><br>==========<br><br>> 19.3 ºC<br><br>< 10.0 seconds<br><br>==========<br><br>> 400 seconds with > 15 MPH<br><br>0.00 times the seconds with vehicle speed below 1b | 1 failure<br><br>500 msec/ sample<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | up IAT<br><br>2a) ECT drops from power up ECT<br><br>2b) Engine run time<br>==========<br>Diagnostic is aborted when 3) or 4) occurs:<br>3) Engine run time with vehicle speed below 1b<br><br>4) Minimum IAT during test | ≥ 3.3 ºC<br><br>≥ 1 ºC<br><br>Within ≤ 30 seconds<br>==========<br><br>> 1800 seconds<br><br>≤ -9 ºC | | |
| | | | | | | | | |

| 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<br>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<br>(@ 150ºC) | < 55 Ohms | | | 5 failures out of 6 samples<br><br>1 sec/ sample<br><br>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<br>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<br>(@ -60ºC) | > 134,000 Ohms | Engine run time<br>OR<br>IAT min | > 10.0 seconds<br><br>≥ -9.0 °C | 5 failures out of 6 samples<br><br>1 sec/ sample<br><br>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<br>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:<br><br>1) postive step change is greater than calculated high limit<br><br>OR<br><br>2) negitive step change is lower than calculated low limit.<br><br>The calculated high and low limits for the next reading use the following calibrations:<br>1) Sensor time constant<br>2) Sensor low limit<br>3) Sensor high limit<br><br>*****Generic Example*****<br><br>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.<br><br>The next reading (after the 90 Deg C reading) must be between 73 Deg C and 101 Deg C to be valid.<br><br>****************************** | <br><br><br><br><br><br><br><br><br><br>7.4 seconds<br>-60.0 Deg C<br>200.0 Deg C | No Active DTC's | ECT_Sensor_Ckt_FP | 3 failures out of 4 samples<br><br>1 sec/ sample<br><br>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 (naturally aspirated) | P0121 | Detects a performance failure in the Throttle Position sensor (TPS) sensor, such as when a TPS value is stuck in range.<br><br>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.<br><br>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<br>AND<br>ABS(Measured MAP – MAP Model 2) Filtered | > 300 kPa*(g/s)<br><br><= 22.0 kPa | Engine Speed<br>Engine Speed<br><br>(Coolant Temp<br>OR<br>OBD Coolant Enable Criteria<br><br>(Coolant Temp<br>OR<br>OBD Max Coolant Achieved<br><br>Intake Air Temp<br>Intake Air Temp<br><br>Minimum total weight factor (all factors multiplied together)<br><br>See Residual Weight Factor tables.<br><br>No Active DTCs: | >= 400 RPM<br><= 4,230 RPM<br><br>>= -9 Deg C<br><br>= TRUE)<br><br><= 130 Deg C<br><br>= FALSE)<br><br>>= -20 Deg C<br><= 129 Deg C<br><br>>= 0.50<br><br>Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM**<br><br>MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM**<br><br>MAP_SensorCircuitFA<br>EGRValvePerformance_FA<br>MAF_SensorCircuitFA<br>CrankSensor_FA<br>ECT_Sensor_FA<br>IAT_SensorFA | Continuous<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | No Pending DTCs: | EGRValve_FP<br>ECT_Sensor_Ckt_FP<br>IAT_SensorCircuitFP | | |
| | | | | | | | | |

| 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<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>P06A3 | 79 /159 counts;<br><br>57 counts continuous;<br><br>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<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>P06A3 | 79 /159 counts;<br><br>57 counts continuous;<br><br>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:<br><br>Thermostat type is divided into normal (non-heated) and electrically heated.<br><br>For this application the "type" cal (KeTHMG_b_TMS_ElecThstEquipped) = 0<br>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.<br><br>**********<br>Type cal above = 1 (Electrically heated t-stat)<br>== == == ==<br>Range #1 (Primary) ECT reaches Commanded temperature minus 11 °C when Ambient min is ≤ 52 °C and > 10 °C.<br>Note: Warm up target for range #1 will be at least 75 °C<br>== == == ==<br>Range #2 (Alternate) ECT reaches Commanded temperature minus 11 °C when Ambient min is ≤ 10 °C and > -9 °C.<br>Note: Warm up target for range #2 will be at least | See the two tables named:<br>**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.<br><br>This diagnostic models the net energy into and out of the cooling | No Active DTC's<br><br>Engine not run time (soaking time before current trip)<br><br>Engine run time<br><br>Fuel Condition<br><br>Distance traveled<br><br>**********<br>If Engine RPM is continuously greater than for this time period<br><br>The diagnostic test for this key cycle will abort<br>**********<br><br>**********<br>If T-Stat Heater commanded duty cycle for this time period | ECT_Sensor_Ckt_FA<br>ECT_Sensor_Perf_FA<br>VehicleSpeedSensor_FA<br>OAT_PtEstFiltFA<br>IAT_SensorCircuitFA<br>MAF_SensorFA<br>THMR_AWP_AuxPumpFA<br>THMR_AHV_FA<br>THMR_SWP_Control_FA<br>THMR_SWP_NoFlow_FA<br>THMR_SWP_FlowStuckOn_FA<br>EngineTorqueEstInaccurate<br><br>≥ 1,800 seconds<br><br>30 ≤ Eng Run Tme ≤ 1,470 seconds<br><br>Ethanol ≤ 87 %<br><br>≥ 0.50 miles<br><br>**********<br>8,200 rpm<br>5.0 seconds<br><br>**********<br><br>**********<br>> 20.0 % duty cycle<br>> 5.0 seconds | 1 failure to set DTC<br><br>1 sec/ sample<br><br>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<br><br>**********<br>Type cal above = 0<br>(non - heated t-stat)<br>== == == ==<br>Range #1 (Primary) ECT reaches 75 °C when Ambient min is ≤ 52 °C and > 10 °C.<br>== == == ==<br>Range #2 (Alternate) ECT reaches 55 °C when Ambient min is ≤ 10 °C and > -9 °C.<br><br>********** | system during the warm-up process.<br><br>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<br><br>**********<br>ECT at start run | **********<br>-60 ≤ ECT ≤ 56 °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 | P0131 | 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.<br><br>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 | < 40.0 mVolts | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>AIR intrusive test<br>Fuel intrusive test<br>Idle intrusive test<br>EGR intrusive test<br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br><br>Low Fuel Condition<br>Only when<br>FuelLevelDataFault<br><br>Commanded Equivalence Ratio<br>Air Per Cylinder<br>Fuel Control State<br>Closed Loop Active | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>AIR System FA<br>Ethanol Composition Sensor FA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br><br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>10.0 < Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br><br>= False<br><br>= False<br><br>0.9922 < ratio < 1.0137<br>175 < mgram < 700<br>= Closed Loop<br>= TRUE<br>(Please see “**Closed Loop Enable Clarification**” in Supporting Tables). | 285 failures out of 350 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | All Fuel Injectors fo active Cylinders<br>Fuel Condition<br><br>Ethanol Estimation in Progress<br><br><br>Fuel State<br><br>All of the above met for | Enabled (On)<br>Ethanol ≤ 87 %<br><br>= Not Active<br>(Please see "**Ethanol Estimation in Progress**" in Supporting Tables).<br><br>DFCO not active<br><br>> 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 1 | P0132 | 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.<br><br>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<br><br>System Voltage<br>AFM Status<br>Heater Warm-up delay<br>Engine Run Time<br>Engine Run Accum<br><br>Low Fuel Condition Diag Only when FuelLevelDataFault<br><br>**********<br>Secondary delay after above conditions are complete (cold start condition)<br><br>Secondary delay after above conditions are complete (not cold start condition)<br><br>Commanded Equivalence Ratio<br><br>********** All of the above met for | TPS_ThrottleAuthorityDefaulted<br>MAF_SensorFA<br>MAP_SensorFA<br>EvapExcessPurgePsbl_FA<br>FuelInjectorCircuit_FA<br>Ethanol Composition Sensor FA<br>AIR System FA<br><br>10.0 < Volts<br>= All Cylinders active<br>= Complete<br>> 5.0 seconds<br>> 30.0 seconds<br><br>= False<br><br>= False<br><br>**********<br>> 235.0 seconds when engine soak time > 28,800 seconds<br><br>> 235.0 seconds when engine soak time ≤ 28,800 seconds<br><br>≤ 1.014 EQR<br><br>**********<br>> 2.0 seconds | 100 failures out of 125 samples<br><br>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 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.<br><br>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<br><br>System Voltage Heater Warm-up delay O2S Heater device control<br><br>B1S1 O2S Heater Duty Cycle<br><br>All of the above met for | ECT_Sensor_FA<br><br>> 10.0 Volts<br>= Complete<br><br>= Not active<br><br>> zero<br><br>> 120 seconds | 8 failures out of 10 samples<br><br>Frequency:<br>1 tests per trip<br>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 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.<br><br>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<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>AIR intrusive test<br>Fuel intrusive test<br>Idle intrusive test<br>EGR intrusive test<br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br><br>Low Fuel Condition<br>Only when<br>FuelLevelDataFault<br><br>Commanded Equivalence Ratio<br>Air Per Cylinder<br>Fuel Control State<br>Closed Loop Active | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>AIR System FA<br>Ethanol Composition Sensor FA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br><br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>10.0 < Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br><br>= False<br><br>= False<br><br>0.992 ≤ ratio ≤ 1.014<br>175 ≤ mgrams ≤700<br>= Closed Loop<br>= TRUE<br>(Please see “**Closed Loop Enable Clarification**” in Supporting Tables). | 320 failures out of 400 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | All Fuel Injectors fo active Cylinders<br>Fuel Condition<br><br>Ethanol Estimation in Progress<br><br><br>Fuel State<br><br>All of the above met for | Enabled (On)<br>Ethanol ≤ 87 %<br><br>= Not Active<br>(Please see “**Ethanol Estimation in Progress**” in Supporting Tables).<br><br>DFCO not active<br><br>> 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.<br><br>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<br><br>System Voltage<br>AFM Status<br>Heater Warm-up delay<br>Engine Run Time<br>Engine Run Accum<br><br>Low Fuel Condition Only when FuelLevelDataFault<br><br>**********<br>Secondary delay after above conditions are complete (cold start condition)<br><br>Secondary delay after above conditions are complete (not cold start condition)<br><br>Commanded Equivalence Ratio<br><br>********** All of the above met for | TPS_ThrottleAuthorityDefaulted<br>MAF_SensorFA<br>MAP_SensorFA<br>EvapExcessPurgePsbl_FA<br>FuelInjectorCircuit_FA<br>Ethanol Composition Sensor FA<br>AIR System FA<br><br>10.0 < Volts<br>= All Cylinders active<br>= Complete<br>> 5.0 seconds<br>> 30.0 seconds<br><br>= False<br><br>= False<br><br>**********<br>> 235.0 seconds when engine soak time > 28,800 seconds<br><br>> 235.0 seconds when engine soak time ≤ 28,800 seconds<br><br>≤ 1.014 EQR<br><br>**********<br>> 2.0 seconds | 100 failures out of 125 samples<br><br>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.<br><br>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.<br><br><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.<br>The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient.<br><br>OR<br><br>Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) | > 8.0 units<br>≤ 7.0 units<br><br><br><br><br><br><br>> 75.0 grams (upper voltage threshold is 500 mvolts and lower voltage threshold is 200 mvolts) | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013B, P013E, P013F, P2270 or P2271<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. | Frequency: Once per trip<br>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.<br><br>Secondary method: | | | Low Fuel Condition<br>Only when<br>FuelLevelDataFault<br><br>Post fuel cell<br><br><br><br><br>Crankshaft Torque<br><br>DTC's Passed<br><br><br><br>==========<br>After above conditions are met: DFCO mode is continued (wo driver initiated pedal input). | = False<br><br>= False<br><br>= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.<br>< 125.0 Nm<br><br>P2270 (and P2272 if applicable)<br>P013E (and P014A if applicable)<br><br>========== | | |

| 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.<br><br>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.<br><br><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.<br>The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient.<br><br>OR<br><br>Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) | > 8.0 units<br>≤ 7.0 units<br><br><br><br><br><br><br>> 250 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 600 mvolts) | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013A, P013E, P013F, P2270 or P2271<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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<br>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.<br><br>Secondary method: | | | Green Cat System Condition<br><br>Low Fuel Condition Only when FuelLevelDataFault<br><br>Post fuel cell<br><br>DTC's Passed<br><br>==========<br>After above conditions are met: Fuel Enrich mode continued.<br><br>========== | is above 22.0 grams/sec.<br><br>= 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).<br><br>= False<br><br>= False<br><br>= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.<br><br>P2270<br>P013E<br>P013A<br>P2271<br>P013F<br><br>==========<br><br>========== | | |

| 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:<br>0.950 ≤ Base Commanded EQR ≤ 1.100<br><br>==========<br>During this test: Engine Airflow must stay below:<br><br>and the delta Engine Airflow over 12.5 msec must be: | ==========<br><br>150 gps<br><br><br>≤ 100.0 gps | | |
| | | | | | | | | |

| 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.<br><br>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.<br><br><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.<br>The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient.<br><br>OR<br><br>Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) | > 8.0 units<br>≤ 7.0 units<br><br><br><br><br><br><br>> 75.0 grams (upper voltage threshold is 500 mvolts and lower voltage threshold is 200 mvolts) | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>B2S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013D, P014A, P014B, P2272 or P2273<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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.<br>Airflow accumulation is only enabled when airflow | Frequency: Once per trip<br>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.<br><br>Secondary method: | | | Low Fuel Condition Only when FuelLevelDataFault<br><br>Post fuel cell<br><br>Crankshaft Torque<br><br>DTC's Passed<br><br>==========<br>After above conditions are met:<br>DFCO mode is continued (wo driver initiated pedal input). | is above 22.0 grams/sec.<br><br>= False<br><br>= False<br><br>= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.<br>< 125.0 Nm<br><br>P2272<br>P014A<br><br>========== | | |

| 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.<br><br>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.<br><br><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.<br>The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient.<br><br>OR<br><br>Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) | > 8.0 units<br>≤ 7.0 units<br><br><br><br><br><br><br>> 250 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 600 mvolts) | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br><br>B2S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013C, P014A, P014B, P2272 or P2273<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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.<br>Airflow accumulation is only enabled when airflow | Frequency: Once per trip<br>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.<br>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.<br><br>Secondary method: | | | Green Cat System Condition<br><br>Low Fuel Condition Only when FuelLevelDataFault<br><br>Post fuel cell<br><br>DTC's Passed<br><br>==========<br>After above conditions are met: Fuel Enrich mode continued.<br><br>========== | is above 22.0 grams/sec.<br><br>= Not Valid,<br>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.<br>(Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).<br><br>= False<br><br>= False<br><br>= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.<br><br>P2272<br>P014A<br>P013C<br>P2273<br>P014B<br><br>==========<br><br>========== | | |

| 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:<br>0.950 ≤ Base Commanded EQR ≤ 1.100<br><br>==========<br>During this test: Engine Airflow must stay below:<br><br>and the delta Engine Airflow over 12.5 msec must be: | ==========<br><br>150 gps<br><br><br>≤ 100.0 gps | | |
| | | | | | | | | |

| 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.<br><br>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<br><br>AND<br><br>The Accumulated mass air flow monitored during the Delayed Response Test under DFCO<br><br>DFCO begins after:<br>1) Catalyst has been rich for a minimum of<br>AND<br>2) Catalyst Rich Accumulation Air Flow is | > 500 mvolts<br><br><br><br><br><br>> 150 grams<br><br><br><br>> 1 secs<br><br><br>≥ 3.0 grams | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013A, P013B, P013F, P2270 or P2271<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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:<br>Once per trip<br>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 22.0 grams/sec. | | |
| | | | | | Low Fuel Condition Only when FuelLevelDataFault | = False<br>= 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<br>==========<br>After above conditions are met: DFCO mode entered (wo driver initiated pedal input). | ≤ 7 cylinders<br>========== | | |
| | | | | | | | | |

| 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.<br><br>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<br><br>AND<br><br>The Accumulated mass air flow monitored during the Delayed Response Test | < 350 mvolts<br><br><br><br><br><br>> 500 grams | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013A, P013B, P013E, P2270 or P2271<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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:<br>Once per trip<br>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 22.0 grams/sec. | | |
| | | | | | Green Cat System Condition | = Not Valid,<br>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.<br>(Note: This feature is only enabled when the vehicle is new and cannot be enabled in service). | | |
| | | | | | Low Fuel Condition<br>Only when FuelLevelDataFault | = False<br>= 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<br>P013E<br>P013A<br>P2271 | | |
| | | | | | Number of fueled cylinders | ≥ 1 cylinders | | |
| | | | | | ==========<br>After above conditions are met: Fuel Enrich mode entered. | ========== | | |

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

| 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.<br><br>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<br>System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle<br><br>All of the above met for | ECT_Sensor_FA<br>> 10.0 Volts<br>= Complete<br><br>= Not active<br><br>> zero<br><br>> 120 seconds | 8 failures out of 10 samples<br><br>Frequency:<br>1 tests per trip<br>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. |
|---|---|---|---|---|---|---|---|---|
| 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.<br><br>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<br><br>AND<br><br>The Accumulated mass air flow monitored during the Delayed Response Test under DFCO<br><br>DFCO begins after:<br>1) Catalyst has been rich for a minimum of<br>AND<br>2) Catalyst Rich Accumulation Air Flow is | > 500 mvolts<br><br><br><br><br><br>> 150 grams<br><br><br><br>> 1 secs<br><br><br>≥ 3.0 grams | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br>B2S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013C, P013D, P014B, P2272 or P2273<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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.<br>Airflow accumulation is only enabled when airflow | Frequency:<br>Once per trip<br>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 22.0 grams/sec. | | |
| | | | | | Low Fuel Condition Only when FuelLevelDataFault | = False<br>= 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 | P2272 | | |
| | | | | | Number of fueled cylinders<br>==========<br>After above conditions are met: DFCO mode entered (wo driver initiated pedal input). | ≤ 7 cylinders<br>========== | | |
| | | | | | | | | |

| 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.<br><br>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<br><br>AND<br><br>The Accumulated mass air flow monitored during the Delayed Response Test | < 350 mvolts<br><br><br><br><br><br>> 500 grams. | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>B2S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013C, P013D, P014A, P2272 or P2273<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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.<br>Airflow accumulation is only enabled when airflow | Frequency:<br>Once per trip<br>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 22.0 grams/sec. | | |
| | | | | | Green Cat System Condition | = Not Valid, Green Cat System condition is considered valid until accumulated airflow is greater than 720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 22.0 grams/ sec. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service). | | |
| | | | | | Low Fuel Condition | = False | | |
| | | | | | Only when FuelLevelDataFault | = False | | |
| | | | | | Post fuel cell | = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. | | |
| | | | | | DTC's Passed | P2272<br>P014A<br>P013C<br>P2273 | | |
| | | | | | Number of fueled cylinders | ≥ 1 cylinders | | |
| | | | | | ==========<br>After above conditions are met: Fuel Enrich mode entered. | ========== | | |

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

| 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.<br><br>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<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>AIR intrusive test<br>Fuel intrusive test<br>Idle intrusive test<br>EGR intrusive test<br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br><br>Low Fuel Condition<br>Only when<br>FuelLevelDataFault<br><br>Commanded Equivalence Ratio<br>Air Per Cylinder<br><br>Fuel Control State<br>Closed Loop Active | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>AIR System FA<br>Ethanol Composition Sensor FA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br><br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>10.0 < Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br><br>= False<br><br>= False<br><br>0.992 ≤ ratio ≤ 1.014<br>175 ≤ APC ≤ 700 mgrams<br><br>= Closed Loop<br>= TRUE<br>(Please see “**Closed Loop Enable** | 285 failures out of 350 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | **Clarification**" in Supporting Tables). | | |
| | | | | | All Fuel Injectors for active Cylinders Fuel Condition | Enabled (On) ≤ 87 % Ethanol | | |
| | | | | | Ethanol Estimation in Progress | = Not Active (Please see "**Ethanol Estimation in Progress**" in Supporting Tables). | | |
| | | | | | Fuel State | DFCO not active | | |
| | | | | | All of the above met for | > 5.0 seconds | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>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<br><br>System Voltage<br>AFM Status<br>Heater Warm-up delay<br>Engine Run Time<br>Engine Run Accum<br><br>Low Fuel Condition<br>Only when<br>FuelLevelDataFault<br><br>**********<br>Secondary delay after above conditions are complete (cold start condition)<br><br>Secondary delay after above conditions are complete (not cold start condition)<br><br>Commanded Equivalence Ratio<br><br>********** All of the above met for | TPS_ThrottleAuthorityDefaulted<br>MAF_SensorFA<br>MAP_SensorFA<br>EvapExcessPurgePsbl_FA<br>FuelInjectorCircuit_FA<br>Ethanol Composition Sensor FA<br>AIR System FA<br><br>10.0 < Volts<br>= All Cylinders active<br>= Complete<br>> 5.0 seconds<br>> 30.0 seconds<br><br>= False<br><br>= False<br><br>**********<br>> 280.0 seconds when engine soak time > 28,800 seconds<br><br>> 280.0 seconds when engine soak time ≤ 28,800 seconds<br><br>≤ 1.014 EQR<br><br>**********<br>> 2 seconds | 100 failures out of 125 samples<br><br>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 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.<br><br>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<br>System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle<br><br>All of the above met for | ECT_Sensor_FA<br>> 10.0 Volts<br>= Complete<br><br>= Not active<br><br>> zero<br><br>> 120 seconds | 8 failures out of 10 samples<br><br>Frequency:<br>1 tests per trip<br>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.<br><br>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<br><br>AIR intrusive test<br>Fuel intrusive test<br>Idle intrusive test<br>EGR intrusive test<br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br><br>Low Fuel Condition<br>Only when<br>FuelLevelDataFault<br><br>Commanded Equivalence Ratio<br>Air Per Cylinder<br>Fuel Control State<br>Closed Loop Active | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>AIR System FA<br>Ethanol Composition Sensor FA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br><br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>10.0 < Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br><br>= False<br><br>= False<br><br>0.992 ≤ ratio ≤ 1.014<br>175 ≤ mgrams ≤ 700<br>= Closed Loop<br>= TRUE<br>(Please see “**Closed Loop Enable Clarification**” in Supporting Tables). | 320 failures out of 400 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | All Fuel Injectors fo active Cylinders<br>Fuel Condition<br><br>Ethanol Estimation in Progress<br><br><br>Fuel State<br><br>All of the above met for | Enabled (On)<br>≤ 87 % Ethanol<br><br>= Not Active<br>(Please see "**Ethanol Estimation in Progress**" in Supporting Tables).<br><br>DFCO not active<br><br>> 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 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.<br><br>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<br><br>System Voltage<br>AFM Status<br>Heater Warm-up delay<br>Engine Run Time<br>Engine Run Accum<br><br>Low Fuel Condition Only when FuelLevelDataFault<br><br>**********<br>Secondary delay after above conditions are complete (cold start condition)<br><br>Secondary delay after above conditions are complete (not cold start condition)<br><br>Commanded Equivalence Ratio<br><br>********** All of the above met for | TPS_ThrottleAuthorityDefaulted<br>MAF_SensorFA<br>MAP_SensorFA<br>EvapExcessPurgePsbl_FA<br>FuelInjectorCircuit_FA<br>Ethanol Composition Sensor FA<br>AIR System FA<br><br>10.0 < Volts<br>= All Cylinders active<br>= Complete<br>> 5.0 seconds<br>> 30.0 seconds<br><br>= False<br><br>= False<br><br>**********<br>> 280.0 seconds when engine soak time > 28,800 seconds<br><br>> 280.0 seconds when engine soak time ≤ 28,800 seconds<br><br>≤ 1.014 EQR<br><br>**********<br>> 2 seconds | 100 failures out of 125 samples<br><br>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 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.<br><br>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.<br><br><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.<br>The EWMA repass limit is<br>The EWMA calculation uses a 0.20 coefficient. This method calculates the result when the WRAF O2 sensor measured EQR is<br><br>OR<br><br>Secondary Method: The Accumulated time monitored during the R2L Delayed Response Test.<br><br>AND<br><br>Pre WRAF O2 sensor measured EQR is | > 0.68 EWMA (sec)<br>≤ 0.60 EWMA (sec)<br><br>< 0.900 EQR<br><br>≥ 3.2 Seconds<br><br>> 0.500 EQR | No Active DTC's<br><br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br><br>Low Fuel Condition<br>Only when<br>FuelLevelDataFault<br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>MAF_SensorFA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>AIR System FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EthanolCompositionSensor_FA<br>EngineMisfireDetected_FA<br>WRAF_Bank_1_FA<br>P0131, P0132, P013A, P013B, P013E, P013F, P2270, P2271<br><br>> 10.0 Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br><br>= False<br><br>= False<br><br>= Not Valid, | Frequency: Once per trip<br>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. |
|---|---|---|---|---|---|---|---|---|
| | | and intake ai 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.<br><br><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<br><br>Engine Coolant ( Or OBD Coolant Enable Criteria<br><br>IAT<br>Engine run Accum<br><br>Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled)<br><br>Engine Airflow<br>Vehicle Speed to initially enable test<br>Vehicle Speed range to keep test enabled (after initially enabled)<br><br>Closed loop integral<br>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.<br><br>≥ 30 seconds<br><br>> 50 ºC<br><br>= TRUE )<br><br>> -40 ºC<br>> 30 seconds<br><br>800 ≤ RPM ≤ 3,000<br><br>750 ≤ RPM ≤ 3,200<br><br>4.0 ≤ gps ≤ 35.0<br><br>31.1 ≤ MPH ≤ 82.0<br><br>27.3 ≤ MPH ≤ 87.0<br><br>0.75 ≤ C/L Int ≤ 1.12<br>= TRUE<br>(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<br><br>Ethanol Estimation in Progress<br><br><br><br>Baro<br>Post fuel cell<br><br>EGR Intrusive diagnostic<br>All post sensor heater delays<br>O2S Heater (post sensor) on Time<br>Predicted Catalyst temp<br>Fuel State<br><br>==========<br>All of the above met for at least 0.2 seconds, and then the Force Cat Rich intrusive stage is requested.<br>==========<br><br>Pre O2S EQR B1S1 at end of Cat Rich stage<br>Fuel State<br>Number of fueled cylinders<br><br>==========<br>After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input). | not in control of purge<br><br>= Not Active<br>(Please see “**Ethanol Estimation in Progress**” in Supporting Tables).<br><br><br><br>> 70 kpa<br>= enabled<br><br>= not active<br><br>= not active<br><br>≥ 60.0 sec<br>475 ≤ ºC ≤ 1,024<br>= DFCO possible<br><br>==========<br><br><br><br><br><br>==========<br><br><br>≥ 1.085 EQR<br>= DFCO active<br><br>≤ 7 cylinders<br><br>========== | | |
| | | | | | | | | |

| 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.<br><br>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.<br><br>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.<br>The EWMA repass limit is The EWMA calculation uses a 0.20 coefficient.<br><br>OR<br><br>Secondary method: The Accumulated time monitored during the L2R Delayed Response Test.<br><br>AND<br><br>Pre O2 sensor voltage is<br><br>OR<br><br>At end of Cat Rich stage the Pre O2 sensor output is | > 0.68 EWMA (sec)<br>≤ 0.60 EWMA (sec)<br><br>≥ 2.5 Seconds<br><br>< 450 mvolts<br><br>< 750 mvolts | No Active DTC's<br><br>P015A test is complete and<br><br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br><br>Low Fuel Condition<br>Only when<br>FuelLevelDataFault | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>MAF_SensorFA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>AIR System FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EthanolCompositionSensor_FA<br>EngineMisfireDetected_FA<br>P0131, P0132, P013A, P013B, P013E, P013F, P015A, P2270, P2271<br><br>= Passed<br><br>> 10.0 Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br><br>= False<br><br>= False | Frequency: Once per trip<br>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.<br><br><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<br><br>O2 Heater (pre sensor) on for<br>Learned Htr resistance<br><br>Engine Coolant<br>( Or OBD Coolant Enable Criteria<br><br>IAT<br>Engine run Accum<br><br>Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled)<br><br>Engine Airflow<br>Vehicle Speed to initially enable test<br>Vehicle Speed range to keep test enabled (after | = Not Valid,<br>Green O2S condition is considered valid until the accumulated air flow is greater than<br>**Multiple DTC Use_Green Sensor Delay Criteria - Limit**<br>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.<br><br>≥ 30 seconds<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>> 50 °C<br><br>= TRUE )<br><br>> -40 °C<br>> 30 seconds<br><br>800 ≤ RPM ≤ 3,000<br><br>750 ≤ RPM ≤ 3,200<br><br>4.0 ≤ gps ≤ 35.0<br><br>31.1 ≤ MPH ≤ 82.0 | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | initially enabled) | 27.3 ≤ MPH ≤ 87.0 | | |
| | | | | | Closed loop integral<br>Closed Loop Active | 0.75 ≤ C/L Int ≤ 1.12<br>= TRUE<br>(Please see "**Closed Loop Enable Clarification**" in Supporting Tables). | | |
| | | | | | Evap | not in control of purge | | |
| | | | | | Ethanol Estimation in Progress | = Not Active<br>(Please see "**Ethanol Estimation in Progress**" in Supporting Tables). | | |
| | | | | | Baro<br>Post fuel cell<br>EGR Intrusive diagnostic<br>All post sensor heater delays<br>O2S Heater (post sensor) on Time | > 70 kpa<br>= enabled<br>= not active<br>= not active<br>≥ 60.0 sec | | |
| | | | | | Predicted Catalyst temp<br>Fuel State<br>Number of fueled cylinders | 475 ≤ ºC ≤ 1,024<br>= DFCO inhibit<br>≥ 1 cylinders | | |
| | | | | | ==========<br>When above conditions are met: Fuel Enrich mode is entered.<br>==========<br>During this test: Engine Airflow must stay between:<br>and the delta Engine Airflow over 12.5msec | ==========<br><br>==========<br><br>4 ≤ gps ≤ 20 | | |

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

| 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.<br><br>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.<br><br><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.<br>The EWMA repass limit is<br>The EWMA calculation uses a 0.20 coefficient. This method calculates the result when the Pre O2 sensor voltage is<br><br>OR<br><br>Secondary method: The Accumulated time monitored during the R2L Delayed Response Test.<br><br>AND<br><br>Pre O2 sensor voltage is above | > 0.68 EWMA (sec)<br>≤ 0.60 EWMA (sec)<br><br>< 450 mvolts<br><br>≥ 3.2 Seconds<br><br>> 100 mvolts | No Active DTC's<br><br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br><br>Low Fuel Condition Only when<br>FuelLevelDataFault<br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>MAF_SensorFA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>AIR System FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EthanolCompositionSensor_FA<br>EngineMisfireDetected_FA<br>P0151, P0152, P013C, P013D, P014A, P014B, P2272, P2273<br><br>> 10.0 Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br><br>= False<br><br>= False<br><br>= Not Valid, Green O2S condition is | Frequency: Once per trip<br>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.<br><br>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<br>Learned Htr resistance<br><br>Engine Coolant<br>( Or OBD Coolant Enable Criteria<br><br>IAT<br>Engine run Accum<br><br>Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled)<br><br>Engine Airflow<br><br>Vehicle Speed to initially enable test<br>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.<br><br>≥ 30 seconds<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>> 50 °C<br><br>= TRUE )<br><br>> -40 °C<br>> 30 seconds<br><br>800 ≤ RPM ≤ 3,000<br><br>750 ≤ RPM ≤ 3,200<br><br>4.0 ≤ gps ≤ 35.0<br><br>31.1 ≤ MPH ≤ 82.0<br><br>27.3 ≤ 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<br>Closed Loop Active | 0.75 ≤ C/L Int ≤ 1.12<br>= TRUE<br>(Please see "**Closed Loop Enable Clarification**" in Supporting Tables). | | |
| | | | | | Evap | not in control of purge | | |
| | | | | | Ethanol Estimation in Progress | = Not Active<br>(Please see "**Ethanol Estimation in Progress**" in Supporting Tables). | | |
| | | | | | Baro<br>Post fuel cell | > 70 kpa<br>= enabled | | |
| | | | | | EGR Intrusive diagnostic<br>All post sensor heater delays<br>O2S Heater (post sensor) on Time | = not active<br>= not active<br>≥ 60.0 sec | | |
| | | | | | Predicted Catalyst temp<br>Fuel State | 475 ≤ ºC ≤ 1,024<br>= DFCO possible | | |
| | | | | | ==========<br>All of the above met for at least 0.2 seconds, and then the Force Cat Rich intrusive stage is requested.<br>========== | ==========<br><br><br><br><br>========== | | |
| | | | | | Pre O2S voltage B1S1 at end of Cat Rich stage<br>Fuel State<br>Number of fueled cylinders<br>==========<br><br>After above conditions are | ≥ 750 mvolts<br>= DFCO active<br><br><= 7 cylinders<br>========== | | |

| 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.<br><br>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.<br><br><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.<br>The EWMA repass limit is<br>The EWMA calculation uses a 0.20 coefficient.<br><br>OR<br><br>Secondary method: The Accumulated time monitored during the L2R Delayed Response Test.<br><br>AND<br><br>Pre O2 sensor voltage is below<br><br>OR<br><br>At end of Cat Rich stage the Pre O2 sensor output is | > 0.68 EWMA (sec)<br>≤ 0.60 EWMA (sec)<br><br>≥ 2.5 Seconds<br><br>< 450 mvolts<br><br>< 750 mvolts | No Active DTC's<br><br>P015C test is complete and<br><br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br><br>Low Fuel Condition<br>Only when<br>FuelLevelDataFault | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>MAF_SensorFA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>AIR System FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EthanolCompositionSensor_FA<br>EngineMisfireDetected_FA<br>P0151, P0152, P013C, P013D, P014A, P014B, P015C, P2272, P2273<br><br>= Passed<br><br>> 10.0 Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br><br>= False<br><br>= False | Frequency: Once per trip<br>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.<br><br><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<br><br>O2 Heater (pre sensor) on for<br>Learned Htr resistance<br><br>Engine Coolant<br>( Or OBD Coolant Enable Criteria<br><br>IAT<br>Engine run Accum<br><br>Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled)<br><br>Engine Airflow<br>Vehicle Speed to initially enable test<br>Vehicle Speed range to keep test enabled (after initially enabled) | = Not Valid,<br>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.<br><br>≥ 30 seconds<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>> 50 °C<br><br>= TRUE )<br><br>> -40 °C<br>> 30 seconds<br><br>800 ≤ RPM ≤ 3,000<br><br>750 ≤ RPM ≤ 3,200<br><br>4.0 ≤ gps ≤ 35.0<br><br>31.1 ≤ MPH ≤ 82.0<br><br>27.3 ≤ 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<br>Closed Loop Active | 0.75 ≤ C/L Int ≤ 1.12<br>= TRUE<br>(Please see "**Closed Loop Enable Clarification**" in Supporting Tables). | | |
| | | | | | Evap | not in control of purge | | |
| | | | | | Ethanol Estimation in Progress | = Not Active<br>(Please see "**Ethanol Estimation in Progress**" in Supporting Tables). | | |
| | | | | | Baro<br>Post fuel cell<br>EGR Intrusive diagnostic<br>All post sensor heater delays<br>O2S Heater (post sensor) on Time | > 70 kpa<br>= enabled<br>= not active<br>= not active<br>≥ 60.0 sec | | |
| | | | | | Predicted Catalyst temp<br>Fuel State<br>Number of fueled cylinders | 475 ≤ ºC ≤ 1,024<br>= DFCO inhibit<br>≥ 1 cylinders | | |
| | | | | | ==========<br>When above conditions are met: Fuel Enrich mode is entered.<br>==========<br>During this test: Engine Airflow must stay between:<br>and the delta Engine Airflow over 12.5msec must be : | ==========<br><br>==========<br><br>4 ≤ gps ≤ 20<br><br>≤ 50.0 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.<br><br>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<br>System Voltage Heater<br>Warm-up delay O2S Heater device control<br>B1S1 O2S Heater Duty Cycle<br><br>All of the above met for | ECT_Sensor_FA<br>> 10.0 Volts<br>= Complete<br><br>= Not active<br><br>> zero<br><br>> 120 seconds | 8 failures out of 10 samples<br><br>Frequency:<br>1 tests per trip<br>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 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.<br><br>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<br><br>AND<br><br>The filtered short-term fuel trim metric<br>(Note: any value below 0.95 effectively nullifies the short-term fuel trim criteria) | >= 1.270<br><br><br><br>>= 0.100<br><br>If a fault has been detected the long-term fuel trim metric must be < 1.130 and the short-term fuel trim metric must be < 1.150 to repass the diagnostic. | The primary fuel trim diagnostic is enabled<br><br>Engine speed<br>BARO<br>Coolant Temp<br><br>Coolant Temp<br>MAP<br>Inlet Air Temp<br>MAF<br>Fuel Level<br><br>Long Term Fuel Trim data accumulation:<br><br>Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis | <br><br>400 <rpm< 7,000<br>> 70 kPa<br>> -40 °C (or OBD Coolant Enable Criteria = TRUE)<br>< 150 °C<br>10 <kPa< 255<br>-40 <°C< 150<br>1 <g/s< 1,000<br>> 10 % or if fuel sender is faulty the diagnostic will bypass the fuel level criteria.<br><br>> 25.00 seconds of data must accumulate on each trip, with at least 15.00 seconds of data in the current fuel trim cell before a pass or fail decision can be made. Additional time can be required for cold ambient starts to accommodate larger minimum LTM's for startability reasons. See **Startup Engine Coolant adjusment to Minimum accumulation time** .<br><br>(Please see **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage** in Supporting Tables for a list of cells utilized for diagnosis) | Frequency: 100 ms Continuous Loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Closed Loop<br>Long Term FT | Enabled<br>Enabled<br>(Please see "**Closed Loop Enable Clarification**" and "**Long Term FT Enable Criteria**" in Supporting Tables.) | | |
| | | | | | EGR Diag.<br>Catalyst Diag.<br>Post O2 Diag.<br>Device Control<br>EVAP Diag. | Intrusive Test Not Active<br>Intrusive Test Not Active<br>Intrusive Test Not Active<br>Not Active<br>Large Leak Diagnostic (P0455) Not Active | | |
| | | | | | No active DTC: | IAC_SystemRPM_FA<br>MAP_SensorFA<br>MAF_SensorFA<br>MAF_SensorTFTKO<br>AIR System FA<br>EvapExcessPurgePsbl_FA<br>Ethanol Composition Sensor FA<br>FuelInjectorCircuit_FA<br>EngineMisfireDetected_FA<br>EGRValvePerformance_FA<br>EGRValveCircuit_FA<br>MAP_EngineVacuumStatus<br>AmbPresDfltdStatus<br>TC_BoostPresSnsrFA<br>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.<br><br>There are two methods to determine a Rich fault. They are Passive and Intrusive.<br><br>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:**<br>The filtered Non-Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Short Term Fuel Trim metric<br>(Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria)<br><br>**********<br>**Intrusive Test:**<br>For 3 out of 5 intrusive segments<br><br>The filtered Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Non-Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Short Term Fuel Trim metric<br>(Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria) | <= 0.705<br><br><br><br><br><br><br><br><= 2.000<br><br><br><br><br><br><br><br>********** <br><br><br><br><br><= 0.710<br><br><br><br><= 0.705<br><br><br><br><= 2.000<br><br><br><br><br>If a fault has been detected (by the passive or intrusive test) the long-term fuel trim metric must be > 0.745 and the short- | ********** <br><br>Purge Vapor Fuel | Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered.<br><br>**********<br><br><= 20.00%<br><br>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)<br><br>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:<br>100 ms<br>Continuous Loop<br><br>**********<br><br>**Segment Definition:**<br>Segments can last up to 60 seconds and are separated by the lesser of 20.00 seconds of purge-on time or enough time to purge 36 grams of vapor. A maximum of 5 completed segments or 20 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | term fuel trim metric is only monitored on programs that have acceptable emissions when the long-term fuel metric reaches its full authority.<br><br>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.<br><br>Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics. This is why the intrusive test is operated over several | | term fuel trim metric must be > 0.850 to repass the diagnostic. The intrusive test will be enabled at long-term fuel metric values < 0.75 until the diagnostic repasses after a failure. | | If the accumulated purge volume is > 4,250.0 grams, the intrusive test will not be inhibited even if Purge Vapor Fuel is > 20.0 %. | time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge Long Term Fuel Trim metric > 0.710 for at least 200.00 seconds, indicating that the canister has been purged. | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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. |
|---|---|---|---|---|---|---|---|---|
| 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.<br>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<br><br>AND<br><br>The filtered short-term fuel trim metric<br>(Note: any value below 0.95 effectively nullifies the short-term fuel trim criteria) | >= 1.270<br><br><br><br>>= 0.100<br><br>If a fault has been detected the long-term fuel trim metric must be < 1.130 and the short-term fuel trim metric must be < 1.150 to repass the diagnostic. | The primary fuel trim diagnostic is enabled<br><br>Engine speed<br>BARO<br>Coolant Temp<br><br>Coolant Temp<br>MAP<br>Inlet Air Temp<br>MAF<br>Fuel Level<br><br><br><br>Long Term Fuel Trim data accumulation:<br><br><br><br><br><br><br><br><br><br><br><br>Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis | <br><br><br>400 <rpm< 7,000<br>> 70 kPa<br>> -40 °C (or OBD Coolant Enable Criteria = TRUE)<br>< 150 °C<br>10 <kPa< 255<br>-40 <°C< 150<br>1 <g/s< 1,000<br>> 10 % or if fuel sender is faulty the diagnostic will bypass the fuel level criteria.<br><br>> 25.00 seconds of data must accumulate on each trip, with at least 15.00 seconds of data in the current fuel trim cell before a pass or fail decision can be made.Additional time can be required for cold ambient starts to accommodate larger minimum LTM's for startability reasons. See **Startup Engine Coolant adjusment to Minimum accumulation time** .<br><br>(Please see **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage** in Supporting Tables for a list of cells utilized for diagnosis) | Frequency: 100 ms Continuous Loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Closed Loop<br>Long Term FT | Enabled<br>Enabled<br>(Please see "**Closed Loop Enable Clarification**" and "**Long Term FT Enable Criteria**" in Supporting Tables.) | | |
| | | | | | EGR Diag.<br>Catalyst Diag.<br>Post O2 Diag.<br>Device Control<br>EVAP Diag. | Intrusive Test Not Active<br>Intrusive Test Not Active<br>Intrusive Test Not Active<br>Not Active<br>Large Leak Diagnostic (P0455) Not Active | | |
| | | | | | No active DTC: | IAC_SystemRPM_FA<br>MAP_SensorFA<br>MAF_SensorFA<br>MAF_SensorTFTKO<br>AIR System FA<br>EvapExcessPurgePsbl_FA<br>Ethanol Composition Sensor FA<br>FuelInjectorCircuit_FA<br>EngineMisfireDetected_FA<br>EGRValvePerformance_FA<br>EGRValveCircuit_FA<br>MAP_EngineVacuumStatus<br>AmbPresDfltdStatus<br>TC_BoostPresSnsrFA<br>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.<br><br>There are two methods to determine a Rich fault. They are Passive and Intrusive.<br><br>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:**<br>The filtered Non-Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Short Term Fuel Trim metric<br>(Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria)<br><br>**********<br>**Intrusive Test:**<br>For 3 out of 5 intrusive segments,<br><br>the filtered Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Non-Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Short Term Fuel Trim metric<br>(Note: any value above1.05 effectively nullifies the short-term fuel trim criteria) | <= 0.705<br><br>AND<br><br><= 2.000<br><br>**********<br><br><= 0.710<br><br>AND<br><br><= 0.705<br><br>AND<br><br><= 2.000<br><br>If a fault has been detected (by the passive or intrusive test) the long-term fuel trim metric must be > | **********<br>Purge Vapor Fuel | Secondary Parameters and Enable Conditions are identical to those for P0174, with the exception that fuel level is not considered.<br><br>**********<br><= 20.00%<br>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)<br><br>A minimum number of accumlated Fuel Trim Data samples are required to adequately learn a correct Purge Vapor Fuel value. See the table<br>**Minimum Non-Purge Samples for Purge (Vapor Fuel )**<br>for the Purge Off cells used to validate the Purge Vapor Fuel parameter.<br><br>If the accumulated purge volume is > 4,250.0 | Frequency:<br>100 ms<br>Continuous Loop<br><br>**********<br>**Segment Definition:**<br>Segments can last up to 60 seconds and are separated by the lesser of 20.00 seconds of purge-on time or enough time to purge 36 grams of vapor.<br>A maximum of 5 completed segments or 20 attempts are allowed for each intrusive test.<br>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.<br><br>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.<br><br>Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics. This is why the intrusive test is operated over several | | 0.745 and the short-term fuel trim metric must be > 0.850 to repass the diagnostic. The intrusive test will be enabled at long-term fuel metric values < 0.75 until the diagnostic repasses after a failure. | | grams, the intrusive test will not be inhibited even if Purge Vapor Fuel is > 20.0 %.<br><br>(Note: values greater than 50% indicate the Purge Vapor Fuel requirement is not being used) | purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge Long Term Fuel Trim metric > 0.710 for at least 200.00 seconds, indicating that the canister has been purged. | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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. |
|---|---|---|---|---|---|---|---|---|
| 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)<br>a] Intrusive Test Trigger: 1] Fuel Pump Duty Cycle Clamped Time ( min or max duty cycle) >= 5 sec<br><br>Or 2] Fuel Pres Err Variance <= calibration value KeFDBR_cmp_FPSS_MinPres<br><br>Variance ;<br>Otherwise, Report status as Pass<br>b] Intrusive test freq limit: 60 sec between intrusive tests that pass,<br>c] Intrusive test Fuel Flow limit: Fuel Flow Actual < Max allowed Fuel Flow rate | Sensed fuel pressure change<br>[absolute value, during intrusive test] | <= 30 kPa | a) Diagnostic enabled [FDBR_b_FPSS_DiagEnbld]<br><br>b) Timer Engine Running [FDBR_t_EngModeRunCoarse]<br><br>c1) Fuel Flow Rate Valid<br><br>c2) FDB_FuelPresSnsrCktFA<br><br>c3) Reference Voltage Fault Status [DTC P0641]<br><br>c4) FAB_FuelPmpCktFA<br><br>c5) Fuel Control Enable Fault Active [DTC P12A6]<br><br>c6) Fuel Pump Driver Module OverTemp Fault Active [DTC P1255]<br><br>c7) Fuel Pump Speed Fault Active [DTC P129F]<br><br>c8) CAN Sensor Bus message $0C3 Comm Fault [CFMR_b_FTZM_Info1_UcodeCmFA DTC P165C]<br><br>c9) CAN Sensor Bus Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_UcodeCmFA DTC] | a) == TRUE<br><br>b) >= 5.00 seconds<br><br>c1) == TRUE<br><br>c2) <> TRUE<br><br>c3) <> TRUE<br><br>c4] <> TRUE<br><br>c5) <> TRUE<br><br>c6) <> TRUE<br><br>c7) <> TRUE<br><br>c8) <> TRUE<br><br>c9] <> TRUE | 1 sample / 12.5 millisec<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | c10) Fuel Pump Duty Cycle Fault Active | c10) <> TRUE | | |
| | | | | | c11) Sensor Configuration [FDBR_e_FuelPresSnsrConfig] | c11) == CeFDBR_e_WiredTo_FTZM | | |
| | | | | | c12) Sensor Bus Relay On | c12) == TRUE | | |
| | | | | | d) Emissions Fuel Level Low [Message $3FB] | d) <> TRUE | | |
| | | | | | e) Fuel Control Enable | e) == TRUE | | |
| | | | | | f) Fuel Pump Control State | f) == Normal Control OR == Fuel Pres Sensor Stuck Control | | |
| | | | | | g) Instantaneous Fuel Flow [FCBR_dm_InstFuelFlow] | g) >= 0.05 gm/sec | | |
| | | | | | h) Diagnostic System Disabled [DRER_b_DiagSysDsb] | h) <> TRUE | | |
| | | | | | j1) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B $0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr DTC] | j1) <> TRUE | | |
| | | | | | j2) CAN Sensor Bus message $0C3_Available | j2) == TRUE | | |
| | | | | | j3) Fuel Pres Sensor Ref Voltage Status Message Counter Incorrect Alive Rolling Count and | j3) <> TRUE | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_Info1_ARC_ChkErr DTC] | | | |
| | | | | | | | | |

| 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<br><br>Values are analyzed as percent of sensor reference voltage [[Abs [5.0V - SensorVoltsActual] / 5.0V] *100%] | Fuel Pressure Sensor output %<br><br>[re. full range as percent of 5.0V reference] | < 4.00 %<br>or<br>[0 kPa gauge] | a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl]<br><br>b) Run_Crank Active [PMDR_b_RunCrankActive<br><br>c) Diagnostic System Disabled [DRER_b_DiagSysDsbl]<br><br>d) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig] | a) == TRUE<br><br>b) == TRUE<br><br>c) <> TRUE<br><br>d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo ECM<br>d2) IF NOT, then see Case2 | 64.00 failures / 80.00 samples<br><br>1 sample/12.5 ms | Type B, 2 Trips |
| | | | Fuel Pressure Sensor output %<br><br>[re. full range as percent of 5.0V reference] | < 4.00 %<br>or<br>[0 kPa gauge] | a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl]<br><br>b) Run_Crank Active [PMDR_b_RunCrankActive<br><br>c) Diagnostic System Disabled [DRER_b_DiagSysDsbl]<br><br>d1) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig]<br><br>d2) Sensor Bus Relay On<br><br>d3) CAN Sensor Bus message $0C3_Available<br><br>d4) Fuel Pres Sensor Ref | a) == TRUE<br><br>b) == TRUE<br><br>c) <> TRUE<br><br>d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo FTZM<br><br>d2) == TRUE<br><br>d3) == TRUE<br><br>d4) <> TRUE | 64.00 failures / 80.00 samples<br><br>1 sample/12.5 ms | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_Info1_ARC_ChkErr DTC] | d2) IF calibration CeFDBR_e_WiredTo_FTZM <> WiredTo FTZM, then see Case1 | | |
| | | | | | | | | |

| 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<br><br>Values are analyzed as percent of sensor reference voltage [[Abs [5.0V - SensorVoltsActual] / 5.0V] *100%] | Fuel Pressure Sensor output %<br><br>[re. full range as percent of 5.0V reference] | > 96.00 %<br>or<br>[743 kPa ga] | a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl]<br><br>b) Run_Crank Active [PMDR_b_RunCrankActive<br><br>c) Diagnostic System Disabled [DRER_b_DiagSysDsbl]<br><br>d) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig] | a) == TRUE<br><br>b) == TRUE<br><br>c) <> TRUE<br><br>d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo ECM<br>d2) IF NOT, then see Case2 | 64.00 failures / 80.00 samples<br><br>1 sample/12.5 ms | Type B, 2 Trips |
| | | | Fuel Pressure Sensor output %<br><br>[re. full range as percent of 5.0V reference] | > 96.00 %<br>or<br>[743 kPa ga] | a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl]<br><br>b) Run_Crank Active [PMDR_b_RunCrankActive<br><br>c) Diagnostic System Disabled [DRER_b_DiagSysDsbl]<br><br>d1) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig]<br><br>d2) Sensor Bus Relay On<br><br>d3) CAN Sensor Bus message $0C3_Available<br><br>d4) Fuel Pres Sensor Ref | a) == TRUE<br><br>b) == TRUE<br><br>c) <> TRUE<br><br>d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo FTZM<br><br>d2) == TRUE<br><br>d3) == TRUE<br><br>d4) <> TRUE | 64.00 failures / 80.00 samples<br><br>1 sample/12.5 ms | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_Info1_ARC_ChkErr DTC] | d2) IF calibration CeFDBR_e_WiredTo_FTZM <> WiredTo FTZM, then see Case1 | | |
| | | | | | | | | |

| 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<br><br>((Low Limit fail Filtered Fuel Control Error )<br><br>OR<br><br>(High Limit Fail: Filtered Fuel Control Error))<br><br>AND<br><br>(FIltered Absolute delta between sensor1 and sensor2 | <br><br><=<br>**P0191 - Low fail limit of fuel control due to pressure sensor skewed low**<br>(See supporting table)<br><br>>=<br>**P0191 - High fail limit of fuel control due to high pressure sensor skewed High**<br>(see Supporting table)<br><br>>= 1.00 mpa<br><br>Note:<br>fuel control error is calcuated based on the squreroot of senor1 divided by sensor2, this value is filter to ensure proper failure detection.<br><br>Absolute delta between sensor1 and sensor2 value is filter to ensure proper failure detection. | Commanded Pressure rate of change (increasing or dercresing)<br><br>for a period of time | < 0.70 mpa<br><br>>= 1.25 seconds<br><br>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<br><br>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.<br><br>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:<br>400 Failuer out of 500 Samples<br>6.25 ms per Sample<br>Continuous | Type A, 1 Trips |

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

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

| 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.<br><br>Or<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.<br><br>Or<br><br>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.<br><br>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<br><br>>= 200 KOhms impedance between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00<br><br>samples<br><br>100 ms /sample<br>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.<br><br>Or<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.<br><br>Or<br><br>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.<br><br>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<br><br>>= 200 KOhms impedance between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Or<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.<br><br>Or<br><br>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.<br><br>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<br><br>>= 200 KOhms impedance between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Or<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.<br><br>Or<br><br>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.<br><br>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<br><br>>= 200 KOhms impedance between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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 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.<br><br>Or<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.<br><br>Or<br><br>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.<br><br>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<br><br>>= 200 KOhms impedance between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Sec<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Or<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.<br><br>Or<br><br>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.<br><br>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<br><br>>= 200 KOhms impedance between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Or<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.<br><br>Or<br><br>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.<br><br>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<br><br>>= 200 KOhms impedance between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Or<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.<br><br>Or<br><br>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.<br><br>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<br><br>>= 200 KOhms impedance between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>P06A3 | 79 /159 counts;<br><br>57 counts continuous;<br><br>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<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>P06A3 | 79 /159 counts;<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. | <br><br><= 1 volt between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. | <br><br><= 1 volt between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. | <br><br><= 1 volt between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. | <br><br><= 1 volt between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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 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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. | <br><br><= 1 volt between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. | <br><br><= 1 volt between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. | <br><br><= 1 volt between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. | <br><br><= 1 volt between signal and controller ground | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00<br>to<br>20.00<br>samples<br><br>100 ms /sample<br>Continuous | Type A,<br>1 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Random Misfire Detected<br><br>Cylinder 1 Misfire Detected<br><br>Cylinder 2 Misfire Detected<br><br>Cylinder 3 Misfire Detected<br><br>Cylinder 4 Misfire Detected<br><br>Cylinder 5 Misfire Detected<br><br>Cylinder 6 Misfire Detected<br><br>Cylinder 7 Misfire Detected<br><br>Cylinder 8 Misfire Detected | P0300<br><br>P0301<br><br>P0302<br><br>P0303<br><br>P0304<br><br>P0305<br><br>P0306<br><br>P0307<br><br>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.<br><br>Emissions Neutral Default Action: If consumed Emissions Neutral Default DTCs from other subsystems are set: Ignore Rough Road, Traction, Stability, and Antilock brake signals. If default action not activated, Misfire Monitor could complete less frequently or inaccurately. Default Action Latched for duration of Trip<br><br>Default Action: If Misfire P030x sets on some hybrid applications, the isolation damper | Crankshaft Deceleration Value(s) vs. Engine Speed and Engine load<br><br>The equation used to calculate deceleration value is tailored to specific vehicle operating conditions.<br>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***<br>see Algorithm Description Document for additional details.<br><br>SINGLE CYLINDER CONTINUOUS MISFIRE(<br>(Medres_Decel<br>Medres_Jerk<br>OR (Medres_Decel<br>Medres_Jerk<br>OR (Lores_Decel<br>Lores_Jerk<br>OR (Lores_Decel<br>Lores_Jerk<br>OR RevBalanceTime<br>) | - see details of thresholds on Supporting Tables Tab<br><br>> **RufSCD_Decel** AND<br>> **RufSCD_Jerk)**<br>> **SCD_Decel** AND<br>> **SCD_Jerk )**<br>> **RufCyl_Decel** AND<br>> **RufCyl_Jerk)**<br>> **CylModeDecel** AND<br>> **CylModeJerk )**<br>>**RevMode_Decel** | Engine Run Time<br><br>Engine Coolant Temp<br><br>Or If ECT at startup Then<br><br>System Voltage<br>+ Throttle delta<br>- Throttle delta<br><br>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<br><br>"ECT"<br>If OBD Max Coolant Achieved = FALSE<br>-9 ºC < ECT<br>Or if OBD Max Coolant Achieved = TRUE<br>-9 ºC < ECT < 130 ºC<br><br>< -9 ºC<br>If OBD Max Coolant Achieved = FALSE<br>21 ºC < ECT<br>If OBD Max Coolant Achieved = TRUE<br>21 ºC < ECT < 130 ºC<br><br>9.00 < volts < 32.00<br>< 95.00 % per 25 ms<br>< 95.00 % per 25 ms<br><br>Not Enabled | Emission Exceedence = any ( 5 ) failed 200 rev blocks out of ( 16) 200 rev block tests<br><br>Failure reported for ( 1 ) Exceedence in 1st ( 16 ) 200 rev block tests, or ( 4 ) Exceedences thereafter.<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | between engine and transmission can go into extreme resonance. Default action is to move rpm out of the resonance zone. If default action not activated, significant hardware damage could occur rendering vehicle inoperable. | ********** **This Feature not used on Gasoline engines**<br><br>Combustion Modes that force selection of Idle Tables<br>**********<br><br>Other patterns of misfire use adjustments to the single cylinder continuous misfire threshold tables:<br><br>RANDOM MISFIRE<br>Use random misfire thresholds If no misfire for<br><br>(Medres_Decel<br><br>AND<br>Medres_Jerk)<br><br>OR (Medres_Decel<br><br>AND<br>Medres_Jerk)<br><br>OR (Lores_Decel<br><br>AND<br>Lores_Jerk) | ********** **This Feature not used on Gasoline engines**<br><br>**CombustModeIdleTbl** in Supporting Tables<br><br>**********<br><br>> 3 Engine Cycles<br><br>> **RufSCD_Decel** * **Random_SCD_Decel**<br><br>>**RufSCD_Jerk** * **Random_SCD_Jerk**<br><br>> **SCD_Decel** * **Random_SCD_Decel**<br><br>> **SCD_Jerk** * **Random_SCD_Jerk**<br><br>> **RufCyl_Decel** * **RandomCylModDecel**<br><br>> **RufCyl_Jerk** * **RandomCylModJerk** | | | any Catalyst Exceedence = ( 1 ) 200 rev block as data supports for catalyst damage.<br><br>Catalyst Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP.<br><br>Continuous | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | OR (Lores_Decel<br>AND<br>Lores_Jerk) | > **CylModeDecel** * **RandomCylModDecel**<br><br>> **CylModeJerk** * **RandomCylModJerk** | | | | |
| | | | OR RevBalanceTime | > **RevMode_Decel** * **RandomRevModDecl** | | | | |
| | | | PAIRED CYLINDER MISFIRE<br>If a cylinder & it's pair are above PAIR thresholds<br>(Medres_Decel<br>AND<br>Medres_Jerk) | <br><br><br><br><br><br><br>> **RufSCD_Decel** * **Pair_SCD_Decel**<br><br>> **RufSCD_Jerk** * **Pair_SCD_Jerk** | | | | |
| | | | OR (Medres_Decel<br>AND<br>Medres_Jerk) | > **SCD_Decel** * **Pair_SCD_Decel**<br><br>> **SCD_Jerk** * **Pair_SCD_Jerk** | | | | |
| | | | OR (Lores_Decel<br>AND<br>Lores_Jerk) | > **RufCyl_Decel** * **PairCylModeDecel**<br><br>> **RufCyl_Jerk** * **PairCylModeJerk** | | | | |
| | | | OR (Lores_Decel<br>AND<br>Lores_Jerk) | > **CylModeDecel** * **PairCylModeDecel**<br><br>> **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** | | | | |
| | | | BANK MISFIRE | | | | | |
| | | | Cylinders above Bank Thresholds | >= 2 cylinders | | | | |
| | | | (Medres_Decel | > **RufSCD_Decel * Bank_SCD_Decel** | | | | |
| | | | AND Medres_Jerk) | > **RufSCD_Jerk * Bank_SCD_Jerk** | | | | |
| | | | OR (Medres_Decel | > **SCD_Decel * Bank_SCD_Decel** | | | | |
| | | | AND Medres_Jerk) | > **SCD_Jerk * Bank_SCD_Jerk** | | | | |
| | | | OR (Lores_Decel | > **RufCyl_Decel * BankCylModeDecel** | | | | |
| | | | AND Lores_Jerk) | > **RufCyl_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<br>1st cylinder uses single cyl continuous misfire thresholds; 2nd Cylinder uses:<br>(Medres_Decel | > **RufSCD_Decel** * **ConsecSCD_Decel**<br>AND | | | | |
| | | | Medres_Jerk) | > **RufSCD_Jerk** * **ConsecSCD_Jerk** | | | | |
| | | | OR (Medres_Decel | > **SCD_Decel** * **ConsecSCD_Decel**<br>AND | | | | |
| | | | Medres_Jerk) | > **SCD_Jerk** * **ConsecSCD_Jerk** | | | | |
| | | | OR (Lores_Decel | > **RufCyl_Decel** * **ConsecCylModDecel**<br>AND | | | | |
| | | | Lores_Jerk) | > **RufCyl_Jerk** * **ConsecCylModeJerk** | | | | |
| | | | OR (Lores_Decel | > **CylModeDecel** * **ConsecCylModDecel**<br>AND | | | | |
| | | | Lores_Jerk) | > **CylModeJerk** * **ConsecCylModeJerk** | | | | |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | CylBeforeDeacCyl_Jerk) | > **CylModeJerk** * **ClyBeforeAFM_Jerk** * **RandomAFM_Jerk** | | | | |
| | | | OR IF option Crank based IMEP estimate is Enabled and CrankBased_IMEP is | Not Enabled<br>< **Misfire_IMEP_Thresh_vs_BinID** (Note: Thresholds uses following tables to pick threshold vs BinID. See supporting tables for more information on how BinID works to select appropriate calibration threshold) **Misfire_IMEP_BinID_vs_RPM_Load** **Misfire_IMEP_BinID_RPM_Axis** **Misfire_IMEP_BinID_Load_Axis**<br>- see details on Supporting Tables Tab | | | | |
| | | | Misfire Percent Emission Failure Threshold | ≥ 1.80 % P0300 | | | | |
| | | | Misfire Percent Catalyst | > | | | | |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CamLctnExhFA<br>CamSensorAnyLctnTFTKO<br>AnyCamPhaser_FA<br>AnyCamPhaser_TFTKO<br>AmbPresDfltdStatus | | |
| | | | | | 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 speed and engine load region | ***Undetectable region*** from Malfunction Criteria | 4 cycle delay | |
| | | | | | Abusive Engine Over Speed | > 8,192 rpm | 0 cycle delay | |
| | | | | | Below zero torque (except CARB approved 3000 rpm to redline triangle.) | < **ZeroTorqueEngLoad** or <**ZeroTorqueAFM** if AFM is active<br>in Supporting Tables | 4 cycle delay | |
| | | | | | Below zero torque:<br>TPS<br>Vehicle Speed | ≤ 0.8 % (≤ 0.8 % in AFM)<br>> 30 mph (> 30 mph AFM) | 4 cycle delay | |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 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<br>****************************** | > 199.99 % Max Torque<br>****************************** | 0 cycle delay<br>******************* | |
| | | | | | 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.<br>Filter Driveline ring: | > "**Ring Filter**" # of engine cycles after misfire in Supporting Tables | | |
| | | | | | Stop filter early: | > "**Number of Normals**" # of engine cycles after misfire in Supporting Tables tab | | |
| | | | | | ABNORMAL ENGINE SPEED OSCILLATION: (checks each "misfire" candidate in 100 engine Cycle test to see if it looks like some disturbance like rough road (abnormal). ) | | | |
| | | | | | Used Off Idle, and while not shifting,<br>TPS<br>Engine Speed<br>Veh Speed<br>Auto Transmission | <br><br>> 3 %<br>> 950 rpm<br>> 3 mph<br>not shifting | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | indivdual candidate deemed abnormal if number of consecutive decelerating cylinders after "misfire": (Number of decels can vary with misfire detection equation)<br>Consecutive decels while in SCD Mode<br>Cyl Mode<br>Rev Mode<br><br>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.<br><br>abnormal candidates/ total candidates<br><br>MISFIRE CRANKSHAFT PATTERN RECOGNITION checks each "misfire" candidate in 100 engine Cycle test to see if overall crankshaft pattern looks like real misfire (recognized), or some disturbance like rough road (unrecognized). At the end of 100 engine cycle test, the ratio of | > **Abnormal SCD Mode**<br>> **Abnormal Cyl Mode**<br>> **Abnormal Rev Mode**<br>in Supporting Tables<br><br>> 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 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<br>Veh Speed | 1,000 < rpm < 4,530<br>> 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 | > Misfire_ decel * **1st_FireAftrMisfr_Acel** | | |
| | | | | | AND | | | |
| | | | | | CylAfter_Jerk) | > Misfire_Jerk * **1st_FireAftrMisfr_Jerk** | | |
| | | | | | | Or if AFM mode is active: > Misfire_ decel * **1stFireAftrMisAcelAFM** > Misfire_Jerk * | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | **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 cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present. | | discard 100 | |

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

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

| 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.<br><br>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<br><br>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<br><br>(where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock) | **> P0324_PerCyl_ExcessiveKnock_Threshold**<br>(no units) | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br><br><br>Engine Air Flow<br><br><br><br>Engine Coolant Temperature<br><br>or<br><br>OBD Coolant Enable Criteria<br><br>Inlet Air Temperature<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle) | Yes<br><br>≥ 2.0 seconds<br><br>≥ 400 RPM<br>AND<br>≤ 8,500 RPM<br><br>≥ 200 mg/cylinder<br>AND<br>≤ 2,000 mg/cylinder<br><br>≥ -40 deg's C<br><br><br><br>= TRUE<br><br>≥ -40 deg's C<br><br>≥ 42 revs | First Order Lag Filters with Weight Coefficient = 0.0234<br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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:<br><br>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:<br>A. Low output with a good circuit (because the 20 kHz injected signal is detected on both of the sensor inputs)<br>or<br>B, High output for an Open Circuit (because | Open Circuit Method chosen (2 possible methods: 20 kHz or Normal Noise):<br><br>**Case 1 (20 kHz Method):**<br><br>Filtered FFT Output<br><br>**Case 2 (Normal Noise Method):**<br><br>Filtered FFT Output | =<br>**P0325_P0330_OpenMethod_2**<br><br>**>**<br>**P0325_P0330_OpenCktThrshMin (20 kHz)**<br>**AND**<br>**<**<br>**P0325_P0330_OpenCktThrshMax (20 kHz)**<br><br>**>**<br>**P0325_P0330_OpenCktThrshMin (Normal Noise)**<br>**AND**<br>**<**<br>**P0325_P0330_OpenCktThrshMax (Normal Noise)** | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br>Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)<br><br>Engine Air Flow<br><br>Engine Coolant Temperature<br><br>or<br><br>OBD Coolant Enable Criteria<br><br>Inlet Air Temperature | Yes<br><br>≥ 2.0 seconds<br><br>≥ 400 RPM<br>and<br>≤ 8,500 RPM<br><br>≥ 100 revs<br><br>≥ 50 mg/cylinder<br>and<br>≤ 2,000 mg/cylinder<br><br>≥ -40 deg's C<br><br>= TRUE<br><br>≥ -40 deg's C | First Order Lag Filter with Weight Coefficient<br><br>Weight Coefficient = 0.0100<br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | the 20 kHz injected signal is detected only on one of the sensor inputs).<br>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.<br><br>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.<br><br>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<br><br>(where 'FFT Intensity' = Non-knocking, background engine noise for a selected frequency)<br><br>OR<br><br>Filtered FFT Intensity | **Case 1: Engine not in AFM mode**<br><br>< **P0326_P0331_AbnormalNoise_Threshold** (Supporting Table)<br><br>**Case 2: Engine is in AFM mode**<br><br>< **P0326_P0331_AbnormalNoise_Thresh_AFM** (Supporting Table; Engine is in AFM mode) | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br>Engine Air Flow<br><br>Engine Coolant Temperature<br><br>or<br><br>OBD Coolant Enable Criteria<br><br>Inlet Air Temperature<br><br>Individual Cylinders enabled for Abnormal Noise<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle) | Yes<br><br>≥ 2.0 seconds<br><br>≥ 2,000 RPM (not in AFM mode)<br>OR<br>≥ 2,000 (in AFM mode)<br><br>AND<br>≤ 8,500 RPM<br><br>≥ 300 mg/cylinder<br>AND<br>≤ 2,000 mg/cylinder<br><br>≥ -40 deg's C<br><br>= TRUE<br><br>≥ -40 deg's C<br><br>**P0326_P0331_AbnormalNoise_CylsEnabled** (Supporting Table)<br><br>≥ 158 Revs | First Order Lag Filters with Weight Coefficient =<br><br>0.0043<br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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<br><br>(of 5.0 Volt reference) | Diagnostic Enabled?<br><br>Engine Speed | Yes<br><br>> 400 RPM<br>and<br>< 8,500 RPM | 50 Failures<br>out of<br>63 Samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>(of 5 Volt Reference) | Diagnostic Enabled?<br><br>Engine Speed | Yes<br><br>> 400 RPM<br>and<br>< 8,500 RPM | 50 Failures<br>out of<br>63 Samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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:<br><br>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:<br><br>A. Low output with a good circuit (because the 20 kHz injected signal is detected on both of the sensor inputs)<br>or<br>B, High output for an | **Individual Sensor Thresholds Enabled?**<br><br>**Open Circuit Method chosen** (2 possible methods: 20 kHz or Normal Noise):<br><br>Filtered FFT Output<br><br>Filtered FFT Output | = 0 ,<br>Use Case 1 and 2<br><br>=<br>**P0325_P0330_OpenMethod_2**<br><br>(supporting table)<br><br>**Case 1 (20 kHz Method):**<br><br>**> P0325_P0330_OpenCktThrshMin (20 kHz) AND < P0325_P0330_OpenCktThrshMax (20 kHz)**<br><br>**Case 2 (Normal Noise Method):**<br><br>**> P0325_P0330_OpenCktThrshMin (Normal Noise) AND < P0325_P0330_OpenCktThrshMax (Normal Noise)**<br><br>**Case 3 (20 kHz Method):** | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br>Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)<br><br>Engine Air Flow<br><br>Engine Coolant Temperature<br><br>or<br><br>OBD Coolant Enable Criteria<br><br>Inlet Air Temperature | Yes<br><br>≥ 2.0 seconds<br><br>≥ 400 RPM<br>and<br>≤ 8,500 RPM<br><br>≥ 100 revs<br><br>≥ 50 mg/cylinder<br>and<br>≤ 2,000 mg/cylinder<br><br>≥ -40 deg's C<br><br>= TRUE<br><br>≥ -40 deg's C | First Order Lag Filter with Weight Coefficient<br><br>**Case 1 & 2:** Weight Coefficient = 0.0100<br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | Open Circuit (because the 20 kHz injected signal is detected only on one of the sensor inputs).<br><br>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.<br><br>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.<br><br>See Supporting Tables | Filtered FFT Output<br><br>Filtered FFT Output | ><br>**P0330_OpenCktThrshMin2 (20 kHz)**<br><br>AND<br><br><<br>**P0330_OpenCktThrshMax2 (20kHz)**<br><br>**Case 4 (Normal Noise Method):**<br><br>><br>**P0330_OpenCktThrshMin2 (NN)**<br><br>AND<br><br><<br>**P0330_OpenCktThrshMax2 (NN)** | | | **Case 3 & 4**<br>Weight Coefficient = 0.01<br><br>Updated each engine event | |

| 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:<br>A. Use 20 kHz method at allengine RPM (used when acceptable separation achieved at all RPM) or<br>B. Use 20 kHz method at low/medium RPM and Normal Noise at high RPM<br><br>For each method the failure thresholds can be the same for both sensors (in a 2 sensor application), or the failure thresholds can be unique to each sensor. | | | | | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>The failure thresholds can be the same for both sensors (in a 2 sensor application), or the failure thresholds can be unique to each sensor. | Individual Sensor Thresholds Enabled?<br><br>Filtered FFT Intensity<br><br>(where 'FFT Intensity' = Non-knocking, background engine noise)<br><br>Filtered FFT Intensity | = 0 ,<br>Use Case 1 and 2<br><br>**Case 1: Engine <u>not</u> in AFM mode**<br><<br>**P0326_P0331_AbnormalNoise_Threshold**<br>(Supporting Table)<br><br>OR<br><br>**Case 2: Engine <u>is</u> in AFM mode**<br><<br>**P0326_P0331_AbnormalNoise_Thresh_AFM**<br><br>(Supporting Table)<br><br>**Case 3: Engine not in AFM mode**<br><br><<br>**P0331_AbnormalLo2**<br>(Supporting Table)<br><br>OR<br><br>**Case 4: Engine is in AFM mode**<br><<br>**P0331_AbnormalLoAFM_2**<br>(Supporting Table) | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br>Engine Air Flow<br><br>Engine Coolant Temperature<br><br>or<br><br>OBD Coolant Enable Criteria<br><br>Inlet Air Temperature<br><br>Individual Cylinders enabled for Abnormal Noise<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle) | Yes<br><br>≥ 2.0 seconds<br><br>≥ 2,000 RPM (not in AFM mode)<br>OR<br>> 2,000 (in AFM mode)<br><br>AND<br>≤ 8,500 RPM<br><br>≥ 300 mg/cylinder<br>AND<br>≤ 2,000 mg/cylinder<br><br>≥ -40 deg's C<br><br>= TRUE<br><br>≥ -40 deg's C<br><br>**P0326_P0331_AbnormalNoise_CylsEnabled**<br>(Supporting Table)<br><br>≥ 158 Revs | First Order Lag Filter with Weight Coefficient<br><br>**Case 1 & 2:**<br>Weight Coefficient = 0.0100<br><br>Updated each engine event<br><br>**Case 3 & 4:**<br>Weight Coefficient = 0.01<br><br>Updated each engine eventFirst | Type B, 2 Trips |

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

| 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<br><br>(of 5 Volt Reference) | Diagnostic Enabled?<br><br>Engine Speed | Yes<br><br>> 400 RPM<br>and<br>< 8,500 RPM | 50 Failures<br>out of<br>63 Samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>(of 5 Volt Reference) | Diagnostic Enabled?<br><br>Engine Speed | Yes<br><br>> 400 RPM<br>and<br>< 8,500 RPM | 50 Failures<br>out of<br>63 Samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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<br>AND<br>(cam pulses being received<br>OR<br>( MAF_SensorFA<br>AND<br>Engine Air Flow | Test is Enabled<br><br><br><br>= FALSE<br><br>> 3.0 grams/second )) | Continuous every 100 msec | Type B, 2 Trips |
| | | | No crankshaft pulses received | >= 0.1 seconds | Engine is Running<br><br>Starter is not engaged | Test is Enabled | Continuous every 12.5 msec | |
| | | | No crankshaft pulses received | | Engine is Running<br>OR<br>Starter is engaged<br><br>No DTC Active: | Test is Enabled<br><br><br><br>P0340<br>P0341 | 2 failures out of 10 samples<br><br>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 10 or more crank re-synchronizations occur | < 10.0 seconds | Engine Air Flow<br>Cam-based engine speed<br>No DTC Active: | Test is Enabled<br>>= 3.0 grams/second<br>> 450 RPM<br>P0335 | Continuous every 250 msec | Type B, 2 Trips |
| | | | No crankshaft synchronization gap found | >= 0.4 seconds | Engine is Running<br>Starter is not engaged | Test is Enabled | Continuous every 12.5 msec | |
| | | | Time since starter engaged without detecting crankshaft synchronization gap | >= 3.3 seconds | Starter engaged<br>AND<br>(cam pulses being received<br>OR<br>( MAF_SensorFA<br>AND<br>Engine Air Flow | Test is Enabled<br>= FALSE<br>> 3.0 grams/second ) ) | Continuous every 100 msec | |
| | | | Crank pulses received in one engine revolution<br>OR<br>Crank pulses received in one engine revolution | < 1 pulses<br>> 65,535 pulses | Engine is Running<br>OR<br>Starter is engaged<br>No DTC Active: | Test is Enabled<br>P0340<br>P0341 | 8 failures out of 10 samples<br>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<br><br>OR<br><br>Time that starter has been engaged without a camshaft sensor pulse | >= 5.5 seconds<br><br>>= 4.0 seconds | Starter engaged<br>AND<br>(crank pulses being received<br>OR<br>( MAF_SensorFA<br>AND<br>Engine Air Flow | Test is Enabled<br><br>= FALSE<br><br>> 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<br><br>Starter is not engaged | Test is Enabled | Continuous every 100 msec | |
| | | | No camshaft pulses received during 24 MEDRES events<br><br>(There are 24 MEDRES events per engine cycle)<br><br>Test begins when MEDRES region<br>AND<br>accumulated number of MEDRES events | = region 5<br><br>>= 0 counts | Crankshaft is synchronized<br><br>Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged<br><br>No DTC Active: | Test is Enabled<br><br>CrankSensor_FA | Continuous, every MEDRES event unitl test completes, one test at every start attempt | |
| | | | The number of camshaft pulses received during 100 engine cycles | = 0 pulses | Crankshaft is synchronized<br><br>No DTC Active: | Test is Enabled<br><br>CrankSensor_FA | 8 failures out of 10 samples<br><br>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 24 MEDRES events is<br>OR<br><br>(There are 24 MEDRES events per engine cycle)<br><br>Test begins when MEDRES region<br>AND<br>accumulated number of MEDRES events | < 4 pulses<br>> 8 pulses<br><br><br><br><br><br>= region 5<br><br>>= 0 counts | Crankshaft is synchronized<br><br>Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged<br><br>No DTC Active: | Test is Enabled<br><br><br><br><br><br>CrankSensor_FA | Continuous, every MEDRES event unitl test completes, one test at every start attempt | Type B, 2 Trips |
| | | | The number of camshaft pulses received during 100 engine cycles<br>OR | < 398 pulses<br>> 402 pulses | Crankshaft is synchronized<br><br>No DTC Active: | Test is Enabled<br><br>CrankSensor_FA | 8 failures out of 10 samples<br><br>Continuous every engine cycle | |

| 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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures<br><br>out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures<br><br>out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 | 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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 1 | P0420 | NOTE: The information below applies to applications that use the Decel Catalyst Monitor Algorithm<br><br>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<br><br>Normalized Ratio OSC Value Calculation Information and Definitions =<br>1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time)<br>2. BestFailing OSC value from a calibration | Normalized Ratio OSC Value<br>The EWMA calculation uses a 0.11 coefficient. | < 0.35 | All enable criteria associated with P0420 can be found under P2270 - (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)<br><br>Rapid Step Response (RSR) feature will initiate multiple tests:<br><br>If the difference between current EWMA value and the current OSC Normalized Ratio value is<br><br>and the current OSC Normalized Ratio value is<br><br>Maximum number of RSR tests to detect failure when RSR is enabled.<br><br>MAF<br><br>Predicted catalyst temperature<br><br>Front O2 Sensor<br>or<br>Front WRAF<br><br>Rear O2 Sensor<br><br>General Enable Criteria<br><br>In addition to the p-codes listed under P2270, the following DTC's shall also | <br><br><br><br><br>> 0.42<br><br>< 0.10<br><br>12<br><br><br>> 3.00 g/s<br>< 25.00 g/s<br><br>< 900 ° C<br><br>> 675.00 mV<br>or<br>> 1.25 EQR<br><br>> 825.00 mV | 1 test attempted per valid decel period<br><br>Minimum of 1 test per trip<br><br>Maximum of 4 tests per trip<br><br>Frequency: Fueling Related : 12.5 ms<br><br>OSC Measurements: 100 ms<br><br>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)<br>3. WorstPassing OSC value (based on temp and exhaust gas flow)<br><br>Normalized Ratio Calculation = (1-2) / (3-2)<br><br>A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part.<br><br>Refer to the **P0420_WorstPassingOSCTableB1** and **P0420_BestFailingOSCTableB1** in Supporting Tables tab for details<br><br>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.<br><br>Additional conditions and their related values | | | not be set:<br><br>For switching O2 sensors:<br><br>For WRAF O2 sensors: | <br><br>O2S_Bank_1_Sensor_1_FA<br>O2S_Bank_1_Sensor_2_FA<br>O2S_Bank_2_Sensor_1_FA<br>O2S_Bank_2_Sensor_2_FA<br><br>WRAF_Bank_1_FA<br>WRAF_Bank_2_FA<br><br>**P0420_WorstPassingOSCTableB1**<br><br>**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. |
|---|---|---|---|---|---|---|---|---|
| Catalyst System Low Efficiency Bank 2 | P0430 | Note: The information below applies to applications that use the Decel Catalyst Monitor Algorithm<br><br>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<br><br>Normalized Ratio OSC Value Calculation Information and Definitions =<br>1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time)<br>2. BestFailing OSC value from a calibration | Normalized Ratio OSC Value<br>The EWMA calculation uses a 0.11 coefficient. | < 0.35 | All enable criteria associated with P0430 can be found under P2272 - (O2 Sensor Signal Stuck Lean Bank 2 Sensor 2)<br><br>Rapid Step Response (RSR) feature will initiate multiple tests:<br><br>If the difference between current EWMA value and the current OSC Normalized Ratio value is<br><br>and the current OSC Normalized Ratio value is<br><br>Maximum number of RSR tests to detect failure when RSR is enabled.<br><br>MAF<br><br>Predicted catalyst temperature<br><br>Front O2 Sensor<br>or<br>Front WRAF<br><br>Rear O2 Sensor<br><br>General Enable Criteria<br><br>In addition to the p-codes listed under P2272, the following DTC's shall also | <br><br><br><br><br>> 0.42<br><br>< 0.10<br><br>12<br><br>> 3.00 g/s<br>< 25.00 g/s<br><br>< 900 ° C<br><br>> 675.00 mV<br>or<br>> 1.25 EQR<br><br>> 825.00 mV | 1 test attempted per valid decel period<br><br>Minimum of 1 test per trip<br><br>Maximum of 4 tests per trip<br><br>Frequency: Fueling Related : 12.5 ms<br><br>OSC Measurements: 100 ms<br><br>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)<br>3. WorstPassing OSC value (based on temp and exhaust gas flow)<br><br>Normalized Ratio Calculation = (1-2) / (3-2)<br><br>A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part.<br><br>Refer to the **P0430_WorstPassingOSCTableB2** and **P0430_BestFailingOSCTableB2** in Supporting Tables tab for details<br><br>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.<br><br>Additional conditions and their related values | | | not be set:<br><br>For switching O2 sensors:<br><br>For WRAF O2 sensors: | <br><br>O2S_Bank_1_Sensor_1_FA<br>O2S_Bank_1_Sensor_2_FA<br>O2S_Bank_2_Sensor_1_FA<br>O2S_Bank_2_Sensor_2_FA<br><br>WRAF_Bank_1_FA<br>WRAF_Bank_2_FA<br><br>**P0430_WorstPassingOSCTableB2**<br><br>**P0430_BestFailingOSCTableB2** | | |

| 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. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission (EVAP) System Small Leak Detected<br><br>(No ELCP - Conventional EVAP Diagnostic - with EAT using OAT Sensor - with Fuel Tank Zone Module (FTZM)) | P0442 | This DTC will detect a small leak (≥ 0.020") in the EVAP system between the fuel fill cap and the purge solenoid. On some applications a small leak is defined as ≥ 0.025", 0.030", or 0.150". The engine off natural vacuum method (EONV) is used. EONV is an evaporative system leak detection diagnostic that runs when the vehicle is shut off when enable conditions are met. Prior to sealing the system and performing the diagnostic, the fuel volatility is analyzed. In an open system (Canister Vent Solenoid [CVS] open) high volatility fuel creates enough flow to generate a measurable pressure differential relative to atmospheric.After the volatility check, the vent solenoid will close. After the vent is closed, typically a build up of pressure from the hot soak begins (phase-1). The pressure typically will peak and then begin to decrease as the fuel cools. When | The total delta from peak pressure to peak vacuum during the test is normalized against a calibration pressure threshold table that is based upon fuel level and ambient temperature. (Please see **P0442 EONV Pressure Threshold (Pascals)** in Supporting Tables). The normalized value is calculated by the following equation: 1 - (peak pressure - peak vacuum) / pressure threshold. The normalized value is entered into EWMA (with 0= perfect pass and 1= perfect fail).<br><br>When EWMA is<br><br>the DTC light is illuminated.<br><br>The EWMA calculation uses a 0.13 weighting coefficient.<br><br>The DTC light can be turned off if the EWMA is<br><br>and stays below the EWMA fail threshold for 3 additional consecutive trips. | > 0.64 (EWMA Fail Threshold),<br><br>≤ 0.35 (EWMA Re-Pass Threshold) | Fuel Level<br>Drive Time<br>Drive length<br><br>(ECT<br><br>OR<br>OBD Coolant Enable Criteria<br><br>Baro<br>Distance since assembly plant<br>Engine not run time before key off must be<br><br>Time since last complete test<br>if normalized result and EWMA is passing<br><br>OR<br>Time since last complete test<br>if normalized result or EWMA is failing<br><br>Estimated Ambient Temperature (EAT) using OAT sensor at end of drive<br><br>Conditions for Estimated Ambient Temperature Using OAT Sensor to be | 10 % ≤ Percent ≤ 90 %<br>≥ 600 seconds<br>≥ 5.0 miles<br><br>≥ 63 °C<br><br>= TRUE)<br><br>≥ 70 kPa<br>≥ 10.0 miles<br><br>≤ refer to **P0442 Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature** in Supporting Tables.<br><br>≥ 8 hours<br><br>≥ 8 hours<br><br>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<br><br>EWMA<br><br>Average run length is 8 to 12 trips under normal conditions<br><br>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. | | | Valid<br>**********<br>1. Startup OAT is less than previous trip EAT<br><br>OR<br>2. Startup ECT - previous trip EAT<br><br>OR<br>3. Engine off time<br><br>OR<br>4. At startup, time since previous EAT valid and able to learn<br><br>OR<br>5. EAT - current OAT<br><br>OR<br>6. EAT < current OAT and speed timer and current OAT - EAT<br><br>Speed timer increments at 100 msec rate and increments vary based on vehicle speed as follows:<br><br>vehicle speed < 10 mph<br>10 mph<speed< 35 mph<br>35 mph<speed< 124<br>124 mph<speed< 124<br><br>Speed timer can never be less than 0 seconds<br><br>**********<br>1. High Fuel Volatility<br><br>During the volatility | **********<br><br><br><br>≤ 0 °C<br><br><br>≥ 9,000 seconds<br><br><br>≤ 3,600 seconds<br><br><br>0 °C ≤ difference ≤ 2 °C<br><br><br>≥ 240 seconds<br><br>≤ 2 °C<br><br><br><br><br>- 0.2 seconds<br>0.10 seconds<br>0.20 seconds<br>0.20 seconds<br><br><br><br>**********<br><br> | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 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.<br><br>OR<br>2. Vacuum Refueling Detected<br><br>See P0454 Fault Code for information on vacuum refueling algorithm.<br><br>OR<br>3. Fuel Level Refueling Detected<br><br>See P0464 Fault Code for information on fuel level refueling.<br><br>OR<br>4. Vacuum Out of Range and No Refueling<br><br>See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling. | < -5 | | |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | P0498<br>P0499<br>P0496<br>P1001<br>P1005<br>P11FF<br>P130F<br>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)<br><br>(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.<br><br>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<br><br>250 ms / sample | Type B, 2 Trips<br><br>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<br><br>(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.<br><br>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:<br>Vented Vacuum<br>for<br>OR<br>Vented Vacuum<br>for<br><br><br><br>Vent Restriction Test:<br>Tank Vacuum<br>for<br>before Purge Volume<br><br>After setting the DTC for the first time, 0 liters of fuel must be consumed before setting the DTC for the second time. | <br><br>< -623 Pa<br>60 seconds<br><br>> 1,245 Pa<br>60 seconds<br><br><br><br>> 2,989 Pa<br>5 seconds<br>≥ 12 liters | Fuel Level<br>System Voltage<br>Startup IAT<br>Startup ECT<br>BARO<br><br>No active DTCs:<br><br><br><br><br><br><br><br>No Active DTC's TFTKO | 10 % ≤ Percent ≤ 90 %<br>≥ 10.0 volts<br>4 °C≤Temperature≤ 35 °C<br>≤ 35 °C<br>≥ 70 kPa<br><br>MAP_SensorFA<br>TPS_FA<br>VehicleSpeedSensor_FA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>EnginePowerLimited<br>FuelLevelDataFault<br><br>P0443<br>P0449<br>P0452<br>P0453<br>P0454<br>P0458<br>P0459<br>P0498<br>P0499<br>P1001<br>P1005<br>P11FF<br>P130F<br>U18A2 | Once per Cold Start<br><br>Time is dependent on driving conditions<br><br>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)<br><br>(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.<br><br>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<br>P130F<br>U18A2 | 50 failures out of 63 samples<br><br>100 ms / sample | Type B, 2 Trips<br><br>Note: In certain controlle rs 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<br><br>(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.<br><br>During the EONV test, the fuel tank vacuum sensor is re-zeroed. A re-zero occurs:<br>1) At the transition from the volatility phase to the pressure phase.<br>2) At the transition from the pressure phase to the vacuum phase.<br><br>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.<br><br>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)<br><br>Upper voltage threshold (voltage addition above the nominal voltage)<br><br>Lower voltage threshold (voltage subtraction below the nominal voltage)<br><br>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).<br><br>When EWMA is<br><br>the DTC light is illuminated.<br><br>The EWMA calculation uses a 0.20 weighting coefficient.<br><br>The DTC light can be turned off if the EWMA is<br><br>and stays below the | <br><br>0.2 volts<br><br>0.2 volts<br><br><br><br><br><br><br><br><br><br>> 0.73 (EWMA Fail Threshold),<br><br><br><br><br><br>≤ 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<br><br>EWMA<br><br>Average run length: 6<br>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.<br>1) An individual re-zero test generates a re-zero ratio. The ratio goes from 0.0 to 1.0.<br>2) A 0.0 means that the re-zero pressure signal achieved exactly atmospheric pressure.<br>3) A ratio of 1.0 means that the re-zero pressure did not get within the window.<br>4) Re-zero pressure within the window generates values between 0.0 and 1.0.<br><br>If a refueling event is not detected, then the resulting re-zero ratio is filtered using an exponentially weighted moving average (EWMA). When the EWMA exceeds a fail threshold, the vacuum re-zero test reports a failure. Once the vacuum re-zero test fails, the EWMA fall below a lower re-pass threshold before it can pass the vacuum re-zero test again. | EWMA fail threshold for 3 additional consecutive trips. | | | | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage<br><br>(No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM)) | P0452 | This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too low out of range.<br><br>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.<br><br>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<br><br>The normal operating range of the FTP sensor is 0.5 volts (~1245 Pa) to 4.5 volts<br>(~ -3736 Pa). | < 0.15 volts ( 3.0 % of Vref or ~ 1,495 Pa) | No active DTC's: | P1001<br>P1005<br>U18A2 | 640 failures out of 800 samples<br><br>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<br><br>(No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM)) | P0453 | This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too high out of range.<br><br>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.<br><br>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<br><br>The normal operating range of the FTP sensor is 0.5 volts (~1245 Pa) to 4.5 volts<br>(~ -3736 Pa). | > 4.85 volts ( 97.0 % of Vref or ~ -3,985 Pa) | No active DTCs: | P1001<br>P1005<br>U18A2 | 640 failures out of 800 samples<br><br>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<br><br>(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.<br><br>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.<br><br>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.”<br><br>The vacuum change rationality diagnostic is an “X out of Y” test.<br>1) Each time the EONV test completes, the (Y) sample counter is incremented.<br>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<br><br>< 249 Pa<br><br>> 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.<br><br>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.<br>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.<br>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<br><br>(No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM)) | P0455 | This DTC will detect a weak vacuum condition (large leak or purge blockage) in the EVAP system.<br><br>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.<br><br>The algorithm accumulates purge flow during the test to determine a displaced purge volume as the test proceeds.<br><br>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.<br><br>On fuel systems with fuel caps<br><br>If the first failure of | Purge volume<br>while<br>Tank vacuum<br><br>After setting the DTC for the first time, 0 liters of fuel must be consumed before setting the DTC for the second time.<br><br>Weak Vacuum Follow-up Test (fuel cap replacement test)<br>Weak Vacuum Test failed.<br><br>Passes if tank vacuum<br><br>Note: Weak Vacuum Follow-up Test can only report a pass. | > 60 liters<br><br>≤ 2,740 Pa<br><br>≥ 2,740 Pa | Fuel Level<br>System Voltage<br>BARO<br>Purge Flow<br><br>No active DTCs:<br><br>No Active DTC's TFTKO<br><br>If ECT > IAT, Startup temperature delta (ECT-IAT):<br>Startup IAT<br>Startup ECT<br><br>Weak Vacuum Follow-up Test<br>This test can run following a weak vacuum failure or on a hot restart. | 10 % ≤ Percent ≤ 90 %<br>≥ 10.0 volts<br>≥ 70 kPa<br>≥ 2.50 %<br><br>MAP_SensorFA<br>TPS_FA<br>VehicleSpeedSensor_FA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>EnginePowerLimited<br>FuelLevelDataFault<br><br>P0443<br>P0449<br>P0452<br>P0453<br>P0454<br>P0458<br>P0459<br>P0498<br>P0499<br>P1001<br>P1005<br>P11FF<br>P130F<br>U18A2<br><br>≤ 8 °C<br>4 °C≤Temperature≤ 35 °C<br>≤ 35 °C | Once per cold start<br><br>Time is dependent on driving conditions<br><br>Maximum time before test abort is 1,400 seconds<br><br>Weak Vacuum Follow-up Test<br><br>With large leak detected, the follow-up test is limited to 1,300 seconds. Once the MIL is on, the follow-up test runs indefinitely. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>On fuel systems without fuel caps<br><br>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<br><br>(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.<br><br>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<br><br>250 ms / sample | Type B, 2 Trips<br><br>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<br><br>(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.<br><br>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<br><br>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<br><br>(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<br>b) while engine fuel consumption is | a) < 5liters<br><br>b) ≥ 35.69 liters | 1. Diagnostic Enabled<br><br>2. Engine Operational State | 1. == True<br><br>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 (For use on vehicles with a fuel float connected to an FTZM) | P0462 | This DTC will detect a primary fuel tank sensor out-of-range low. | Fuel level Sender % of 5V range | < 10 % | a) Diagnostic enabled status<br>b) Fuel Level Sensor Initialized status<br>c) Fuel Level Sensor Data Available Status<br>d) Communication faults status | a) == True<br>b) == True<br>c) == True<br>d) <> True | 40 failures out of 50 samples<br><br>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 High Voltage (For use on vehicles with a fuel float connected to an FTZM) | P0463 | This DTC will detect a primary fuel tank level sensor out-of-range high. | Fuel level Sender % of 5V range | > 60 % | a) Diagnostic enabled status<br>b) Fuel Level Sensor Initialized status<br>c) Fuel Level Sensor Data Available Status<br>d) Communication faults status | a) == True<br>b) == True<br>c) == True<br>d) <> True | 40 failures out of 50 samples<br>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 Intermittent<br><br>(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.<br><br>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.<br><br>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.”<br><br>The fuel level change rationality diagnostic is an “X out of Y” test.<br>1) Each time the EONV test completes, the (Y) sample counter is incremented.<br>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.<br><br>An intermittent fuel level signal problem is defined as:<br><br>The fuel level changes by and does not remain for 30 seconds during a 600 second refueling rationality test. | > 10 %<br>> 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.<br><br>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.<br>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.<br>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. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission (EVAP) System Flow During Non-Purge<br><br>(No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM)) | P0496 | This DTC will determine if the purge solenoid is leaking to engine manifold vacuum.<br><br>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.<br><br>Additional Information<br><br>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).<br><br>The purge valve leak diagnostic exists to helps service replace | Tank Vacuum<br>for<br><br>Test time | > 2,491 Pa<br>5 seconds<br><br>≤ refer to **P0496 Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level** in Supporting Tables.<br><br>Test time only increments when engine vacuum ≥ 10.0 kPa. | Fuel Level<br>System Voltage<br>BARO<br>Startup IAT<br><br>Startup ECT<br>Engine Off Time<br><br>No active DTCs:<br><br><br><br><br><br><br>No Active DTC's TFTKO | 10 % ≤ Percent ≤ 90 %<br>≥ 10.0 volts<br>≥ 70 kPa<br>4 °C≤Temperature≤ 35 °C<br><br>≤ 35 °C<br>≥ 28,800.0 seconds<br><br>MAP_SensorFA<br>TPS_FA<br>VehicleSpeedSensor_FA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>EnginePowerLimited<br>FuelLevelDataFault<br><br>P0443<br>P0449<br>P0452<br>P0453<br>P0454<br>P0458<br>P0459<br>P0498<br>P0499<br>P1001<br>P1005<br>P11FF<br>P130F<br>U18A2 | Once per cold start<br><br>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<br><br>(No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM)) | P0498 | Controller specific output driver circuit diagnoses the vent solenoid low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. | Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure.<br><br>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 | No active DTC's: | P1005<br>P130F<br>U18A2 | 50 failures out of 63 samples<br><br>100 ms / sample | Type B, 2 Trips<br><br>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<br><br>(No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM)) | P0499 | Controller specific output driver circuit diagnoses the vent solenoid low sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.<br><br>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.<br><br>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 | No active DTC's: | P1005<br>P130F<br>U18A2 | 50 failures out of 63 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>Filter coefficient | > 91.00 rpm<br><br>0.00300 | Baro<br><br>Coolant Temp<br><br>Engine run time<br><br>Ignition voltage<br><br>Time since gear change<br><br>Time since a TCC mode change<br><br>IAT<br><br>Vehicle speed<br><br>Commanded RPM delta<br><br>Idle time<br><br>For manual transmissions:<br>Clutch Pedal Position<br>or<br>Clutch Pedal Position | > 70 kPa<br><br>> 60 °C<br><br>≥ 30 sec<br><br>32 ≥ volts ≥ 11<br><br>≥ 3 sec<br><br>> 3 sec<br><br>> -20 °C<br><br>≤ 1.24 mph, 2kph<br><br>≤ 25 rpm<br><br>> 10 sec<br><br>> 88.00 pct<br><br>< 75.00 pct<br><br>PTO not active<br><br>Transfer Case not in 4WD LowState | Diagnostic runs in every 12.5 ms loop<br><br>Diagnostic reports pass or fail in 10 seconds once all 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | No active DTCs | Off-vehicle device control (service bay control) must not be active.<br><br>following conditions not TRUE:<br>(VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimit AND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion)<br><br>Clutch is not depressed<br><br>TC_BoostPresSnsrFA<br>ECT_Sensor_FA<br>EnginePowerLimited<br>EGRValveCircuit_FA<br>EGRValvePerformance_FA<br>IAT_SensorCircuitFA<br>EvapFlowDuringNonPurge_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>FuelInjectorCircuit_FA<br>MAF_SensorFA<br>EngineMisfireDetected_FA<br>IgnitionOutputDriver_FA<br>TPS_FA<br>TPS_Performance_FA<br>VehicleSpeedSensor_FA<br>FuelLevelDataFault<br>LowFuelConditionDiagnostic<br>Clutch Sensor FA<br>AmbPresDfltdStatus | | |

| 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 Idle time | P2771<br><br>> 10 sec<br><br>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<br><br>Filter coefficient | < -182.00 rpm<br><br>0.00300 | Baro<br><br>Coolant Temp<br><br>Engine run time<br><br>Ignition voltage<br><br>Time since gear change<br><br>Time since a TCC mode change<br><br>IAT<br><br>Vehicle speed<br><br>Commanded RPM delta<br><br>For manual transmissions:<br>Clutch Pedal Position<br>or<br>Clutch Pedal Position | > 70 kPa<br><br>> 60 °C<br><br>≥ 30 sec<br><br>32 ≥ volts ≥ 11<br><br>≥ 3 sec<br><br>> 3 sec<br><br>> -20 °C<br><br>≤ 1.24 mph, 2kph<br><br>≤ 25 rpm<br><br>> 88.00 pct<br><br>< 75.00 pct<br><br>PTO not active<br><br>Transfer Case not in 4WD LowState<br><br>Off-vehicle device control (service bay control) must not be active. | Diagnostic runs in every 12.5 ms loop<br><br>Diagnostic reports pass or fail in 10 seconds once all 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimit AND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion)<br><br>Clutch is not depressed<br><br>TC_BoostPresSnsrFA<br>ECT_Sensor_FA<br>EnginePowerLimited<br>EGRValveCircuit_FA<br>EGRValvePerformance_FA<br>IAT_SensorCircuitFA<br>EvapFlowDuringNonPurge_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>FuelInjectorCircuit_FA<br>MAF_SensorFA<br>EngineMisfireDetected_FA<br>IgnitionOutputDriver_FA<br>TPS_FA<br>TPS_Performance_FA<br>VehicleSpeedSensor_FA<br>FuelLevelDataFaultLow<br>FuelConditionDiagnostic<br>Clutch SensorFA<br>AmbPresDfltdStatus<br>P2771 | | |
| | | | | | No active DTCs | | | |
| | | | | | All of the above met | > 10 sec | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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. |
|---|---|---|---|---|---|---|---|---|
| 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.<br><br>The engine running test compares the measured oil pressure to threshold. If the measured oil pressure is out of the thresholds, then the error counter increments. The engine off test compares the measured oil pressure against thresholds after the engine has stopped rotating. If the measured oil pressure is out of the thresholds, then the error counter increments. | **Two Stage Oil Pump EOP Sensor Test with Engine Running, High Pressure State**<br><br><u>To Fail when previously passing with the engine running:</u><br><br>Filtered Engine Oil Pressure below expected threshold<br><br>OR<br><br>Filtered Engine Oil Pressure above expected threshold<br><br><u>To pass when previously failing:</u><br><br>Filtered Engine Oil Pressure above low threshold plus an offset<br><br>OR | <br><br>Filtered Oil Pressure < ( **P0521_P06DD_P06DE_OP_HiStatePressure** * 1.00 - 133.0 kPa)<br><br>OR<br><br>Filtered Oil Pressure > ( **P0521_P06DD_P06DE_OP_HiStatePressure** * 1.00 + 180.0 kPa)<br><br>Filtered Oil Pressure > **P0521_P06DD_P06DE_OP_HiStatePressu** (**re** * 1.00 - 133.0 kPa + 10.0 kPa)<br><br>OR<br><br>Filtered Oil Pressure < ( | Two Stage Oil Pump is Present = TRUE<br><br>Pump is in high pressure state<br><br>Engine Running Diagnostic Status<br><br>Engine Off Rationality Test Diagnostic Reporting Status<br><br>Oil Pressure Sensor In Use<br><br>Engine Running<br><br>Ambient Air Pressure<br><br>Oil Aeration (= TRUE if engine speed > 8,000 RPM for longer than 30.0seconds)<br><br>Filtered Engine Speed within range<br><br>Modelled Oil Temperature within range<br><br>Pump state change complete<br><br>No active DTC's | TRUE<br><br>Enabled<br><br>Test not report a fail state<br><br>Yes<br><br>≥ 30.0 seconds<br><br><br><br>≥ 70.0 kPa<br><br>FALSE<br><br>1,000 RPM ≤ Filtered Engine Speed ≤ 4,500 RPM<br><br>40.0 deg C ≤ Modelled Oil Temperature ≤ 100.0 deg C<br><br>Time since state change > 0.50 s<br><br>Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA | <br><br><br><br>≥ 40 errors out of 50 samples.<br><br><br><br>Performed every 100 msec<br><br><br><br>≥ 10 passes out of 50 samples.<br><br><br><br>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 | **P0521_P06DD_P06DE_OP_HiStatePressure** * 1.00 + 180.0 kPa - 10.0 kPa)<br><br>(Details on Supporting Tables Tab: **P0521_P06DD_P06DE_OP_HiStatePressure** ) | | EngOilP essureSensorCkt FA<br>AmbientAirDefault<br>EngOilTempFA<br>CrankSensor_FA | | |
| | | | **Two Stage Oil Pump EOP Sensor Test with Engine Running, Low Pressure State**<br><br><u>To Fail when previously passing with the engine running:</u><br><br>Filtered Engine Oil Pressure below expected threshold<br><br>OR<br><br>Filtered Engine Oil Pressure above expected threshold | <br><br>Filtered Oil Pressure < ( **P0521_P06DD_P06DE_OP_LoStatePressure**<br><br>* 1.00 - 133.0 kPa)<br><br>OR<br><br>Filtered Oil Pressure > ( **P0521_P06DD_P06DE_OP_LoStatePressure** * 1.00 + 180.0 kPa) | Two Stage Oil Pump is Present = TRUE<br><br>Pump is in low pressure state<br><br>Engine Running Diagnostic Status<br><br>Engine Off Rationality Test Diagnostic Reporting Status<br><br>Oil Pressure Sensor In Use<br><br>Engine Running<br><br>Ambient Air Pressure<br><br>Oil Aeration (= TRUE if engine speed > 8,000 RPM for longer than 30.0seconds)<br><br>Filtered Engine Speed within range | TRUE<br><br>Enabled<br><br>Test not report a fail state<br><br>Yes<br><br>≥ 30.0 seconds<br><br><br>≥ 70.0 kPa<br><br>FALSE<br><br>1,000 RPM ≤ Filtered Engine Speed ≤ 4,500 RPM | <br><br><br><br>≥ 40 errors out of 50 samples.<br><br><br><br>Performed every 100 msec | |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | EngOilPressureSensorCkt FA<br>CrankSensor_FA | | |
| | | | | | | | | |

| 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<br><br>Deadband: < 5 percent or > 95 percent | Engine Speed Enable<br>Engine Speed Disable<br><br>Oil Pressure Sensor In Use<br><br>Diagnostic Status | > 400 rpm<br>< 350 rpm<br><br>Yes<br><br>Enabled | 1,280 failures out of 1,600 samples<br><br>Performed every 3.125 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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<br><br>Deadband: < 5 percent or > 95 percent | Oil Pressure Sensor In Use<br><br>Diagnostic Status | Yes<br><br>Enabled | 1,280 failures out of 1,600 samples<br>Performed every 3.125 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Resume Circuit | P0567 | Detects a failure of the cruise resume switch in a continously applied state<br><br>"Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Resume range for too long, the code is set and cruise control is disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails." | Cruise Control Resume switch remains applied for greater than a calibratable period of time. | fail continuously in the applied state for greater than 89.000 seconds | Diagnostic is enabled.<br><br>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<br><br>"Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Set range for too long, the code is set and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails." | Cruise Control Set switch remains applied for greater than a calibratable period of time. | fail continuously in the applied state for greater than 89.000 seconds | Diagnostic is enabled.<br><br>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 Input Circuit | P0575 | Determines if cruise switch state received from the BCM is valid.<br><br>"Emissions Neutral Default Action : When the ECM determines that a serial communication fault from the BCM has occurred with frame $1E1, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails." | If x of y rolling count / protection value faults occur, disable cruise for duration of fault | Message <> 2's complement of message<br><br>Message rollling count<>previous message rolling count value plus one | Diagnostic is enabled.<br><br>Cruise Control Switch Serial Data Error Diagnostic Enable<br><br>Serial communication to BCM<br><br>Power Mode<br>Engine Running | 1.00<br><br>No loss of communication<br><br>= RUN<br>= TRUE | 9 failures out of / 17 samples<br><br>Performed on every received message<br><br>9 rolling count failures out of / 17 samples<br><br>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 | Diagnostic is enabled.<br><br>Brake Pedal Position Sensor Circuit Range / Performance Diagnostic Enable | 1.00<br><br>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<br><br>OR<br><br>calculated brake pedal position delta sample counter > 1,000.00 for slow test | calculated brake pedal position delta > 2.63<br><br>OR (for slow test)<br><br>shift lever has been in park once this key cycle<br><br>vehicle speed >= 6.00<br><br>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<br><br>vehicle speed >= 6.00<br><br>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 | Diagnostic is enabled.<br><br>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 | Diagnostic is enabled.<br><br>Brake Pedal Position Sensore High Voltage Diagnostic Enable | 1.00 | 20.00 /<br><br>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 | 25.00 | Diagnostic is enabled.<br><br>Brake Pedal Position Sensor Circuit Intermittent / Erratic Diagnostic Enable | 1.00 | 5.00 /<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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.<br>5.00<br>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<br>failures detected via Error Correcting Code | | | Diagnostic runs continuously via the flash hardware. | |
| | | | | In all cases, the failure count is cleared when controller shuts down | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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 > | 0.47369 s | | | When dual store updates occur. | |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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 / 18 counts intermittent. 50 ms/count in the ECM main processor | |
| | | | 2 fails in a row in the MAIN processor's ALU check | | | Test is Enabled: 1 (If 0, this test is disabled) | 25 ms | |
| | | | 2 fails in a row in the MAIN processor's configuration register masks versus known good data | | | Test is Enabled: 1 (If 0, this test is disabled) | 12.5 to 25 ms | |
| | | | Checks number of stack over/under flow since last powerup reset >= | 3.00 | | Test is Enabled: 1 (If 0, this test is disabled) | variable, depends on length of time to corrupt stack | |
| | | | Voltage deviation > | 0.4950 | | Test is Enabled: 1 (If 0, this test is disabled) | 5 / 10 counts or 0.150 seconds continuous; 50 ms/count in the ECM main processor | |
| | | | Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization. | 3 (results in MIL), 5 (results in MIL and remedial action) | | Test is Enabled: 1 (If 0, this test is disabled) | variable, depends on length of time to access flash with corrupted memory | |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | MAIN processor determines a seed has not changed within a specified time period within the 50ms task. | Previous seed value equals current seed value. | | Test is Enabled:<br>1<br>(If 0, this test is disabled) | Table, f(Loop Time). See supporting tables:<br>**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. |
|---|---|---|---|---|---|---|---|---|
| Internal ECM Processor Integrity Performance | P0607 | Indicates that the ECM has detected an internal processor integrity performance. | Performs the failure diagnostic for the offline and online BIST results. | | | Test is enabled:<br>1 .<br><br>(If 0, this test is disabled) | 5 counts<br><br>background task/ count in the ECM main processor | Type A, 1 Trips |
| | | | Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >= | 3 (results in MIL),<br>5 (results in MIL and remedial action) | | Test is enabled: 1 .<br>(If 0, this test is disabled) | variable, depends on length of time to access flash with corrupted memory | |
| | | | Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >= | 3 (results in MIL),<br>5 (results in MIL and remedial action) | | Test is enabled: 1 .<br>(If 0, this test is disabled) | variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM | |

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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<br><br>OR<br><br>Internal ECU Boost Voltage<br><br>OR<br><br>Driver Status<br><br>OR<br><br>Driver Status | >= 90 Volts<br><br><br><br><= 40 Volts<br><br><br><br>= Not Ready<br><br><br><br>= Uninitialized | Battery Voltage | >= 8 or >= 11<br><br>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<br><br>Low Voltage - 160 failures out of 200 samples<br><br>Driver Status Not Ready- 160 failures out of 200 samples<br><br>Driver Status Uninitialized - Uninitialized state for >= 100 counts<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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 <<br>or ECM percent Vref1 ><br>or the difference between ECM filtered percent Vref1 and percent Vref1 > | 4.875 % Vref1<br>5.125 % Vref1<br><br>0.0495 % Vref1 | Diagnostic enabled<br><br>AND<br>[<br><br>(Run/Crank voltage for Time period AND Starter engaged)<br><br>OR<br><br>(Run/Crank voltage AND Starter engaged)<br>] | = 1<br><br><br><br>> 6.41 Volts<br>= 0.03 Seconds<br>= FALSE<br><br><br><br>> 8.41 Volts<br>= TRUE | 19 / 39 counts; or<br><br>0.1875 sec continuous;<br><br>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 #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 <<br>or ECM percent Vref2 ><br>or the difference between ECM filtered percent Vref2 and percent Vref2 > | 4.875 % Vref2<br>5.125 % Vref2<br><br>0.0495 % Vref2 | Diagnostic enabled<br><br>AND<br>[<br>(Run/Crank voltage for Time period AND Starter engaged)<br><br>OR<br><br>(Run/Crank voltage AND Starter engaged)<br>] | = 1<br><br><br><br>> 6.41 Volts<br>= 0.03 Seconds<br>= FALSE<br><br><br><br>> 8.41 Volts<br>= TRUE | 19 / 39 counts; or<br><br>0.1875 sec continuous;<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. | Open Circuit:<br>≥ 200 K Ω ohms impedance between output and controller ground | Run/Crank Voltage | Voltage ≥ 11.00 volts | 8 failures out of 10 samples<br><br>250 ms / sample | Type B, 2 Trips<br><br>Note: In certain controlle rs P0686 may also set (Powertr ain 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.<br><br>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<br><br>250 ms / sample | Type B, 2 Trips<br><br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. | Short to power:<br>≤ 0.5 Ω impedance between output and controller power | Run/Crank Voltage | Voltage ≥ 11.00 volts | 8 failures out of 10 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Control Module Power Relay Feedback Circuit Low Voltage | P0689 | Detects low voltage in the control module relay feedback circuit. This diagnostic reports the DTC when low voltage is present. Monitoring occurs when run crank voltage is above a calibrated value. | Control module relay feedback circuit low voltage | Powertrain relay voltage <= 5.00 | Powertrain relay short low diagnostic enable<br><br>Run Crank voltage<br><br>Powertrain relay state | = 1.00<br><br>> 9.00<br><br>= ON | 5 failures out of 6 samples<br><br>1000 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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”<br><br>No active DTCs: | >= 2.00 seconds<br><br>PowertrainRelayStateOn_FA | 50 failures out of 63 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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 <<br>or ECM percent Vref3 ><br>or the difference between ECM filtered percent Vref3 and percent Vref3 > | 4.875 % Vref3<br>5.125 % Vref3<br><br>0.0495 % Vref3 | Diagnostic enabled<br><br>AND<br>[<br>(Run/Crank voltage for Time period AND Starter engaged)<br><br>OR<br><br>(Run/Crank voltage AND Starter engaged)<br>] | = 1<br><br><br><br>> 6.41 Volts<br>= 0.03 Seconds<br>= FALSE<br><br><br><br>> 8.41 Volts<br>= TRUE | 19 / 39 counts; or<br><br>0.1875 sec continuous;<br><br>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 <<br>or ECM percent Vref4 ><br>or the difference between ECM filtered percent Vref4 and percent Vref4 > | 4.875 % Vref4<br>5.125 % Vref4<br><br>0.0495 % Vref4 | Diagnostic enabled<br><br>AND<br>[<br>(Run/Crank voltage for Time period AND Starter engaged)<br><br>OR<br><br>(Run/Crank voltage AND Starter engaged)<br>] | = 1<br><br><br><br>> 6.41 Volts<br>= 0.03 Seconds<br>= FALSE<br><br><br><br>> 8.41 Volts<br>= TRUE | 19 / 39 counts; or<br><br>0.1875 sec continuous;<br><br>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**<br><br>**AND**<br><br>**< P06B6_P06B7_OpenTestCktThrshMax**<br><br>**See Supporting Tables** | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br><br><br>Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)<br><br>Engine Air Flow | Yes<br><br>≥ 2.0 seconds<br><br>> 400 RPM<br>and<br>< 4,000 RPM<br><br>≥ 200 Revs<br><br><br><br>≥ 50 mg/cylinder<br>and<br>≤ 2,000 mg/cylinder | First Order Lag Filter with Weight Coefficient<br><br>Weight Coefficient =<br><br>0.0100<br><br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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. | Individual Sensor Threshold Enabled?<br><br>FFT Diagnostic Output | 0.00 , Use Case 1<br><br>**Case 1:**<br><br>**> P06B6_P06B7_OpenTestCktThrshMin**<br><br>**AND**<br><br>**< P06B6_P06B7_OpenTestCktThrshMax**<br><br>**See Supporting Tables**<br><br>**Case 2:**<br><br>> **P06B7_OpenTestCktMin2**<br><br>**AND**<br><br>< **P06B7_OpenTestCktMax2**<br><br>**See Supporting Tables** | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br>Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)<br><br>Engine Air Flow | Yes<br><br>≥ 2.0 seconds<br><br>> 400 RPM and < 4,000 RPM<br><br>≥ 200 Revs<br><br>≥ 50 mg/cylinder and ≤ 2,000 mg/cylinder | First Order Lag Filter with Weight Coefficient<br><br>**Case 1 Weight Coefficient** =<br><br>0.0100<br><br>Updated each engine event<br><br>**Case 2 Weight Coefficient =** 0.0100<br><br>Updated each engine event | Type B, 2 Trips |

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Oil Pressure Control Circuit High | P06DC | Controller specific output driver circuit diagnoses the oil pump low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds. | Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. | Short to Power<br>≤ 0.5 Ω impedance between output and controller power | Powertrain Relay Voltage<br><br>Run/Crank Active<br><br>Cranking State | ≥ 11.00<br><br>= True<br><br>= False | >= 40 errors out of 50 samples.<br><br>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 - One Sided | P06DD | Diagnoses the two stage oil pump is stuck. This diagnostic includes an intrusive test and a passive test.<br><br>Intrusive test:<br><br>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.<br><br>Passive test:<br>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><br><br>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]<br><br>Oil Pressure delta<br>< **P06DD_P06DE_OP_StateChangeMin**<br><br>AND<br><br>Filtered Oil Pressure<br>≥ **P06DD_P06DE_MinOilPressThresh**<br><br>(see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin P06DD_P06DE_MinOilPressThresh** ) | <u>Common Criteria:</u><br><br>Two Stage Oil Pump is Present<br><br>Engine Running<br><br>Ambient Air Pressure<br><br>Oil Aeration<br>(= TRUE if engine speed > 8,000 RPM for longer than 30.0seconds)<br><br>No active DTC's for diagnsotic enable:<br><br>Check oil pump TFTKO as a diagnostic enable when Enabled.<br><br>No active DTC's for control enable:<br><br><u>Active Criteria:</u><br>One Sided Performance Test = Enabled | TRUE<br><br>≥ 30.0 seconds<br><br>≥ 70.0 kPa<br><br>FALSE<br><br>Fault bundles:<br>MAF_SensorFA<br>ECT_Sensor_FA<br>IAT_SensorFA<br>CrankSensor_FA<br>EngOilPressureSensorCktFA<br>AmbientAirDefault<br>EngOilTempFA<br><br>Enabled : OilPmpTFTKO<br><br>Enabled Fault bundles for control disable :<br>OilPmpTFTKO<br>EngineTorqueEstInaccurate<br>EngOilPressureSensorFA<br>PowertrainRelayFault<br>CrankSensor_FA<br>EngOilTempFA<br><br>Enabled | ≥ 12 errors out of 15 samples.<br><br>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 | 40.0 deg C ≤ Oil Temp ≤ 100.0 deg C | | |
| | | | | | Filtered Engine Speed within range | 1,000 RPM ≤ Filtered Engine Speed ≤ 3,300 RPM | | |
| | | | | | Engine Torque within range | **P06DD_P06DE_MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **P06DD_P06DE_MaxEnableTorque_OP**<br><br>(see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinEnableTorque_OP** **P06DD_P06DE_MaxEnableTorque_OP** ) | | |
| | | | | | Delta Filtered Engine Speed within a range | ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds ] ≤ 50 RPM | | |
| | | | | | Filtered Oil Pressure within range | Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh**<br><br>(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 | 82.0 kPa < ABS[ **P0521_P06DD_P06DE_OP_HiStatePressure - P0521_P06DD_P06DE_OP_LoStatePressure** ] < 200.0 kPa | | |
| | | | | | <u>Passive Criteria:</u> | | | |
| | | | | | Active Test Passed | TRUE | | |
| | | | | | Filtered Engine Speed within range | 1,000 RPM ≤ Filtered Engine Speed ≤ 4,500 RPM | | |
| | | | | | Modelled Oil Temperature within range | 40.0 deg C ≤ Oil Temp ≤ 100.0 deg C | | |
| | | | | | Delta Filtered Engine Speed within a range | ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.00 seconds ] ≤ 1,000 RPM | | |
| | | | | | Oil Pressure Delta within a range | Oil Pressure Delta < **P06DD_P06DE_OP_StateChangeMin** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin** ) | | |
| | | | <u>Fast Pass Condition</u><br><br>Oil Pressure delta is less than a minimum delta pressure on a state | Oil Pressure delta =<br><br>ABS [ Filtered Oil Pressure at beginning | <u>Common Criteria:</u><br><br>Two Stage Oil Pump is Present | TRUE | 0 errors out of 5 samples.<br><br>Run once per trip | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | change and the measured filtered oil pressure is above a threshold | of state change - filtered oil pressure after 1.5 seconds]<br><br>Oil Pressure delta<br><<br>**P06DD_P06DE_OP_StateChangeMin**<br><br>AND<br><br>Filtered Oil Pressure<br>≥<br>**P06DD_P06DE_MinOilPressThresh**<br><br>(see P06DD details on Supporting Tables Tab<br>**P06DD_P06DE_OP_StateChangeMin**<br>**P06DD_P06DE_MinOilPressThresh**<br>) | Engine Running<br><br>Ambient Air Pressure<br><br>Oil Aeration<br>(= TRUE if engine speed > 8,000 RPM for longer than 30.0seconds)<br><br>No active DTC's for diagnsotic enable:<br><br>Check oil pump TFTKO as a diagnostic enable when Enabled.<br><br>No active DTC's for control enable:<br><br><u>Active Criteria:</u><br>One Sided Performance Test = Enabled<br><br>Oil Pump in Low State<br><br>Modelled Oil Temperature within range | ≥ 30.0 seconds<br><br>≥ 70.0 kPa<br><br>FALSE<br><br>Fault bundles:<br>MAF_SensorFA<br>ECT_Sensor_FA<br>IAT_SensorFA<br>CrankSensor_FA<br>EngOilPressureSensorCktFA<br>AmbientAirDefault<br>EngOilTempFA<br><br>Enabled : OilPmpTFTKO<br><br>Enabled Fault bundles for control disable :<br><br>OilPmpTFTKO<br>EngineTorqueEstInaccurate<br>EngOilPressureSensorFA<br>PowertrainRelayFault<br>CrankSensor_FA<br>EngOilTempFA<br><br>Enabled<br><br>> 1.5 seconds<br><br>40.0 deg C ≤ Oil Temp ≤ 100.0 deg C | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Filtered Engine Speed within range | 1,000 RPM ≤ Filtered Engine Speed ≤ 3,300 RPM | | |
| | | | | | Engine Torque within range | **P06DD_P06DE_MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **P06DD_P06DE_MaxEnableTorque_OP**<br><br>(see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinEnableTorque_OP** **P06DD_P06DE_MaxEnableTorque_OP** ) | | |
| | | | | | Expected Oil Pressure Delta within range | 82.0 kPa < ABS[ **P0521_P06DD_P06DE_OP_HiStatePressure** - **P0521_P06DD_P06DE_OP_LoStatePressure** ] < 200.0 kPa | | |
| | | | | | Delta Filtered Engine Speed within a range | ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds ] ≤ 50 RPM | | |
| | | | | | Filtered Oil Pressure within range | Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh**<br><br>(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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |

| 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 EBCM is valid | Serial Communication 2's complement message - ($1C7/$1C9 for engine torque, $1CA/$1C6 for axle torque) | Message <> 2's complement of message | Active Communication with EBCM | Received serial data | >= 6 failures out of 10<br><br>Performed on every received message | Type C, No SVS Emissions Neutral Diagnostic - Type C |
| | | | | | Power Mode<br>Engine Running | = Run<br>= True | | |
| | | | | | Status of traction in GMLAN message ($4E9) | = Traction Present | | |
| | | | OR<br>Serial Communication message ($1C7/$1C9 for engine torque, $1CA/ $1C6 for axle torque) rolling count index value | Message rolling count value <> previous message rolling count value plus one | Run/Crank Active | > 0.50 seconds | 6 rolling count failures out of 10 samples | |
| | | | | | Ignition Voltage | > 6.41 volts | Performed on every received message | |
| | | | OR<br>Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period | Requested torque intervention type toggles from not increasing request to increasing request | | | >= 3 multi-transitions out of 5 samples.<br><br>Performed every 200 ms | |
| | | | Torque request greater than torque request diagnostic maximum threshold | > 251 Nm<br>for engine torque based traction torque system,<br>OR<br>> 4,000 Nm<br>for axle torque based traction torque system | | | >= 4 out of 10 samples<br><br>Performed on every received message | |

| 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<br>for<br><br>out of total samples | <br><br><br>>= 8 counts<br><br>>= 10 counts | Message frame<br><br>All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage<br><br>And<br><br>Sensor Bus Relay | = Is available<br><br><br>>= 3,000.00 milliseconds<br><br>= Run<br><br>>= 11.00 Volts<br><br>>= 11.00 Volts<br><br><br>= On (if present) | Executes in 10ms loop. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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<br>for<br><br>out of total samples | <br><br><br>>= 8 counts<br><br>>= 10 counts | Message frame<br><br>All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage<br><br>And<br><br>Sensor Bus Relay | = Is available<br><br>>= 3,000.00 milliseconds<br><br>= Run<br><br>>= 11.00 Volts<br><br>>= 11.00 Volts<br><br><br>= On (if present) | Executes in 10ms loop. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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<br><br>Fuel Pump Driver Control Module System Voltage Performance diagnostic is enabled<br><br>Fuel Tank Zone Module (FTZM) serial messages are available<br><br>FTZM Run Crank Active is TRUE<br><br>Starter motor not engaged<br><br>Sensor Bus relay is commanded ON | = 1 | 50 failures out of 63 samples<br><br>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<br><br>out of total samples | >= 8 counts<br><br>>= 10 counts | Message frame<br><br>All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage<br><br>And<br><br>Sensor Bus Relay | = Is available<br><br>>= 3,000.00 milliseconds<br><br>= Run<br><br>>= 11.00 Volts<br><br>>= 11.00 Volts<br><br>= On (if present) | Executes in 10ms loop. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Driver Control Module Reset Error | P1005 | This DTC monitors for a reset error in the Fuel Pump Driver Control Module | If the received value for the time since the last FPDCM reset has reset and the newly received value or previous value is<br><br>for<br><br>out of total samples | <= 0.50 seconds<br><br>>= 2.00 counts<br><br>>= 400.00 counts | DTC is enabled<br><br>Sensor bus relay<br><br>Battery voltage<br><br>P1000<br><br>U18A2 | Enabled<br><br>On<br><br>> 11.00 Volts<br><br>Not active<br><br>Not active | Diagnostic runs in 50 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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>Fuel Pump Driver Control Module Ignition Switch Run/Start Position Circuit High diagnostic is enabled<br><br>Fuel Tank Zone Module (FTZM) serial messages are available<br><br>Run Crank Active<br><br>Sensor Bus relay is commanded ON | <br><br><br><br>= 1<br><br><br><br>= FALSE | 40 failures out of 50 samples<br><br>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<br>for<br><br>out of total samples | <br><br><br><br>>= 8 counts<br><br>>= 10 counts | Message frame<br><br>All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage<br><br>Sensor Bus Relay | = Is available<br><br><br>>= 3,000.00 milliseconds<br><br>= Run<br><br>>= 11.00 Volts<br><br><br>>= 11.00 Volts<br><br>= On (if present) | Executes in 100ms loop. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Phase U-V-W Circuit Open | P1029 | This DTC detects if any of the 3phase fuel pump control circuits is Open [system configuration "Brushless"]<br><br>The diagnostic can detect open circuit faults when the fuel pump is not rotating. In the "stopped" state, small currents are injected into each motor phase circuit pair by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. This process is completed in less than 1 millisecond. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are | Phased-pair circuit voltage | 3V <= V [back-EMF] <= 6V | a) Sensed fuel pump speed<br><br>b) Device configuration FCBR_e_ChassisFuelPresSysType<br><br>c) Diagnostic Enabled - KeFABR_b_OpenCktDiagEnbl<br><br>d) CAN Sensor Bus message $3EC_Avail<br><br>e) Sensor Bus Relay On<br><br>f) Sensor Bus B Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr] | a) == 0 RPM<br><br>b) CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys<br><br>c) == TRUE<br><br>d) == TRUE<br><br>e) == TRUE<br><br>f) <> TRUE | 40.00 failures / 80.00 samples<br><br>1 sample / 12.5 ms | Type A, 1 Trips |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Phase U-V-W Circuit Low | P102A | This DTC detects if the fuel pump control circuit is shorted to low [Short to Ground]<br><br>The diagnostic detects short-to-ground faults using 2 methods depending on whether the fuel pump is rotating. 1) In the "rotating" state, voltage drop across each phase-pair high-side drive is monitored, or 2) in the "stopped" state, small currents are injected into each motor phase circuit pair | Phased-pair circuit voltage Difference | Vdelta > 0.145 V | a) Device configuration FCBR_e_ChassisFuelPressSysType<br><br>b) Diagnostic KeFABR_b_GshtCktDiagEnbl<br><br>c) CAN Sensor Bus message $3EC_Avail<br><br>d) Sensor Bus Relay On<br><br>e) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr] | a) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys<br><br>b) == TRUE<br><br>c) == TRUE<br><br>d) == TRUE<br><br>e) <> TRUE | 40.00 failures / 80.00 samples<br><br>1 sample / 12.5 ms | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage].<br>The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds.<br>This open circuit diagnostic follows "smart device" Component Technical Specifications. | Phased-pair circuit voltage | V [back-EMF] >= 6 V | a) Sensed fuel pump speed<br><br>b) Device configuration FCBR_e_ChassisFuelPresSysType<br><br>c) Diagnostic KeFABR_b_GshtCktDiagEnbl<br><br>d) CAN Sensor Bus message $3EC_Avail<br><br>e) Sensor Bus Relay On<br><br>f) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr] | a) == 0 RPM<br><br>b) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys<br><br>c) == TRUE<br><br>d) == TRUE<br><br>e) == TRUE<br><br>f) <> TRUE | 40.00 failures / 80.00 samples<br><br>1 sample / 12.5 ms | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Phase U-V-W Circuit High | P102B | This DTC detects if the fuel pump control circuit is shorted to high voltage [Short to Battery]<br><br>The diagnostic detects short-to-battery faults using 2 methods depending on whether the fuel pump is rotating. 1) In the "rotating" state, voltage drop across each phase-pair low-side current shunt is monitored, or 2) in the "stopped" state, small currents are injected | Phased-pair circuit voltage Difference | Vdelta > 0.4 V | a) Device configuration FCBR_e_ChassisFuelPresSysType<br><br>b) Diagnostic KeFABR_b_PshtCktDiagEnbl<br><br>c) CAN Sensor Bus message $3EC_Avail<br><br>d) Sensor Bus Relay On<br><br>e) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr] | a) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys<br><br>b) == TRUE<br><br>c) == TRUE<br><br>d) == TRUE<br><br>e) <> TRUE | 40.00 failures / 80.00 samples<br><br>1 sample / 12.5 ms | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | into each motor phase circuit pair by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage].<br>The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds.<br>This open circuit diagnostic follows "smart device" Component Technical Specifications. | Phased-pair circuit voltage | V[backEMF] > 6 V | a) Sensed fuel pump speed<br><br>b) Device configuration FCBR_e_ChassisFuelPresSysType<br><br>b) Diagnostic KeFABR_b_PshtCktDiagEnbl<br><br>c) CAN Sensor Bus message $3EC_Avail<br><br>d) Sensor Bus Relay On<br><br>e) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr] | a) == 0 RPM<br><br>b) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys<br><br>b) == TRUE<br><br>c) == TRUE<br><br>d) == TRUE<br><br>e) <> TRUE | 40.00 failures / 80.00 samples<br><br>1 sample / 12.5 ms | |
| | | | | | | | | |

| 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 (applications with LIN MAF) | P10BC | Detects a performance failure in the Barometric Pressure (BARO) sensor, such as when a BARO value is stuck in range.<br><br>With this monitor, the BARO sensor is compared to a redundant sensor called BARO C. If the BARO sensor value is not similar to the BARO C sensor value, then the BARO Sensor A/C Correlation diagnostic will fail. | Difference between BARO A Sensor reading and BARO C Sensor reading | > 15.0 kPa | LIN Communications established with MAF | | 160 failures out of 200 samples<br><br>1 sample every 25 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from these three sensors.<br><br>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<br><br>AND<br><br>ABS(Measured Flow – Modeled Air Flow) Filtered<br>OR<br>ABS(Measured MAP – MAP Model 1) Filtered<br><br>AND<br><br>ABS(Measured MAP – MAP Model 2) Filtered | > 300 kPa*(g/s)<br><br><br><br>> 25.0 grams/sec<br><br>> 22.0 kPa )<br><br><br><br>> 22.0 kPa | Engine Speed<br>Engine Speed<br><br>(Coolant Temp<br>OR<br>OBD Coolant Enable Criteria<br><br>(Coolant Temp<br>OR<br>OBD Max Coolant Achieved<br><br>Intake Air Temp<br>Intake Air Temp<br><br>Minimum total weight factor (all factors multiplied together)<br><br>See Residual Weight Factor tables. | >= 400 RPM<br><= 4,230 RPM<br><br>>= -9 Deg C<br><br>= TRUE)<br><br><= 130 Deg C<br><br>= FALSE)<br><br>>= -20 Deg C<br><= 129 Deg C<br><br>>= 0.50<br><br>Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM**<br><br>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<br><br>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 Erro multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM**<br><br>MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** | | |
| | | | | | No Active DTCs: | MAP_SensorCircuitFA<br>EGRValvePerformance_FA<br>MAF_SensorCircuitFA<br>CrankSensor_FA<br>ECT_Sensor_FA<br>IAT_SensorFA | | |
| | | | | | No Pending DTCs: | EGRValve_FP<br>ECT_Sensor_Ckt_FP<br>IAT_SensorCircuitFP | | |
| | | | | | | | | |

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

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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<br><br>out of total samples | >= 15 counts<br><br>>= 16 counts | Message frame<br><br>All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage<br><br>And<br><br>Sensor Bus Relay | = Is available<br><br>>= 3,000.00 milliseconds<br><br>= Run<br><br>>= 11.00 Volts<br><br>>= 11.00 Volts<br><br>= On (if present) | Executes in 10ms loop. | Type B, 2 Trips |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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 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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>The FTZM ERFS control may adjust the PWM slew rate or frequency as a self-protection method, but may not reduce pump rotational speed or impact pumping performance in any way due to an over-temperature condition. | Fuel Pump Driver Temperature | T > 160 degC | a) Diagnostic enabled [KeFABR_b_OvertempDiagEnbl]<br><br>b) Sensor Bus Relay On<br><br>c) CAN Sensor Bus message $3EC_Available<br><br>d) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr] | a) == TRUE<br><br>b) == TRUE<br><br>c) == TRUE<br><br>d) <> TRUE | 5.00 failures / 10.00 samples<br><br>1 sample / 100 millisec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>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 | SENT Fuel Rail Pressure Sensor Internal Performance Enable<br><br>No Fault Pending | Enabled when a code clear is not active or not exiting device control<br><br>True<br><br>P16E4<br>P16E5<br>P128F | 400 failures out of 500 samples<br><br>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 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 | SENT Fuel Rail Pressure Sensor Internal Performance Enable<br><br>No Fault Pending | Enabled when a code clear is not active or not exiting device control<br><br>True<br><br>P16E4<br>P16E5<br>P128F | 400 failures out of 500 samples<br><br>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 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)<br><br>Message Age | = true<br><br>> 1.69 ms | SENT signal Serial waveform diagnostics enable<br><br>SENT power up delay<br><br>No Fault Active on | True<br><br>>= 0.00 seconds<br><br>Enabled when a code clear is not active or not exiting device control<br><br>P16E4<br>P16E5 | 400 failures out of 500 samples<br><br>6.25 ms per sample<br>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 System Ignition Switch Run/ Start Position Circuit Low (Only on applications that use an FTZM) | P129D | Detects low voltage of the fuel pump driver control module ignition switch circuit. This diagnostic reports the DTC when the fuel pump driver control module ignition switch circuit voltage is below a calibrated value. | Fuel Pump Driver Control Module Ignition switch Run/Start position circuit low | FTZM Run Crank Active is FALSE | Fuel Tank Zone Module (FTZM) is present on vehicle<br><br>Fuel Pump Driver Control Module Ignition Switch Run/Start Position Circuit High diagnostic is enabled<br><br>Fuel Tank Zone Module (FTZM) serial messages are available<br><br>Run Crank Active<br><br>Sensor Bus relay is commanded ON | <br><br><br><br>= 1<br><br><br><br>= TRUE | 40 failures out of 50 samples<br><br>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 Fuel Pump Speed Signal Incorrect | P129F | FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless pump speed is inferred using rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 millisecs. Diagnostic software [FABR ring] calculates the error between the commanded, arbitrated fuel pump speed [FCBR ring] and the FTZM sensed fuel pump speed. The error is filtered and evaluated against calibratable threshold limits to determine pass/fail status. Any failure that exists on the fuel pump output circuit (3 phases) will be manifested in a Fuel Pump Speed | Sensed Filtered Fuel Pump Speed Error | > Speed Error Low Threshold [Supporting Table] **P129F Threshold Low**<br><br>OR<br><br>< Speed Error High Threshold [Supporting Table] **P129F Threshold High** | a) Diagnostic Enabled FABR Speed Rationality Diagnostic<br>b) CAN Sensor Bus message $0CB_Available<br>c) FABR Fuel Control Enable Fault Active<br>d) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B $0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr]<br>e) FABR Fuel Pump Ckt FA<br>f) FABR Driver OverTemp FA<br>g) Run_Crank input Voltage<br>h) Sensor Bus Relay On<br>j) CAN Sensor Bus message $0CB Data Fault [CFMR_b_FTZM_Info8_ARC_ChkErr]<br>k) CAN Sensor Bus message $0CB Comm Fault [CFMR_b_FTZM_Info8_UcodeCmFA]<br>l) Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_UcodeCmFA]<br>m) Timer - FABR Rising Edge Diagnostic Delay<br>n) Timer - FABR Falling Edge Diagn Delay | a) == TRUE<br>b) == TRUE<br>c) <> TRUE<br>d) <> TRUE<br>e) <> TRUE<br>f) <> TRUE<br>g) > 9.00 volts<br>h) == TRUE<br>j) <> TRUE<br>k) <> TRUE<br>l) <> TRUE<br>m) > 2.20 seconds<br>n) > 1.00 seconds | 1 sample / 12.5 msec | Type B, 2 Trips |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Driver Control Module Enable Circuit Performance<br><br>[FTZM Brushed Motor Fuel Pump applications only] | P12A6 | The purpose of the Fuel Pump Driver Control Module Enable Circuit Performance Diagnostic is to detect if the state of the fuel control enable circuit is valid. This is accomplished by comparing the Fuel Control Enable circuit voltage state [high or low] measured by the Fuel Pump Driver Control Module to the state of Fuel Control Enable signal in the ECM. When the measured state does not match the expected state, the fail counter increments. | Fuel Control Enable Circuit Voltage State (Fuel Pump Driver Control Module) | <> Fuel Control Enable State (ECM) | a) Chassis Fuel Pres Sys Type configuration selection<br><br>b) Diagnostic Enabled<br>c) Serial Data message FTZM Information 2 ($CC) Alive Rolling Count Check Error<br>d) Diagnostic serial data available (message $CC)<br>e) Sensor Bus Relay On<br>f1) Run_Crank Ignition Sw Position Active<br>OR<br>f2) Run_Crank Ignition Sw Position Active timer [delay] | a) == FCBR ECM [Gas or Diesel] FTZM [Brushed DC or Brushless DC pump] Sys<br><br>b) == TRUE<br>c) <> True<br><br>d) == TRUE<br><br>e) == TRUE<br>f1) <> True<br><br>OR<br>f2) >= 0.00 seconds | 0 failures / 0 samples<br><br>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 Module (Fuel Tank Zone Module) Control Signal Message Counter Incorrect | P12A8 | This DTC monitors for an error in communication with the Fuel Pump Control Module (FTZM) Control Signal Message | Communication of the Alive Rolling Count or Protection Value from the Fuel Pump Control Module (FTZM) over CAN bus is incorrect<br>for<br><br>out of total samples | <br><br><br><br>>= 8 counts<br><br>>= 10 counts | Message frame<br><br>All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage<br><br>Sensor Bus Relay | = Is available<br><br><br>>= 3,000.00 milliseconds<br><br>= Run<br><br>>= 11.00 Volts<br><br><br>>= 11.00 Volts<br><br>= On (if present) | Executes in 10ms loop. | Type B, 2 Trips |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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?<br><br>Three possible Ignition Coil Power Sources (only 1 used):<br><br>Ignition Coil Power Source =<br><br><u>Case 1: Battery</u><br>Delay starting at Key-On<br><br><u>Case 2: Ignition Run/ Crank</u><br>Ignition Run/Crank Voltage<br><br><u>Case 3: PT Relay</u><br>PT Relay Voltage | Yes<br><br>PT Relay (Case 3)<br><br>5 Engine Revs<br><br>> 5.0 volts<br><br>> 11.0 volts | 50 Failures out of 63 Samples<br><br>6.25 msec rate | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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?<br><br>Three possible Ignition Coil Power Sources (only 1 used):<br><br>Ignition Coil Power Source =<br><br><u>Case 1: Battery</u><br>Delay starting at Key-On<br><br><u>Case 2: Ignition Run/ Crank</u><br>Ignition Run/Crank Voltage<br><br><u>Case 3: PT Relay</u><br>PT Relay Voltage | Yes<br><br>PT Relay (Case 3)<br><br>5 Engine Revs<br><br>> 5.0 volts<br><br>> 11.0 volts | 50 Failures out of 63 Samples<br><br>6.25 msec rate | Type: 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 A Reference Feedback Range/ Performance<br><br>[For use on vehicles with FTZM] | P1434 | This DTC will detect a fault in Primary fuel tank level sensor 5V reference by comparing DEC ECU commanded signal period and pulse width values against measured period and pulse width reported by the smart device | Reference Voltage 0 Period Error Maximum<br><br>[Measured Ref V Period - Commanded Ref V Period] | > 25.00 millisec | a] CAN serial data available [$2D7]<br><br>b] Calibration - Reference Voltage Command Source<br><br>c] Timer - Reference Voltage Pulse Width Available Synchronization<br><br>d] Timer - Reference Voltage Period Available Delay<br><br>e] Diagnostic System Disabled<br><br>f] FTZM Serial Data Info4 Rolling Counter Check Error<br><br>g] Reference Voltage Performance 0 Diagnostic Enabled | a] == True<br><br>b] == ECM<br><br>c] > 1.25 sec<br><br>d] > 0.75 sec<br><br>e] <> True<br><br>f] <> True g]<br><br>== TRUE | 250 ms / sample | Type B, 2 Trips |
| | | | Reference Voltage 0 Pulse Width Error Maximum<br><br>[Measured Ref V PW - Commanded Ref V PW] | > 1.50 millisec | a] CAN serial data available [$2D7]<br><br>b] Calibration - Reference Voltage Command Source<br><br>c] Timer - Reference Voltage Pulse Width Available Synchronization<br><br>d] Timer - Reference Voltage Period Available Delay<br><br>e] Diagnostic System Disabled | a] == True<br><br>b] == ECM<br><br>c] > 1.25 sec<br><br>d] > 0.75 sec<br><br>e] <> True | 250 ms / sample<br><br>16 Failures / 20 Samples | |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Mass Air Flow Sensor A Signal Message Counter Incorrect | P14B6 | This DTC monitors for an error in communication with the Mass Air Flow Sensor A | Communication of the Alive Rolling Count Press_2B_C03 from the Mass Air Flow Sensor A over LIN bus is incorrect for<br><br>out of total samples<br><br>Or<br><br>Communication of the Alive Rolling Count TmpHum_2A_C03 from the Mass Air Flow Sensor A over LIN bus is incorrect for<br><br>out of total samples | >= 8.00 counts<br><br>>= 10.00 counts<br><br><br><br><br>>= 8.00 counts<br><br>>= 10.00 counts | Message frame<br><br>All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage | = Is available<br><br>>= 3,000.00 milliseconds<br><br>= Run<br><br>>= 11.00 Volts<br><br>>= 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. |
|---|---|---|---|---|---|---|---|---|
| Transmissio n ngine Speed Re uest Circuit | P150C | This DTC monitors for an error in communication with the Transmission ngine Speed Re uest signal in 1 D | Communication of the Alive Rolling Count or Protection Value in the Transmission ngine Speed signal over CAN bus is incorrect for<br><br>out of total samples | >= 8 counts<br><br>>= 10 counts | Message frame<br><br>All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage | = Is available<br><br>>= 3,000.00 milliseconds<br><br>= Run<br><br>>= 11.00 Volts<br><br>>= 11.00 Volts | xecutes 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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>TPS minimum learn is not active AND Throttle is being Controlled<br><br>Throttle is considered in a steady state condition when the desired throttle position over a 12.5 ms period is<br><br>For a settling time period<br><br>Ignition voltage failure is false | > 6.41 Volts<br><br>< 0.25 percent<br><br>> 4.00 seconds<br><br>P1682 | 0.49 ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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<br><br>Current<br><br>SIDI fuel pump Low Current Test<br><br>Current | <br><br>>= 11.00 Amps<br><br><br><br><= 0.10 Amps | Battery Voltage<br><br>Low Side Fuel Pressure<br><br>Additional Enable Conditions:<br>All must be true<br>(High Pressure Pump is enabled and<br>High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and<br>High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and<br>Cam or Crank Sensor Not FA and<br>IAT,IAT2,ECT Not FA and<br>Low side Fuel Pump Relay ckt Not FA and<br>Estimate fuel rail pressure is valid and<br>Green Engine (In assembly plant) is not enabled and<br>Not if low fuel condition and<br>Low side Fuel Pump is on and<br>Injector Flow Test is not active and<br>Device control commanded pressure is false and<br>Device control pump ckt enabled on is false andEngine movement detected is true and<br>Manufacturers enable counter is 0)<br>Flex Fuel Sensor Not FA | >= 11 Volts<br><br>> 0.275 MPa<br><br>Enabled when a code clear is not active or not exiting device control<br>Engine is not cranking | Current High/ Low<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Ignition voltage out of correlation error(P1682) not active and<br><br>Barometric Pressure<br>Inlet Air Temp<br>Fuel Temp | <br><br><br><br>>= 70.0 KPA<br>>= -40.0 degC<br>-40 <= 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<br><br>out of total samples | <br><br><br><br>>= 8 counts<br><br>>= 10 counts | Message frame<br><br>All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage<br><br>And<br><br>Sensor Bus Relay | = Is available<br><br><br>>= 3,000.00 milliseconds<br><br>= Run<br><br>>= 11.00 Volts<br><br><br>>= 11.00 Volts<br><br><br>= On (if present) | Executes in 10ms loop. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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 Relay commanded on<br><br>AND<br><br>(Run/Crank voltage > Table, f(IAT). See supporting tables: **P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)**<br><br>OR PT Relay Ignition voltage > 5.50 Volts)<br><br>AND<br><br>Run/Crank voltage > 5.50 Volts | 240 / 480 counts; or<br><br>0.175 sec continuous;<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>AND<br><br>(Run/Crank voltage > Table, f(IAT). See supporting tables: **P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)**<br><br>OR PT Relay Ignition voltage > 5.50 Volts)<br><br>AND<br><br>Run/Crank voltage > 5.50 Volts | 240 / 480 counts; or<br><br>0.175 sec continuous;<br><br>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 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<br><br>Powertrain relay state | = 1.00<br><br>= INACTIVE | 50 failures out of 63 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Sensor Bus Relay Control Circuit Open | P16D7 | Detects an open circuit in the sensor bus relay circuit. This diagnostic reports the DTC when an open circuit is present. A decision is made by comparing a voltage measurement to a controller specific voltage threshold. | Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. | Open Circuit:<br>≥ 200 K Ω ohms impedance between output and controller ground | Run/Crank Voltage | Voltage ≥ 11.00 volts | 8 failures out of 10 samples<br><br>250 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P16D8 may also set (Sensor Bus Relay Control Circuit Low). |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Sensor Bus Relay Control Circuit High | P16D9 | Detects a short to power in the sensor bus relay circuit. This diagnostic reports the DTC when a short to power is present. A decision is made by comparing a voltage measurement to a controller specific voltage threshold. | Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. | Short to power:<br>≤ 0.5 Ω impedance between output and controller power | Run/Crank Voltage | Voltage ≥ 11.00 volts | 8 failures out of 10 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>SENT Signal Line State | <= 5<br><br>= Low | SENT Sensor Communication Circuit Diagnostic Enabled<br><br>SENT power up delay | True<br><br>>= 0.00 seconds<br><br>Enabled when a code clear is not active or not exiting device control | 400 failures out of 500 samples<br><br>6.25 ms per sample<br>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<br><br>SENT Signal Line State | <= 5<br><br>= High | SENT Sensor Communication Circuit Diagnostic Enabled<br><br>SENT power up delay | True<br><br>>= 0.00 seconds<br><br>Enabled when a code clear is not active or not exiting device control | 400 failures out of 500 samples<br><br>6.25 ms per sample<br>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<br><br>For all of the following cases: If the individual diagnostic threshold is equal to 2048 ms, this individual case is not applicable. If any of the following cases are X out of Y diagnostics and the fail (x) is greater than the sample (Y), this individual case is also not applicable. | Equivance Ratio torque compensation exceeds threshold | -288.91 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | Type A, 1 Trips |
| | | | Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given by threshold | 288.91 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range | 288.91 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range | 104.75<br>mg | Ignition State | Accessory, run or crank | Up/down timer<br>175<br>ms continuous,<br>0.5<br>down time<br>multipier | |
| | | | Absolute difference between the previous Final Advance and the current Final Advance not Adjusted for Equivalence Ratio is out of bounds given by threshold range | 16.58<br>degrees | | Engine speed >0rpm | Up/down timer<br>429<br>ms continuous,<br>0.5<br>down time<br>multipier | |
| | | | Torque Learn offset is out of bounds given by threshold range | High Threshold<br><br>0.00<br>Nm<br><br>Low Threshold<br><br>0.00 | Ignition State | Accessory, run or crank | Up/down timer<br>175<br>ms continuous,<br>0.5<br>down time<br>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 > 570 rpm | Up/down timer 460 ms continuous, 0.5 down time multipier | |
| | | | Difference between Unmanaged Spark and PACS Spark is greater than threshold | 16.57 degrees | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Commanded Predicted Engine Torque and its dual store do not match | N/A | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Zero pedal axle torque is out of bounds given by threshold range | High Threshold<br><br>3,154.84<br>Nm<br>Low Threshold<br><br>-65,535.00<br>Nm | Ignition State | Accessory, run or crank | Up/down timer<br>175<br>ms continuous,<br>0.5<br>down time<br>multipier | |
| | | | Creep Coast Axle Torque is out of bounds given by threshold range | High Threshold<br><br>3,154.84<br>Nm<br>Low Threshold<br><br>-65,535.00<br>Nm | Ignition State | Accessory, run or crank | Up/down timer<br>2,048<br>ms continuous,<br>0.5<br>down time<br>multipier | |
| | | | Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range | 288.91<br>Nm | Ignition State | Accessory, run or crank | Up/down timer<br>175<br>ms continuous,<br>0.5<br>down time<br>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<br>1.000<br>Low Threshold<br>0.074 | Ignition State | Accessory, run or crank | Up/down timer<br>475<br>ms continuous,<br>0.5<br>down time multipier | |
| | | | Launch spark is active but the launch spark redundant path indicates it should not be active | N/A | | Engine speed <<br>7,900.00<br>or<br>8,000.00<br>rpm (hysteresis pair) | Up/down timer<br>160<br>ms continuous,<br>0.5<br>down time multipier | |
| | | | Rate limited vehicle speed and its dual store do not equal | N/A | | Time since first CAN message with vehicle speed >=<br>0.500<br>sec | 10 / 40<br>counts;<br>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:<br>1.10 T/C Range Hi<br>0.10 T/C Range Lo<br>Low Threshold:<br>1.10 T/C Range Hi<br>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 | 4<br>cylinders | | Engine run flag = TRUE ><br>2.00<br>s<br>Number of cylinder events since engine run ><br>24<br><br>No fuel injector faults active | Up/down timer<br>460<br>ms continuous,<br>0.5<br>down time multipier | |
| | | | Driver progression mode and its dual store do not equal | N/A | Ignition State | Accessory, run or crank | Up/down timer<br>475<br>ms continuous,<br>0.5<br>down time multipier | |
| | | | Predicted torque for uncorrected zero pedal determination is greater than calculated limit. | Table, f(Engine, Oil Temp).<br>**P16F3_Speed Control External Load f(Oil Temp, RPM)**<br>+<br>288.91 | Ignition State | Accessory, run or crank | Up/down timer<br>2,048<br>ms continuous,<br>0.5<br>down time multipier | |

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

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

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

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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 | 288.91 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Engine Speed Lores Intake Firing (event based) calculation does not equal its redundant calculation | N/A | | Engine speed greater than 0rpm | Up/down timer 160 ms continuous, 0.5 down time multipier | |
| | | | Engine Speed Lores Intake Firing timing (event based) calculation does not equal its redundant calculation | N/A | | Engine speed greater than 0rpm | Up/down timer 160 ms continuous, 0.5 down time multipier | |
| | | | Idle speed control calculated predicted minimum torque request exceeds calculated torque limit | Table, f(Oil Temp, RPM). See supporting tables: **P16F3_Speed Control External Load f(Oil Temp, RPM)** + 288.91 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Cruise Axle Torque Request exceeds threshold | | | seconds | 0.5 down time multipier | |
| | | | Desired engine torque request greater than redundant calculation plus threshold | 287.91 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Engine min capacity above threshold | 288.91 Nm | Ignition State | Accessory, run or crank | Up/down timer 69 ms continuous, 0.5 down time multipier | |
| | | | No fast unmanaged retarded spark above the applied spark plus the threshold | 15.00 Degree | | Engine speed greater than 0rpm | Up/down timer 429 ms continuous, 0.5 down time multipier | |

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

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

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

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

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

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

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

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | 1. Difference of reserve torque value and its redundant calculation exceed threshold<br><br>OR<br><br>2. Reserve request does not agree with operating conditions or Difference of final predicted torque and its redundant calculation exeed threshold<br><br>OR<br><br>3. Rate of change of reserve torque exceeds threshold, increasing direction only<br><br>OR<br><br>4. Reserve engine torque above allowable capacity threshold | 1. 287.91 Nm<br><br>2. N/A<br><br>3. 287.91 Nm<br><br>4. 287.91 Nm | 3. & 4.:<br>Ignition State | 1. & 2.:<br>Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 288.91 Nm<br><br>3. & 4.:<br>Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Engine Vacuum and its dual store do not match | N/A | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference of the calculated Intake Manifold Pressure during engine event versus during time | Table, f(Desired Engine Torque). See supporting tables: | | Engine speed >0rpm | Up/down timer 160 ms continuous, 0.5 | |

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

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

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

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | 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<br><br>OR<br><br>2. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its dual store do not equal<br><br>OR<br><br>3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal | 1. 5.00 %<br><br>2. N/A<br><br>3. N/A | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | omman e ax e torque | , 5 . | n t on ta e | ccessor , run or cran | p own t me | |

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

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

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>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 | Diagnostic is Enabled<br><br>System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. | ≤ 0.5 Ω impedance between signal and controller power | Diagnostic is Enabled<br><br>System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples<br><br>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 Too Lean Bank 1 | P2096 | 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 P2096 will set.<br><br>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.<br><br>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<br><br>AND<br><br>The Average Total Offset % Authority<br><br>(Note: any value greater than or equal to +100% effectively nullifies the Average Total Offset % Authority criteria)<br><br>High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 35 % for >= 5.0 seconds AND the % Authority metric is approaching the failure threshold.<br><br>Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 30 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary. | >= 86.0 %<br><br>>= 60.0 %<br><br>If the P2096 is actively failing then the Average Integral Offset must be < 75.0 % and the Average Total Offset must be < 200.0 % for the diagnostic to report a pass. | The post cat fuel trim diagnostic is enabled<br><br>The diagnostic is enabled during:<br>Deceleration<br>Idle<br>Cruise<br>Light Acceleration<br>Heavy Acceleration<br><br>Ambient Air Pressure<br>Engine AirFlow<br>Intake Manifold Pressure<br>Induction Air Temperature<br>Start-up Coolant Temp.<br><br>PTO<br>Intrusive diag. fuel control<br>Ethanol Estimation in Progress<br><br>O2 Heater Learned Resistance<br><br>Long Term Secondary Fuel Trim Enabled for (see "**Long Term Secondary Fuel Trim Enable Criteria**" in Supporting Tables)<br><br>High Vapor Conditions<br><br>Green Cat System | <br><br><br>No<br>No<br>Yes<br>Yes<br>Yes<br><br>>= 70 kPa<br>>= 0.0 g/s <= 10,000.0<br>>= 0 kPa <= 256<br>>= -20 deg. C <= 200<br>>= -20 deg. C (or OBD Coolant Enable Criteria = TRUE)<br><br>Not Active<br>Not Active<br>Not Active<br><br>= Valid<br>( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>>= 0.1 seconds<br><br>Not Present<br><br>= Not Valid, | Frequency: Continuous Monitoring in 100ms loop.<br><br>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). | | | Condition | Green Cat System condition is considered valid until the accumulated air flow is greater than 720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is above 22 grams/sec. | | |
| | | | | | No Fault Active for: | AmbientAirDefault<br>AIR System FA<br>Ethanol Composition Sensor FA<br>ECT_Sensor_FA<br>EGRValveCircuit_FA<br>EGRValvePerformance_FA<br>IAT_SensorFA<br>CamSensorAnyLocationFA<br>EvapEmissionSystem_FA<br>EvapFlowDuringNonPurge_FA<br>FuelTankPressureSnsrCkt_FA<br>EvapPurgeSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapVentSolenoidCircuit_FA<br>FuelInjectorCircuit_FA<br>MAF_SensorFA<br>MAF_SensorTFTKO<br>MAP_SensorFA<br>MAP_EngineVacuumStatus<br>EngineMisfireDetected_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" 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):<br><br>Deceleration<br>Idle<br>Cruise<br>Light Acceleration<br>Heavy Acceleration<br><br>(Note: A value in any of the above operating "cells" that is an order of magnitude (or more) higher than other cells is an indication that the diagnostic is not capable of diagnosing in that cell). | A/F Imbalance Bank1<br>O2S_Bank_1_Sensor_1_FA<br>O2S_Bank_1_Sensor_2_FA<br><br><br><br><br><br><br>300<br>300<br>300<br>300<br>300 | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Post Catalyst Fuel Trim System Too Rich Bank 1 | P2097 | 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 P2097 will set.<br><br>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.<br><br>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<br><br>AND<br><br>The Average Total Offset % Authority<br><br>(Note: any value less than or equal to -100% effectively nullifies the Average Total Offset % Authority criteria)<br><br>High Vapor Feature:<br>The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 35 % for >= 5.0 seconds.<br><br>Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 30 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary. | <= -85.0%<br><br><= -55.0%<br><br>If the P2097 is actively failing then the Average Integral Offset must be > -75.0 % and the Average Total Offset must be > -200.0 % for the diagnostic to report a pass. | Same as P2096 | Same as P2096 | Frequency: Continuous Monitoring in 100ms loop.<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Post Catalyst Fuel Trim System Too Lean Bank 2 | P2098 | 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 P2098 will set.<br><br>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.<br><br>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<br><br>AND<br><br>The Average Total Offset % Authority<br><br>(Note: any value greater than or equal to +100% effectively nullifies the Average Total Offset % Authority criteria)<br><br>High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 35 % for >= 5.0 seconds AND the % Authority metric is approaching the failure threshold.<br><br>Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 30 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary. | >= 87.0%<br><br>>= 60.0%<br><br>If the P2098 is actively failing then the Average Integral Offset must be < 75.0 % and the Average Total Offset must be < 200.0 % for the diagnostic to report a pass. | The post cat fuel trim diagnostic is enabled<br><br>The diagnostic is enabled during:<br>Deceleration<br>Idle<br>Cruise<br>Light Acceleration<br>Heavy Acceleration<br><br>Ambient Air Pressure<br>Engine AirFlow<br>Intake Manifold Pressure<br>Induction Air Temperature<br>Start-up Coolant Temp.<br><br>PTO<br>Intrusive diag. fuel control<br>Ethanol Estimation in Progress<br><br>O2 Heater Learned Resistance<br><br>Long Term Secondary Fuel Trim Enabled for (see "Long Term Secondary Fuel Trim Enable Criteria" in Supporting Tables)<br><br>High Vapor Conditions<br><br>Green Cat System | <br><br><br>No<br>No<br>Yes<br>Yes<br>Yes<br><br>>= 70 kPa<br>>= 0.0 g/s <= 10,000.0<br>>= 0 kPa <= 256<br>>= -20 deg. C <= 200<br>>= -20 deg. C (or OBD Coolant Enable Criteria = TRUE)<br><br>Not Active<br>Not Active<br>Not Active<br><br>= Valid<br>( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>>= 0.1 seconds<br><br>Not Present<br><br>= Not Valid, | Frequency: Continuous Monitoring in 100ms loop.<br><br>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). | | | Condition | Green Cat System condition is considered valid until the accumulated air flow is greater than 720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is above 22 grams/sec. | | |
| | | | | | No Fault Active for: | AmbientAirDefault<br>AIR System FA<br>Ethanol Composition Sensor FA<br>ECT_Sensor_FA<br>EGRValveCircuit_FA<br>EGRValvePerformance_FA<br>IAT_SensorFA<br>CamSensorAnyLocationFA<br>EvapEmissionSystem_FA<br>EvapFlowDuringNonPurge_FA<br>FuelTankPressureSnsrCkt_FA<br>EvapPurgeSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapVentSolenoidCircuit_FA<br>FuelInjectorCircuit_FA<br>MAF_SensorFA<br>MAF_SensorTFTKO<br>MAP_SensorFA<br>MAP_EngineVacuumStatus<br>EngineMisfireDetected_FA<br>A/F Imbalance Bank2 | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | O2S_Bank_2_Sensor_1 FA<br>O2S_Bank_2_Sensor_2_ FA | | |
| | | | | | For the cells identified as enabled (i.e. those containing a "Yes" above), the minimum accumulated samples required before the fuel control metric is considered usable for that cell (1 sample = 100ms):<br><br>Deceleration<br>Idle<br>Cruise<br>Light Acceleration<br>Heavy Acceleration<br><br>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). | <br><br><br><br><br><br><br><br>300<br>300<br>300<br>300<br>300 | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Post Catalyst Fuel Trim System Too Rich Bank 2 | P2099 | 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 P2099 will set.<br><br>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.<br><br>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<br><br>AND<br><br>The Average Total Offset % Authority<br><br>(Note: any value less than or equal to -100% effectively nullifies the Average Total Offset % Authority criteria)<br><br>High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 35 % for >= 5.0 seconds.<br><br>Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 30 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary. | >= -80.0%<br>.<br><br>>= -55.0%<br><br>If the P2099 is actively failing then the Average Integral Offset must be < -75.0 % and the Average Total Offset must be < -200.0 % for the diagnostic to report a pass. | Same as P2098 | Same as P2098 | Frequency: Continuous Monitoring in 100ms loop.<br><br>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 voltage is high enough and there is not a voltage failure and the throttle position minimum learn is not active and the throttle is being controlled 2) Throttle control is driving the throttle in the incorrect direction. This is determined if the throttle position is greater than a threshold percent and the powertrain relay voltage is high enough and the throttle position minimum learn is active. | Difference between measured throttle position and modeled position, (modeled = MAX (Commanded vs. Commanded Filtered)) > | 10.00 percent | TPS minimum learn is not active AND<br><br>Powertrain Relay Contact1 Fault is FALSE (no P1682 fault) AND<br><br>Throttle Control is not in Service or DVT control AND<br><br>Throttle is being Controlled<br><br>AND<br><br>( (Engine Running AND Run/Crank Voltage)<br>OR<br>Run Crank Voltage) | <br><br><br><br><br><br><br><br><br><br><br>> 5.50 Volts<br><br>> 8.41 Volts | 15 counts;<br><br>12.5 ms/count in the primary processor | Type A, 1 Trips |
| | | | OR<br><br>Difference between modeled position (modeled = MIN (Commanded vs. Commanded Filtered)) and measured throttle position > | 10.00 percent | | | | |
| | | | Throttle Position > | 36.00 percent | TPS minimum learn active AND<br><br>Powertrain Relay Contact1 Fault is FALSE (no P1682 fault) AND<br><br>Throttle Control is not in Service or DVT control | = TRUE | 11 counts;<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Throttle Return to Default Performance | P2119 | Throttle unable to return to default throttle position after de-energizing ETC motor. | (Normalized TPS1 percent Vref ><br>AND<br>Normailzed TPS2 percent Vref ><br>On the main processor)<br><br>OR<br><br>(Normalized TPS1 percent Vref <<br>AND<br>Normailzed TPS2 percent Vref <<br>On the main processor) | 1.7560 % Vref<br><br>1.7590 % Vref<br><br><br><br><br>1.4340 % Vref<br><br>1.4310 % Vref | Throttle de-energized due to one of the following conditions:<br><br>Powerup Default Learn<br>OR<br>Default Throttle Authority<br>OR<br>PT Relay Voltage<br>OR<br>Main System Shutdown<br>OR<br>Battery Saver Active<br>OR<br>(Powertrain Relay On<br>AND<br>Run/Crank Active) | <br><br><br><br>= TRUE<br><br>= TRUE<br><br>< 5.500 Volts<br><br>= TRUE<br><br>= TRUE<br><br>= FALSE<br><br>= FALSE | 0.4969 s if ETC motor command is STOP (when Default Throttle Authority or Main System Shutdown is causing Throttle de-energize)<br><br>5.0000 s if ETC motor command is not STOP | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>P06A3 | 19 / 39 counts; or<br><br>14 counts continuous;<br><br>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<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>P06A3 | 19 / 39 counts; or<br><br>14 counts continuous;<br><br>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<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>P0697 | 19 / 39 counts; or<br><br>14 counts continuous;<br><br>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<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>P0697 | 19 / 39 counts; or<br><br>14 counts continuous;<br><br>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<br><br>No TPS sensor faults<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>(P0122, P0123, P0222, P0223)<br><br>P06A3 | 79 / 159 counts; or<br><br>58 counts continuous;<br><br>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<br><br>No TPS sensor faults<br><br>No 5V reference error or fault for # 4 5V reference circuit | > 6.41 Volts<br><br>(P0122, P0123, P0222, P0223)<br><br>P06A3 | 79 / 159 counts; or<br><br>58 counts continuous;<br><br>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<br><br>No APP sensor faults<br><br>No 5V reference errors or faulst for # 3 & # 4 5V reference circuits | > 6.41 Volts<br><br>(P2122, P2123,P2127, P2128)<br><br>(P06A3, P0697) | 19 / 39 counts intermittent; or<br><br>15 counts continuous,<br><br>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<br><br>No APP sensor faults<br><br>No 5V reference errors or faulst for # 3 & # 4 5V reference circuits | > 6.41 Volts<br><br>(P2122, P2123,P2127, P2128)<br><br>(P06A3, P0697) | 19 / 39 counts intermittent; or<br><br>15 counts continuous,<br><br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. | <br><br><= 1 volt between signal and controller power | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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 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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. | <br><br><br><br><br><br><= 1 volt between signal and controller power | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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 ><br><br>AND<br><br>Number of learn attempts > | 0.5740 % Vref<br><br><br><br>10 counts | Run/Crank voltage<br><br>TPS minimum learn is active<br><br>No previous TPS min learn values stored in long term memory | > 6.41 Volts<br><br>= 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. |
|---|---|---|---|---|---|---|---|---|
| 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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. | <br><br><br><br><br><br><= 1 volt between signal and controller power | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>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<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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.<br><br>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. | <br><br><br><br><br><br><= 1 volt between signal and controller power | Battery Voltage<br>Engine Run Time | >= 11 Volts<br>>= 0 Seconds<br><br>P062B not FA or TFTK | 10.00 failures out of 20.00 samples<br><br>100 ms /sample<br>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 1 Air-Fuel Ratio Imbalance | P219A | This monitor determines if there is an Air Fuel Imbalance in the fueling system for a cylinder on Bank 1. Detection is based on a the pre catalyst oxygen sensor voltage. The pre catalyst 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).<br><br>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.<br><br>The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table | Standard Mode Filtered Ratio<br><br>The EWMA calculation uses the weighting coefficient from the following supporting table: **P219A EWMA Coefficient**<br><br>For this program, the Optional Mode is NOT used<br><br>Optional Mode Filtered Ratio<br><br>The EWMA calculation uses the weighting coefficient from the following supporting table while in Optional Mode: | > 0.43<br><br>If the diagnostic has reported a failure on the prior trip, the EWMA Filtered Ratio must fall below 0.39 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing.<br><br>> 0.50<br><br>If the diagnostic has reported a failure on the prior trip, the Optional Mode Filtered Ratio must fall below 0.35 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing. | The A/F imbalance diagnostic is enabled<br><br>System Voltage<br><br>Fuel Level<br><br>Engine Coolant Temperature<br><br>Cumulative engine run time<br><br>Diagnostic enabled at Idle (regardless of other operating conditions)<br><br>Engine speed range<br><br>Engine speed delta during a short term sample period<br><br>Mass Airflow (MAF) range<br><br>Cumulative delta MAF during a short term sample period<br><br>Filtered MAF delta between samples<br>Note: first order lag filter coefficient applied to MAF | <br><br>No lower than 10.0 Volts for more than 0.2 seconds<br><br>> 10.0 % The diagnostic will disregard the fuel level criteria if the fuel sender is faulty.<br><br>> -20 deg. C (or OBD Coolant Enable Criteria = TRUE)<br><br>> 0.0 seconds<br><br>No<br><br>900 to 3,800 RPM<br><br>< 200 RPM<br><br>7 to 700 g/s<br><br>< 6 g/s<br><br>< 0.75 g/s | Minimum of 1 test per trip, up to 6 tests per trip during RSR or FIR.<br><br>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, 10.80 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm. This data is collected only when enable conditions are met, and as such significantly more operating time is required than is indicated above. Generally, a report will be | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL 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.<br><br>Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered | **P219A EWMA Coefficient Opt Table** | | = 0.050<br><br>Air Per Cylinder (APC)<br><br>APC delta during short term sample period<br><br>Filtered APC delta between samples<br>Note: first order lag filter coefficient applied to APC = 0.100<br><br>Spark Advance<br><br>Throttle Area (percent of max)<br><br>Intake Cam Phaser Angle<br><br>Exhaust Cam Phaser Angle<br>---<br>Electronic Waste Gate (eWG) present<br><br>If eWG = yes then Waste Gate Position<br><br>Intrusive eWG Feature<br><br>If intrusive Waste Gate positin is enabled then the electronic Waste Gate will be commanded to the following range when the other enable conditions have been met.<br><br>Intrusive Waste Gate Position Min | <br><br>150 to 850 mg/cylinder<br><br>< 80 mg/cylinder<br><br>< 7.00 percent<br><br>5 to 55 degrees<br><br>2 to 100 percent<br><br>0 to 30 degrees<br><br>0 to 30 degrees<br>---<br>No<br><br>0.0 to 101.0<br><br>Disabled<br><br>0.0 | made within 5 minutes of operation.<br><br>For RSR or FIR, 12 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.<br><br>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.<br><br>Some applications may need to command a unique cam phaser value before performing the above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use his feature.<br><br>For programs using Active Fuel Management or Multiple Cam profiles, a secondary Imbalance Ratio can be calculated while in the secondary operating modes. This secondary ratio is an optional calculation and is labeled as the "Optional Mode Ratio". The Optional Mode Ratio is calculated the same as explained above with the following supporting | | | Intrusive Waste Gate Position Max<br>----------<br><br>Active Fuel Management Firing Fraction<br><br>if the Optional Mode is enabled (see Malfunction Criteria) Active Fuel Management Firing fraction for Optional Mode calculations<br><br>Intrusive Firing Fraction during Fast Initial Response or Rapid Step Response<br><br>If the intrusive Firing Fraction feature is enabled the Active Fuel Management firing fraction will be forced to a value above this threshold when in Fast Initial Response or in Rapid Step Response.<br>----------<br><br>For programs using multi-step cam profiles:<br><br>High Lift Cam Profile will use:<br><br>Low Lift Cam Profile will use: | 101.0<br>----------<br><br>0.99 to 1.10<br><br>0.99 to 0.01<br><br>Disabled<br><br>>= 0.99<br><br>----------<br><br>Standard Mode Filtered Ratio<br><br>Standard Mode Filtered Ratio | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | tables:<br>**P219A Variance Threshold Bank1 Opt Table** ,<br>**P219A Normalizer Bank1 Opt Table** ,<br>and<br>**P219A Quality Factor Bank1 Opt Table** | | | Quality Factor (QF)<br>QF calibrations are located in a 17x17 lookup table versus engine speed and load (see Supporting Table **P219A Quality Factor Bank1 Table** ).<br>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.<br><br>Fuel Control Status<br>Closed Loop and Long Term FT Enabled for:<br><br>Device Control<br>AIR pump<br>CASE learn<br>EGR<br>EVAP<br>Engine Over Speed Protection<br>Idle speed control<br>PTO<br>Injector base pulse width<br><br>O2 learned htr resistance<br><br>Rapid Step Response (RSR): | >= 0.99<br><br>>= 1.2 seconds<br>(Please see "**Closed Loop Enable Clarification**" and "**Long Term FT Enable Criteria**" in Supporting Tables)<br><br>Not active<br>Not on<br>Not active<br>Not intrusive<br>Not intrusive<br>Not Active<br><br>Normal<br>Not Active<br>Above min pulse limit<br><br>= Valid (the O2 heater resistance has learned since NVM reset) | | |

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

| 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).<br><br>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.<br><br>The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table | Standard Mode Filtered Ratio<br><br>The EWMA calculation uses the weighting coefficient from the following supporting table: **P219B EWMA Coefficient**<br><br>Optional Mode Filtered Ratio<br><br>For this program the Optional Mode is NOT used<br><br>The EWMA calculation uses the weighting coefficient from the following supporting table while in Optional Mode: **P219B EWMA Coefficient Opt Mode** | > 0.43<br><br>If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.38 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing.<br><br>> 0.60<br><br>If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.45 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing | The A/F imbalance diagnostic is enabled<br><br>System Voltage<br><br>Fuel Level<br><br>Engine Coolant Temperature<br><br>Cumulative engine run time<br><br>Diagnostic enabled at Idle (regardless of other operating conditions)<br><br>Engine speed range<br><br>Engine speed delta during a short term sample period<br><br>Mass Airflow (MAF) range<br><br>Cumulative delta MAF during a short term sample period<br><br>Filtered MAF delta between samples<br><br>Note: first order lag filter coefficient applied to MAF = 0.050 | No lower than 10.0 Volts for more than 0.2 seconds<br><br>> 10.0 % The diagnostic will disregard the fuel level criteria if the fuel sender is faulty.<br><br>> -20 deg. C (or OBD Coolant Enable Criteria = TRUE)<br><br>> 0.0 seconds<br><br>No<br><br>900 to 3,800 RPM<br><br>< 200 RPM<br><br>7 to 700 g/s<br><br>< 6 g/s<br><br>< 0.75 g/s | Minimum of 1 test per trip, up to 6 tests per trip during RSR or FIR.<br>The front O2 sensor voltage is sampled once per cylinder event.<br>Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 10.80 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm. This data is collected only when enable conditions are met, and as such significantly more operating time is required than is indicated above.<br>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.<br><br>Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered | | | Air Per Cylinder (APC)<br><br>APC delta during short term sample period<br><br>Filtered APC delta between samples<br>Note: first order lag filter coefficient applied to APC = 0.100<br><br>Spark Advance<br><br>Throttle Area (percent of max)<br><br>Intake Cam Phaser Angle<br><br>Exhaust Cam Phaser Angle<br><br>---<br>Electronic Waste Gate (eWG) present<br><br>If eWG = yes then<br><br>Waste Gate Position<br><br>Intrusive eWG Feature<br><br>If intrusive Waste Gate positin is enabled then the electronic Waste Gate will be commanded to the following range when the other enable conditions have been met.<br><br>Intrusive Waste Gate | 150 to 850 mg/cylinder<br><br>< 80 mg/cylinder<br><br>< 7.00 percent<br><br>5 to 55 degrees<br><br>2 to 100 percent<br><br>0 to 30degrees<br><br>0 to 30degrees<br><br>---<br>No<br><br><br><br>0.0 to 101.0<br><br>Disabled<br><br><br><br><br><br>0.0 | minutes of operation.<br><br>For RSR or FIR, 12 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.<br><br>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.<br><br>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.<br><br>For programs using Active Fuel Management or Multiple Cam profiles a secondary Imbalance Ratio can be calculated while in the secondary operating modes. This secondary ratio is an optional calculation and is labeled as the "Optional Mode Ratio". The Optional Mode Ratio is calculated the same as explained above with the following supporting | | | Position Min<br><br>Intrusive Waste Gate Position Max<br>---<br><br>Active Fuel Management Firing Fraction<br><br>if the Optional Mode is enabled (see Malfunction Criteria) Active Fuel Management Firing fraction for Optional Mode calculations<br><br>Intrusive Firing Fraction during Fast Initial Response or Rapid Step Response<br><br>If the intrusive Firing Fraction feature is enabled the Active Fuel Management firing fraction will be forced to a value above this threshold when in Fast Initial Response or in Rapid Step Response.<br>---<br><br>For programs using multi-step cam profiles:<br><br>High Lift Cam Profile will use:<br><br>Low Lift Cam Profile will use: | 101.0<br>---<br><br>0.99 to 1.10<br><br>0.99 to 0.01<br><br>Disabled<br><br>>= 0.99<br>---<br><br>Standard Mode Filtered Ratio<br><br>Standard Mode Filtered Ratio | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | tables:<br>**P219B Variance Threshold Bank2 Opt Table**<br>,<br>**P219B Normalizer Bank2 Opt Table** ,<br>and<br>**P219B Quality Factor Bank2 Table** | | | Quality Factor (QF)<br>QF calibrations are located in a 17x17 lookup table versus engine speed and load (Supporting Table **P219B Quality Factor Bank2 Table** ).<br>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.<br><br>Fuel Control Status Closed Loop and Long Term FT Enabled for:<br><br>Device Control<br>AIR pump<br>CASE learn<br>EGR<br>EVAP<br>Engine Over Speed Protection<br>Idle speed control<br>PTO<br><br>Injector base pulse width<br><br>O2 learned htr resistance<br><br>Rapid Step Response | >= 0.99<br><br>>= 1.2 seconds<br>(Please see "Closed Loop Enable Clarification" and "Long Term FT Enable Criteria" in Supporting Tables)<br><br>Not active<br>Not on<br>Not active<br>Not intrusive<br>Not intrusive<br>Not Active<br><br>Normal<br>Not Active<br><br>Above min pulse limit<br><br>= Valid (the O2 heater resistance has learned since NVM reset) | | |

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

| 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 (applications with LIN MAF) | P2228 | Detects an eroneously low value being reported over the LIN serial connection from the BARO sensor. The diagnostic monitors the BARO sensor pressure output and fails the diagnostic when the pressure is too low.<br><br>The BARO sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure. The BARO pressure value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol. | BARO Pressure | < 50.0 kPa | LIN Communications established with MAF | | 160 failures out of 200 samples<br><br>1 sample every 25 msec | Type B, 2 Trips |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure (BARO) Sensor Circuit Intermittent (applications with LIN MAF) | P2230 | Detects a noisy or erratic signal in the barometric pressure (BARO) circuit by monitoring the BARO sensor and failing the diagnostic when the BARO signal has a noisier output than is expected.<br><br>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”.<br><br>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<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current BARO reading - BARO reading from 25 milliseconds previous) | > 100 kPa<br><br>40 consecutive BARO readings | LIN Communications established with MAF | | 4 failures out of 5 samples<br><br>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 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.<br><br>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<br><br>AND<br><br>The Accumulated mass air flow monitored during the Stuck Lean Voltage Test | < 825 mvolts<br><br><br><br><br><br><br>> 250 grams | No Active DTC's<br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013A, P013B, P013E, P013F, P2270 or P2271<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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:<br>Once per trip<br>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 22.0 grams/sec. | | |
| | | | | | Low Fuel Condition | = False | | |
| | | | | | Only when FuelLevelDataFault | = False | | |
| | | | | | Pedal position | ≤ 100.0 % | | |
| | | | | | Engine Airflow | 4.0 ≤ gps ≤ 35.0 | | |
| | | | | | Closed loop integral | 0.75 ≤ C/L Int ≤ 1.12 | | |
| | | | | | Closed Loop Active | = TRUE (Please see "**Closed Loop Enable Clarification**" in Supporting Tables). | | |
| | | | | | Evap | not in control of purge | | |
| | | | | | Ethanol Estimation in Progress | = Not Active (Please see "**Ethanol Estimation in Progress**" in Supporting Tables). | | |
| | | | | | Post fuel cell | = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. | | |
| | | | | | Crankshaft Torque | < 125.0 Nm | | |
| | | | | | EGR Intrusive diagnostic | = not active | | |
| | | | | | All post sensor heater delays | = not active | | |
| | | | | | O2S Heater (post sensor) on Time | ≥ 60.0 sec | | |
| | | | | | Transmission Temp | ≥ -40.0 ºC | | |
| | | | | | Predicted Catalyst temp | 475 ≤ ºC ≤ 1,024 | | |
| | | | | | Fuel State | = DFCO possible | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | ==========<br>All of the above met for at least 0.0 seconds, and then check the following<br><br>Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled)<br><br>Vehicle Speed to initially enable test<br>Vehicle Speed range to keep test enabled (after initially enabled)<br>==========<br>All of the above met for at least 0.2 seconds, and then the Force Cat Rich intrusive stage is requested.<br>==========<br>During Stuck Lean test the following must stay TRUE or the test will abort:<br>Commanded Fuel<br>Crankshaft Torque | ==========<br><br><br><br>800 ≤ RPM ≤ 3,000<br><br>750 ≤ RPM ≤ 3,200<br><br>31.1 ≤ MPH ≤ 82.0<br><br>27.3 ≤ MPH ≤ 87.0<br><br><br><br><br><br><br>0.95 ≤ EQR ≤ 1.10<br>< 125.0 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.<br><br>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<br><br>AND<br><br>The Accumulated mass air flow monitored during the Stuck Rich Voltage Test | > 150 mvolts<br><br>> 12.0 grams | No Active DTC's<br><br>B1S2 DTC's Not Active this key cycle<br><br>System Voltage<br>Learned heater resistance<br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013A, P013B, P013E, P013F or P2270<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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:<br>Once per trip<br>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 22.0 grams/sec. | | |
| | | | | | Low Fuel Condition Only when FuelLevelDataFault | = False<br>= False | | |
| | | | | | Fuel State | = DFCO possible | | |
| | | | | | DTC's Passed | = P2270<br>= P013E<br>= P013A | | |
| | | | | | ==========<br>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.<br><br>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<br><br>AND<br><br>The Accumulated mass air flow monitored during the Stuck Lean Voltage Test | < 825 mvolts<br><br><br><br><br><br>> 250 grams. | No Active DTC's<br><br><br><br><br><br><br><br><br><br>B2S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013C, P013D, P014A, P014B, P2272 or P2273<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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.<br>Airflow accumulation is only enabled when airflow | Frequency:<br>Once per trip<br>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 22.0 grams/sec. | | |
| | | | | | Low Fuel Condition | = False | | |
| | | | | | Only when FuelLevelDataFault | = False | | |
| | | | | | Pedal position | ≤ 100.0 % | | |
| | | | | | Engine Airflow | 4.0 ≤ gps ≤ 35.0 | | |
| | | | | | Closed loop integral | 0.75 ≤ C/L Int ≤ 1.12 | | |
| | | | | | Closed Loop Active | = TRUE (Please see "**Closed Loop Enable Clarification**" in Supporting Tables). | | |
| | | | | | Evap | not in control of purge | | |
| | | | | | Ethanol Estimation in Progress | = Not Active (Please see "**Ethanol Estimation in Progress**" in Supporting Tables). | | |
| | | | | | Post fuel cell | = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. | | |
| | | | | | Crankshaft Torque | < 125.0 Nm | | |
| | | | | | EGR Intrusive diagnostic | = not active | | |
| | | | | | All post sensor heater delays | = not active | | |
| | | | | | O2S Heater (post sensor) on Time | >= 60.0 sec | | |
| | | | | | Transmission Temp | ≥ -40.0 ºC | | |
| | | | | | Predicted Catalyst temp | 475 ≤ ºC ≤ 1,024 | | |
| | | | | | Fuel State | = DFCO possible | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | ==========<br>All of the above met for at least 0.0 seconds, and then check the following<br><br>Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled)<br><br>Vehicle Speed to initially enable test<br>Vehicle Speed range to keep test enabled (after initially enabled)<br><br>==========<br>All of the above met for at least 0.2 seconds, and then the Force Cat Rich intrusive stage is requested.<br>==========<br>During Stuck Lean test the following must stay TRUE or the test will abort:<br>Commanded Fuel<br>Crankshaft Torque | ==========<br><br><br><br>800 ≤ RPM ≤ 3,000<br><br>750 ≤ RPM ≤ 3,200<br><br>31.1 ≤ MPH ≤ 82.0<br><br>27.3 ≤ MPH ≤ 87.0<br><br><br><br><br><br><br>0.95 ≤ EQR ≤ 1.10<br>< 125.0 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.<br><br>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<br><br>AND<br><br>The Accumulated mass air flow monitored during the Stuck Rich Voltage Test | > 150 mvolts<br><br><br><br><br><br><br>> 12.0 grams. | No Active DTC's<br><br><br><br><br><br><br><br><br><br>B2S2 DTC's Not Active this key cycle<br><br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>Ethanol Composition Sensor FA<br>O2S_Bank_ 1_TFTKO<br>O2S_Bank_ 2_TFTKO<br><br>P013C, P013D, P014A, P014B or P2272<br><br>> 10.0 Volts<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid,<br>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.<br>Airflow accumulation is only enabled when airflow | Frequency:<br>Once per trip<br>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 22.0 grams/sec.<br><br>= False<br><br>= False<br><br>= DFCO possible<br>= P2272<br>= P014A<br>= P013C<br><br>==========<br>After above conditions are met: DFCO mode is continued (wo driver initiated pedal input). | | |
| | | | | | | | | |

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure Sensor C Circuit Intermittent/ Erratic (applications with LIN MAF) | P227E | Detects a noisy or erratic signal in the barometric pressure (BARO) C circuit by monitoring the BARO C sensor and failing the diagnostic when the BARO C signal has a noisier output than is expected.<br><br>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”.<br><br>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<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current BARO C reading - BARO C reading from 25 milliseconds previous) | > 100 kPa<br><br>40 consecutive BARO C readings | LIN Communications established with MAF | | 4 failures out of 5 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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) | >=<br>**P228C P2C1F - High Pressure Pump Control (HPC) fail threshold of pressure too low**<br>Mpa<br>(see supporting tables) | High Pressure Pump Performance Diagnostic Enable<br><br>Battery Voltage<br><br>Low Side Fuel Pressure<br><br>Additional Enable Conditions:<br>All must be true<br>(High Pressure Pump is enabled and<br>High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and<br>High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and<br>Low side Fuel Pump Relay ckt Not FA and<br>Estimate fuel rail pressure is valid and<br>Green Engine (In assembly plant) is not enabled and<br>Not if low fuel condition and<br>Low side Fuel Pump is on and<br>Injector Flow Test is not active and<br>Device control commanded pressure is false and<br>Device control pump ckt enabled on is false and | True<br><br>>= 11 Volts<br><br>> 0.275 MPa<br><br>Enabled when a code clear is not active or not exiting device control<br>Engine is not cranking | Positive Pressure Error -<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Engine movement detected is true and Manufacturers enable counter is 0)<br>Flex Fuel Sensor Not FA<br>Ignition voltage out of correlation error(P1682) not active<br><br>Barometric Pressure<br>Inlet Air Temp<br>Fuel Temp | <br><br><br><br><br>>= 70.0 KPA<br>>= -40.0 degC<br>-40 <=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<br><br>Battery Voltage<br><br>Low Side Fuel Pressure<br><br>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 and Engine movement | True<br><br>>= 11 Volts<br><br>> 0.275 MPa<br><br>Enabled when a code clear is not active or not exiting device control Engine is not cranking | Negative Pressure Error - 10.00 second failures out of 12.50 second samples | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | detected is true<br>andManufacturers enable counter is 0)<br>Flex Fuel Sensor Not FA<br>Ignition voltage out of correlation error(P1682) not active<br><br>Barometric Pressure<br>Inlet Air Temp<br>Fuel Temp | <br><br><br><br><br><br>>= 70.0 KPA<br>>= -40.0 DegC<br>-40 <= 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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 | 50 Failures out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 #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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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 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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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.<br><br>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<br><br>Ignition Voltage | <br><br>> 11.0 Volts | 50 Failures out of 63 Samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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) | Message <> two's complement of message | Diagnostic Status | Enabled | >= 16 failures out of 20 samples. | Type B, 2 Trips |
| | | | | | Power Mode | = Run | Performed on every received message | |
| | | | OR<br>Rolling count error - Serial Communication message ($189/$199) rolling count index value | Message <> previous message rolling count value + one | Ignition Voltage | > 6.41 volts | >= 6 Rolling count errors out of 10 samples. | |
| | | | | | Engine Running | = True | | |
| | | | OR | | Run/Crank Active | > 0.50 Sec | Performed on every received message | |
| | | | Range Error - Serial Communication message - ($189/$199) TCM Requested Torque Increase | > 725 Nm | No Serial communication loss to TCM (U0101) | No loss of communication | >= 6 range errors out of 10 samples. | |
| | | | | | | | Performed on every received message | |
| | | | OR | | | | | |
| | | | Multi-transition error - Trans torque intervention type request change | Requested torque intervention type toggles from not increasing request to increasing request | | | >= 5 multi-transitions out of 5 samples. Performed every 200 msec | |

| 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).<br><br>Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment.<br><br>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:<br><br>Time difference between the current read and the previous read of the timer<br><br>Range Test:<br><br>The variation of the HWIO timer and mirror timer is | > 1.50 seconds<br><br>> 0.25 %. | | | Count Up Test: 8 failures out of 40 samples<br><br>1 sec / sample<br><br>Continuous while run/crank is not active and until controller shutdown is initiated.<br><br>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 by calculating the difference between the sensed, filtered system [line] pressure versus the ECM-commanded pressure [error calculation]. The calculated error is then compared to calibrated fault threshold tables for a fault decision. | Sensed Filtered Fuel System [line] pressure error | <= Low Threshold [Supporting Table] **P2635 Threshold Low**<br><br>OR<br><br>>= High Threshold [Supporting Table] **P2635 Threshold High** | a) Diagnostic enabled [FDBR_b_FSRD]<br><br>b) Timer Engine Running [FDBR_t_EngModeRunCoarse]<br><br>c1) Fuel Flow Rate Valid<br><br>c2) Ambient Air Pressure Value Defaulted<br><br>c3) FDB_FuelPresSnsrCktFA<br><br>c4) Reference Voltage Fault Status [DTC P0641]<br><br>c5) Exhaust AfterTreatment Fuel Injector A Control Circuit Short Low Fault [HCIR_b_GshtFA DTC P20CD]<br><br>c6) Fuel Pres Sensor Performance Fault Active [DTC P018B]<br><br>c7) Use Calculated Flow Performance Fault Thresholds [FDBR_b_UseCalcFSRD_FltThrshs]<br><br>c8) Engine Speed Status Valid<br><br>c9) FAB_FuelPmpCktFA<br><br>c10) Fuel Control Enable | a) == TRUE<br><br>b) >= 30.00 seconds<br><br>c1) == TRUE<br><br>c2) <> TRUE<br><br>c3) <> TRUE<br><br>c4) <> TRUE<br><br>c5) <> TRUE<br><br>c6) <> TRUE<br><br>c7) <> TRUE<br><br>c8] == TRUE<br><br>c9] <> TRUE<br><br>c10) <> TRUE | 1 sample / 12.5 millisec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Fault Active [DTC P12A6] | | | |
| | | | | | c11) Fuel Pump Driver Module OverTemp Fault Active [DTC P1255] | c11) <> TRUE | | |
| | | | | | c12) Fuel Pump Speed Fault Active [DTC P129F] | c12) <> TRUE | | |
| | | | | | c13) CAN Sensor Bus message $0C3 Comm Fault [CFMR_b_FTZM_Info1_UcodeCmFA DTC P165C] | c13) <> TRUE | | |
| | | | | | c14) CAN Sensor Bus Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_UcodeCmFA DTC] | c14] <> TRUE | | |
| | | | | | c15) Sensor Configuration [FDBR_e_FuelPresSnsrConfig] | c15) == CeFDBR_e_WiredTo_FTZM | | |
| | | | | | c16) Sensor Bus Relay On | c16) == TRUE | | |
| | | | | | d) Emissions Fuel Level Low [Message $3FB] | d) <> TRUE | | |
| | | | | | e) Fuel Control Enable | e) == TRUE | | |
| | | | | | f) Fuel Pump Control State | f) == NORMAL | | |
| | | | | | g) Run_Crank input circuit voltage | g) 11.00 volts <= Run_Crank_V <= 32.00 volts | | |
| | | | | | h) High Pres Fuel Pump | h) <> TRUE | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Mode Management Enabled | | | |
| | | | | | j) High Pres Fuel Pump Control Mode | j) <> Disabled Mode AND a8b) <> ZeroFlow Mode | | |
| | | | | | k) Instantaneous Fuel Flow [FCBR_dm_InstFuelFlow] | k) 0.05 grams/sec <= InstFuelFlow <= Max Allowed Flow [Supporting Table] **P2635 Max Fuel Flow** | | |
| | | | | | m1) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B $0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr DTC] | m1) <> TRUE | | |
| | | | | | m2) CAN Sensor Bus message $0C3_Available | m2) == TRUE | | |
| | | | | | m3) Fuel Pres Sensor Ref Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_Info1_ARC_ChkErr DTC] | m3) <> TRUE | | |
| | | | | | n) Timer - Diagnostic Enable | n) > 2.00 seconds | | |
| | | | | | | | | |

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

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

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

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

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module Serial Peripheral Interface Bus 5 | P30DA | This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message. | This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor. | | Run/Crank voltage | >= 6.41 Volts, else the failure will be reported for all conditions | In the primary processor, 8 / 16 counts intermittent<br><br>12.5 ms /count in the ECM main processor | Type A, 1 Trips |

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

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

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

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

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

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

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

| 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<br><br>Message $0BD<br><br>Message $0C7<br><br>Message $0F9<br><br>Message $189<br><br>Message $199<br><br>Message $19D<br><br>Message $1AF<br><br>Message $1F5<br><br>Message $4C9 | <br><br>≥ 10,000.00 milliseconds<br><br>≥ 500.00 milliseconds<br><br>≥ 500.00 milliseconds<br><br>≥ 500.00 milliseconds<br><br>≥ 500.00 milliseconds<br><br>≥ 500.00 milliseconds<br><br>≥ 500.00 milliseconds<br><br>≥ 10,000.00 milliseconds | General Enable Criteria:<br><br>All below criteria have been met for<br><br>If message is on Bus A: U0073 not active<br><br>If message is on Bus B: U0074 not active<br><br>If message is on Bus S: U0076 not active<br><br>CAN channel is requesting full communications<br><br>Normal CAN transmission on Bus is enabled<br><br>If bus type is Sensor Bus, sensor bus relay is on<br><br>Accessory mode to off mode not pending<br><br>Battery voltage<br><br>Conroller is an OBD controller<br>Or<br>Battery Voltage<br><br>Controller type:<br>OBD Controller<br><br>If power mode = Run/ Crank:<br><br>Power Mode is run | <br><br>>= 3,000.00 milliseconds<br><br><br><br><br><br><br><br><br><br>> 11.00 Volts<br><br><br><br><= 18.00 Volts | Diagnostic runs in 12.5 ms loop | Type A, 1 Trips |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication With Body Control Module | U0140 | This DTC monitors for a loss of communication with the Body Control Module. | Message is not received from controller for<br><br>Message $0F1<br><br>Message $12A<br><br>Message $1E1<br><br>Message $1F1<br><br>Message $1F3<br><br>Message $3C9<br><br>Message $3CB<br><br>Message $3F1<br><br>Message $451<br><br>Message $4D7<br><br>Message $4E1<br><br>Message $4E9 | <br><br>≥ 500.00 milliseconds<br><br>≥ 10,000.00 milliseconds<br><br>≥ 500.00milliseconds<br><br>≥ 500.00milliseconds<br><br>≥ 10,000.00 milliseconds<br><br>≥ 10,000.00 milliseconds<br><br>≥ 10,000.00 milliseconds<br><br>≥ 10,000.00 milliseconds<br><br>≥ 500.00 milliseconds<br><br>≥ 10,000.00 milliseconds<br><br>≥ 10,000.00 milliseconds<br><br>≥ 10,000.00 milliseconds | General Enable Criteria:<br><br>All below criteria have been met for<br><br>If message is on Bus A: U0073 not active<br><br>If message is on Bus B: U0074 not active<br><br>If message is on Bus S: U0076 not active<br><br>CAN channel is requesting full communications<br><br>Normal CAN transmission on Bus is enabled<br><br>If bus type is Sensor Bus, sensor bus relay is on<br><br>Accessory mode to off mode not pending<br><br>Battery voltage<br><br>Conroller is an OBD controller<br>Or<br>Battery Voltage<br><br>Controller type:<br>OBD Controller<br><br>If power mode = Run/ Crank:<br><br>Power Mode is run | <br><br>>= 3,000.00 milliseconds<br><br><br><br><br><br><br><br><br><br>> 11.00 Volts<br><br><br><br><= 18.00 Volts | Diagnostic runs in 12.5 ms loop | Type C, No SVS "Emissions Neutral Diagnostics – Type C" |

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

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication with Throttle Position Sensor 1 | U0606 | Detects a continuous or intermittent short low or short high or open fault in the TPS SENT Communication Circuit 1 by monitoring the voltage and failing the diagnostic when the voltage for the wave pulse is below or above state threshold as defined by SAE J2716 SENT Protocol.<br>Detects a message fault in the TPS SENT Communication Circuit by monitoring the message pulse time and failing the diagnostic when the time for the pulse is below a low time threshold or above a high time threshold or if the message age limit is greater than a time threshold.<br>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<br><br>OR<br><br>Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol<br><br>OR<br><br>Message Pulse <<br>Message Pulse ><br><br>OR<br><br>Message Age Limit >=<br><br>OR<br><br>Signal CRC fails | 0.5 V<br><br>OR<br><br>4.1 V<br><br>OR<br><br>0.125977 ms<br>0.209991 ms<br><br>OR<br><br>3.125 ms | Run/Crank voltage | > 6.41 Volts | 79 / 159 counts;<br><br>57 counts continuous;<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication with Throttle Position Sensor 2 | U0607 | Detects a continuous or intermittent short low or short high or open fault in the TPS SENT Communication Circuit 2 by monitoring the voltage and failing the diagnostic when the voltage for the wave pulse is below or above state threshold as defined by SAE J2716 SENT Protocol.<br>Detects a message fault in the TPS SENT Communication Circuit by monitoring the message pulse time and failing the diagnostic when the time for the pulse is below a low time threshold or above a high time threshold or if the message age limit is greater than a time threshold.<br>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<br>OR<br>Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol<br>OR<br>Message Pulse <<br>Message Pulse ><br>OR<br>Message Age Limit >=<br>OR<br>Signal CRC fails | 0.5 V<br>OR<br>4.1 V<br>OR<br>0.125977 ms<br>0.209991 ms<br>OR<br>3.125 ms | Run/Crank voltage | > 6.41 Volts | 79 / 159 counts;<br>57 counts continuous;<br>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. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication With Mass or Volume Air Flow Sensor A | U060F | This DTC monitors for a loss of communication on the LIN bus with Mass or Volume Air Flow Sensor A. | Message is not received from device for<br><br>MAF_Rsp_Press_2B_C03<br><br>MAF_Rsp_TmpHum_2A_C03 | <br><br>>= 62.50 milliseconds<br><br>>= 250.00 milliseconds | General Enable Criteria:<br><br>Diagnostic is enabled<br><br>LIN channel is enabled<br><br>LIN module is initialized<br><br>Slave is calibrated as present<br><br>All below criteria have been met for<br><br>Accessory mode to off mode not pending<br><br>Battery voltage<br><br>Conroller is an OBD controller<br>Or<br>Battery Voltage<br><br>Controller type:<br>OBD Controller<br><br>If power mode = Run/ Crank:<br><br>Power Mode is run<br><br>If calibratable low voltage disable mode is not Never Disabled<br><br>Low voltage disable mode: OBDII<br><br>If OBDII:<br>Run/Crank ignition | <br><br>Enabled<br><br>Enabled<br><br><br><br><br>>= 3,000.00 milliseconds<br><br><br><br>> 11.00 Volts<br><br><br><br><= 18.00 Volts<br><br><br><br><br><br><br><br><br><br><br><br><br><br>>= 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | voltage<br><br>If EOBD:<br>Run/Crank ignition voltage<br><br>If Secure:<br>Starter motor engaged for<br>Or<br>Run/Crank ignition voltage<br><br>If Hybrid Secure:<br>Run/Crank ignition voltage<br><br>If power mode = Accessory:<br><br>Off key cycle diagnostics are enabled<br>Or<br>Controller is an OBD controller<br><br>Controller shutdown is not impending<br><br>Power Mode is not run/ crank<br><br>Battery voltage | <br><br><br>>= 9.00 Volts<br><br><br>> 15.00 milliseconds<br><br>> 8.41 Volts<br><br><br>>= 6.41 Volts<br><br><br><br>Enabled<br><br><br><br><br><br><br><br>>= 11.00 Volts | | |
| | | | | | | | | |

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

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

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

| 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 on Bus S | U18A2 | This DTC monitors for a loss of communication with the Fuel Pump Driver Control Module on Bus S. | Message is not received from controller for<br><br>Message $0D5<br><br>Message $0D7 | <br><br>≥ 10,000.00 milliseconds<br><br>≥ 10,000.00 milliseconds | General Enable Criteria:<br><br>All below criteria have been met for<br><br>If message is on Bus A: U0073 not active<br><br>If message is on Bus B: U0074 not active<br><br>If message is on Bus S: U0076 not active<br><br>CAN channel is requesting full communications<br><br>Normal CAN transmission on Bus is enabled<br><br>If bus type is Sensor Bus, sensor bus relay is on<br><br>Accessory mode to off mode not pending<br><br>Battery voltage<br><br>Conroller is an OBD controller<br>Or<br>Battery Voltage<br><br>Controller type:<br>OBD Controller<br><br>If power mode = Run/ Crank:<br><br>Power Mode is run | <br><br>>= 3,000.00 milliseconds<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>> 11.00 Volts<br><br><br><br><br><br><= 18.00 Volts | Diagnostic runs in 12.5 ms loop | Type B, 2 Trips |

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

# Initial Supporting table - 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 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 2 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 3 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 4 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 5 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 6 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 7 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 8 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 9 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 10 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 11 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 12 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 13 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 14 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 15 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 16 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| 17 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |

# Initial Supporting table - P0521_P06DD_P06DE_OP_HiStatePressure

**Description:** Two Stage Oil Pump Oil Pressure in High State

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

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

# Initial Supporting table - P0521_P06DD_P06DE_OP_LoStatePressure

**Description:** Two Stage Oil Pump Oil Pressure in Low State

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

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

## Initial Supporting table - P06DD_P06DE_MaxEnableTorque_OP

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

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

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

## Initial Supporting table - P06DD_P06DE_MinEnableTorque_OP

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

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

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

## Initial Supporting table - P06DD_P06DE_MinOilPressThresh

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

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

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

# Initial Supporting table - P06DD_P06DE_OP_StateChangeMin

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

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

| y/x | 40.0 | 50.0 | 60.0 | 70.0 | 80.0 | 90.0 | 100.0 | 110.0 | 120.0 |
|---|---|---|---|---|---|---|---|---|---|
| 1,000.0 | 29.2 | 20.6 | 17.8 | 21.4 | 19.2 | 15.6 | 13.3 | 0.0 | 0.0 |
| 1,500.0 | 33.1 | 25.2 | 22.8 | 29.1 | 22.3 | 19.9 | 16.9 | 0.0 | 0.0 |
| 2,000.0 | 36.4 | 29.9 | 27.8 | 32.9 | 27.1 | 23.5 | 15.5 | 0.2 | 0.0 |
| 2,500.0 | 37.5 | 35.4 | 28.7 | 30.9 | 31.1 | 25.5 | 14.0 | 0.4 | 0.0 |
| 3,000.0 | 29.6 | 37.6 | 28.1 | 30.4 | 29.5 | 23.4 | 10.8 | 0.3 | 0.0 |
| 3,500.0 | 26.1 | 37.3 | 33.9 | 35.1 | 31.1 | 23.7 | 10.3 | 1.3 | 0.0 |
| 4,000.0 | 28.1 | 31.2 | 34.6 | 32.6 | 29.2 | 21.1 | 12.0 | 2.8 | 0.0 |
| 4,500.0 | 23.1 | 32.6 | 30.4 | 32.9 | 29.8 | 26.4 | 23.6 | 3.8 | 0.0 |
| 5,000.0 | 15.0 | 19.3 | 21.1 | 20.3 | 15.5 | 13.9 | 11.4 | 1.4 | 0.0 |

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

**Description:** KtETHD_P_CDD_HeatToCoolantMin

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

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

# Initial Supporting table - P219A EWMA Coefficient

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

**Value Units:** Unitless Scalar
**X Unit:** Unitless Scalar

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

## Initial Supporting table - P219A EWMA Coefficient Opt Table

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

**Value Units:** Unitless Scalar
**X Unit:** Unitless Scalar

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

# Initial Supporting table - P219A Quality Factor 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 | 800 | 1,000 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,200 | 3,400 | 3,600 | 3,800 | 4,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 120 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 160 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 200 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 240 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 280 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 320 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 360 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 400 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 440 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 480 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 520 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 560 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 600 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 640 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 700 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 750 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 800 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

# Initial Supporting table - P219B EWMA Coefficient

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

**Value Units:** Unitless Scalar
**X Unit:** Unitless Scalar

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

## Initial Supporting table - P219B EWMA Coefficient Opt Mode

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

**Value Units:** Unitless Scalar
**X Unit:** Unitless Scalar

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

# Initial Supporting table - P219B Quality Factor Bank2 Table

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

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

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

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

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

The cell numbers in the table are defined as:
CeFADR_e_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_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 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 800 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 1,200 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 1,600 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 2,000 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 2,400 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 2,800 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 3,200 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 3,600 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 4,000 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 4,400 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 4,800 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 5,200 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 5,600 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 6,000 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 6,400 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| 6,800 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |

## Initial Supporting table - P0011_P0021_P05CC_P05CD_EngOilPressEnblIc

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

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

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

# Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdHiDsblIc

**Description:** Minimum engine speed to disable Intake cam

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

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

## Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdLoEnblIc

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

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

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

## Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresHiEnbllc

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

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

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

# Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresLoDsbllc

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

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

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

## Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmHiEnbllc

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

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

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

# Initial Supporting table - P0011DP0021DP0DCCDP0DCDDLoRpmLoDsbllc

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

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

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

## Initial Supporting table - P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning

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

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

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

# Initial Supporting table - P0011_P05CC_StablePositionTimeIc1

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

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

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

## Initial Supporting table - P0014_P0024_P05CE_P05CF_EngOilPressEnblEc

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

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

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

# Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdHiDsblEc

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

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

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

## Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdLoEnblEc

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

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

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

# Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresHiEnblEc

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

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

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

# Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresLoDsblEc

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

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

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

## Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc

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

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

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

# Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmLoDsblEc

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: 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 | 750 | 1,100 | 1,450 | 1,800 | 2,150 | 2,500 | 2,850 | 3,200 | 3,550 | 3,900 | 4,250 | 4,600 | 4,950 | 5,300 | 6,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

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

**Description:** P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

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

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

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

**Description:** P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM

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

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

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

**Description:** P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 Residual Weight Factor based on MAF Est

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

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

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

**Description:** P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 Residual Weight Factor based on RPM

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

| y/x | 0 | 400 | 750 | 1,100 | 1,450 | 1,800 | 2,150 | 2,500 | 2,850 | 3,200 | 3,550 | 3,900 | 4,250 | 4,600 | 4,950 | 5,300 | 6,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.900 | 0.800 | 0.750 | 0.700 | 0.700 | 0.700 | 0.700 | 0.700 | 0.700 |

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

**Description:** KtECTD_T_HSC_FastFailTempDiff

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

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

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

**Description:** KtECTR_E_CTR_WrmUpEnrgyLimTest1

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

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

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

**Description:** KtECTR_E_CTR_WrmUpEnrgyLimTest0

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

| y/x | -20 | -7 | 10 | 30 | 45 | 60 | 85 |
|---|---|---|---|---|---|---|---|
| 1 | 21,749 | 18,650 | 14,597 | 9,829 | 6,253 | 6,253 | 6,253 |

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

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

**P0606_Last Seed Timeout f(Loop Time) - Part 1**

| y/x | CePISR_e_2p5msSeq | CePISR_e_3p125msSeq | CePISR_e_5msSeq | CePISR_e_6p25msSeq | CePISR_e_10msSeq | CePISR_e_12p5msSeq | CePISR_e_20msSeq | CePISR_e_25msSeq |
|---|---|---|---|---|---|---|---|---|
| 1 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 |

**P0606_Last Seed Timeout f(Loop Time) - Part 2**

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

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

**Description:** Fail threshold for PSW per operating loop.

**P0606_PSW Sequence Fail f(Loop Time) - Part 1**

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

**P0606_PSW Sequence Fail f(Loop Time) - Part 2**

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

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

**Description:** Sample threshold for PSW per operating loop.

**P0606_PSW Sequence Sample f(Loop Time) - Part 1**

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

**P0606_PSW Sequence Sample f(Loop Time) - Part 2**

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

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

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

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

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

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

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

# Initial Supporting table - 1st_FireAftrMisfr_Acel

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

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

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

# Initial Supporting table - 1st_FireAftrMisfr_Jerk

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

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

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

# Initial Supporting table - 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 | 0.78 | 0.75 | 0.91 | 0.80 | 0.81 | 0.80 | 0.82 | 0.87 |
| 16 | 0.75 | 0.82 | 0.70 | 0.82 | 0.78 | 0.80 | 0.77 | 0.92 | 0.73 |
| 18 | 0.69 | 0.88 | 0.67 | 0.76 | 0.75 | 0.74 | 0.72 | 0.99 | 0.46 |
| 20 | 0.64 | 0.90 | 0.69 | 0.67 | 0.72 | 0.67 | 0.63 | 0.79 | 0.38 |
| 24 | 0.64 | 0.90 | 0.69 | 0.67 | 0.72 | 0.67 | 0.63 | 0.79 | 0.38 |
| 30 | 0.64 | 0.90 | 0.69 | 0.67 | 0.72 | 0.67 | 0.63 | 0.79 | 0.38 |
| 40 | 0.64 | 0.90 | 0.69 | 0.67 | 0.72 | 0.67 | 0.63 | 0.79 | 0.38 |
| 60 | 0.64 | 0.90 | 0.69 | 0.67 | 0.72 | 0.67 | 0.63 | 0.79 | 0.38 |
| 98 | 0.64 | 0.90 | 0.69 | 0.67 | 0.72 | 0.67 | 0.63 | 0.79 | 0.38 |

# Initial Supporting table - Bank_SCD_Jerk

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

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

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 0.81 | 1.14 | 1.71 | 1.65 | 1.39 | 1.26 | 1.22 | 1.26 | 1.51 |
| 16 | 0.90 | 1.30 | 1.92 | 1.97 | 1.50 | 1.37 | 1.38 | 1.39 | 1.26 |
| 18 | 0.72 | 1.28 | 1.90 | 2.07 | 2.00 | 1.79 | 1.46 | 1.55 | 0.78 |
| 20 | 0.61 | 1.26 | 1.44 | 1.37 | 1.52 | 1.42 | 1.30 | 1.15 | 0.61 |
| 24 | 0.61 | 1.26 | 1.44 | 1.37 | 1.52 | 1.42 | 1.30 | 1.15 | 0.61 |
| 30 | 0.61 | 1.26 | 1.44 | 1.37 | 1.52 | 1.42 | 1.30 | 1.15 | 0.61 |
| 40 | 0.61 | 1.26 | 1.44 | 1.37 | 1.52 | 1.42 | 1.30 | 1.15 | 0.61 |
| 60 | 0.61 | 1.26 | 1.44 | 1.37 | 1.52 | 1.42 | 1.30 | 1.15 | 0.61 |
| 98 | 0.61 | 1.26 | 1.44 | 1.37 | 1.52 | 1.42 | 1.30 | 1.15 | 0.61 |

## Initial Supporting table - BankCylModeDecel

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

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

| y/x | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,600 | 3,000 | 3,500 | 4,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 0.88 | 0.73 | 0.69 | 0.58 | 0.59 | 0.76 | 0.87 | 1.07 | 0.92 | 0.97 | 0.82 | 0.90 | 0.88 | 0.90 | 1.00 | 1.00 | 1.00 |
| 16 | 0.74 | 0.55 | 0.59 | 0.48 | 0.50 | 0.72 | 0.79 | 0.79 | 0.79 | 0.80 | 0.80 | 0.81 | 0.87 | 0.75 | 0.71 | 0.71 | 0.71 |
| 18 | 0.72 | 0.51 | 0.55 | 0.49 | 0.46 | 0.67 | 0.57 | 0.59 | 0.67 | 0.63 | 0.71 | 0.67 | 0.78 | 0.68 | 0.56 | 0.56 | 0.56 |
| 20 | 0.77 | 0.49 | 0.52 | 0.48 | 0.49 | 0.68 | 0.46 | 0.48 | 0.65 | 0.54 | 0.61 | 0.57 | 0.61 | 0.64 | 0.50 | 0.50 | 0.50 |
| 24 | 0.83 | 0.48 | 0.50 | 0.48 | 0.53 | 0.75 | 0.35 | 0.37 | 0.67 | 0.74 | 0.69 | 0.71 | 0.67 | 0.70 | 0.46 | 0.46 | 0.46 |
| 30 | 0.82 | 0.46 | 0.51 | 0.52 | 0.54 | 0.78 | 0.30 | 0.46 | 0.65 | 0.76 | 0.71 | 0.67 | 0.64 | 0.68 | 0.50 | 0.61 | 0.58 |
| 40 | 0.73 | 0.43 | 0.48 | 0.54 | 0.57 | 0.74 | 0.33 | 0.37 | 0.60 | 0.81 | 0.84 | 0.69 | 0.61 | 0.74 | 0.61 | 0.64 | 0.60 |
| 60 | 0.57 | 0.37 | 0.42 | 0.49 | 0.57 | 0.73 | 0.39 | 0.78 | 0.86 | 0.92 | 1.12 | 0.91 | 0.60 | 0.97 | 0.98 | 0.78 | 0.48 |
| 98 | 0.46 | 0.31 | 0.35 | 0.44 | 0.52 | 0.71 | 0.46 | 0.58 | 0.73 | 0.95 | 1.62 | 1.19 | 0.70 | 1.08 | 1.31 | 1.00 | 0.52 |

# Initial Supporting table - BankCylModeJerk

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

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

| y/x | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,600 | 3,000 | 3,500 | 4,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 1.59 | 1.33 | 1.51 | 1.33 | 1.46 | 1.90 | 1.59 | 1.76 | 1.54 | 1.46 | 1.36 | 1.87 | 1.93 | 2.17 | 2.36 | 2.36 | 2.36 |
| 16 | 1.57 | 1.08 | 1.44 | 1.11 | 1.34 | 2.20 | 1.73 | 1.73 | 1.55 | 1.52 | 1.48 | 1.58 | 1.83 | 1.72 | 1.92 | 1.92 | 1.92 |
| 18 | 1.53 | 1.02 | 1.39 | 1.10 | 1.29 | 2.07 | 1.71 | 1.73 | 1.39 | 1.45 | 1.39 | 1.53 | 1.64 | 1.74 | 1.83 | 1.83 | 1.83 |
| 20 | 1.48 | 0.96 | 1.31 | 1.15 | 1.25 | 1.97 | 1.68 | 1.80 | 1.26 | 1.34 | 1.38 | 1.49 | 1.49 | 1.62 | 1.64 | 1.64 | 1.64 |
| 24 | 1.34 | 0.89 | 1.15 | 1.09 | 1.08 | 2.00 | 1.80 | 1.69 | 1.54 | 1.46 | 1.50 | 1.60 | 1.31 | 1.60 | 1.56 | 1.56 | 1.56 |
| 30 | 1.26 | 0.73 | 0.90 | 0.95 | 0.94 | 2.34 | 1.96 | 1.24 | 2.52 | 1.76 | 1.66 | 1.84 | 1.41 | 1.55 | 1.31 | 1.40 | 1.88 |
| 40 | 1.23 | 0.61 | 0.68 | 0.74 | 0.82 | 2.24 | 1.22 | 0.35 | 3.89 | 2.55 | 1.75 | 2.75 | 1.46 | 1.41 | 1.66 | 1.45 | 2.75 |
| 60 | 1.18 | 0.51 | 0.55 | 0.65 | 0.76 | 2.02 | 1.34 | 1.49 | 2.88 | 2.81 | 1.89 | 4.76 | 1.60 | 1.44 | 1.55 | 3.38 | 2.69 |
| 98 | 1.16 | 0.46 | 0.49 | 0.59 | 0.71 | 1.82 | 1.42 | 1.15 | 2.66 | 3.00 | 2.19 | 4.11 | 1.73 | 1.27 | 1.67 | 3.14 | 2.55 |

# Initial Supporting table - Catalyst_Damage_Misfire_Percentage

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

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

| y/x | 0 | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 | 6,000 | 7,000 |
|---|---|---|---|---|---|---|---|---|
| 0 | 11.2 | 11.2 | 11.2 | 11.2 | 9.8 | 4.8 | 4.8 | 4.8 |
| 10 | 11.2 | 11.2 | 11.2 | 11.2 | 9.8 | 4.8 | 4.8 | 4.8 |
| 20 | 11.2 | 11.2 | 11.2 | 9.8 | 9.8 | 4.8 | 4.8 | 4.8 |
| 30 | 11.2 | 11.2 | 11.2 | 9.8 | 8.1 | 4.8 | 4.8 | 4.8 |
| 40 | 9.8 | 9.8 | 9.8 | 9.8 | 7.0 | 4.8 | 4.8 | 4.8 |
| 50 | 9.8 | 9.8 | 9.8 | 8.1 | 6.1 | 4.8 | 4.8 | 4.8 |
| 60 | 8.1 | 8.1 | 8.1 | 7.0 | 5.4 | 4.8 | 4.8 | 4.8 |
| 70 | 6.1 | 6.1 | 6.1 | 6.1 | 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 | 1,600 | 2,000 | 2,400 | 2,600 | 3,000 | 3,500 |
|---|---|---|---|---|---|---|---|---|---|
| 8 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 12 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 16 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 20 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 24 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 30 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 98 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

# Initial Supporting table - ClyBeforeAFM_Jerk

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

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

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

# Initial Supporting table - CombustModeIdleTbl

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

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

## Initial Supporting table - ConsecCylModeJerk

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

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

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

## Initial Supporting table - ConsecSCD_Decel

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

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

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

# Initial Supporting table - ConsecSCD_Jerk

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

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

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

## Initial Supporting table - CylAfterAFM_Jerk

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

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

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

# Initial Supporting table - CylBeforeAFM_Decel

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

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

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

# Initial Supporting table - CylModeDecel

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

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

**CylModeDecel - Part 2**

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

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

# Initial Supporting table - CylModeJerk

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

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

**CylModeJerk - Part 2**

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

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

# Initial Supporting table - DeacCylInversionDecel

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

**Value Units:** Delta time per cylinder (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 |
|---|---|---|---|---|---|---|---|---|---|
| 8 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 12 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 16 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 20 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 24 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 30 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 40 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 60 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 98 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |

# Initial Supporting table - DeacCylInversionJerk

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

**Value Units:** Change in Delta time per cylinder from last cylinder (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 |
|---|---|---|---|---|---|---|---|---|---|
| 8 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 12 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 16 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 20 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 24 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 30 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 40 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 60 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |
| 98 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 | -16,384 |

# Initial Supporting table - EngineOverSpeedLimit

**Description:** Engine OverSpeed Limit versus gear

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

**EngineOverSpeedLimit - Part 1**

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

**EngineOverSpeedLimit - Part 2**

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

# Initial Supporting table - Ethanol Estimation Refuel Threshold

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

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

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

# Initial Supporting table - InfrequentRegen

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

**Value Units:** Enumerated value of 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 - Hig□ Pressure Pump Control Mode timeout

**Description:** High Pressure Pump Control Mode timeout

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

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

## upporting table - P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure St

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

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

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

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

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

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

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

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

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

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

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

## Initial Supporting table - P0420_BestFailingOSCTableB1

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

| y/x | 13.55 | 14.20 | 14.84 | 15.49 | 16.14 | 16.79 | 17.44 | 18.09 | 18.73 | 19.38 | 20.03 | 20.68 | 21.33 | 21.98 | 22.63 | 23.27 | 23.92 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 475.00 | 1.09 | 1.05 | 1.01 | 0.97 | 0.94 | 0.87 | 0.78 | 0.71 | 0.67 | 0.62 | 0.55 | 0.52 | 0.51 | 0.50 | 0.47 | 0.45 | 0.42 |
| 528.00 | 1.51 | 1.47 | 1.43 | 1.37 | 1.33 | 1.26 | 1.18 | 1.09 | 1.00 | 0.93 | 0.86 | 0.83 | 0.82 | 0.78 | 0.76 | 0.72 | 0.69 |
| 581.00 | 1.84 | 1.82 | 1.76 | 1.71 | 1.63 | 1.55 | 1.46 | 1.37 | 1.28 | 1.21 | 1.14 | 1.10 | 1.08 | 1.03 | 0.99 | 0.95 | 0.92 |
| 634.00 | 1.99 | 1.95 | 1.88 | 1.81 | 1.74 | 1.65 | 1.56 | 1.47 | 1.39 | 1.32 | 1.25 | 1.20 | 1.17 | 1.14 | 1.11 | 1.08 | 1.05 |
| 687.00 | 2.05 | 1.99 | 1.92 | 1.85 | 1.78 | 1.69 | 1.60 | 1.52 | 1.44 | 1.37 | 1.31 | 1.25 | 1.22 | 1.20 | 1.17 | 1.14 | 1.12 |
| 740.00 | 2.09 | 2.02 | 1.95 | 1.88 | 1.81 | 1.72 | 1.63 | 1.55 | 1.47 | 1.41 | 1.35 | 1.30 | 1.28 | 1.25 | 1.22 | 1.19 | 1.17 |
| 793.00 | 2.12 | 2.05 | 1.98 | 1.91 | 1.84 | 1.75 | 1.66 | 1.60 | 1.52 | 1.46 | 1.39 | 1.34 | 1.32 | 1.28 | 1.25 | 1.22 | 1.20 |
| 846.00 | 2.15 | 2.08 | 2.01 | 1.94 | 1.87 | 1.78 | 1.69 | 1.64 | 1.56 | 1.50 | 1.43 | 1.39 | 1.35 | 1.31 | 1.27 | 1.24 | 1.21 |
| 900.00 | 2.18 | 2.11 | 2.04 | 1.97 | 1.90 | 1.81 | 1.72 | 1.67 | 1.61 | 1.55 | 1.48 | 1.43 | 1.39 | 1.35 | 1.30 | 1.26 | 1.24 |

## 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 | 13.55 | 14.20 | 14.84 | 15.49 | 16.14 | 16.79 | 17.44 | 18.09 | 18.73 | 19.38 | 20.03 | 20.68 | 21.33 | 21.98 | 22.63 | 23.27 | 23.92 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 475.00 | 1.39 | 1.35 | 1.31 | 1.27 | 1.24 | 1.17 | 1.08 | 1.01 | 0.97 | 0.92 | 0.85 | 0.82 | 0.81 | 0.79 | 0.77 | 0.75 | 0.72 |
| 528.00 | 1.81 | 1.77 | 1.73 | 1.67 | 1.63 | 1.56 | 1.48 | 1.39 | 1.30 | 1.23 | 1.17 | 1.13 | 1.12 | 1.08 | 1.06 | 1.02 | 0.99 |
| 581.00 | 2.14 | 2.12 | 2.06 | 2.01 | 1.92 | 1.85 | 1.76 | 1.67 | 1.58 | 1.50 | 1.44 | 1.41 | 1.38 | 1.33 | 1.29 | 1.25 | 1.22 |
| 634.00 | 2.29 | 2.25 | 2.18 | 2.11 | 2.04 | 1.95 | 1.86 | 1.77 | 1.69 | 1.62 | 1.55 | 1.50 | 1.47 | 1.45 | 1.41 | 1.38 | 1.36 |
| 687.00 | 2.35 | 2.29 | 2.22 | 2.15 | 2.08 | 1.99 | 1.90 | 1.82 | 1.74 | 1.67 | 1.61 | 1.55 | 1.52 | 1.50 | 1.47 | 1.44 | 1.42 |
| 740.00 | 2.39 | 2.32 | 2.25 | 2.18 | 2.11 | 2.02 | 1.93 | 1.85 | 1.77 | 1.71 | 1.65 | 1.60 | 1.58 | 1.55 | 1.52 | 1.49 | 1.47 |
| 793.00 | 2.42 | 2.35 | 2.28 | 2.21 | 2.14 | 2.05 | 1.96 | 1.89 | 1.82 | 1.76 | 1.69 | 1.64 | 1.62 | 1.58 | 1.55 | 1.52 | 1.50 |
| 846.00 | 2.45 | 2.38 | 2.31 | 2.24 | 2.17 | 2.08 | 1.99 | 1.94 | 1.86 | 1.80 | 1.74 | 1.69 | 1.65 | 1.61 | 1.57 | 1.54 | 1.51 |
| 900.00 | 2.48 | 2.41 | 2.34 | 2.27 | 2.20 | 2.11 | 2.02 | 1.97 | 1.91 | 1.85 | 1.78 | 1.73 | 1.69 | 1.65 | 1.60 | 1.56 | 1.54 |

# Initial Supporting table - P0430_BestFailingOSCTableB2

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

| y/x | 13.55 | 14.20 | 14.84 | 15.49 | 16.14 | 16.79 | 17.44 | 18.09 | 18.73 | 19.38 | 20.03 | 20.68 | 21.33 | 21.98 | 22.63 | 23.27 | 23.92 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 475.00 | 1.14 | 1.10 | 1.06 | 1.02 | 0.99 | 0.92 | 0.83 | 0.76 | 0.72 | 0.67 | 0.60 | 0.57 | 0.56 | 0.54 | 0.52 | 0.50 | 0.47 |
| 528.00 | 1.56 | 1.52 | 1.48 | 1.42 | 1.38 | 1.31 | 1.23 | 1.14 | 1.05 | 0.98 | 0.92 | 0.88 | 0.87 | 0.83 | 0.81 | 0.77 | 0.74 |
| 581.00 | 1.89 | 1.87 | 1.81 | 1.76 | 1.67 | 1.60 | 1.51 | 1.42 | 1.33 | 1.25 | 1.19 | 1.16 | 1.13 | 1.08 | 1.04 | 1.00 | 0.97 |
| 634.00 | 2.04 | 2.00 | 1.93 | 1.86 | 1.79 | 1.70 | 1.61 | 1.52 | 1.44 | 1.37 | 1.30 | 1.25 | 1.22 | 1.20 | 1.16 | 1.13 | 1.11 |
| 687.00 | 2.10 | 2.04 | 1.97 | 1.90 | 1.83 | 1.74 | 1.65 | 1.57 | 1.49 | 1.42 | 1.36 | 1.30 | 1.27 | 1.25 | 1.22 | 1.19 | 1.17 |
| 740.00 | 2.14 | 2.07 | 2.00 | 1.93 | 1.86 | 1.77 | 1.68 | 1.60 | 1.52 | 1.46 | 1.40 | 1.35 | 1.33 | 1.30 | 1.27 | 1.24 | 1.22 |
| 793.00 | 2.17 | 2.10 | 2.03 | 1.96 | 1.89 | 1.80 | 1.71 | 1.64 | 1.57 | 1.51 | 1.44 | 1.39 | 1.37 | 1.33 | 1.30 | 1.27 | 1.25 |
| 846.00 | 2.20 | 2.13 | 2.06 | 1.99 | 1.92 | 1.83 | 1.74 | 1.69 | 1.61 | 1.55 | 1.49 | 1.44 | 1.40 | 1.36 | 1.32 | 1.29 | 1.26 |
| 900.00 | 2.23 | 2.16 | 2.09 | 2.02 | 1.95 | 1.86 | 1.77 | 1.72 | 1.66 | 1.60 | 1.53 | 1.48 | 1.44 | 1.40 | 1.35 | 1.31 | 1.29 |

## Initial Supporting table - P0430_WorstPassingOSCTableB2

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

| y/x | 13.55 | 14.20 | 14.84 | 15.49 | 16.14 | 16.79 | 17.44 | 18.09 | 18.73 | 19.38 | 20.03 | 20.68 | 21.33 | 21.98 | 22.63 | 23.27 | 23.92 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 475.00 | 1.44 | 1.40 | 1.36 | 1.32 | 1.29 | 1.22 | 1.13 | 1.06 | 1.02 | 0.97 | 0.90 | 0.87 | 0.86 | 0.84 | 0.82 | 0.80 | 0.77 |
| 528.00 | 1.86 | 1.82 | 1.78 | 1.72 | 1.67 | 1.61 | 1.53 | 1.44 | 1.35 | 1.28 | 1.21 | 1.18 | 1.17 | 1.13 | 1.11 | 1.07 | 1.04 |
| 581.00 | 2.19 | 2.17 | 2.11 | 2.06 | 1.97 | 1.90 | 1.81 | 1.72 | 1.63 | 1.55 | 1.49 | 1.46 | 1.43 | 1.38 | 1.34 | 1.30 | 1.27 |
| 634.00 | 2.34 | 2.30 | 2.23 | 2.16 | 2.09 | 2.00 | 1.91 | 1.82 | 1.74 | 1.67 | 1.61 | 1.55 | 1.52 | 1.50 | 1.46 | 1.43 | 1.41 |
| 687.00 | 2.40 | 2.34 | 2.27 | 2.20 | 2.13 | 2.04 | 1.95 | 1.87 | 1.79 | 1.72 | 1.66 | 1.61 | 1.57 | 1.55 | 1.52 | 1.49 | 1.47 |
| 740.00 | 2.44 | 2.37 | 2.30 | 2.23 | 2.16 | 2.07 | 1.98 | 1.90 | 1.82 | 1.76 | 1.70 | 1.65 | 1.63 | 1.60 | 1.57 | 1.54 | 1.52 |
| 793.00 | 2.47 | 2.40 | 2.33 | 2.26 | 2.19 | 2.10 | 2.01 | 1.95 | 1.87 | 1.81 | 1.74 | 1.70 | 1.67 | 1.63 | 1.60 | 1.57 | 1.55 |
| 846.00 | 2.50 | 2.43 | 2.36 | 2.29 | 2.22 | 2.13 | 2.04 | 1.99 | 1.91 | 1.85 | 1.79 | 1.74 | 1.70 | 1.66 | 1.62 | 1.59 | 1.57 |
| 900.00 | 2.53 | 2.46 | 2.39 | 2.32 | 2.25 | 2.16 | 2.07 | 2.02 | 1.96 | 1.90 | 1.83 | 1.78 | 1.74 | 1.70 | 1.65 | 1.61 | 1.59 |

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

## Initial Supporting table - Pair_SCD_Jerk

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

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

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

## Initial Supporting table - PairCylModeDecel

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

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

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

## Initial Supporting table - PairCylModeJerk

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

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

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

# Initial Supporting table - Random_SCD_Decel

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

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

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

# Initial Supporting table - Random_SCD_Jerk

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

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

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

## Initial Supporting table - RandomAFM_Decl

**Description:** Used for P0300 - P0308, 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 |
|---|---|---|---|---|---|---|---|---|---|
| 8 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 12 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 16 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 20 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 24 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 30 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 98 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

# Initial Supporting table - RandomAFM_Jerk

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

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

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

# Initial Supporting table - RandomCylModDecel

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

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

| y/x | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,600 | 3,000 | 3,500 | 4,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.08 | 1.09 | 1.06 | 1.00 | 1.10 | 1.02 | 1.04 | 1.00 | 1.00 | 1.00 |
| 12 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.04 | 1.00 | 1.21 | 1.14 | 1.38 | 1.13 | 1.35 | 1.16 | 1.15 | 1.23 | 1.23 | 1.23 |
| 16 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.06 | 1.10 | 1.27 | 1.30 | 1.25 | 1.12 | 1.29 | 1.35 | 1.36 | 1.36 | 1.36 |
| 20 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.08 | 1.00 | 1.20 | 1.41 | 1.39 | 1.28 | 1.25 | 1.50 | 1.32 | 1.33 | 1.33 | 1.33 |
| 24 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.04 | 1.00 | 1.20 | 1.30 | 1.36 | 1.14 | 1.15 | 1.33 | 1.30 | 1.21 | 1.21 | 1.21 |
| 30 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.20 | 1.20 | 1.40 | 1.23 | 1.18 | 1.24 | 1.32 | 1.20 | 1.33 | 1.33 |
| 40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.94 | 1.16 | 1.18 | 1.55 | 1.50 | 1.29 | 1.22 | 1.41 | 1.33 | 1.50 | 1.53 |
| 60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.87 | 0.95 | 1.19 | 1.67 | 2.03 | 1.65 | 1.34 | 1.67 | 1.80 | 1.89 | 1.71 |
| 98 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.89 | 1.01 | 1.21 | 1.68 | 2.90 | 2.15 | 1.59 | 1.92 | 2.29 | 2.57 | 1.97 |

# Initial Supporting table - RandomCylModJerk

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

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

| y/x | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,600 | 3,000 | 3,500 | 4,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 12 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 16 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.10 | 1.06 | 1.00 | 1.00 | 1.00 |
| 20 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.28 | 1.00 | 1.00 | 1.07 | 1.04 | 1.11 | 1.10 | 1.00 | 1.00 | 1.00 |
| 24 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.45 | 1.08 | 1.03 | 1.07 | 1.13 | 1.06 | 1.12 | 1.00 | 1.00 | 1.00 |
| 30 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.42 | 1.44 | 1.25 | 1.15 | 1.31 | 1.10 | 1.15 | 1.00 | 1.20 | 1.00 |
| 40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.27 | 2.01 | 1.76 | 1.30 | 2.04 | 1.16 | 1.17 | 1.24 | 1.10 | 1.75 |
| 60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.23 | 1.39 | 1.57 | 2.32 | 1.49 | 3.87 | 1.30 | 1.32 | 1.27 | 2.77 | 1.85 |
| 98 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.21 | 1.44 | 1.52 | 2.48 | 1.71 | 3.34 | 1.38 | 1.24 | 1.52 | 2.86 | 2.09 |

## Initial Supporting table - RandomRevModDecl

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

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

| y/x | 3,001 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|
| 8 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 12 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 16 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 20 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 24 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 30 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 98 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

# Initial Supporting table - RepetSnapDecayAdjst

**Description:** Used for P0300 - P0308, If misfire is present in consecutive engine cycles, this multiplier is applied to the misfire jerk threshold and compared to a crankshaft snap value after the misfire has taken place.. Table lookup as a function of engine rpm.

**Value Units:** multiplier
**X Unit:** RPM

| y/x | 900 | 1,100 | 1,400 | 1,600 | 1,800 | 2,000 | 2,600 | 3,000 | 4,000 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 1.00 | 1.15 | 1.25 | 2.14 | 1.20 | 1.03 | 1.00 | 1.00 |

# Initial Supporting table - RevMode_Decel

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

**Value Units:** Delta time between revolutions (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 | 90 | 58 | 47 | 34 | 28 | 20 | 20 | 20 |
| 6 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 88 | 56 | 45 | 32 | 26 | 20 | 20 | 20 |
| 8 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 86 | 56 | 44 | 30 | 26 | 20 | 20 | 20 |
| 10 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 85 | 57 | 45 | 30 | 26 | 20 | 20 | 20 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 86 | 59 | 45 | 32 | 27 | 20 | 20 | 20 |
| 14 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 86 | 63 | 46 | 34 | 29 | 21 | 21 | 21 |
| 16 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 94 | 68 | 47 | 36 | 33 | 22 | 22 | 22 |
| 18 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 105 | 72 | 49 | 39 | 36 | 25 | 25 | 25 |
| 20 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 115 | 77 | 52 | 42 | 40 | 29 | 29 | 29 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 123 | 82 | 55 | 45 | 43 | 32 | 32 | 32 |
| 24 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 132 | 86 | 60 | 49 | 47 | 34 | 34 | 34 |
| 26 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 141 | 91 | 64 | 51 | 51 | 37 | 37 | 37 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 155 | 99 | 74 | 60 | 60 | 43 | 42 | 42 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 40 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 60 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 97 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

# Initial Supporting table - Ring Filter

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

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

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

# Initial Supporting table - SCD_Decel

**Description:** Used for P0300-P0308 Crankshaft decel threshold. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

**Value Units:** Delta time per cylinder (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 | 607 | 607 | 344 | 214 | 148 | 100 | 77 | 58 | 48 | 32,767 | 32,767 | 32,767 | 32,767 |
| 6 | 590 | 576 | 318 | 198 | 138 | 95 | 70 | 55 | 48 | 32,767 | 32,767 | 32,767 | 32,767 |
| 8 | 610 | 586 | 337 | 197 | 136 | 95 | 69 | 54 | 50 | 32,767 | 32,767 | 32,767 | 32,767 |
| 10 | 658 | 617 | 353 | 212 | 146 | 98 | 73 | 51 | 49 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 734 | 668 | 382 | 231 | 157 | 106 | 80 | 51 | 55 | 32,767 | 32,767 | 32,767 | 32,767 |
| 14 | 858 | 722 | 415 | 254 | 172 | 117 | 87 | 51 | 66 | 32,767 | 32,767 | 32,767 | 32,767 |
| 16 | 1,195 | 789 | 449 | 278 | 188 | 132 | 96 | 52 | 75 | 32,767 | 32,767 | 32,767 | 32,767 |
| 18 | 1,586 | 858 | 480 | 310 | 205 | 151 | 111 | 61 | 82 | 32,767 | 32,767 | 32,767 | 32,767 |
| 20 | 2,066 | 941 | 520 | 347 | 226 | 172 | 126 | 74 | 92 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 24 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 26 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 40 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 60 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 97 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

# Initial Supporting table - SCD_Jerk

**Description:** Used for P0300-P0308. Crankshaft jerk threshold. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

**Value Units:** Change in Delta time per cylinder from last cylinder (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 | 886 | 554 | 303 | 185 | 126 | 95 | 73 | 54 | 43 | 32,767 | 32,767 | 32,767 | 32,767 |
| 6 | 766 | 520 | 264 | 160 | 117 | 84 | 71 | 50 | 37 | 32,767 | 32,767 | 32,767 | 32,767 |
| 8 | 716 | 508 | 270 | 160 | 117 | 82 | 70 | 50 | 37 | 32,767 | 32,767 | 32,767 | 32,767 |
| 10 | 666 | 506 | 264 | 159 | 123 | 88 | 70 | 52 | 40 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 752 | 518 | 260 | 156 | 128 | 94 | 74 | 55 | 45 | 32,767 | 32,767 | 32,767 | 32,767 |
| 14 | 873 | 574 | 256 | 149 | 130 | 94 | 82 | 58 | 62 | 32,767 | 32,767 | 32,767 | 32,767 |
| 16 | 1,278 | 659 | 328 | 197 | 132 | 103 | 90 | 64 | 80 | 32,767 | 32,767 | 32,767 | 32,767 |
| 18 | 1,618 | 740 | 422 | 265 | 158 | 129 | 102 | 82 | 91 | 32,767 | 32,767 | 32,767 | 32,767 |
| 20 | 2,032 | 825 | 538 | 357 | 212 | 157 | 123 | 104 | 110 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 24 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 26 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 40 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 60 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 97 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

## Initial Supporting table - SnapDecayAfterMisfire

**Description:** Used for P0300 - P0308, multiplier times the 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 | 1,600 | 1,800 | 2,000 | 2,600 | 3,000 | 4,000 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 3.20 | 3.72 | 2.59 | 2.00 | 1.93 | 2.55 | 3.38 | 3.38 |
| 1 | 0.89 | 2.46 | 2.91 | 2.83 | 2.52 | 3.27 | 2.28 | 3.27 | 3.27 |
| 1 | 1.13 | 2.30 | 2.22 | 2.06 | 2.06 | 2.53 | 2.09 | 2.04 | 2.75 |
| 1 | 0.97 | 1.70 | 1.51 | 1.57 | 1.62 | 1.87 | 2.43 | 2.79 | 2.57 |
| 2 | 1.15 | 1.39 | 1.07 | 1.06 | 1.23 | 1.55 | 2.21 | 2.75 | 3.75 |
| 3 | 1.29 | 1.60 | 1.34 | 1.20 | 1.03 | 1.21 | 1.89 | 2.33 | 2.75 |
| 5 | 1.25 | 1.34 | 1.20 | 1.28 | 1.19 | 1.42 | 1.72 | 2.08 | 2.08 |
| 6 | 1.25 | 1.34 | 1.20 | 1.28 | 1.19 | 1.42 | 1.72 | 2.08 | 2.08 |
| 7 | 1.25 | 1.34 | 1.20 | 1.28 | 1.19 | 1.42 | 1.72 | 2.08 | 2.08 |

# Initial Supporting table - 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 | 0.40002 | 0.42004 | 0.43994 | 0.45996 | 0.47998 | 0.50000 | 0.52002 | 0.54004 | 0.56006 | 0.57996 | 0.59998 | 0.62000 | 0.64001 | 0.66003 | 0.68005 | 0.69995 | 0.71997 |

# Initial Supporting table - ZeroTorqueAFM

**Description:** Used for P0300-P0308. Zero torque engine load while in Active Fuel Management. %of Max Brake Torque along the Neutral rev line, as a function of RPM and Baro

**Value Units:** Percent of Maximum Brake torque (%)
**X Unit:** RPM
**Y Units:** Barometric Pressure (kPa)

**ZeroTorqueAFM - Part 1**

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | -3.50 | -3.50 | -3.50 | -2.50 | -2.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 |
| 75 | -3.50 | -3.50 | -3.50 | -2.50 | -2.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 |
| 85 | -3.50 | -3.50 | -3.50 | -2.50 | -2.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 |
| 95 | -3.50 | -3.50 | -3.50 | -2.50 | -2.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 |
| 105 | -3.50 | -3.50 | -3.50 | -2.50 | -2.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 |

**ZeroTorqueAFM - Part 2**

| y/x | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,001 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -0.15 | 2.35 | 4.85 | 7.35 | 9.85 | 12.35 | 14.85 | 17.35 |
| 75 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -0.15 | 2.35 | 4.85 | 7.35 | 9.85 | 12.35 | 14.85 | 17.35 |
| 85 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -0.15 | 2.35 | 4.85 | 7.35 | 9.85 | 12.35 | 14.85 | 17.35 |
| 95 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -0.15 | 2.35 | 4.85 | 7.35 | 9.85 | 12.35 | 14.85 | 17.35 |
| 105 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -0.15 | 2.35 | 4.85 | 7.35 | 9.85 | 12.35 | 14.85 | 17.35 |

# Initial Supporting table - ZeroTorqueEngLoad

**Description:** Used for P0300-P0308. %of Max Brake Torque that represents Zero Brake torque along the Neutral rev line, as a function of RPM and Baro

**Value Units:** Percent of Maximum Brake torque (%)
**X Unit:** RPM
**Y Units:** Barometric Pressure (kPa)

**ZeroTorqueEngLoad - Part 1**

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | -2.50 | -2.50 | -2.50 | -2.31 | -2.12 | -1.93 | -1.75 | -1.56 | -1.38 | 0.00 | -0.10 | -0.55 | -1.00 |
| 75 | -2.25 | -2.25 | -2.25 | -2.06 | -1.87 | -1.68 | -1.50 | -1.31 | -1.13 | 0.25 | 0.15 | -0.30 | -0.75 |
| 85 | -2.00 | -2.00 | -2.00 | -1.81 | -1.62 | -1.44 | -1.25 | -1.06 | -0.88 | 0.50 | 0.40 | -0.05 | -0.50 |
| 95 | -1.75 | -1.75 | -1.75 | -1.56 | -1.37 | -1.19 | -1.00 | -0.81 | -0.63 | 0.75 | 0.65 | 0.20 | -0.25 |
| 105 | -1.50 | -1.50 | -1.50 | -1.31 | -1.12 | -0.94 | -0.75 | -0.56 | -0.38 | 1.00 | 0.90 | 0.45 | 0.00 |

**ZeroTorqueEngLoad - Part 2**

| y/x | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,001 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | -1.00 | 6.57 | 14.13 | 21.70 | 29.26 | 36.83 | 44.39 | 59.52 |
| 75 | -0.75 | -0.75 | -0.75 | -0.75 | -0.75 | -0.75 | 6.82 | 14.38 | 21.95 | 29.51 | 37.08 | 44.64 | 59.77 |
| 85 | -0.50 | -0.50 | -0.50 | -0.50 | -0.50 | -0.50 | 7.07 | 14.63 | 22.20 | 29.76 | 37.33 | 44.89 | 60.02 |
| 95 | -0.25 | -0.25 | -0.25 | -0.25 | -0.25 | -0.25 | 7.32 | 14.88 | 22.45 | 30.01 | 37.58 | 45.14 | 60.27 |
| 105 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.57 | 15.13 | 22.70 | 30.26 | 37.83 | 45.39 | 60.52 |

## Initial Supporting table - Closed Loop Enable Clarification - KaFCLP_U_SlphrIntglOfst_Thrsh

**Description:** Integral Offset voltage thresholds (bank and cell specific cals) used with KeFCLP_Pct_CatAccuSlphrPostDsbl to check for sulphur poisoning.

**Value Units:** millivolts
**X Unit:** Post Catalyst Number

| y/x | CiOXYR_O2_PostCat1 | CiOXYR_O2_PostCat2 |
|---|---|---|
| CiFCLP_Decel | 1,000 | 1,000 |
| CiFCLP_Idle | 1,000 | 1,000 |
| CiFCLP_Cruise | 1,000 | 1,000 |
| CiFCLP_LightAccel | 1,000 | 1,000 |
| CiFCLP_HeavyAccel | 1,000 | 1,000 |

## Initial Supporting table - Closed Loop Enable Clarification - KcFCLP_Cnt_O2RdyCyclesThrsh

**Description:** Number of times a post oxygen sensor value must be in range before declaring it ready

**Value Units:** Time (events * 12.5 milliseconds)

| y/x | 1 |
|---|---|
| 1 | 10 |

## Initial Supporting table - Closed Loop Enable Clarification - KcFULC_O2_SensorReadyEvents

**Description:** Number of times a pre oxygen sensor value must be in range before declaring it ready

**Value Units:** Time (events * 12.5 milliseconds)

| y/x | 1 |
|---|---|
| 1 | 10 |

## Initial Supporting table - Closed Loop Enable Clarification - KeEOSD_U_RichThrsh

**Description:** The oxygen sensor voltage above which a sensor will be considered failing during a Rich Test.

**Value Units:** Volts

| y/x | 1 |
|---|---|
| 1 | 1,050 |

## Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_dm_IntegrationAirflowMax

**Description:** Maximum allowed estimated airflow for post O2 integral terms to be updated.

**Value Units:** Grams per Second

| y/x | 1 |
|---|---|
| 1 | 512 |

## Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_Pct_CatAccuSlphrPostDsbl

**Description:** Sulphur percent threshold above which post integral learning is disabled if the threshold criteria KaFCLP_U_SlphrIntglOfst_Thrsh is also met.

**Value Units:** Percent

| y/x | 1 |
|---|---|
| 1 | 75 |

## Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMax

**Description:** Maximum allowed estimated catalytic converter temperature for post O2 integral terms to be updated.

**Value Units:** Celcius

| y/x | 1 |
|---|---|
| 1 | 950 |

# Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMin

**Description:** Minimum allowed estimated catalytic converter temperature to begin using post O2 integration correction terms. Converter temperature must remain above this threshold to ramp-in the post O2 integration adjustments. Once the ramp-in has started, a converter temperature below this threshold will freeze the ramp-in multiplier. Post O2 integration will not be allowed below this converter temperature

**Value Units:** Celcius

| y/x | 1 |
|---|---|
| 1 | 500 |

# Initial Supporting table - Closed Loop Enable Clarification - KeFULC_T_WRAF_SensorReadyThrsh

**Description:** Pumping cell temperature threshold above which the wideband oxygen sensor will be considered ready for use

**Value Units:** Degrees Celcius

| y/x | 1 |
|---|---|
| 1 | 700 |

# Initial Supporting table - Closed Loop Enable Clarification - KeWRSC_T_HtrCntrlCL

**Description:** WRAF heater temperature enabling threshold for transition from Open Loop to Closed Loop

**Value Units:** Degrees Celcius

| y/x | 1 |
|---|---|
| 1 | 628 |

## Initial Supporting table - Closed Loop Enable Clarification - KeWRSI_T_PumpCurrentEnable

**Description:** WRAF heater temperature threshold for enabling the sensor pump current

**Value Units:** Degrees Celcius

| y/x | 1 |
|---|---|
| 1 | 628 |

## Initial Supporting table - Closed Loop Enable Clarification - KfFCLL_T_AdaptiveLoCoolant

**Description:** LTM learning is inhibited if the engine coolant temperature is below this calibration.

**Value Units:** Degrees Celcius

| y/x | 1 |
|---|---|
| 1 | 39 |

## Initial Supporting table - Closed Loop Enable Clarification - KfFCLP_U_O2ReadyThrshLo

**Description:** Voltage limit checked against when determining if a post converter oxygen sensor is in range

**Value Units:** millivolts

| y/x | 1 |
|---|---|
| 1 | 1,100 |

# Initial Supporting table - Closed Loop Enable Clarification - KfFULC_U_O2_SensorReadyThrshLo

**Description:** Voltage limit checked against when determining if a pre converter oxygen sensor is in range

**Value Units:** millivolts

| y/x | 1 |
|---|---|
| 1 | 1,795 |

## Initial Supporting table - Closed Loop Enable Clarification - KtFCLL_p_AdaptiveLowMAP_Limit

**Description:** Long term fuel learning is disabled below this MAP limit as a function of barometric pressure.

**Value Units:** KPa
**X Unit:** KPa

| y/x | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |

# Initial Supporting table - Closed Loop Enable Clarification - KtFCLP_t_PostIntgIDisableTime

**Description:** Disable integral offset after engine start for this amount of time as a function of start up coolant temperature.

**Value Units:** Time in seconds
**X Unit:** Degrees Celcius

| y/x | -40 | -29 | -18 | -6 | 5 | 16 | 28 | 39 | 50 | 61 | 73 | 84 | 95 | 106 | 118 | 129 | 140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 |

## Initial Supporting table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglRampInTime

**Description:** Time required to ramp integral offset to desired value as a function of start up coolant temperature.

**Value Units:** Time in seconds
**X Unit:** Degrees Celcius

| y/x | -40 | -29 | -18 | -6 | 5 | 16 | 28 | 39 | 50 | 61 | 73 | 84 | 95 | 106 | 118 | 129 | 140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 60.0 | 60.0 | 60.0 | 60.0 | 60.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |

# Initial Supporting table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopAutostart

**Description:** Engine run time following an autostart, as a function of begin run coolant, which must be exceeded to enable CLOSED LOOP.

**Value Units:** Time in seconds
**X Unit:** Degrees Celcius

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 360.0 | 300.0 | 240.0 | 180.0 | 130.0 | 55.0 | 45.0 | 35.0 | 20.0 | 10.0 | 8.0 | 5.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |

## Initial Supporting table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopTime

**Description:** Engine run time, as a function of startup coolant temperature, which must be exceeded to enable CLOSED LOOP.

**Value Units:** Time in seconds
**X Unit:** Degrees Celcius

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 360.0 | 300.0 | 240.0 | 180.0 | 130.0 | 55.0 | 45.0 | 35.0 | 20.0 | 10.0 | 8.0 | 5.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |

# Initial Supporting table - P0442 Volatility Time as a Function of Estimate of Ambient Temperature

**Description:** EONV volatility time as a function of estimated ambient temperature

**Value Units:** Volatility time (seconds)
**X Unit:** Estimated Ambient Temperature (Deg C)

| y/x | -10 | -4 | 1 | 7 | 13 | 18 | 24 | 29 | 35 | 41 | 46 | 52 | 58 | 63 | 69 | 74 | 80 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

## Initial Supporting table - P0442 Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature

**Description:** Maximum engine off time before vehicle off time as a function of estimated ambient temperature (EAT)

**Value Units:** Maximum Engine Off Time Before Vehicle Off Time (seconds)
**X Unit:** Estimated Ambient Temperature (Deg C)

| y/x | -10 | -4 | 1 | 7 | 13 | 18 | 24 | 29 | 35 | 41 | 46 | 52 | 58 | 63 | 69 | 74 | 80 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

# Initial Supporting table - P0442 EONV Pressure Threshold (Pascals)

**Description:** EONV pressure threshold as a function of fuel level and estimated ambient temperature (EAT)

**Value Units:** EONV Pressure Threshold (Pascals)
**X Unit:** Fuel Level (percent) from 0 to 100 with step size 6.25
**Y Units:** Estimated Ambient Temperature (deg C) from -10 to 80 with step size 5.625

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 2 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 3 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 4 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 6 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 7 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 8 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 9 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 10 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 11 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 12 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 13 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 14 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 15 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 16 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |
| 17 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 | -124.5 |

# Initial Supporting table - P0496 Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level

**Description:** Purge valve leak test engine vacuum test time as a function of fuel level

**Value Units:** Purge Valve Leak Test Engine Vacuum Test Time (seconds)
**X Unit:** Fuel Level (percent)

| y/x | 0 | 6 | 12 | 19 | 25 | 31 | 37 | 44 | 50 | 56 | 62 | 69 | 75 | 81 | 87 | 94 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 75 | 72 | 70 | 67 | 65 | 62 | 59 | 57 | 54 | 52 | 49 | 46 | 44 | 41 | 39 | 36 | 33 |

## Initial Supporting table - P057B KtBRKI_K_CmpltTestPointWeight

**Description:**

| y/x | 0.000 | 0.010 | 0.020 | 0.026 | 0.050 | 0.250 | 0.500 | 0.750 | 1.000 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

## Initial Supporting table - P057B KtBRKI_K_FastTestPointWeight

**Description:**

| y/x | 0.000 | 0.010 | 0.020 | 0.026 | 0.050 | 0.250 | 0.500 | 0.750 | 1.000 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

## Initial Supporting table - DFCO_CoolEnblHi_Temp

**Description:**

| y/x | -40 | 0 | 25 |
|---|---|---|---|
| 1 | 30.0 | 30.0 | 30.0 |

## Initial Supporting table - DFCO_DelayAfterStart_Time

**Description:**

| y/x | -30 | 20 | 55 | 70 | 90 |
|---|---|---|---|---|---|
| 1 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |

## Initial Supporting table - DFCO_DsblLo_Vehicle_Speed

**Description:**

| y/x | CeTCOR_e_NonEcoMode | CeTCOR_e_EcoMode |
|---|---|---|
| CeTGRR_e_TransGr1 | 0 | 0 |
| CeTGRR_e_TransGr2 | 0 | 0 |
| CeTGRR_e_TransGr3 | 0 | 0 |
| CeTGRR_e_TransGr4 | 0 | 0 |
| CeTGRR_e_TransGr5 | 0 | 0 |
| CeTGRR_e_TransGr6 | 0 | 0 |
| CeTGRR_e_TransGr9 | 0 | 0 |
| CeTGRR_e_TransGr10 | 0 | 0 |
| CeTGRR_e_TransGrNeut | 0 | 0 |
| CeTGRR_e_TransGrRvrs | 0 | 0 |
| CeTGRR_e_TransGrPark | 0 | 0 |
| CeTGRR_e_TransGr7 | 0 | 0 |
| CeTGRR_e_TransGr8 | 0 | 0 |

# Initial Supporting table - DFCO_EnblHi_Vehicle_Speed

**Description:**

| y/x | CeTCOR_e_NonEcoMode | CeTCOR_e_EcoMode |
|---|---|---|
| CeTGRR_e_TransGr1 | 20.0 | 20.0 |
| CeTGRR_e_TransGr2 | 22.0 | 22.0 |
| CeTGRR_e_TransGr3 | 0.0 | 0.0 |
| CeTGRR_e_TransGr4 | 0.0 | 0.0 |
| CeTGRR_e_TransGr5 | 0.0 | 0.0 |
| CeTGRR_e_TransGr6 | 0.0 | 0.0 |
| CeTGRR_e_TransGr9 | 0.0 | 0.0 |
| CeTGRR_e_TransGr10 | 0.0 | 0.0 |
| CeTGRR_e_TransGrNeut | 0.0 | 0.0 |
| CeTGRR_e_TransGrRvrs | 0.0 | 0.0 |
| CeTGRR_e_TransGrPark | 0.0 | 0.0 |
| CeTGRR_e_TransGr7 | 0.0 | 0.0 |
| CeTGRR_e_TransGr8 | 0.0 | 0.0 |

## Initial Supporting table - DFCO_EngSpdEnblOst

**Description:**

| y/x | -2,500 | -2,150 | -1,500 | -500 | -200 | -150 | -100 | -8 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 500 | 100 | 50 | 0 | 0 | 0 | 0 | 0 | 0 |

# Initial Supporting table - P0068_Delta MAF Threshold f(TPS)

**Description:** Table of delta MAF values as a function of desired throttle position. The output of this table provides a delta MAF that if the measured minus the estimated MAF exceeds, is considered a fail.

**Value Units:** Delta MAF Values (dm)
**X Unit:** Desired Throttle Position (Pct)

| y/x | 10.00 | 15.00 | 20.00 | 25.00 | 30.00 | 35.00 | 40.00 | 45.00 | 100.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 55.48 | 61.44 | 67.30 | 73.12 | 255.00 | 255.00 | 255.00 | 255.00 | 255.00 |

# Initial Supporting table - P0068_Delta MAP Threshold f(TPS)

**Description:** Table of delta MAP values as a function of desired throttle position. The output of this table provides a delta MAP that if the measured minus the estimated MAP exceeds, is considered a fail.

**Value Units:** Delta MAP Values (kPa)
**X Unit:** Desired Throttle Position (Pct)

| y/x | 10.00 | 15.00 | 20.00 | 25.00 | 30.00 | 35.00 | 40.00 | 45.00 | 100.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 48.61 | 46.87 | 39.48 | 34.73 | 255.00 | 255.00 | 255.00 | 255.00 | 255.00 |

# Initial Supporting table - P0068_Maximum MAF f(RPM)

**Description:** Table of maximum MAF values vs. engine speed. This is the maximum MAF the engine can see under all ambient conditions.

**Value Units:** Delta MAF Values (dm)
**X Unit:** Engine Speed (RPM)

| y/x | 600.00 | 1,400.00 | 2,200.00 | 3,000.00 | 3,800.00 | 4,600.00 | 5,400.00 | 6,200.00 | 7,000.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 30.00 | 68.00 | 112.00 | 155.00 | 207.00 | 262.00 | 298.00 | 305.00 | 305.00 |

# Initial Supporting table - P0068_Maximum MAF f(Volts)

**Description:** Table of maximum MAF values vs. system voltage. The output of the air meter is clamped to lower values as system voltage drops off.

**Value Units:** Delta MAF Values (dm)
**X Unit:** System Voltage (V)

| y/x | 6.00 | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.00 | 13.00 | 14.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 69.70 | 180.36 | 376.20 | 511.99 | 511.99 | 511.99 | 511.99 | 511.99 | 511.99 |

## Initial Supporting table - P0326_P0331_AbnormalNoise_Thresh_AFM

**Description:** Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine IS in AFM mode

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.064 | 0.064 | 0.064 | 0.064 | 0.068 | 0.100 | 0.152 | 0.243 | 0.718 | 0.851 | 1.855 | 1.855 | 1.855 | 1.855 | 1.855 | 1.855 | 1.855 |

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

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

**Value Units:** Max Time for Last Seed Timeout (ms)
**X Unit:** Operating Loop Sequence (enum)

**P0606_Last Seed Timeout f(Loop Time) - Part 1**

| y/x | CePISR_e_2p5msSeq | CePISR_e_3p125msSeq | CePISR_e_5msSeq | CePISR_e_6p25msSeq | CePISR_e_10msSeq | CePISR_e_12p5msSeq | CePISR_e_20msSeq | CePISR_e_25msSeq |
|---|---|---|---|---|---|---|---|---|
| 1 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 |

**P0606_Last Seed Timeout f(Loop Time) - Part 2**

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

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

**Description:** Fail threshold for PSW per operating loop.

**Value Units:** Fail threshold for PSW (count)
**X Unit:** Operating Loop (enum)

**P0606_PSW Sequence Fail f(Loop Time) - Part 1**

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

**P0606_PSW Sequence Fail f(Loop Time) - Part 2**

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

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

**Description:** Sample threshold for PSW per operating loop.

**Value Units:** Sample threshold for PSW (count)
**X Unit:** Operating Loop (enum)

**P0606_PSW Sequence Sample f(Loop Time) - Part 1**

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

**P0606_PSW Sequence Sample f(Loop Time) - Part 2**

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

# Initial Supporting table - P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)

**Description:** The Run/Crank voltages required to pull in the PT relay as a function of induction air temperature.

**Value Units:** Run/Crank Voltages required to pull in PT Relay (V)
**X Unit:** Induction Air Temperature (deg C)

| y/x | 23.0 | 85.0 | 95.0 | 105.0 | 125.0 |
|---|---|---|---|---|---|
| 1 | 7.000 | 8.699 | 9.000 | 9.199 | 10.000 |

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

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

**Value Units:** Torque Security Threshold for Engine Sync and Time Based Delta Pressure (kPa)
**X Unit:** Desired Engine Torque (Nm)

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

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

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

**Value Units:** External Load Table for SPDR (Nm)
**X Unit:** Engine Oil Temperature (deg C)
**Y Units:** Engine Speed (RPM)

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

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

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

**Value Units:** Max Time for Last Seed Timeout (ms)
**X Unit:** Operating Loop Sequence (enum)

**P0606_Last Seed Timeout f(Loop Time) - Part 1**

| y/x | CePISR_e_2p5msSeq | CePISR_e_3p125msSeq | CePISR_e_5msSeq | CePISR_e_6p25msSeq | CePISR_e_10msSeq | CePISR_e_12p5msSeq | CePISR_e_20msSeq | CePISR_e_25msSeq |
|---|---|---|---|---|---|---|---|---|
| 1 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 |

**P0606_Last Seed Timeout f(Loop Time) - Part 2**

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

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

**Description:** Fail threshold for PSW per operating loop.

**Value Units:** Fail threshold for PSW (count)
**X Unit:** Operating Loop (enum)

**P0606_PSW Sequence Fail f(Loop Time) - Part 1**

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

**P0606_PSW Sequence Fail f(Loop Time) - Part 2**

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

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

**Description:** Sample threshold for PSW per operating loop.

**Value Units:** Sample threshold for PSW (count)
**X Unit:** Operating Loop (enum)

**P0606_PSW Sequence Sample f(Loop Time) - Part 1**

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

**P0606_PSW Sequence Sample f(Loop Time) - Part 2**

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

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

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

**Value Units:** Torque Security Threshold for Engine Sync and Time Based Delta Pressure (kPa)
**X Unit:** Desired Engine Torque (Nm)

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

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

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

**Value Units:** External Load Table for SPDR (Nm)
**X Unit:** Engine Oil Temperature (deg C)
**Y Units:** Engine Speed (RPM)

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

# Initial Supporting table - P0191 - High fail limit of fuel control due to high pressure sensor skewed High

**Description:** High fail limit of fuel control due to high pressure sensor skewed High error as Function of desired pressure

**Value Units:** Ratio
**X Unit:** Desired Pressure (Mpa)

| y/x | 1.50 | 3.00 | 4.00 | 15.00 | 20.00 | 25.00 | 27.50 | 32.00 | 36.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.09 | 1.05 |

# Initial Supporting table - P0191 - Low fail limit of fuel control due to pressure sensor skewed low

**Description:** Low fail limit of fuel control due to pressure sensor skewed low error as Function of desired pressure

**Value Units:** Ratio
**X Unit:** Desired Pressure (Mpa)

| y/x | 1.50 | 3.00 | 4.00 | 15.00 | 20.00 | 25.00 | 27.50 | 32.00 | 36.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 0.86 | 0.86 | 0.86 | 0.86 | 0.86 | 0.86 | 0.86 | 0.92 | 0.95 |

## Initial Supporting table - P0330_OpenCktThrshMax2 (20kHz)

**Description:** Max threshold table for the 20 KHz portion of the open circuit diagnostic for sensor 2. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the min cal filters.

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.949 | 9.000 | 9.029 | 9.020 | 8.988 | 8.920 | 8.828 | 8.699 | 8.549 | 8.359 | 8.148 | 7.898 | 7.629 | 7.318 | 6.988 | 6.619 | 6.229 |

## Initial Supporting table - P0330_OpenCktThrshMax2 (NN)

**Description:** Max threshold table for the Normal Noise for sensor 2. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the min cal filters.

| y/x | 2,700 | 2,900 | 3,000 | 3,250 | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

## Initial Supporting table - P0330_OpenCktThrshMin2 (20 kHz)

**Description:** Min threshold table for the Normal Noise portion of the open circuit diagnostic. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the max cal filters.

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.689 | 2.760 | 2.809 | 2.840 | 2.850 | 2.840 | 2.809 | 2.760 | 2.689 | 2.600 | 2.488 | 2.359 | 2.209 | 2.039 | 1.850 | 1.639 | 1.408 |

## Initial Supporting table - P0330_OpenCktThrshMin2 (NN)

**Description:** Min threshold table for the Normal Noise portion of the open circuit diagnostic for sensor 2. The lookup into this table will be filtered to define the max threshold or the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the max cal filters.

| y/x | 2,700 | 2,900 | 3,000 | 3,250 | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

# Initial Supporting table - P0331_AbnormalLo2

**Description:** The low limit (no Hi limit, left for excessive knock) for sensor 2 for the performance diagnostic, abnormal noise; used for per sensor and per cyl performance diagnostics. The lookup in this table as a function of RPM and APC is then filtered using KeKNKD_k_PerfAbnFilter (KeKNKD_k_PerfCylAbnFilter for per cyl), and then this filtered quantity VaKNKD_k_PerfAbnFiltLimitLo (VaKNKD_k_PerfCylAbnFiltLimitLo for per cyl) becomes the actual limit. The code will immediately set if the filtered intensity goes below the filtered threshold

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.060 | 0.060 | 0.060 | 0.060 | 0.060 | 0.069 | 0.149 | 0.239 | 0.340 | 0.449 | 0.569 | 0.699 | 0.840 | 0.840 | 0.840 | 0.840 | 0.840 |

## Initial Supporting table - P0331_AbnormalLoAFM_2

**Description:** The low limit for AFM mode (no Hi limit, left for excessive knock) for sensor 2 for the performance diagnostic, abnormal noise; used for per sensor and per cyl performance diagnostics. The lookup in this table as a function of RPM and APC is then filtered using KeKNKD_k_PerfAbnFilter (KeKNKD_k_PerfCylAbnFilter for per cyl), and then this filtered quantity VaKNKD_k_PerfAbnFiltLimitLo (VaKNKD_k_PerfCylAbnFiltLimitLo for per cyl) becomes the actual limit. The code will immediately set if the filtered intensity goes below the filtered threshold

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.060 | 0.060 | 0.060 | 0.060 | 0.060 | 0.069 | 0.149 | 0.239 | 0.340 | 0.449 | 0.569 | 0.699 | 0.840 | 0.840 | 0.840 | 0.840 | 0.840 |

## Initial Supporting table - P06B7_OpenTestCktMax2

**Description:** Max threshold table for the 20 KHz for the test circuit diagnostic for sensor 2. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the min cal filters.

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.049 | 0.100 | 0.119 | 0.180 | 0.299 | 0.398 | 0.510 | 0.520 | 0.529 | 0.750 | 1.100 | 1.398 | 1.600 | 1.799 | 2.000 | 2.199 | 2.398 |

## Initial Supporting table - P06B7_OpenTestCktMin2

**Description:** Min threshold table for the 20 KHz for the test circuit diagnostic for sensor 2. The lookup into this table will be filtered to define the max threshold for the filtered intensity. To fail, the filtered intensity needs to fall between this cal and the max cal filters.

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 0.020 | 0.020 | 0.049 | 0.078 | 0.119 | 0.129 | 0.158 | 0.180 | 0.199 | 0.219 | 0.260 | 0.299 | 0.318 | 0.340 |

# Initial Supporting table - P129F Threshold High

**Description:** P129F Filtered Fuel Pump Speed Error High Threshold [over-performing motor]
Instantaneously calculated filtered pump speed error measured is higher than commanded

**Value Units:** revs / min
**X Unit:** revs / min [commanded pump speed]
**Y Units:** kiloPascals [requested fuel pressure]

| y/x | 200.0 | 300.0 | 400.0 | 500.0 | 600.0 |
|---|---|---|---|---|---|
| 1,000.0 | -675.0 | -675.0 | -675.0 | -675.0 | -675.0 |
| 2,000.0 | -675.0 | -675.0 | -675.0 | -675.0 | -675.0 |
| 3,000.0 | -675.0 | -675.0 | -675.0 | -675.0 | -675.0 |
| 4,000.0 | -675.0 | -675.0 | -675.0 | -675.0 | -675.0 |
| 5,000.0 | -675.0 | -675.0 | -675.0 | -675.0 | -675.0 |
| 6,000.0 | -675.0 | -675.0 | -675.0 | -675.0 | -675.0 |
| 7,000.0 | -1,200.0 | -1,200.0 | -1,200.0 | -1,200.0 | -1,200.0 |

# Initial Supporting table - P129F Threshold Low

**Description:** P129F Filtered Fuel Pump Speed Error Low Threshold [under-performing motor]
Instantaneously calculated filtered pump speed error measured is lower than commanded

**Value Units:** revs / min
**X Unit:** revs / min [commanded pump speed]
**Y Units:** kiloPascals [requested fuel pressure]

| y/x | 200.0 | 300.0 | 400.0 | 500.0 | 600.0 |
|---|---|---|---|---|---|
| 1,000.0 | 675.0 | 675.0 | 675.0 | 675.0 | 675.0 |
| 2,000.0 | 675.0 | 675.0 | 675.0 | 675.0 | 675.0 |
| 3,000.0 | 675.0 | 675.0 | 675.0 | 675.0 | 675.0 |
| 4,000.0 | 675.0 | 675.0 | 675.0 | 675.0 | 675.0 |
| 5,000.0 | 675.0 | 675.0 | 675.0 | 675.0 | 675.0 |
| 6,000.0 | 675.0 | 675.0 | 675.0 | 675.0 | 675.0 |
| 7,000.0 | 1,200.0 | 1,200.0 | 1,200.0 | 1,200.0 | 1,200.0 |

# Initial Supporting table - P228C P2C1F - High Pressure Pump Control (HPC) fail threshold of pressure too low

**Description:** The High Pressure Pump Control (HPC) fail threshold of pressure too low test as a function of desired fuel pressure.

**Value Units:** Pressure Error - Desired pressure - Actual Pressure (Mpa)
**X Unit:** Desired Pressure (Mpa)

| y/x | 2 | 3 | 4 | 15 | 20 | 25 | 28 | 32 | 36 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

# Initial Supporting table - P228D P2C20 - High Pressure Pump Control (HPC) fail threshold for pressure too high

**Description:** The High Pressure Pump Control (HPC) fail threshold for pressure too high test as a function of desired fuel pressure.

**Value Units:** Pressure Error - Desired pressure - Actual Pressure (Mpa)
**X Unit:** Desired Pressure (Mpa)

| y/x | 1.50 | 3.00 | 4.00 | 15.00 | 20.00 | 25.00 | 27.50 | 32.00 | 36.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -3.00 | -3.00 | -3.00 | -3.00 | -3.00 | -3.00 | -3.00 | -3.00 | -3.00 |

# Initial Supporting table - P2635 Max Fuel Flow

**Description:** P2635 Maximum Fuel Flow Disable Criteria
Maximum allowed fuel flow values above which the diagnostic is disabled

**Value Units:** grams / second
**X Unit:** kilopascals [commanded fuel pressure]
**Y Units:** volts [device supply]

| y/x | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 700 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 6 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 8 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 9 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 11 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 12 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 14 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 15 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 17 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 18 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 20 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 21 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 23 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 24 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 26 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 27 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |
| 29 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 | 512 |

# Initial Supporting table - P2635 Threshold High

**Description:** P2635 Filtered Fuel Pressure Error High Threshold [under-performing pump]
Instantaneously calculated filtered fuel pressure error

**Value Units:** kilopascals
**X Unit:** kilopascals [commanded fuel pressure]
**Y Units:** grams / sec [fuel flow]

| y/x | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 700 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 2 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 3 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 5 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 6 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 8 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 9 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 11 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 12 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 14 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 15 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 17 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 18 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 20 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 21 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 23 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 24 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 26 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 27 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 29 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 30 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 32 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 33 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 35 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 36 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 38 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 39 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 41 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 42 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 44 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 45 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |

| Initial Supporting table - P2635 Threshold High | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 47 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |
| 48 | 30 | 38 | 45 | 53 | 60 | 68 | 75 | 100 | 280 |

# Initial Supporting table - P2635 Threshold Low

**Description:** P2635 Filtered Pressure Error Low Threshold [over-performing pump]
Instantaneously calculated filtered fuel pressure error

**Value Units:** kilopascals
**X Unit:** kilopascals [commanded fuel pressure]
**Y Units:** grams / second [fuel flow]

| y/x | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 700 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 2 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 3 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 5 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 6 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 8 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 9 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 11 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 12 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 14 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 15 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 17 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 18 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 20 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 21 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 23 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 24 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 26 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 27 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 29 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 30 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 32 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 33 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 35 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 36 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 38 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 39 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 41 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 42 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 44 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 45 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |

| Initial Supporting table - P2635 Threshold Low | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 47 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |
| 48 | -440 | -390 | -340 | -290 | -240 | -190 | -140 | -90 | -65 |

## - P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F - kaFULO_n_ P

**Description:** Max Engine Speed to allow Multipulse function of injector energy profile

**Value Units:** Max Engine Speed to allow Multipulse
**X Unit:** Injector Energy Profile
**Y Units:** Multipulse Mode (0 = Double Pulse, 1 = Triple Pulse)

| y/x | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| 0 | 3,600 | 3,600 | 3,600 | 3,600 |
| 1 | 3,000 | 3,000 | 3,000 | 3,000 |

# Initial Supporting table - Minimum Non-Purge Samples for Purge Vapor Fuel

**Description:** Number of Fuel Trim Monitor sample counts required to allow the Purge Vapor Fuel value to inhibit the Intrusive Rich test

**Value Units:** Sample Counts per loop rate of 100ms (divide by 10 to get seconds)
**X Unit:** Long Term Fuel Trim Cell I.D. (no units) (Only PurgeOff cells are used)

| Minimum Non-Purge Samples for Purge Vapor Fuel - Part 1 | | | | |
|---|---|---|---|---|
| y/x | CeFADR_e_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 | 305 | 305 | 305 | 305 |
| **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 | 305 | 305 | 70 | 70 |

# Initial Supporting table - P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage

**Description:** Identifies which Long Term Fuel Trim Cell I.D.s are used for diagnosis. Only cells identified as "CeFADD_e_NonSelectedCell" are not used for diagnosis.

| **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 1** | | | | |
|---|---|---|---|---|
| y/x | CeFADR_e_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_SelectedPurgeCell |
| **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 3** | | | | |
| y/x | CeFADR_e_Cell08_PurgOffAirMode5 | CeFADR_e_Cell09_PurgOffAirMode4 | CeFADR_e_Cell10_PurgOffAirMode3 | CeFADR_e_Cell11_PurgOffAirMode2 |
| 1 | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell |
| **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 4** | | | | |
| y/x | CeFADR_e_Cell12_PurgOffAirMode1 | CeFADR_e_Cell13_PurgOffAirMode0 | CeFADR_e_Cell14_PurgOffIdle | CeFADR_e_Cell15_PurgOffDecel |
| 1 | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell |

# Initial Supporting table - Startup Engine Coolant adjusment to Minimum accumulation time

**Description:** Time offset added to the minimum accumulation time based on Startup Coolant.

**Value Units:** Counts (10 counts equals 1 second)
**X Unit:** Degree C

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 500 | 500 | 500 | 500 | 300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# Initial Supporting table - RufCyl_Decel

**Description:** Used for P0300-P0308. Crankshaft decel threshold during Idle or GPF regen. Thresholds are a function of rpm and % engine Load.

**Value Units:** Delta time per cylinder (usec)
**X Unit:** rpm
**Y Units:** percent load of max indicated torque (%)

**RufCyl_Decel - Part 1**

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 1,650 | 1,500 | 943 | 575 | 400 | 282 | 219 | 189 | 134 | 93 | 49 | 28 | 20 |
| 6 | 1,650 | 1,500 | 925 | 575 | 400 | 260 | 189 | 175 | 132 | 93 | 46 | 28 | 20 |
| 8 | 1,760 | 1,600 | 925 | 600 | 425 | 292 | 201 | 166 | 132 | 95 | 47 | 30 | 20 |
| 10 | 1,980 | 1,800 | 962 | 635 | 451 | 320 | 206 | 157 | 126 | 85 | 49 | 35 | 28 |
| 12 | 2,200 | 1,986 | 1,033 | 663 | 472 | 347 | 217 | 161 | 116 | 89 | 50 | 42 | 33 |
| 14 | 2,750 | 2,173 | 1,114 | 699 | 503 | 366 | 236 | 188 | 129 | 92 | 59 | 53 | 40 |
| 16 | 3,025 | 2,326 | 1,256 | 783 | 546 | 390 | 262 | 204 | 137 | 87 | 69 | 62 | 46 |
| 18 | 3,135 | 2,508 | 1,412 | 915 | 631 | 423 | 282 | 223 | 153 | 103 | 90 | 73 | 52 |
| 20 | 3,245 | 2,665 | 1,568 | 1,030 | 721 | 468 | 304 | 250 | 182 | 115 | 103 | 86 | 59 |
| 22 | 3,410 | 2,837 | 1,700 | 1,136 | 793 | 497 | 330 | 275 | 204 | 125 | 110 | 97 | 65 |
| 24 | 3,575 | 2,985 | 1,800 | 1,237 | 859 | 518 | 358 | 294 | 235 | 139 | 126 | 108 | 75 |
| 26 | 3,740 | 3,142 | 1,900 | 1,332 | 935 | 549 | 388 | 316 | 265 | 164 | 149 | 118 | 84 |
| 28 | 3,850 | 3,284 | 1,994 | 1,429 | 1,002 | 614 | 419 | 337 | 298 | 190 | 174 | 129 | 90 |
| 30 | 3,960 | 3,431 | 2,084 | 1,526 | 1,075 | 680 | 451 | 357 | 319 | 215 | 196 | 138 | 95 |
| 32 | 4,228 | 3,568 | 2,183 | 1,632 | 1,152 | 742 | 482 | 378 | 337 | 253 | 225 | 145 | 101 |
| 34 | 4,498 | 3,695 | 2,287 | 1,750 | 1,236 | 811 | 514 | 403 | 365 | 291 | 249 | 154 | 108 |
| 36 | 4,765 | 3,822 | 2,412 | 1,875 | 1,326 | 876 | 548 | 426 | 390 | 328 | 271 | 165 | 114 |

**RufCyl_Decel - Part 2**

| y/x | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,001 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 6 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 8 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 10 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 14 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 16 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 18 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 20 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 24 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

| Initial Supporting table - RufCyl_Decel | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 28 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 32 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 34 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 36 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

# Initial Supporting table - RufCyl_Jerk

**Description:** Crankshaft jerk threshold during Idle or GPF regen. Thresholds are a function of rpm and % engine Load.

**Value Units:** Delta time per cylinder (usec)
**X Unit:** rpm
**Y Units:** percent load of max indicated torque (%)

**RufCyl_Jerk - Part 1**

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 1,650 | 1,500 | 925 | 575 | 444 | 292 | 168 | 143 | 120 | 98 | 50 | 40 | 24 |
| 6 | 1,650 | 1,500 | 925 | 575 | 446 | 288 | 171 | 126 | 112 | 91 | 49 | 39 | 23 |
| 8 | 1,760 | 1,600 | 894 | 600 | 446 | 290 | 164 | 114 | 106 | 84 | 47 | 39 | 22 |
| 10 | 1,980 | 1,800 | 818 | 587 | 449 | 292 | 151 | 83 | 68 | 62 | 48 | 39 | 28 |
| 12 | 2,200 | 1,961 | 731 | 538 | 449 | 292 | 155 | 92 | 59 | 56 | 52 | 45 | 34 |
| 14 | 2,522 | 2,129 | 706 | 527 | 449 | 300 | 187 | 116 | 99 | 73 | 60 | 54 | 38 |
| 16 | 2,796 | 2,267 | 853 | 612 | 460 | 337 | 218 | 115 | 107 | 88 | 71 | 63 | 43 |
| 18 | 2,983 | 2,406 | 1,003 | 766 | 534 | 423 | 250 | 145 | 131 | 109 | 92 | 73 | 52 |
| 20 | 3,187 | 2,561 | 1,152 | 897 | 635 | 475 | 274 | 168 | 156 | 136 | 110 | 83 | 59 |
| 22 | 3,410 | 2,716 | 1,333 | 997 | 727 | 533 | 297 | 193 | 184 | 164 | 130 | 93 | 65 |
| 24 | 3,575 | 2,879 | 1,578 | 1,086 | 779 | 591 | 325 | 224 | 215 | 190 | 152 | 105 | 74 |
| 26 | 3,740 | 3,054 | 1,824 | 1,204 | 830 | 644 | 353 | 256 | 245 | 225 | 170 | 116 | 82 |
| 28 | 3,901 | 3,189 | 2,027 | 1,307 | 899 | 705 | 383 | 284 | 275 | 254 | 190 | 126 | 88 |
| 30 | 4,083 | 3,348 | 2,261 | 1,396 | 967 | 771 | 416 | 314 | 299 | 276 | 205 | 134 | 95 |
| 32 | 4,265 | 3,490 | 2,398 | 1,510 | 1,030 | 834 | 452 | 342 | 327 | 303 | 219 | 142 | 101 |
| 34 | 4,497 | 3,617 | 2,540 | 1,617 | 1,093 | 900 | 490 | 377 | 352 | 328 | 236 | 150 | 108 |
| 36 | 4,674 | 3,763 | 2,695 | 1,717 | 1,150 | 963 | 523 | 415 | 380 | 356 | 254 | 160 | 114 |

**RufCyl_Jerk - Part 2**

| y/x | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,001 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 6 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 8 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 10 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 14 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 16 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 18 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 20 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 24 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

| Initial Supporting table - RufCyl_Jerk | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 28 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 32 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 34 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 36 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

# Initial Supporting table - RufSCD_Decel

**Description:** Used for P0300-P0308. Crankshaft decel threshold while in SCD mode during Idle or GPF regen. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load. Note: Misfire's Load term is %, but not PID$04. PID $04 is not robust to temperature and alititude shifts. (especially decel and jerk thresholds since they track actual air trapped in cylinder)

**Value Units:** Delta time per cylinder (usec)
**X Unit:** rpm
**Y Units:** percent load of max indicated torque (%)

**RufSCD_Decel - Part 1**

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 607 | 607 | 344 | 214 | 148 | 100 | 77 | 58 | 48 | 32,767 | 32,767 | 32,767 | 32,767 |
| 6 | 590 | 576 | 318 | 198 | 138 | 95 | 70 | 55 | 48 | 32,767 | 32,767 | 32,767 | 32,767 |
| 8 | 610 | 586 | 337 | 197 | 136 | 95 | 69 | 54 | 50 | 32,767 | 32,767 | 32,767 | 32,767 |
| 10 | 658 | 617 | 353 | 212 | 146 | 98 | 73 | 51 | 49 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 734 | 668 | 382 | 231 | 157 | 106 | 80 | 51 | 55 | 32,767 | 32,767 | 32,767 | 32,767 |
| 14 | 858 | 722 | 415 | 254 | 172 | 117 | 87 | 51 | 66 | 32,767 | 32,767 | 32,767 | 32,767 |
| 16 | 1,195 | 789 | 449 | 278 | 188 | 132 | 96 | 52 | 75 | 32,767 | 32,767 | 32,767 | 32,767 |
| 18 | 1,586 | 858 | 480 | 310 | 205 | 151 | 111 | 61 | 82 | 32,767 | 32,767 | 32,767 | 32,767 |
| 20 | 2,066 | 941 | 520 | 347 | 226 | 172 | 126 | 74 | 92 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 24 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 26 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 28 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 32 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 34 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 36 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

**RufSCD_Decel - Part 2**

| y/x | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,001 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 6 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 8 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 10 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 14 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 16 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 18 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 20 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

| Initial Supporting table - RufSCD_Decel | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 24 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 26 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 28 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 32 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 34 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 36 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

# Initial Supporting table - RufSCD_Jerk

**Description:** Used for P0300-P0308. Crankshaft jerk threshold while in SCD mode during Idle or GPF regen. SCD mode uses smaller windows 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 (%)

**RufSCD_Jerk - Part 1**

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 886 | 554 | 303 | 185 | 126 | 95 | 73 | 54 | 43 | 32,767 | 32,767 | 32,767 | 32,767 |
| 6 | 766 | 520 | 264 | 160 | 117 | 84 | 71 | 50 | 37 | 32,767 | 32,767 | 32,767 | 32,767 |
| 8 | 716 | 508 | 270 | 160 | 117 | 82 | 70 | 50 | 37 | 32,767 | 32,767 | 32,767 | 32,767 |
| 10 | 666 | 506 | 264 | 159 | 123 | 88 | 70 | 52 | 40 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 752 | 518 | 260 | 156 | 128 | 94 | 74 | 55 | 45 | 32,767 | 32,767 | 32,767 | 32,767 |
| 14 | 873 | 574 | 256 | 149 | 130 | 94 | 82 | 58 | 62 | 32,767 | 32,767 | 32,767 | 32,767 |
| 16 | 1,278 | 659 | 328 | 197 | 132 | 103 | 90 | 64 | 80 | 32,767 | 32,767 | 32,767 | 32,767 |
| 18 | 1,618 | 740 | 422 | 265 | 158 | 129 | 102 | 82 | 91 | 32,767 | 32,767 | 32,767 | 32,767 |
| 20 | 2,032 | 825 | 538 | 357 | 212 | 157 | 123 | 104 | 110 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 24 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 26 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 28 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 32 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 34 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 36 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

**RufSCD_Jerk - Part 2**

| y/x | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,001 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 6 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 8 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 10 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 14 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 16 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 18 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 20 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

| Initial Supporting table - RufSCD_Jerk | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 26 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 28 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 30 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 32 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 34 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 36 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

# Initial Supporting table - Misfire_IMEP_BinID_Load_Axis

**Description:** Cylinder LOAD for defining Y AXIS in Misfire_IMEP_BinID_versus_Speed_and_Load

**Value Units:** Indicated Mean Effective Pressure
**X Unit:** Bin ID row number

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 200 | 400 | 600 | 800 | 1,000 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,200 |

## Initial Supporting table - Misfire_IMEP_BinID_RPM_Axis

**Description:** Cylinder RPM for defining the X AXIS in Misfire_IMEP_BinID_versus_Speed_and_Load

**Value Units:** RPM
**X Unit:** BinID Column number

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 |

# Initial Supporting table - Misfire_IMEP_BinID_vs_RPM_Load

**Description:** Misfire calibrations used with Crankshaft Based IMEP (Indicated Mean Effective Pressure) estimatimation do not interpolate versus speed and load. Instead they use unique calibrations within each small speed load "bin". Each Bin has has its own "bin ID". This Bin ID keeps all the Crank Based IMEP estimate calculations and various Misfire calibrations synchronized while minimzing through put. Each speed load range defines a unique "Bin ID" in this Bin ID table. The BinID tables Y axis is cylinder load, and X axis is rpm as defined in Misfire_IMEP_BinID_Load_Axis and Misfire_IMEP_BinID_RPM_Axis tables

**Value Units:** Bin ID
**X Unit:** RPM range
**Y Units:** Cylinder Load Range

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 17 | 34 | 51 | 68 | 85 | 102 | 119 | 136 |
| 1 | 1 | 18 | 35 | 52 | 69 | 86 | 103 | 120 | 137 |
| 2 | 2 | 19 | 36 | 53 | 70 | 87 | 104 | 121 | 138 |
| 3 | 3 | 20 | 37 | 54 | 71 | 88 | 105 | 122 | 139 |
| 4 | 4 | 21 | 38 | 55 | 72 | 89 | 106 | 123 | 140 |
| 5 | 5 | 22 | 39 | 56 | 73 | 90 | 107 | 124 | 141 |
| 6 | 6 | 23 | 40 | 57 | 74 | 91 | 108 | 125 | 142 |
| 7 | 7 | 24 | 41 | 58 | 75 | 92 | 109 | 126 | 143 |
| 8 | 8 | 25 | 42 | 59 | 76 | 93 | 110 | 127 | 144 |
| 9 | 9 | 26 | 43 | 60 | 77 | 94 | 111 | 128 | 145 |
| 10 | 10 | 27 | 44 | 61 | 78 | 95 | 112 | 129 | 146 |
| 11 | 11 | 28 | 45 | 62 | 79 | 96 | 113 | 130 | 147 |
| 12 | 12 | 29 | 46 | 63 | 80 | 97 | 114 | 131 | 148 |
| 13 | 13 | 30 | 47 | 64 | 81 | 98 | 115 | 132 | 149 |
| 14 | 14 | 31 | 48 | 65 | 82 | 99 | 116 | 133 | 150 |
| 15 | 15 | 32 | 49 | 66 | 83 | 100 | 117 | 134 | 151 |
| 16 | 16 | 33 | 50 | 67 | 84 | 101 | 118 | 135 | 152 |

# Initial Supporting table - Misfire_IMEP_Thresh_vs_BinID

**Description:** Crankshaft Indicated Mean Effective Pressure (IMEP) Estimate that below which will be considered misfire. Misfire calibrations used with Crankshaft Based IMEP (Indicated Mean Effective Pressure) estimatimation do not interpolate versus speed and load. Instead they use unique calibrations within each small speed load region or "bin". Each Bin has has its own "BinID". This BinID keeps all the Crank Based IMEP estimate calculations and various Misfire calibrations synchronized while minimzing through put. Each speed load range defines a unique "Bin ID" in this Bin ID table.
The BinID table's Y axis is cylinder load, and X axis is rpm as defined in Misfire_IMEP_BinID_Load_Axis and Misfire_IMEP_BinID_RPM_Axis tables

**Value Units:** KPa
**X Unit:** BinID

**Misfire_IMEP_Thresh_vs_BinID - Part 1**

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

**Misfire_IMEP_Thresh_vs_BinID - Part 2**

| y/x | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Misfire_IMEP_Thresh_vs_BinID - Part 3**

| y/x | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Misfire_IMEP_Thresh_vs_BinID - Part 4**

| y/x | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Misfire_IMEP_Thresh_vs_BinID - Part 5**

| y/x | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Misfire_IMEP_Thresh_vs_BinID - Part 6**

| y/x | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Misfire_IMEP_Thresh_vs_BinID - Part 7**

| y/x | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Misfire_IMEP_Thresh_vs_BinID - Part 8**

| y/x | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Misfire_IMEP_Thresh_vs_BinID - Part 9**

| y/x | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Initial Supporting table - Misfire_IMEP_Thresh_vs_BinID | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Initial Supporting table - P0324_PerCyl_ExcessiveKnock_Threshold

**Description:** Fail threshold for the Knock Performance per-cylinder Excessive Knock Diagnostic

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 |

## Initial Supporting table - P0325_P0330_OpenCktThrshMax (20 kHz)

**Description:** Knock Open Circuit Diagnostic Maximum Threshold when using the 20 kHz method (see "OpenMethod" description)

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.7148 | 5.7148 | 5.6797 | 5.6719 | 5.5723 | 5.5879 | 5.5508 | 5.5508 | 5.5410 | 5.1797 | 4.6504 | 4.1230 | 4.1230 | 4.1230 | 4.1230 | 4.1230 | 4.1230 |

## Initial Supporting table - P0325_P0330_OpenCktThrshMax (Normal Noise)

**Description:** Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

| y/x | 2,700 | 2,900 | 3,000 | 3,250 | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

## Initial Supporting table - P0325_P0330_OpenCktThrshMin (20 kHz)

**Description:** Knock Open Circuit Diagnostic Minimum Threshold when using the 20 kHz method (see "OpenMethod" description)

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.6348 | 2.6211 | 2.6074 | 2.5996 | 2.5703 | 2.5605 | 2.5273 | 2.4941 | 2.4902 | 2.4219 | 2.2539 | 2.2539 | 2.2539 | 2.2539 | 2.2539 | 2.2539 | 2.2539 |

## Initial Supporting table - P0325_P0330_OpenCktThrshMin (Normal Noise)

**Description:** Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

| y/x | 2,700 | 2,900 | 3,000 | 3,250 | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

# Initial Supporting table - P0325_P0330_OpenMethod_2

**Description:** Defines which Knock Open Circuit Diagnostic method to use.

**P0325_P0330_OpenMethod_2 - Part 1**

| y/x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1 | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz |

**P0325_P0330_OpenMethod_2 - Part 2**

| y/x | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|
| 1 | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz |

**P0325_P0330_OpenMethod_2 - Part 3**

| y/x | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|
| 1 | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz |

**P0325_P0330_OpenMethod_2 - Part 4**

| y/x | 15 | 16 | | | |
|---|---|---|---|---|---|
| 1 | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | | | |

## Initial Supporting table - P0326_P0331_AbnormalNoise_CylsEnabled

**Description:** Specifies which cylinders will be used for the Abnormal Noise portion of the performance diagnostics (1 = cylinder used, 0 = cylinder not used)

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

## Initial Supporting table - P0326_P0331_AbnormalNoise_Threshold

**Description:** Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine is NOT in AFM mode

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.064 | 0.064 | 0.064 | 0.064 | 0.068 | 0.100 | 0.152 | 0.243 | 0.718 | 0.851 | 1.855 | 1.855 | 1.855 | 1.855 | 1.855 | 1.855 | 1.855 |

## Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMax

**Description:** Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic. Used only when the 20 kHz method is being used (see "OpenMethod" description). The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.254 | 0.254 | 0.240 | 0.242 | 0.268 | 0.338 | 0.383 | 0.506 | 0.643 | 0.844 | 0.998 | 1.150 | 1.150 | 1.150 | 1.150 | 1.150 | 1.150 |

## Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMin

**Description:** Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic. Used only when the 20 kHz method is being used (see "OpenMethod" description). The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.127 | 0.127 | 0.129 | 0.129 | 0.131 | 0.146 | 0.189 | 0.221 | 0.326 | 0.426 | 0.541 | 0.541 | 0.541 | 0.541 | 0.541 | 0.541 | 0.541 |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| **Transmission Fluid Temperature** | | | | | | | | |
| Transmission Fluid Temperature Sensor Circuit Performance | P0711 | TFT Performance Test<br>The first case Startup delta test monitors the sump temperature sensor to determine if it is changing too little for the operating environment of the transmission. The diagnostic makes sure that temperature is changing and not stuck at a value. The first case runs to completion once each drive cycle. The Noise Test compares the sample to sample delta to a noise calibration and then fails if there is enough fail counts in a given sampling period. | Case 1: Stuck Sensor<br>The test takes a sample of temperature at startup and uses that as an index into tables to set limits on how much of a change in temperature<br>required over a period of time | <br><br><br><br>0 - 1.7969 deg. C<br>100 - 1200 seconds | Not Test Failed This Key On<br><br><br><br><br><br><br><br><br>Battery Voltage between<br><br>TCM and Engine has been running for at least<br><br>Engine speed<br><br>Output speed | P0711<br>P0712<br>P0713<br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br><br><br><br>9 V and 18 V<br><br>2 seconds<br><br><br>>= 450 RPM<br><br>>=100 RPM | 2.5 seconds<br><br>frequency<br>250 ms | Two Trips |
| | | | Case 2: Noise Test<br>Change from previous<br>for | >= 20 deg. C<br>14 events | | | | |
| | | TFT Performance Delta Test<br>This diagnostic test monitors the sump temperature sensor to determine if it is changing too little for the operating environment of the transmission. The diagnostic makes sure that temperature is changing and not stuck at a value. The diagnostic test runs to completion once each drive cycle. | Case 3: Short Term Delta Temp<br>This test samples the initial sump temperature every<br>THEN<br>compares the absolute value of the difference between the initial sump temperature and the value at the end of<br>to compare the absolute value difference between the two values<br>absolute value difference | <br>6 seconds<br><br><br><br>6 seconds<br><br><br>>= 40 | Not Test Failed This Key On<br><br><br>Battery Voltage between<br><br>Engine speed<br><br>Output speed | P0711<br>P0712<br>P0713<br><br><br>9 V and 18 V<br><br>>= 450 RPM<br><br>>=100 RPM | 6 seconds<br><br>frequency<br>250 ms | |

| 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 | P0712 | Out of range low. | Transmission Fluid Temperature<br>for a time | >=150 deg. C<br>> 2.5 seconds. | Not Test Failed This Key On<br><br><br><br>Battery Voltage between | P0711<br>P0712<br>P0713<br><br><br>9 V and 18 V | 2.5 seconds<br><br>frequency<br>250 ms | Two Trips |
| Transmission Fluid Temperature Sensor Circuit High | P0713 | Out of range high. | Transmission Fluid Temperature<br>for a time | <= -45 deg. C<br>> 2.5 seconds | Not Test Failed This Key On<br><br><br><br>Battery Voltage between<br><br>IF Engine run time<br><br>OR<br>Engine Coolant Temperature<br>for a time | P0711<br>P0712<br>P0713<br><br><br>9 V and 18 V<br><br>>= 600 seconds<br><br><br>>= 20 deg. C<br>>= 20 seconds | 2.5 seconds<br><br>frequency<br>250 ms | Two Trips |
| **Speed Sensors** | | | | | | | | |
| Turbine Speed Sensor Circuit | P0715 | This test detects a Turbine Speed Sensor circuit short to battery, ground, or open. | Turbine speed sensor circuit hardware monitor state<br>for | = Fault<br>100 samples | Not Test Failed This Key On | P0715 | 2 seconds<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Turbine Shaft Speed Sensor Circuit Performance | P0716 | Turbine Speed Sensor Performance Test<br>This test detects large changes in Turbine Speed and noisy Turbine Speed by comparing to calibration values. | | | Not Test Failed This Key On<br><br><br><br><br><br><br>No Fault Pending DTCs for this drive cycle. | P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0720<br>P0721<br>P0722 | frequency<br>20 ms | One Trip |
| | | | Case 1: (Unrealistically large changes in turbine speed)<br>If Turbine Speed Change<br>for | <br><br>>= 800 RPM<br>>= 0.15 seconds | | | 0.15 seconds | |
| | | | Case 2: (Noisy Turbine Speed)<br>For sample size<br>IF the change in Turbine Speed<br>THEN the Low Counter is incremented<br><br>IF the change in Turbine Speed<br>THEN the High Counter is incremented<br><br>This test fails if both the Low Counter and the High Counter<br>OR<br>Low Counter<br>OR<br>High Counter | <br>80<br><= -800 RPM<br><br><br>>= 800 RPM<br><br><br>>= 5<br><br>>= 5<br><br>>= 5 | | | 1.6 seconds | |
| | | | Case 3: (Wires to speed sensors electromagnetically coupled)<br>Fault Pending will be set when turbine speed change<br>AND<br>Last Valid Speed<br><br>This test fails when Fault pending is set<br>AND<br>turbine speed<br>When range is attained if:<br>Speed sensor wires electromagnetically coupled counter | <br><br>>= 8192<br><br>>= 200<br><br><br><br><br>< 61<br><br><br>>= 4 | Turbine speed<br>for a time<br><br>AND<br>Shift is completed | > 200 RPM<br>>= 0.5 seconds | 0.14 seconds | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| | | | AND | | | | | |
| | | | Turbine speed change | > High Limit | | | | |
| | | | OR | <= Low limit | | | | |
| | | | for a time | < 2 counts | | | | |
| | | | AND | | | | | |
| | | | Speed sensor wires electromagnetically coupled fail counter | >= 3 | | | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Turbine Shaft Speed Sensor Circuit No Activity | P0717 | This test detects unrealistically low value of turbine speed or unrealistically large changes in turbine speed. | This test fails if turbine speed<br>AND<br>output speed<br>for a time | < 61 RPM<br><br>> 500 RPM<br>> 1 second. | Not Test Failed This Key On<br><br><br><br><br><br><br><br><br><br>No Fault Pending DTCs<br><br><br><br>No hydraulic default condition exists due to loss of ignition voltage<br>Engine Speed between<br>for a time<br><br>Forward range attained, NOT reverse or neutral<br>AND<br>transmission output speed<br>During a shift in progress, transmission output speed<br>AND<br>Engine speed | P0717<br>P0729<br>P0731<br>P0732<br>P0733<br>P0734<br>P0735<br>P0736<br>P0720<br>P0721<br>P0722<br><br>P0720<br>P0721<br>P0722<br><br><br><br>200 and 8500 RPM<br>5 seconds<br><br><br><br>>= 150 RPM<br><br>>= 150 RPM<br><br>>= 400 RPM | 1 second<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Output Shaft Speed Sensor Circuit | P0720 | This test detects a Hall Effect output speed sensor short to battery, short to ground, or open circuit failure. This test verifies that the Hall Effect output speed sensor circuit current is between a low and high threshold. Tests for rapid direction change and error. | All Cases | | Not Test Failed This Key On | P0720 | frequency 20 ms | One Trip |
| | | | Case 1 (Circuit Test)<br>Output speed sensor current<br>OR<br>Output speed sensor current<br>for | <br>> 17 A<br><br><= 5 A<br>0.4 sec | Range Attained | = Forward, Reverse, or Neutral | 0.4 seconds | |
| | | | Case 2 (Direction Change)<br>Direction Change Mismatch Time | <br>> 0.1 sec | Transmission in range or Neutral<br>Output Speed | <br>>= 50 | 0.1 second | |
| | | | Case 3 (Direction Error)<br>HE Output Speed Sensor direction is Error<br>for | <br><br>0.25 sec | Transmission in range or Neutral<br>Output Speed | <br>>= 50 | 0.25 seconds | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Output Shaft Speed Sensor Circuit Performance | P0721 | This test detects a noisy output speed sensor or circuit by detecting large changes in output speed. | All Cases | | Not Test Failed This Key On<br><br><br><br><br><br><br>No Fault Pending DTCs for this drive cycle<br><br><br><br>Shift complete AND range attained NOT neutral | P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0715<br>P0716<br>P0717 | frequency<br>20 ms | One Trip |
| | | | Case 1: (Unrealistically large change in output speed)<br>Change in output speed for a time | <br>>= 500 RPM<br>>= 0.15 seconds | | | 0.15 seconds | |
| | | | Case 2: (Noisy output speed)<br>For sample size<br>IF the change in output speed THEN the Low Counter is incremented.<br>IF the change in output speed THEN the High Counter is incremented.<br><br>Test fails if both the Low Counter and the High Counter<br>OR<br>the Low Counter<br>OR<br>the High Counter | <br>80<br><= -500 RPM<br><br><br>>= 500 RPM<br><br><br><br>>= 5<br><br>>= 5<br><br>>= 5 | | | 1.6 seconds | |
| | | | Case 3: (Wires to speed sensors electromagnetically coupled)<br>Fault Pending will be set when output speed change<br>AND<br>Last Valid Speed<br><br>This test fails when Fault pending is set<br>AND<br>output speed<br>When range is attained if:<br>Speed sensor swapped counter<br>AND | <br><br>>= 8192<br><br>>= 200<br><br><br><br><br>< 61<br><br>>= 4 | Output Speed for a time | > 200 RPM<br>>= 0.5 seconds | 0.14 seconds | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| | | | Output speed change<br>OR<br>for a time<br>AND<br>Speed sensor swapped fail counter | > High Limit<br><= Low limit<br>< 2 counts<br><br><br>>= 3 | | | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Output Shaft Speed Sensor Circuit No Signal | P0722 | This test detects unrealistically low value of output speed or unrealistically large change in output speed. | All Cases | | Not Test Failed This Key On | P0720<br>P0721<br>P0722 | | One Trip |
| | | | Case 1: (Rapid Deceleration)<br>Failure pending if change in output speed<br>Failure sets if fail pending and range attained is Neutral | >= 500 RPM | Transmission output speed for a time<br>Test disabled when output speed<br>for a time | >= 500 RPM<br>>= 2 seconds<br><br><= 500 RPM<br>> 1 seconds | 2 seconds | |
| | | | Case 2: (No Activity or Gear Disengagement)<br>Failure pending if output speed<br>Failure sets if fail pending<br>AND<br>(net engine torque<br>OR<br>net engine torque)<br>for a time | < 61 RPM<br><br><br>> 80 Nm<br><br>< -50 Nm<br>> 1 second | Not Test Failed This Key On<br><br><br><br><br><br><br>Not Test Failed This Key On<br><br><br>No Fault Pending DTCs for this drive cycle<br><br><br>Engine is running<br>Shift not in process<br>Range attained is not Neutral<br>Reverse to Neutral shift not in process<br><br>Transmission input speed<br><br>PRNDL State is in a valid forward range<br>AND<br>Manual Selector Valve is verified in drive | P0731<br>P0732<br>P0733<br>P0734<br>P0735<br>P0729<br>P0736<br><br>P0715<br>P0716<br>P0717<br><br>P0715<br>P0716<br>P0717<br><br><br><br><br><br>>= 1050 RPM | 1 seconds | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Engine Speed Input Circuit | P0725 | This test detects an engine speed sensor circuit failure. | Engine speed sensor circuit hardware monitor state for | = Fault<br>2 seconds | Not Test Failed This Key On | P0725 | 2 seconds<br><br>frequency<br>20 ms | Two Trips |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Engine Speed Sensor Circuit Performance | P0726 | This test detects large changes in Engine Speed and noisy Engine Speed by comparing to calibration values. | All Cases | | Not Test Failed This Key On<br><br><br><br><br><br>No Fault Pending this drive cycle | P0715<br>P0716<br>P0717<br>P0726<br>P0727<br><br>P0715<br>P0716<br>P0717 | frequency<br>20 ms | Two Trips |
| | | | Case 1: (Large change in Engine Speed)<br>Change in engine speed<br>for a time | <br>>= 600 RPM<br>>= 0.15 seconds | | | 0.15 seconds | |
| | | | Case 2: (Noisy Engine Speed)<br>For sample size<br>If the change in engine speed then the Low Counter is incremented.<br>If the change in engine speed then the High Counter is incremented.<br><br>This test fails if both the Low Counter and the High Counter<br>OR<br>Low Counter<br>OR<br>High Counter | <br>80<br><= -650 RPM<br><br>>= 650 RPM,<br><br><br>>= 5<br><br>>= 5<br><br>>= 5 | | | 1.6 seconds | |
| | | | Case 3: (Wires to speed sensors electromagnetically coupled)<br>Fault Pending will be set when engine speed change<br>AND<br>Last Valid Speed<br><br>This test fails when Fault pending is set<br>AND<br>engine speed<br>When range is attained if:<br>Speed sensor swapped counter<br>AND<br>Engine speed change<br>OR<br>for a time | <br><br>>= 8192<br><br>>= 600<br><br><br><br>< 61<br><br>>= 4<br><br>> High Limit<br><= Low limit<br>< 2 counts | Engine speed<br>for a time | > 600 RPM<br>>= 1 second | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| | | | AND<br>Speed sensor swapped fail counter | <br>>= 3 | | | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Engine Speed Sensor Circuit No Signal | P0727 | This test detects unrealistically low value of engine speed or unrealistically large change in engine speed. | All Cases: | | Not Test Failed This Key On | P0726<br>P0727 | frequency<br>20 ms | Two Trips |
| | | | Case 1: (Unrealistically large change in engine speed)<br>Failure pending if change in engine speed | >= 1140 RPM | | | | |
| | | | Case 2: (Unrealistically low value for engine speed)<br>engine speed<br>for a time | < 60 RPM<br>>= 4 seconds | Not Test Failed This Key On OR Fault Pending<br>Turbine speed<br>AND<br>Ignition Key in RUN position<br>AND<br>Ignition Key is not being cycled<br>AND<br>Vehicle is not coasting with engine off. | P0715<br>P0716<br>P0717<br>>= 400 RPM | 4 seconds | |
| Output Shaft Direction Plausibility | P27B4 | This test detects implausible behavior from the output speed sensor by comparing the measured output direction signal to the equivalent output shaft direction derived from solenoid and pressure switch states. | Sensed direction<br>for | /= equivalent direction<br>1 second | Not Failed This Key On and No Fault Pending<br>Not Fault Active<br>Not Failed This Key On and No<br>Not Failed This Key On and No<br>Not Failed This Key On and No | Solenoid Faults (table 1)<br>P0721<br>P0720<br>P0722<br>P0842<br>P0843<br>P0847<br>P0848<br>P0872<br>P0873<br>P0877<br>P0878<br>P0751<br>P0752<br>P0756<br>PO757<br>P0761<br>P0762<br>HSD Faults<br>P0729 | 1 second<br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| | | | | | | P0731<br>P0732<br>P0733<br>P0734<br>P0735<br>P0736 | | |
| | | | | | Battery Voltage NOT between<br>Output speed | 9 V and 18 V<br>> 50 | | |
| Output Shaft Speed Sensor Plausibility | P27B6 | This test detects implausible behavior from the output speed sensor by comparing the measured output speed signal to the equivalent output speed derived from the turbine speed sensor and the current gear ratio. | \|Raw Output Speed - Equivalent Output Speed\|<br>for a time | >= 10<br>>= 10 seconds | Not Failed This Key On and No Fault Pending | P0720<br>P0721<br>P0722 | 10 seconds<br><br>frequency 20 ms | One Trip |
| | | | | | Not Failed This Key On | P0731<br>P0732<br>P0733<br>P0734<br>P0735<br>P0729<br>P0736 | | |
| | | | | | Not Failed This Key On and No Fault Pending | P0715<br>P0716<br>P0717 | | |
| | | | | | Battery Voltage NOT between<br>Output speed<br>Transmission Range NOT Neutral<br>Transmission NOT shifting | 9 V and 18 V<br>>= 50 | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| **Range Verification** | | | | | | | | |
| Gear 1 Incorrect Ratio | P0731 | This test verifies the transmission is maintaining proper ratio while in First range by comparing computed gear ratio to the commanded gear ratio. | Test Error is indicated when the transmission is in first range<br>AND<br>output speed<br>AND<br>gear slip<br><br>When test error is indicated the pass timer is cleared and the fail timer starts accumulating.<br><br>Fault pending is set when fail timer<br><br>Diagnostic code set when fail timer | <br><br><br>>= 100 RPM<br><br>> 100 RPM<br><br><br><br><br><br>> 0<br><br><br>>= 2 seconds | Not Failed This Key On<br><br><br><br>Not responding to Test Failed This Key On<br><br><br><br><br><br>No Fault Pending DTC for this drive cycle.<br><br><br><br>No hydraulic default Gears are commanded<br><br><br>No range switch failure response active<br><br><br>TCM not initializing or shutting down<br><br>Output speed | P0731<br>P0877<br>P0878<br><br><br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0715<br>P0717<br>P0720<br>P0722<br><br><br><br><br><br><br>>= 200 RPM | 2 seconds<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Gear 2 Incorrect Ratio | P0732 | This test verifies the transmission is maintaining proper ratio while in Second range by comparing computed gear ratio to the commanded gear ratio. | Test Error is indicated when the transmission is in second range<br>AND<br>output speed<br>AND<br>gear slip<br><br>When test error is indicated the pass timer is cleared and the fail timer starts accumulating.<br><br>Fault pending is set when fail timer<br><br>Diagnostic code set when fail timer | <br><br><br>>= 100 RPM<br><br>> 100 RPM<br><br><br><br><br><br>> 0<br><br><br>>= 2 seconds | Not Failed This Key On<br><br><br><br>Not responding to Test Failed This Key On<br><br><br><br><br><br>No Fault Pending DTC for this<br><br><br><br>No hydraulic default Gears are commanded<br>No Range Shift is in process<br><br>No range switch failure response active<br><br>TCM not initializing or shutting down<br><br>Output speed | P0732<br>P0877<br>P0878<br><br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0715<br>P0717<br>P0720<br>P0722<br><br><br><br><br><br>>= 200 RPM | 2 seconds<br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Gear 3 Incorrect Ratio | P0733 | This test verifies the transmission is maintaining proper ratio while in Third range by comparing computed gear ratio to the commanded gear ratio. | Test Error is indicated when the transmission is in third range<br>AND<br>output speed<br>AND<br>gear slip<br><br>When test error is indicated the pass timer is cleared and the fail timer starts accumulating.<br><br>Fault pending is set when fail timer<br><br>Diagnostic code set when fail timer | <br><br>>= 100 RPM<br><br>> 100 RPM<br><br><br><br><br><br>> 0<br><br>>= 2 seconds | Not Failed This Key On<br><br><br><br>Not responding to Test Failed This Key On<br><br><br><br><br>No Fault Pending DTC for this<br><br><br><br>No hydraulic default Gears are commanded<br>No Range Shift is in process<br><br>No range switch failure response active<br><br>TCM not initializing or shutting down<br><br>Output speed | P0733<br>P0877<br>P0878<br><br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0715<br>P0717<br>P0720<br>P0722<br><br><br><br><br><br><br>>= 200 RPM | 2 seconds<br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Gear 4 Incorrect Ratio | P0734 | This test verifies the transmission is maintaining proper ratio while in Fourth range by comparing computed gear ratio to the commanded gear ratio. | Test Error is indicated when the transmission is in fourth range<br>AND<br>output speed<br>AND<br>gear slip<br><br>When test error is indicated the pass timer is cleared and the fail timer starts accumulating.<br><br>Fault pending is set when fail timer<br><br>Diagnostic code set when fail timer | <br><br><br>>= 100 RPM<br><br>> 100 RPM<br><br><br><br><br><br>> 0<br><br><br>>= 2 seconds | Not Failed This Key On<br><br><br><br>Not responding to Test Failed This Key On<br><br><br><br><br><br>No Fault Pending DTC for this<br><br><br><br>No hydraulic default Gears are commanded<br>No Range Shift is in process<br><br>No range switch failure response active<br><br>TCM not initializing or shutting down<br><br>Output speed | P0734<br>P0877<br>P0878<br><br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0715<br>P0717<br>P0720<br>P0722<br><br><br><br><br><br>>= 200 RPM | 2 seconds<br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Gear 5 Incorrect Ratio | P0735 | This test verifies the transmission is maintaining proper ratio while in Fifth range by comparing computed gear ratio to the commanded gear ratio. | Test Error is indicated when the transmission is in fifth range<br>AND<br>output speed<br>AND<br>gear slip<br><br>When test error is indicated the pass timer is cleared and the fail timer starts accumulating.<br><br>Fault pending is set when fail timer<br><br>Diagnostic code set when fail timer | <br><br><br>>= 100 RPM<br><br>> 100 RPM<br><br><br><br><br><br>> 0<br><br>>= 2 seconds | Not Failed This Key On<br><br><br><br>Not responding to Test Failed This Key On<br><br><br><br><br>No Fault Pending DTC for this<br><br><br><br>No hydraulic default Gears are commanded<br>No Range Shift is in process<br><br>No range switch failure response active<br><br>TCM not initializing or shutting down<br><br>Output speed | P0735<br>P0877<br>P0878<br><br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0715<br>P0717<br>P0720<br>P0722<br><br><br><br><br><br><br>>= 200 RPM | 2 seconds<br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Gear 6 Incorrect Ratio | P0729 | This test verifies the transmission is maintaining proper ratio while in Sixth range by comparing computed gear ratio to the commanded gear ratio. | Test Error is indicated when the transmission is in sixth range<br>AND<br>output speed<br>AND<br>gear slip<br><br>When test error is indicated the pass timer is cleared and the fail timer starts accumulating.<br><br>Fault pending is set when fail timer<br><br>Diagnostic code set when fail timer | <br><br>>= 100 RPM<br><br>> 100 RPM<br><br><br><br><br><br>> 0<br><br><br>>= 2 seconds | Not Failed This Key On<br><br><br><br>Not responding to Test Failed This Key On<br><br><br><br><br><br>No Fault Pending DTC for this<br><br><br><br>No hydraulic default Gears are commanded<br>No Range Shift is in process<br><br>No range switch failure response active<br><br>TCM not initializing or shutting down<br><br>Output speed | P0729<br>P0877<br>P0878<br><br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0715<br>P0717<br>P0720<br>P0722<br><br><br><br><br><br>>= 200 RPM | 2 seconds<br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Reverse Incorrect Ratio | P0736 | This test verifies the transmission is maintaining proper ratio while in Reverse range by comparing computed gear ratio to the commanded gear ratio. | Test Error is indicated when the transmission is in reverse range<br>AND<br>output speed<br>AND<br>gear slip<br><br>When test error is indicated the pass timer is cleared and the fail timer starts accumulating.<br><br>Fault pending is set when fail timer<br><br>Diagnostic code set when fail timer | <br><br><br>>= 100 RPM<br><br>> 100 RPM<br><br><br><br><br><br>> 0<br><br><br>>= 2 seconds | Not Failed This Key On<br><br><br><br>Not responding to Test Failed This Key On<br><br><br><br><br><br>No Fault Pending DTC for this<br><br><br><br>No hydraulic default Gears are commanded<br>No Range Shift is in process<br><br>No range switch failure response active<br><br>TCM not initializing or shutting down<br><br>Output speed | P0736<br>P0877<br>P0878<br><br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0715<br>P0717<br>P0720<br>P0722<br><br><br><br><br><br>>= 200 RPM | 2 seconds<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| **Torque Converter** | | | | | | | | |
| Torque Converter Clutch (TCC) System Stuck Off | P0741 | This test detects the torque converter being stuck off (unlocked) by comparing TCC slip speed to a calibration value. | TCC Slip<br>for a time | >= 80 RPM<br>>= 15 seconds. | Not Test Failed This Key On | P2761<br>P2763<br>P2764<br>P0720<br>P0721<br>P0722<br>P0715<br>P0716<br>P0717<br>P0741 | 15 seconds<br><br>frequency<br>100 ms | Two Trips |
| | | | | | No Fault Pending DTCs for this drive cycle. | P2761<br>P2763<br>P2764<br>P0720<br>P0721<br>P0722<br>P0715<br>P0716<br>P0717 | | |
| | | | | | Battery Voltage between | 9 V and 18 V | | |
| | | | | | Engine Speed between<br>for | 200 RPM and 8500 RPM<br>5 seconds | | |
| | | | | | Must be in forward range | | | |
| | | | | | Accelerator position | >= 10 % and <= 3.40282x10^38 % | | |
| | | | | | Transmission fluid temperature | >= 5 deg. C and <= 130 deg. C | | |
| | | | | | Time Since Range Change<br>AND<br>Lockup apply is in process or complete<br>AND<br>Commanded TCC pressure | >= 6 seconds<br><br><br><br>>= 1000 kPa | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Torque Converter Clutch (TCC) System Stuck On | P0742 | This test detects the torque converter being stuck on (locked) by comparing TCC slip speed to a calibration value. | Case 1: (High Torque and high throttle fast fail)<br>Accerlrator Position<br>AND<br>net engine torque<br>for a time | <br><br>>= 70 %<br><br>>= 2200 Nm<br>>= 2 seconds | Not Test Failed This Key On | P2761<br>P2763<br>P2764<br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br>U0100 | frequency<br>100 ms<br><br>Case 1:<br>2 Seconds | Two Trips |
| | | | Case 2: (High Output Shaft Acceleration fast fail)<br>output shaft acceleration<br>for a time | <br>>= 100 RPM/second<br>>= 5 seconds | No Fault Pending DTCs for this drive cycle. | P2761<br>P2763<br>P2764<br>P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br>P0725<br>U0100 | Case 2:<br>5 Seconds | |
| | | | Case 3: (Accel/Decel/Accel condition)<br>Report malfunction when output acceleration event is followed by output deceleration event and followed by another output acceleration event. An output acceleration event occurs when output shaft acceleration<br>for a time<br><br>An output deceleration event occurs when output shaft acceleration is<br>for a time | <br><br><br><br>>= 40 RPM/second<br>>= 4 seconds<br><br><br><br><=-40 RPM/second<br>>= 2.5 seconds. | Battery Voltage between<br>Engine Speed between<br>for<br>Must be in forward range<br>TCC is commanded off<br>Engine Speed is not defaulted<br>TCC Slip<br>Accelerator position<br>Net Engine Torque<br>Turbine speed<br>Engine speed<br>Output speed | <br>9 V and 18 V<br>200 RPM and 8500 RPM<br>5 seconds<br><br><br><br>>=-20 RPM and <= 20 RPM<br><br>>= 25 %<br>>= 175 Nm<br><= 3500 RPM<br><= 3500 RPM<br>>= 100 RPM | Case 3:<br>4 Seconds | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| **Pressure Switches** | | | | | | | | |
| Transmission Fluid Pressure Switch 1 Circuit Low | P0842 | This test compares the commanded valve position to the pressure switch PS1 feedback. (part of S1 valve integrity test) | Pending failure occurs when PS1 pressure switch indicates stroked for a time<br><br>In response to the pending failure, S1 valve is retried by triggering S1 valve command to stroked and back to destroked. If PS1 pressure switch continues to indicate stroked, then one of three malfunction cases exists:<br><br>For Case 1 (electrical malfunction),<br><br>SS1 Circuit Low reports failure, also.<br><br>For Case 2 (mechanical malfunction),<br>Shift Solenoid 1 (SS1) Valve Performance – Stuck On reports failure, also.<br><br>For Case 3 (intermittent malfunction),<br>SS1 valve retry attempted<br>AND<br>PS1 pressure switch continues to indicate stroked. | >= 0.125 seconds<br><br><br><br><br><br><br>P0973<br><br><br>P0752<br><br><br>15 times | Not Test Failed This Key On<br><br>S1 valve is destroked<br><br>NOT system initialization in Cold Mode where Transmission Fluid Temperature<br><br>Shutdown is NOT in process | P0842<br><br><br><br>< -25 deg. C | 0.125 seconds<br><br>frequency<br>20 ms | One Trip |
| Shift Solenoid 1 Valve Performance - Stuck Off | P0751 | This test compares the change of state of the valve command to the change of state of the PS1 pressure switch feedback. (part of the S1 valve timeout test) | S1 valve is commanded from destroked to stroked and the PS1 pressure switch indication remains destroked for a time<br>WITH<br>transmission fluid temperature<br><br>(Time increases as temperature decreases with maximum time at<br>transmission fluid temperature) | >= 5 seconds<br><br>>= 0 deg. C<br><br>11.95 seconds<br><br><= -40 deg. C | Not Test Failed This Key On<br><br>S1 valve commanded from destroked to stroked and SS1 solenoid pressurized | P0751 | 5 seconds<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Shift Solenoid 1 (SS1) Valve Performance – Stuck On | P0752 | This test compares the change of state of the valve command to the change of state of the PS1 pressure switch feedback. (part of the S1 valve timeout test). | S1 valve commanded from stroked to destroked and the PS1 pressure switch indication remains stroked for a time<br>WITH<br>transmission fluid temperature<br><br>(Time increases as temperature decreases with maximum time at transmission fluid temperature) | > 6.8496 seconds<br><br>>= 0 deg. C.<br><br>11 seconds<br><br><= -40 deg. C | Not Test Failed This Key On<br><br>S1 valve changes from stroked to destroked and the solenoid must be commanded to exhaust | P0752 | 6.8496 seconds<br><br>frequency 20 ms | One Trip |
| Transmission Fluid Pressure Switch 1 Circuit High | P0843 | This test compares the commanded valve position to the pressure switch PS1 feedback. (part of S1 valve integrity test) | Pending failure occurs when PS1 pressure switch indicates destroked for a time<br><br>In response to the pending failure, S1 valve is retried by triggering S1 valve command to destroked and back to stroked. If the PS1 pressure switch continues to indicate destroked, then one of three malfunction cases exists.<br><br>For Case 1 (electrical malfunction),<br><br>SS1 Control Circuit Low reports failure, also.<br><br>For Case 2 (mechanical malfunction),<br>Shift Solenoid 1 (SS1) Valve Performance – Stuck Off reports failure, also.<br><br>For Case 3 (intermittent malfunction),<br>S1 valve retry attempted<br>AND<br>PS1 pressure switch continues to indicate destroked. | >= .070313 seconds<br><br><br><br><br>P0973<br><br><br>P0751<br><br><br>15 times | Not Test Failed This Key On<br><br>S1 valve is stroked<br><br>NOT system initialization in Cold Mode where Transmission Fluid Temperature<br><br>Shutdown NOT in process | P0843<br><br><br><br>< -25 deg. C | 0.070313 seconds<br><br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Pressure Switch Solenoid 2 Circuit Low | P0847 | This test compares the commanded valve position to the PS2 pressure switch feedback (part of the S2 valve integrity test). | Pending failure occurs when PS2 pressure switch indicates stroked for a time<br><br>In response to the pending failure, S2 valve is retried by triggering S2 valve command to stroked and back to destroked. If PS2 pressure switch continues to indicate stroked, then one of three malfunction cases exists.<br><br>For Case 1 (electrical malfunction),<br><br>SS2 Control Circuit Low reports failure, also.<br><br>For Case 2 (mechanical malfunction),<br>Shift Solenoid 2 Valve Performance – Stuck On reports failure, also.<br><br>For Case 3 (intermittent malfunction),<br>S2 valve retry attempted<br>AND<br>PS2 pressure switch continues to indicate stroked. | >= .039063 seconds<br><br><br><br><br><br><br>P0976<br><br><br>P0757<br><br><br>2 times | Not Test Failed This Key On<br><br>S2 valve is destroked<br><br>NOT system initialization in Cold Mode where Transmission Fluid Temperature<br><br>Shutdown NOT in process | P0847<br><br><br><br><br>< -25 deg. C | 0.039063 seconds<br><br>frequency 20 ms | One Trip |
| Shift Solenoid 2 Valve Performance – Stuck Off | P0756 | This test compares the change of state of the valve command to the change of state of the PS2 pressure switch feedback (part of the S2 valve timeout test). | If the S2 valve is commanded from destroked to stroked and the PS2 pressure switch indication remains destroked for a time<br>WITH<br>transmission fluid temperature<br><br>(Time increases as temperature decreases with maximum time at<br>transmission fluid temperature) | >= 5 seconds<br><br>>= 0 deg. C.<br><br>11.95 seconds<br><br><= -40 deg. C. | Not Test Failed This Key On<br><br>S2 valve commanded from destroked to stroked and SS2 solenoid pressurized | P0756 | 5 seconds<br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Shift Solenoid 2 Valve Performance – Stuck On | P0757 | This test compares the change of state of the valve command to the change of state of the PS2 pressure switch feedback (part of the S2 valve timeout test). | S2 valve commanded from stroked to destroked and the PS2 pressure switch does not indicate destroked for a time<br>WITH<br>transmission fluid temperature<br><br>(Time increases as temperature decreases with maximum time at transmission fluid temperature) | >= 6.4004 seconds<br><br>>= 0 deg. C.<br><br>15 seconds<br><br><= -40 deg. C. | Not Test Failed This Key On<br><br>S2 valve changes from stroked to destroked and the solenoid must be commanded to exhaust | P0757 | 6.4004 seconds<br><br>frequency 20 ms | One Trip |
| Transmission Fluid Pressure Switch 2 Circuit High | P0848 | This test compares the commanded valve position to the PS2 pressure switch feedback (part of the S2 valve integrity test). | Pending failure occurs when PS2 pressure switch indicates destroked for a time<br><br>In response to the pending failure, S2 valve is retried by triggering S2 valve command to destroked and back to stroked. If PS2 pressure switch continues to indicate destroked, then one of three malfunction cases exists.<br><br>For Case 1 (electrical malfunction),<br><br>SS2 Control Circuit Low reports failure, also.<br><br>For Case 2 (mechanical malfunction),<br>Shift Solenoid 2 Valve Performance – Stuck Off reports failure, also.<br><br>For Case 3 (intermittent malfunction),<br>S2 valve retry attempted<br>AND<br>PS2 pressure switch continues to indicate destroked. | >= 0.30078 seconds<br><br>P0976<br><br>P0756<br><br>2 times | Not Test Failed This Key On<br><br>S2 valve is stroked<br><br>NOT system initialization in Cold Mode where Transmission Fluid Temperature<br><br>Shutdown NOT in process | P0848<br><br>< -25 deg. C | 0.30078 seconds<br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Pressure Switch Solenoid 3 Circuit Low | P0872 | This test compares the commanded valve position to the pressure switch PS3 feedback. (part of S3 valve integrity test) | Pending failure occurs when PS3 pressure switch indicates stroked for a time | > 0.0195 seconds | Not Test Failed This Key On<br>S3 valve is destroked<br>NOT system initialization in Cold Mode where Transmission Fluid Temperature<br>Shutdown NOT in process | P0872<br>< -25 deg. C | 0.0195 seconds<br>frequency 20 ms | One Trip |
| | | | In response to the pending failure, S3 valve is retried by triggering S3 valve command to stroked and back to destroked. If PS3 pressure switch continues to indicate stroked, then one of three malfunction cases exists.<br>For Case 1 (electrical malfunction),<br>SS3 Control Circuit Low reports failure, also.<br>For Case 2 (mechanical malfunction),<br>Shift Solenoid 3 Valve Performance – Stuck On reports failure, also.<br>For Case 3 (intermittent malfunction),<br>S3 valve retry attempted<br>AND<br>PS3 pressure switch continues to indicate stroked. | <br><br><br>P0979<br><br>P0762<br><br>2 times | | | | |
| Shift Solenoid 3 Valve Performance – Stuck Off | P0761 | This test compares the change of state of the valve command to the change of state of the PS3 pressure switch feedback. (part of the S3 valve timeout test) | If the S3 valve is commanded from destroked to stroked and the PS3 pressure switch indication remains destroked for a time<br>WITH<br>transmission fluid temperature<br>(Time increases as temperature decreases with maximum time at transmission fluid temperature) | >= 5 seconds<br>>= 0 deg. C.<br>11.95 seconds<br><= -40 deg. C. | Not Test Failed This Key On<br>S3 valve commanded from destroked to stroked and SS3 solenoid pressurized | P0761 | 5 seconds<br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Shift Solenoid 3 Valve Performance – Stuck On | P0762 | This test compares the commanded valve position to the PS3 pressure switch feedback (part of the S3 valve timeout test). | S3 valve commanded from stroked to destroked and the PS3 pressure switch does not indicate destroked for a time<br>WITH<br>transmission fluid temperature<br><br>(Time increases as temperature decreases with maximum time at<br>transmission fluid temperature) | > 6.5996 seconds<br><br>>= 0 deg. C.<br><br>21.95 seconds<br><br>>= -40 deg. C. | Not Test Failed This Key On<br><br>S3 valve changes from stroked to destroked and the solenoid must be commanded to exhaust | P0762 | 6.5996 seconds<br><br>frequency 20 ms | One Trip |
| Pressure Switch Solenoid 3 Circuit High | P0873 | This test compares the commanded valve position to the pressure switch PS3 feedback. (part of S3 valve integrity test) | Pending failure occurs when PS3 pressure switch indicates destroked for a time<br><br>In response to the pending failure, S3 valve is retried by triggering S3 valve command to destroked and back to stroked. If PS3 pressure switch continues to indicate destroked, then one of the three malfunction cases exists.<br><br>For Case 1 (electrical malfunction),<br><br>SS3 Control Circuit Low reports failure, also.<br><br>For Case 2 (mechanical malfunction),<br>Shift Solenoid 3 Valve Performance – Stuck Off reports failure, also.<br><br>For Case 3 (intermittent malfunction),<br>S3 valve retry attempted<br>AND<br>PS3 pressure switch continues to indicate destroked. | > 0.30078 seconds<br><br>P0979<br><br>P0761<br><br>2 times | Not Test Failed This Key On<br><br>S3 valve is stroked<br><br>NOT system initialization in Cold Mode where Transmission Fluid Temperature<br><br>Shutdown NOT in process | P0873<br><br>< -25 deg. C | 0.30078 seconds<br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Transmission Fluid Pressure Switch 4 Circuit Low | P0877 | This test detects Reverse Pressure Switch closed indication by comparing the Reverse Pressure Switch (ps4) state to the PRNDL switch state. | Case 1: (Forward range)<br>For a sample size<br>(if dropout suspected use sample size)<br>PRNDL is P, D1, D2, D3, D4, D5, D6, T8, or T4<br>AND<br>RPS indicates Reverse<br>for a time<br>(if dropout suspected use time) | <br>100 samples<br>255 samples<br><br><br><br>>= 1 seconds<br>30 seconds | All Cases<br>Not Test Failed This Key On<br><br><br><br>No Fault Pending DTCs for this drive cycle<br><br>Engine Speed between<br><br>for | <br>P0877<br>P0878<br>P0708<br><br>P0708<br><br>200 RPM and 8500 RPM<br>5 seconds | 1 second<br><br>frequency<br>50 ms | One Trip |
| | | | Case 2: (Forward range indefinite)<br>For a sample size,<br>net engine torque<br>AND<br>PRNDL is indefinitely D3 or another forward range<br>for a time | <br>20 samples<br>>= 100 Nm<br><br><br>> 1 second | | | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Transmission Fluid Pressure Switch 4 Circuit High | P0878 | This test detects the Reverse Pressure switch (PS4)being stuck in the open position by comparing to the PRNDL switch state and detects the Reverse Pressure switch stuck open at shutdown. | All Cases | | Not Test Failed This Key On | P0878 | frequency<br>50 ms | One Trip |
| | | | Case 1: (RPS State and PRNDL State do not agree)<br>For sample size<br>PRNDL is REVERSE<br>AND<br>RPS indicates NOT REVERSE<br>after a time | <br>40 samples<br><br><br><br>>= 1 second | PRNDL State is in reverse | | 1 second | |
| | | | For Case 2: (RPS Shutdown Test)<br><br>If RPS indicates<br>for a time<br><br>This time varies with transmission fluid temperature | <br><br>not Reverse<br>>= 5-30 seconds | Transmission Fluid Temperature<br><br>Ignition state is OFF<br><br>Engine was cranking or running this ignition cycle | >= 0 deg. C | 5-30 seconds | |
| | | | For Case 3: (High Ratio Test)<br>If current transmission ratio is within the reverse range ratio<br>for a time<br>AND<br>net engine torque<br>for a time | <br><br><br>>= 0.5 seconds<br><br>>= 100 Nm<br>1 second | 1st range attained and RPS State in forward<br><br>Output speed is | <br><br>>= 100 RPM | 1 second | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| **On-coming/Off-going** | | | | | | | | |
| Pressure Control Solenoid (PCS) 1 Stuck Off | P2723 | This test determines if the on-coming clutch energized by Pressure Control Solenoid 1 engages during a forward range shift. | Pending failure occurs when accumulated event timer<br><br>Timer accumulates when transmission is shifting<br>AND<br>output speed<br>AND commanded gear slip speed<br>(For rough road conditions, use)<br><br>In response of pending failure, a diagnostic response range is commanded. During this command, this test fails if fail timer<br><br>and output speed | > 0 seconds<br><br>>= 60 RPM<br>>= 75 RPM<br>150 RPM.<br><br>>= 2 seconds<br>>= 300 RPM | Not Test Failed This Key On<br><br>Output Speed<br>Turbine Speed<br><br>Normal powertrain shutdown not in process<br><br>Normal or Cold powertrain initialization is complete<br><br>No range switch failure response active<br><br>No Cold Mode operation<br><br>On-coming clutch control enabled<br><br>Power downshift abort to previous range NOT active<br><br>Range shift in process | P2723<br>P0720<br>P0721<br>P0722<br>P0715<br>P0716<br>P0717<br>P0708<br>P0877<br>P0878<br><br>>= 125 RPM<br>>= 60 RPM | 2 seconds<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Pressure Control Solenoid (PCS) 2 Stuck Off | P0776 | This test determines if the on-coming clutch energized by Pressure Control Solenoid 2 engages during a forward range shift. | Pending failure occurs when accumulated event timer<br><br>Timer accumulates when transmission is shifting, output speed<br>AND commanded gear slip speed<br><br>(For rough road conditions, use)<br><br>In response of pending failure, a diagnostic response range is commanded. During this command, this test fails if fail timer<br><br>and output speed | >= 0 seconds<br><br>>= 60 RPM<br><br>> 75 RPM<br>150 RPM.<br><br>>= 2 seconds<br>>= 300 RPM | Not Test Failed This Key On<br><br>Output Speed<br>Turbine Speed<br><br>Normal powertrain shutdown not in process<br><br>Normal or Cold powertrain initialization is complete<br><br>No range switch failure response active<br><br>No Cold Mode operation<br><br>On-coming clutch control enabled<br><br>Power downshift abort to previous range NOT active<br><br>Range shift in process | P0776<br>P0720<br>P0721<br>P0722<br>P0715<br>P0716<br>P0717<br>P0708<br>P0877<br>P0878<br><br>>= 125 RPM<br>>= 60 RPM | 2 seconds<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Pressure Control Solenoid (PCS) 1 Stuck On | P2724 | This test determines if the off-going clutch energized by (PCS1) Pressure Control solenoid 1 remains engaged during a forward range shift. | Accumulated fail timer 1-to-2 upshifts; | >= 0.2998 seconds | Not Test Failed This Key On | P2724<br>P0720<br>P0721<br>P0722<br>P0715<br>P0716<br>P0717<br>P0877<br>P0878<br>P0777<br>P0708 | 1 second<br>frequency 20 ms | One Trip |
| | | | OR accumulated fail timer for other forward range upshifts; | >= 0.5 seconds | | | | |
| | | | OR accumulated fail timer for forward range closed throttle downshift; | >= 0.5 seconds | | | | |
| | | | OR accumulated fail timer for forward downshifts above closed throttle. | >= 1.0 second | | | | |
| | | | | | Output Speed | >= 200 RPM | | |
| | | | Fail timer accumulates during range to range shifts when attained gear slip speed | <= 25 RPM | Turbine Speed | >= 200 RPM | | |
| | | | | | Normal powertrain shutdown not in process | | | |
| | | | | | Normal or Cold powertrain initialization is complete | | | |
| | | | | | No range switch failure response active | | | |
| | | | | | No Cold Mode operation | | | |
| | | | | | Offgoing clutch shift in progress controlled by PCS1 | | | |
| | | | | | Range Shift in process | | | |
| | | | | | Transmission fluid temperature | > -25 deg C | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Pressure Control Solenoid (PCS) 2 Stuck On | P0777 | This test determines if the off-going clutch energized by (PCS2) Pressure Control solenoid 2 remains engaged during a forward range shift. | Accumulated fail timer 1-to-2 upshifts; | >= 0.2998 seconds | Not Test Failed This Key On | P2724<br>P0720<br>P0721<br>P0722<br>P0715<br>P0716<br>P0717<br>P0877<br>P0878<br>P0777<br>P0708 | 1 second<br><br>frequency 20 ms | One Trip |
| | | | OR accumulated fail timer for other forward range upshifts; | >= 0.5 seconds | | | | |
| | | | OR accumulated fail timer for forward range closed throttle downshift; | >= 0.5 seconds | | | | |
| | | | OR accumulated fail timer for forward downshifts above closed throttle. | >= 1.0 second | | | | |
| | | | | | Output Speed | >= 200 RPM | | |
| | | | Fail timer accumulates during range to range shifts when attained gear slip speed | <= 25 RPM | Turbine Speed | >= 200 RPM | | |
| | | | | | Normal powertrain shutdown not in process | | | |
| | | | | | Normal or Cold powertrain initialization is complete | | | |
| | | | | | No range switch failure response active | | | |
| | | | | | No Cold Mode operation | | | |
| | | | | | No abusive garage shift to 1st range detected | | | |
| | | | | | Offgoing clutch shift in progress controlled by PCS2 | | | |
| | | | | | Range Shift in process | | | |
| | | | | | Transmission fluid temperature | > -25 deg C | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| **PRNDL/IMS** | | | | | | | | |
| Transmission Range Sensor High | P0708 | Illegal Range Test<br><br>This test monitors the transmission range switch for invalid input conditions and parity errors occurring over consecutive ignition cycles. | (No Information):<br>Illegal PRNDL state for a time | <br><br>>= 1 second | Not Test Failed This Key On<br><br>Battery Voltage between<br><br>Engine Speed between<br><br>for | P0708<br><br>9 V and 18 V<br><br>200 RPM and 8500 RPM<br>5 seconds | Case 1:<br>1 second<br><br>Case 2:<br>1.5 seconds<br><br>frequency<br>100 ms | One Trip |
| | | Long Term Range Switch Test<br>The PRNDL encoding into the TCM has multiple valid and invalid states. This diagnostic checks the parity of the diagnostic to detect failures in parity over multiple drive cycles | (Long-term Parity):<br>There are 3 counters for long-term parity. These counters are updated at the end of each drive cycle, immediately prior to TCM shutdown.<br><br>For Counter 1, increment counter IF Parity Error Detected; decrement counter IF No Parity Error Detected AND No Motion Detected.<br><br>IF Counter 1<br>THEN report failure.<br><br>For Counter 2, increment counter IF Parity Error Detected AND (No Valid Drive Detected OR No Valid Park/Neutral Detected)<br>AND<br>Output Speed<br>decrement counter IF No Parity Error Detected AND Valid Park/Neutral Detected AND Valid Drive Detected AND Motion Detected.<br>IF Counter 2<br>THEN report failure.<br><br>For Counter 3, increment Counter 3 IF Parity Error Detected while in Reverse AND No Valid Reverse Detected AND Motion Detected. | <br><br><br><br><br><br>>= 15 counts<br><br><br><br><br>> 200 RPM<br><br><br><br>>= 5 counts | | | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| | | | Decrement Counter 3 IF No Parity Error Detected AND Valid Reverse Detected | | | | | |
| | | | AND | | | | | |
| | | | Output Speed | > 200 RPM | | | | |
| | | | IF Counter 3 | >= 5 counts | | | | |
| | | | THEN report failure. | | | | | |
| | | | Where . . . . | | | | | |
| | | | Parity Error Detected is defined as a failure of the 4-bit PRNDL input such that the sum of those bits yields an odd result for a time; | >= 30 seconds; | | | | |
| | | | Motion Detected is defined as output speed | >= 200 RPM | | | | |
| | | | for a time; | >= 10 seconds | | | | |
| | | | Valid Drive Detected is defined as the 4-bit DL indicates Valid Drive for a time; | >= 3 seconds | | | | |
| | | | Valid Park Detected is defined as the 4-bit PRNDL indicates Valid Park for a time | >= 0.2 seconds | | | | |
| | | | and output speed; | <= 20 RPM | | | | |
| | | | Valid Reverse Detected is defined as the 4-bit PRNDL indicates Valid Reverse | | | | | |
| | | | for a time; | >= 15 seconds; | | | | |
| | | | Valid Neutral Detected is defined as the 4-bit PRNDL indicates Valid Neutral | | | | | |
| | | | for a time | >= 0.2 seconds | | | | |
| | | | and output speed | <= 20 RPM | | | | |
| | | | OR for a time. | >= 3 seconds | | | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Transmission Range Sensor Circuit Performance | P0706 | This test monitors the transmission range switch inputs at engine start to determine that it is indicating a valid starting position (Park or Neutral). | For sample size,<br>PRNDL C input is closed OR<br>PRNDL P is NOT closed. | > 11 samples | Not Test Failed This Key On<br><br>Battery voltage between<br><br>Powertrain State is Cranking<br><br>Engine speed | P0706<br><br>9V and 18V<br><br><br>>= 100 RPM and <= 350 RPM | 220 ms<br><br>frequency 20 ms | Two Trips |
| **Solenoid Electrical** | | | | | | | | |
| Main Pressure Modulation Solenoid Control Circuit Open | P0960 | This test detects solenoid electrical open circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br><br>THEN initiate intrusive test by opening low side driver<br><br>If hardware indicates open fault for a sample size<br>THEN report malfunction | <br><br>>= 3 samples<br><br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br>Battery voltage between<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br><br>High Side Driver 1 Enabled | P0960<br>P0962<br>P0657<br>P0658<br>P0659<br><br>9V and 18V<br><br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency 20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Main Pressure Modulation Solenoid System Performance | P0961 | This test detects unexpected slip events. | When the number of continuous main mod slip events for a range is<br>AND<br>gear slip is indicated<br><br>A main mod slip event occurs during a forward or reverse range for output speed<br>when Main Mode RVT Min Threshold is | >= 40<br><br><br><br>>= 100 RPM<br><br>55 | Not Test Failed This Key On<br><br><br><br><br>No Fault Pending DTCs for this drive cycle<br><br>System is not in Initialization, Cold Mode or Shutdown<br><br>Range Shift is Completed and debounced<br><br>Output Speed<br><br>Accelerator Pedal Input is Stable | P0715<br>P0716<br>P0717<br>P0720<br>P0721<br>P0722<br><br>P0717<br>P0722<br><br><br><br><br><br>>= 100 RPM | 0.8 seconds<br><br>frequency<br>20 ms | Two Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Main Pressure Modulation Solenoid Control Circuit Low | P0962 | This test detects solenoid electrical ground circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br>THEN initiate intrusive test by opening low side driver.<br>If hardware indicates low fault for a sample size<br>THEN report malfunction<br>Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size | <br><br>>= 3 samples<br><br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br>Battery voltage between<br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage<br><br>High Side Driver 1 Enabled | P0962<br>P0960<br>P0657<br>P0658<br>P0659<br><br>9V and 18V<br><br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | One Trip |
| Main Pressure Modulation Solenoid Control Circuit High | P0963 | This test detects solenoid electrical short to power circuit malfunctions. | If hardware fault short to power is present for a sample size<br>THEN report malfunction | >= 3 consecutive samples | Not Test Failed This Key On<br><br><br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 1 enabled | P0963<br>P0657<br>P0658<br>P0659<br><br><br>< 4 seconds<br><br>> 10 V | 60 ms<br><br>frequency<br>20 ms | One Trip |
| Pressure Control Solenoid (PCS) 2 Control Circuit Open | P0964 | This test detects solenoid electrical open circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br>THEN initiate intrusive test by opening low side driver<br>IF hardware indicates open fault for a sample size<br>THEN report malfunction | <br><br>>= 3 samples<br><br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br>Battery voltage between<br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage<br><br>High Side Driver 2 Enabled | P0964<br>P0966<br>P2669<br>P2670<br>P2671<br><br>9V and 18V<br><br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Pressure Control Solenoid (PCS) 2 Control Circuit Performance | P0965 | This test detects the performance of the solenoid by comparing desired current to current as measured by the solenoid control integrated circuit. This test monitors if the low side switching frequencies fall within their desired range, and if they are operating properly per their commanded state. | All Cases | | | | frequency 100 ms | One Trip |
| | | | Case 1 (Performance)<br>If abs(Measured current - Commanded current)<br>for a time<br><br>THEN report malfunction | <br>>= 100 milliamps<br>>= 1 sec | Not Test Failed This Key On<br><br><br><br><br><br>No Fault Pending<br><br><br><br>Battery voltage between<br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage<br><br>High Side Driver 2 Enabled<br><br>Transmission not shifting<br><br>LU clutch is not engaging or dis-engaging<br><br>Neutral at Stop is not in process | P2671<br>P2670<br>P2669<br>P0964<br>P0966<br>P0967<br><br>P0964<br>P0966<br>P0967<br><br>9V and 18V<br><br>< 4 seconds<br><br>> 10 V | 1 sec | |
| | | | Case 2 (Frequency)<br>If the solenoid is energized and frequency is<br>OR<br>the solenoid is not energized and frequency is<br><br>THEN report malfunction | <br>< 3000 Hz OR > 5000 Hz<br><br><br>> 3000 Hz | Not Fault Pending<br><br>Not Test Failed This Key On<br><br>Not Fault Pending<br><br>Not Test Failed This Key On<br><br>Battery voltage between<br><br>Lockup Shift Complete<br><br>Range Shift Complete | Solenoid Faults (table 1)<br><br>Solenoid Faults (table 1)<br><br>HSD Faults (table 2)<br><br>HSD Faults (table 2)<br><br>9V and 18V<br><br>> 0.5 sec<br><br>> 0.5 sec | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| | | | | | RELS inactive, RELS override inactive, C2 backfill inactive, Neutral antidrag inactive, Device Control inactive, & EOS inactive | > 0.5 sec | | |
| | | | Case 3 (Plausibility)<br>\|Adler IC commanded - TCM measured duty cycle\| | >= 10 | Not Fault Pending | Solenoid Faults (table 1) | 1 second | |
| | | | for | >= 1 second | Not Test Failed This Key On | Solenoid Faults (table 1) | | |
| | | | THEN report malfunction | | Not Fault Pending | HSD Faults (table 2) | | |
| | | | | | Not Test Failed This Key On | HSD Faults (table 2) | | |
| | | | | | Battery voltage between | 9V and 18V | | |
| | | | | | High Side Driver 2 Enabled | | | |
| Pressure Control Solenoid (PCS) 2 Control Circuit Low | P0966 | This test detects solenoid electrical ground circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault | | Not Test Failed This Key On | P0966<br>P0964<br>P2669<br>P2670<br>P2671 | 120 ms<br><br>frequency<br>20 ms | One Trip |
| | | | IF hardware fault is present for a sample size | >= 3 samples | | | | |
| | | | THEN initiate intrusive test by opening low side driver | | Battery Voltage between | 9 V and 18 V | | |
| | | | | | If Engine Cranking, then Crank Time | < 4 seconds | | |
| | | | IF hardware indicates short to ground fault for a sample size | >= 3 samples | AND | | | |
| | | | THEN report malfunction. | | Battery Voltage | > 10 V | | |
| | | | | | High Side Driver 2 Enabled | | | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Pressure Control Solenoid (PCS) 2 Control Circuit High | P0967 | This test detects solenoid electrical short to power circuit malfunctions. | If hardware fault short to power is present for a sample size<br><br>THEN report malfunction | >= 3 consecutive samples | Not Test Failed This Key On<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br><br>High Side Driver 2 Enabled | P0967<br>P2669<br>P2670<br>P2671<br><br><br>< 4 seconds<br><br>> 10 V | 60 ms<br><br>frequency<br>20 ms | One Trip |
| Pressure Control Solenoid (PCS) 1 Control Circuit Open | P2727 | This test detects solenoid electrical open circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br><br>THEN initiate intrusive test by opening low side driver.<br><br>IF hardware indicates open fault for a sample size<br>THEN report malfunction | <br><br><br>>= 3 samples<br><br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br>Battery Voltage between<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 1 enabled | P2727<br>P2729<br>P0657<br>P0658<br>P0659<br><br>9 V and 18 V<br><br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Pressure Control Solenoid (PCS) 1 Control Circuit Performance | P2728 | This test detects the performance of the solenoid by comparing desired current to current as measured by the solenoid control integrated circuit. This test monitors if the low side switching frequencies fall within their desired range, and if they are operating properly per their commanded state. | Case 1 (Performance)<br>If abs(Measured current - Commanded current)<br>for a time<br><br>THEN report malfunction | <br><br>>= 100 milliamps<br>>= 1 sec | Not Test Failed This Key On<br><br><br><br><br><br>No Fault Pending<br><br><br><br>Battery voltage between<br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage<br><br>High Side Driver 1 Enabled<br><br>Transmission not shifting<br><br>LU clutch is not engaging or dis-engaging<br><br>Neutral at Stop is not in process | P0659<br>P0658<br>P0657<br>P2727<br>P2729<br>P2730<br><br>P2727<br>P2729<br>P2730<br><br>9V and 18V<br><br>< 4 seconds<br><br>> 10 V | 1 sec<br><br>frequency<br>100 ms | One Trip |
| | | | Case 2 (Frequency)<br>If the solenoid is energized and frequency is<br>OR<br>the solenoid is not energized and frequency is<br><br>THEN report malfunction | <br>< 3000 Hz OR > 5000 Hz<br><br><br>> 3000 Hz | Not Fault Pending<br><br>Not Test Failed This Key On<br><br>Not Fault Pending<br><br>Not Test Failed This Key On<br><br>Battery voltage between<br><br>Lockup Shift Complete<br><br>Range Shift Complete | Solenoid Faults (table 1)<br><br>Solenoid Faults (table 1)<br><br>HSD Faults (table 2)<br><br>HSD Faults (table 2)<br><br>9V and 18V<br><br>> 0.5 sec<br><br>> 0.5 sec | frequency<br>20 ms | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| | | | | | RELS inactive, RELS override inactive, C2 backfill inactive, Neutral antidrag inactive, Device Control inactive, & EOS inactive | > 0.5 sec | | |
| | | | Case 3 (Plausibility)<br>\|Adler IC commanded - TCM measured duty cycle\|<br>for<br>THEN report malfunction | <br>>= 10<br>>= 1 second | Not Fault Pending<br>Not Test Failed This Key On<br>Not Fault Pending<br>Not Test Failed This Key On<br>Battery voltage between<br>High Side Driver 1 Enabled | Solenoid Faults (table 1)<br>Solenoid Faults (table 1)<br>HSD Faults (table 2)<br>HSD Faults (table 2)<br>9V and 18V | 1 second<br>frequency 20 ms | |
| Pressure Control Solenoid (PCS) 1 Control Circuit Low | P2729 | This test detects solenoid electrical ground circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br>THEN initiate intrusive test by opening low side driver.<br>IF hardware indicates low fault for a sample size<br>THEN report malfunction | <br>>= 3 samples<br><br>>= 3 samples | Not Test Failed This Key On<br>Battery Voltage between<br>If Engine Cranking, then Crank Time<br>AND Battery Voltage<br>High side driver 1 enabled | P2729<br>P2727<br>P0657<br>P0658<br>P0659<br>9 V and 18 V<br>< 4 seconds<br>> 10 V | 120 ms<br>frequency 20 m | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Pressure Control Solenoid (PCS) 1 Control Circuit High | P2730 | This test detects solenoid electrical short to power circuit malfunctions. | If hardware fault short to power is present for a sample size<br><br>THEN report malfunction | >= 3 consecutive samples | Not Test Failed This Key On<br><br><br><br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 1 enabled | P2730<br>P0657<br>P0658<br>P0659<br><br><br>< 4 seconds<br><br>> 10 V | 60 ms<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Shift Solenoid 1 Control Circuit Open | P097A | This test detects solenoid electrical open circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br>THEN initiate intrusive test by opening low side driver.<br>If hardware indicates open fault for a sample size<br>THEN report malfunction | <br><br>>= 3 samples<br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br>Battery Voltage between<br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 2 enabled | P097A<br>P0973<br>P2669<br>P2670<br>P2671<br><br>9 V and 18 V<br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | One Trip |
| Shift Solenoid 1 Control Circuit Low | P0973 | This test detects solenoid electrical ground circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br>THEN initiate intrusive test by opening low side driver<br>IF hardware indicates low fault for a sample size<br>THEN report malfunction. | <br><br>>= 3 samples<br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br>Battery Voltage between<br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 2 enabled | P0973<br>P097A<br>P2669<br>P2670<br>P2671<br><br>9 V and 18 V<br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Shift Solenoid 1 Control Circuit High | P0974 | This test detects solenoid electrical short to power circuit malfunctions. | If hardware fault short to power is present for a sample size<br><br>THEN report malfunction | >= 3 consecutive samples | Not Test Failed This Key On<br><br><br><br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 2 enabled | P0974<br>P2669<br>P2670<br>P2671<br><br><br>< 4 seconds<br><br>> 10 V | 60 ms<br><br>frequency<br>20 ms | One Trip |
| Shift Solenoid 2 Control Circuit Open | P097B | This test detects solenoid electrical open circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br><br>THEN initiate intrusive test by opening low side driver.<br><br>IF hardware indicates open fault for a sample size<br>THEN report malfunction | <br><br>>= 3 samples<br><br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br><br>Battery Voltage between<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 2 enabled | P097B<br>P0976<br>P2669<br>P2670<br>P2671<br><br>9 V and 18 V<br><br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | One Trip |
| Shift Solenoid 2 Control Circuit Low | P0976 | This test detects solenoid electrical ground circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br><br>THEN initiate intrusive test by opening low side driver.<br><br>IF hardware indicates low fault for a sample size<br>THEN report malfunction | <br><br>>= 3 samples<br><br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br><br>Battery Voltage between<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 2 enabled | P0976<br>P097B<br>P2669<br>P2670<br>P2671<br><br>9 V and 18 V<br><br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Shift Solenoid 2 Control Circuit High | P0977 | This test detects solenoid electrical short to power circuit malfunctions. | If hardware fault short to power is present for a sample size<br>THEN report malfunction | >= 3 consecutive samples | Not Test Failed This Key On<br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br>High side driver 2 enabled | P0977<br>P2669<br>P2670<br>P2671<br><br>< 4 seconds<br><br>> 10 V | 60 ms<br><br>frequency<br>20 ms | One Trip |
| Shift Solenoid 3 Control Circuit Open | P097C | This test detects solenoid electrical open circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br>THEN initiate intrusive test by opening low side driver.<br>IF hardware indicates open fault for a sample size<br>THEN report malfunction | >= 3 samples<br><br>>= 3 samples | Not Test Failed This Key On<br>Battery Voltage between<br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br>High side driver 2 enabled | P097C<br>P0979<br>P2669<br>P2670<br>P2671<br><br>9 V and 18 V<br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | One Trip |
| Shift Solenoid 3 Control Circuit Low | P0979 | This test detects solenoid electrical ground circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF solenoid driver hardware fault is present for a sample size<br>THEN initiate intrusive test by opening low side driver.<br>IF hardware indicates low fault for a sample size<br>THEN report malfunction | >= 3 samples<br><br>>= 3 samples | Not Test Failed This Key On<br>Battery Voltage between<br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br>High side driver 2 enabled | P0979<br>P097C<br>P2669<br>P2670<br>P2671<br><br>9 V and 18 V<br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Shift Solenoid 3 Control Circuit High | P0980 | This test detects solenoid electrical short to power circuit malfunctions. | If hardware fault short to power is present for a sample size<br><br>THEN report malfunction | >= 3 consecutive samples | Not Test Failed This Key On<br><br><br><br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 2 enabled | P0980<br>P2669<br>P2670<br>P2671<br><br><br>< 4 seconds<br><br>> 10 V | 60 ms<br><br>frequency<br>20 ms | One Trip |
| Actuator Supply Circuit Voltage 1 Open (HSD1) | P0657 | This test detects if the voltage measured at the HSD1 detection circuit shows that multiple low side detection circuits indicate open, but the high side detection circuit indicates high voltage. | Report malfunction when the number of failure events<br><br>A failure event occurs when the number of failed solenoids connected to HSD1<br>AND<br>HSD1 voltage | >= 2<br><br><br>>= 2<br><br>>= 6V | Not Test Failed This Key On<br><br>HSD1 is commanded ON<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage | P0657<br><br><br><br><br>< 4 seconds<br><br>> 10 V | 40 ms<br><br>frequency<br>20 ms | One Trip |
| Actuator Supply Circuit Voltage 1 Low (HSD1) | P0658 | This test detects low voltage when high voltage is expected indicating a short to ground at the circuit. | Report malfunction when short to ground is detected for a number of events | >= 3 times | Not Test Failed This Key On<br><br>HSD1 is commanded ON<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage | P0658<br><br><br><br><br>< 4 seconds<br><br>> 10 V | 60 ms<br><br>frequency<br>20 ms | One Trip |
| Actuator Supply Circuit Voltage 1 High (HSD1) | P0659 | This test detects if the voltage measured at the HSD 1 detection circuit indicates high during initialization (when the circuit is off) | During initialization, report malfunction when the number of failure events<br>A failure event occurs when HSD1 voltage | >= 3 times<br><br>>= 6V | During initialization | | 60 ms<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Actuator Supply Circuit Voltage 2 Open (HSD2) | P2669 | This test detects if the voltage measured at the HSD2 detection circuit shows that multiple low side detection circuits indicate open, but the high side detection circuit indicates high voltage. | Report malfunction when the number of failure events<br><br>A failure event occurs when the number of failed solenoids connected to HSD2<br>AND<br>HSD2 voltage | >= 2<br><br>>= 2<br><br>>= 6V | Not Test Failed This Key On<br><br>HSD2 is commanded ON<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage | P2669<br><br><br><br><br>< 4 seconds<br><br>> 10 V | 40 ms<br><br>frequency<br>20 ms | One Trip |
| Actuator Supply Circuit Voltage 2 Low (HSD2) | P2670 | This test detects low voltage when high voltage is expected indicating a short to ground at the circuit. | Report malfunction when short to ground is detected for a number of events | >= 3 times | Not Test Failed This Key On<br><br>HSD2 is commanded ON<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage | P2670<br><br><br><br>< 4 seconds<br><br>> 10 V | 60 ms | One Trip |
| Actuator Supply Circuit Voltage 2 High (HSD2) | P2671 | This test detects if the voltage measured at the HSD 2 detection circuit indicates high during initialization (when the circuit is off) | During initialization, report malfunction when the number of failure events<br>A failure event occurs when HSD2 voltage | >= 3 times<br><br>>= 6V | During initialization | | 60 ms<br><br>frequency<br>20 ms | One Trip |
| Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit Open | P2761 | This test detects torque converter solenoid electrical open circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a<br><br>THEN initiate intrusive test by<br><br>IF hardware indicates open fault for<br><br>THEN report malfunction | <br><br>>= 3 samples<br><br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br><br>Battery Voltage between<br><br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 1 enabled | P2761<br>P2764<br>P0657<br>P0658<br>P0659<br><br>9 V and 18 V<br><br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | Two Trips |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit Performance | P2762 | This test detects the performance of the solenoid by comparing desired current to current as measured by the solenoid control integrated circuit. This test monitors if the low side switching frequencies fall within their desired range, and if they are operating properly per their commanded state. | Case 1 (Performance)<br>If abs(Measured current - Commanded current)<br>for a time<br><br>THEN report malfunction | <br><br>>= 100 milliamps<br>>= 1 sec | Not Test Failed This Key On<br><br><br><br><br><br>No Fault Pending<br><br><br>Battery voltage between<br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage<br><br>High Side Driver 1 Enabled<br><br>Transmission not shifting<br><br>LU clutch is not engaging or dis-engaging<br><br>Neutral at Stop is not in process | P0659<br>P0658<br>P0657<br>P2761<br>P2763<br>P2764<br><br>P2761<br>P2763<br>P2764<br>9V and 18V<br><br>< 4 seconds<br><br>> 10 V | 1 sec<br><br>frequency<br>100 ms | One Trip |
| | | | Case 2 (Frequency)<br>If the solenoid is energized and frequency is<br>OR<br>the solenoid is not energized and frequency is<br><br>THEN report malfunction | <br>< 3000 Hz OR > 5000 Hz<br><br>> 3000 Hz | Not Fault Pending<br><br>Not Test Failed This Key On<br><br>Not Fault Pending<br><br>Not Test Failed This Key On<br><br>Battery voltage between<br>Lockup Shift Complete<br>Range Shift Complete<br>RELS inactive, RELS override inactive, C2 backfill inactive, Neutral antidrag inactive, Device Control inactive, & EOS inactive | Solenoid Faults<br><br>Solenoid Faults<br><br>HSD Faults<br><br>HSD Faults<br><br>9V and 18V<br>> 0.5 sec<br>> 0.5 sec<br>> 0.5 sec | frequency<br>20 ms | |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| | | | Case 3 (Plausibility)<br>\|Adler IC commanded - TCM measured duty cycle\|<br>for<br>THEN report malfunction | <br>>= 10<br>>= 1 second | Not Fault Pending<br>Not Test Failed This Key On<br>Not Fault Pending<br>Not Test Failed This Key On<br>Battery voltage between<br>High Side Driver 1 Enabled | Solenoid Faults (table 1)<br>Solenoid Faults (table 1)<br>HSD Faults (table 2)<br>HSD Faults (table 2)<br>9V and 18V | 1 second<br>frequency 20 ms | |
| Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit High | P2763 | This test detects torque converter solenoid electrical short to power circuit malfunctions. | If hardware fault short to power is present for a sample size<br>THEN report malfunction | >= 3 consecutive samples | Not Test Failed This Key On<br>If Engine Cranking, then<br>Crank Time<br>AND<br>Battery Voltage<br>High side driver 1 enabled | P2763<br>P0657<br>P0658<br>P0659<br>< 4 seconds<br>> 10 V | 60 ms<br>frequency 20 ms | Two Trips |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit Low | P2764 | This test detects torque converter solenoid electrical ground circuit malfunctions. | Fault pending is set at single solenoid driver hardware detection of a low fault<br>IF hardware fault is present for a sample size<br><br>THEN initiate intrusive test by opening low side driver<br><br>IF intrusive test indicates short to ground exists for a sample size<br>THEN report malfunction | <br><br>>= 3 samples<br><br><br><br>>= 3 samples | Not Test Failed This Key On<br><br><br><br>Battery Voltage between<br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage<br><br>High side driver 1 enabled | P2764<br>P2761<br>P0657<br>P0658<br>P0659<br><br>9 V and 18 V<br><br><br>< 4 seconds<br><br>> 10 V | 120 ms<br><br>frequency<br>20 ms | Two Trips |
| **Miscellaneous** | | | | | | | | |
| CAN Communication Bus 2 Bus Off | U0074 | This test detects if the GMLAN bus is off for a calibration duration. | GMLAN bus is off for a time | >= 3 seconds | Not Test Failed This Key On<br><br>Ignition Voltage between<br>Battery Voltage between | U0074<br><br>9V and 18 V<br>9 V and 18 V | 3 seconds<br><br>frequency<br>100 ms | Two Trips |
| Lost Communication with ECM "A" | U0100 | This test detects GMLAN bus failures by detecting the loss of certain message information from the GMLAN Bus. | For all of the signals being monitored on the GMLAN bus, the diagnostic keeps track of the calibration number of timeout, and/or error/invalid states for each message<br><br>If the number of timeout, and/or error/invalid states<br><br>Report failure | <br><br><br><br>> 500 counts out of 600 samples | Ignition Voltage between<br>Battery Voltage between<br><br>The can bus is active (not failed)<br><br>Enable criteria must be met for a time | 9V and 18 V<br>9 V and 18 V<br><br><br><br>> 3 seconds | 0.5 seconds<br><br>frequency<br>10 ms | Two Trips |
| Sensor Reference Voltage "B" Circuit Fault | P0652 | Tests whether the output voltage of the associated 5 Volt (VREF) reference is enabled and within the expected output voltage range. If found to be disabled, attempts are made to re-enable it. | If Power Supply is not enabled<br>OR<br>Voltage<br>OR<br>Voltage<br>for | <br><br>> 5.25 V<br><br>< 4.75 V<br>2 seconds | Battery Voltage between | 9 V and 18 V | 2 seconds<br><br>frequency<br>50 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| Brake Switch Circuit | P0703 | This test counts how many acceleration events occur while the brake switch input indicates “ON”. Failure is reported when the number of events exceeds a calibration value. In some applications, in addition, this test counts how many deceleration events occur while the brake switch input indicates “OFF” and the engine running time while in range. Failure is reported when the number if events exceeds a calibration and the engine running time exceeds a calibration. | case 1<br>The number of vehicle accelerations with the Neutral at Stop input “ON”<br><br>case 2<br>The number of vehicle decelerations with the Neutral at Stop input “Off” and the engine run time > 0 while in range with Neutral at Stop input “off”. Time and counts are carried to the next key cycle | >= 3<br><br>>= 20 | Not Test Failed This Key On<br><br>Not Test Failed This Key On<br><br>Not Fault Pending<br><br>Battery Voltage between<br><br>Primary Input Speed between<br><br>for<br><br>The stuck off section of the test is enabled when Pump mode, Fire Truck pump mode, Direct hold, PTO1, PTO2 are off and NEUTRAL AT STOP: Emissions Credit is enabled. | P0703<br><br>P0720<br>P0721<br>P0722<br><br>P0720<br>P0721<br>P0722<br><br>9 V and 18 V<br><br>200 RPM and 8500 RPM<br>5 seconds | <br><br>frequency<br>150 ms | No MIL |
| Ignition Switch Run/Start Circuit Low | P2534 | This test detects circuit low and open faults associated with the Run/Crank input to the TCM | Run/Crank input is not active for<br><br>THEN report malfunction | >= 5 sec | Engine Speed<br>for<br><br>Output Speed | >= 350 rpm<br>>= 2 sec<br><br>>= 0 rpm | 5 sec<br><br>frequency<br>100ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| **Controller Memory** | | | | | | | | |
| Internal SPI Diagnostics | P0600 | This test detects faults associated with the communication between the microprocessor and the solenoid control integrated circuits internal to the TCM. The diagnostic reads the SPI Range Check Status message as reported by HWIO to determine which devices are being commanded outside of a valid calibration range. The diagnostic reads the SPI Bus Status message as reported by HWIO to determine the validity of SPI data and devices. | If a static bit within SPI messages is not in the proper state for<br><br>THEN report malfunction | >= 1 sec (in steady state range)<br>OR<br>>= 100 ms (during shift) | Battery voltage between<br><br>If Engine Cranking, then Crank Time<br>AND<br>Battery Voltage | 9V and 18V<br><br>< 4 seconds<br><br>> 10 V | 1 sec in steady state range<br>OR<br>100ms during shifts<br><br>frequency<br>20 ms | One Trip |
| Internal Control Module Transmission Range Control Performance | P27B2 | This test verifies the transmission is in a valid range by monitoring the states of both the solenoids and pressure switches. | Actual Solenoid or Pressure Switch State for | /= Expected State<br><br>1 second | Not Failed This Key On and No Fault Pending<br><br>Not Failed This Key On and No Fault Pending<br><br>Not Failed This Key On and No Fault Pending<br><br>Not Failed This Key On and No | Solenoid Faults (table 1)<br><br>P0842<br>P0843<br>P0847<br>P0848<br>P0872<br>P0873<br>P0877<br>P0878<br>P0751<br>P0752<br>P0756<br>PO757<br>P0761<br>P0762<br><br>HSD Faults (table 2)<br><br>P0729 | 1 second<br><br>frequency<br>20 ms | One Trip |

| Component/System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Fault Pending | P0731<br>P0732<br>P0733<br>P0734<br>P0735<br>P0736 | | |
| | | | | | Battery Voltage NOT between<br>Output speed | 9 V and 18 V<br>> 50 | | |

| Table 1 | |
|---|---|
| Solenoid Faults | P2729, P2730, P2727, P2728 |
| | P0966, P0967, P0964, P0965 |
| | P0973, P0974, P097A |
| | P0976, P0977, P097B |
| | P0979, P0980, P097C |
| | P2764, P2763, P2762, P2761 |

| Table 2 | |
|---|---|
| High Side Driver Faults | P0659, P0658, P0657 |
| | P2671, P2670, P2669 |