Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Switch Run/Start Position Circuit Stuck Low Detected	B2B0D	This monitoring checks if the hardwired Run/Crank analog signal matches the value of the Run/Crank Terminal Status message received from the ECM. This fault is set if the two signals do not match where the hardwired signal is set to INACTIVE while the serial data signal is set to ACTIVE.	Run/Crank Analog Signal State **AND** Run/Crank Terminal Status **AND** X **OUT OF** Y	<= 1.5V = ACTIVE = 80 = 100	ECM Timed Out	= FALSE	0.8 [Sec]	Type B 2 Trips
Ignition Switch Run/Start Position Circuit Stuck High Detected	B2BOE	This monitoring checks if the hardwired Run/Crank analog signal matches the value of the Run/Crank Terminal Status message received from the ECM. This fault is set if the two signals do not match where the hardwired signal is set to ACTIVE while the serial data signal is set to INACTIVE.	Run/Crank Analog Signal State **AND** Run/Crank Terminal Status **AND** X **OUT OF** Y	>=5.5V = INACTIVE = 80 = 100	ECM Timed Out	= FALSE	0.8 [Sec]	Type B 2 Trips
Bus-Off detected on the HS Primary bus (Bus A)	U2413	This fault is set if the HS Primary bus enters the Bus-Off state	Bus Off Event Occurred on HS Primary	= TRUE	Run/Crank Analog Signal State **OR** Comm Enable Hardwire Line **AND** System Voltage	>= 5.5V >= 4.5V > 5.5V	25[usec] for pass 10[usec] for fail	Type B 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal memory failure on the CGM Detected	B2B12	This monitoring checks whether a double bit ECC error has occurred in code flash or RAM. This fault is set if an ECC error has occurred.	ECC Error Detected	= TRUE	Guarded Read Flag	= FALSE	50ms	Type B 2 Trips
		This monitoring checks and sets a fault if a defect in the data flash (NVM) is detected.	NVM Fault Detected	= TRUE	N/A	N/A	1.5 us	
Microcontroller Performance Failure Detected	B2B13	This monitoring shall check whether the ALU in the microcontroller is functioning correctly by running an algorithm and checking the results against an expected value. If the result is incorrect the fault shall be set.	Test Result 1 **AND** Test Result 2	!= Expected Result 1 != Expected Result 2	N/A	N/A	1.5 us	Type B 2 Trips
		This monitoring shall check whether any clock monitoring interrupts have occurred. If any clock monitoring interrupts have occurred this fault shall be set.	Clock Monitoring Interrupt Occurred	= TRUE	N/A	N/A		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Loss of Communication with the ECM Detected	U18D5	This monitoring shall check a supervised message from the ECM to check the communication status. If the CGM has not received the supervised message from the ECM for 2.5x of its periodic rate, a secondary counter shall be enabled and decremented. When the secondary timer reaches zero, this fault shall be set if the message still has not been received.	Supervised Message has not been received in 62.5[ms] **THEN** Secondary Timer (4 sec)	= TRUE = 0 sec	Run/Crank Analog Signal State **AND** System Voltage	>= 5.5V >= 7V	4.0625 [sec]	Type B 2 Trips
Loss of Communication with the TCM Detected	U18D7	This monitoring shall check a supervised message from the TCM to check the communication status. If the CGM has not received the supervised message from the TCM for 2.5x of its periodic rate, a secondary counter shall be enabled and decremented. When the secondary timer reaches zero, this fault shall be set if the message still has not been received.	Supervised Message has not been received in 2.5[sec] **THEN** Secondary Timer (4 sec)	= TRUE = 0 sec	Run/Crank Analog Signal State **AND** System Voltage	= ACTIVE >= 7V	6.5 [sec]	Type B 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Loss of Communication with the EBCM Detected	U18DC	This monitoring shall check a supervised message from the EBCM to check the communication status. If the CGM has not received the supervised message from the EBCM for 2.5x of its periodic rate, a secondary counter shall be enabled and decremented. When the secondary timer reaches zero, this fault shall be set if the message still has not been received.	Supervised Message has not been received in 2.5[sec] **THEN** Secondary Timer (4 sec)	= TRUE = 0 sec	Run/Crank Analog Signal State **AND** System Voltage	= ACTIVE >= 7V	6.5 [sec]	Type B 2 Trips

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
Group 1 - Wheel Speed Sensor							
WSS_OPEN_FRONT_LEFT	C0502	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris ASIC sets FL Open Sensor bit = TRUE when High side current < 3.5mA	Polaris ASIC Open Sensor Bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_OPEN_FRONT_RIGHT	C0508	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris ASIC sets FR Open Sensor bit = TRUE when High side current < 3.5mA	Polaris ASIC Open Sensor Bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_OPEN_REAR_LEFT	C050E	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris ASIC sets RL Open Sensor bit = TRUE when High side current < 3.5mA	Polaris ASIC Open Sensor Bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_OPEN_REAR_RIGHT	C0514	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris ASIC sets RR Open Sensor bit = TRUE when High side current < 3.5mA	Polaris ASIC Open Sensor Bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_SHORT_FRONT_LEFT	C0503	This monitor checks if: • HS Shorted to Battery • LS Shorted to Battery • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris Asic sets XX HS OC = TRUE when High side current > 40mA	Low side over current bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_SHORT_FRONT_RIGHT	C0509	This monitor checks if: • HS Shorted to Battery • LS Shorted to Battery • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris Asic sets XX HS OC = TRUE when High side current > 40mA	Low side over current bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_SHORT_REAR_LEFT	C050F	This monitor checks if: • HS Shorted to Battery • LS Shorted to Battery • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris Asic sets XX HS OC = TRUE when High side current > 40mA	Low side over current bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_SHORT_REAR_RIGHT	C0515	This monitor checks if: • HS Shorted to Battery • LS Shorted to Battery • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris Asic sets XX HS OC = TRUE when High side current > 40mA	Low side over current bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_LS_SHORT_TO_GND_FRONT_LEFT	C0502	This monitor checks if: • LS Shorted to Ground • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris Asic sets XX LS SHORT TO GROUND spi bit= TRUE	• Polaris Asic sets XX LS SHORT TO GROUND spi bit= TRUE	• Wheel speed sensor supply is enabled • Tested only during power up or after clear DTC.	100 ms	Type A. MIL Illumination.
WSS_LS_SHORT_TO_GND_FRONT_RIGHT	C0508	This monitor checks if: • LS Shorted to Battery • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris Asic sets XX LS SHORT TO GROUND spi bit= TRUE	• Polaris Asic sets XX LS SHORT TO GROUND spi bit= TRUE	• Wheel speed sensor supply is enabled • Tested only during power up or after clear DTC.	100 ms	Type A. MIL Illumination.
WSS_LS_SHORT_TO_GND_REAR_LEFT	C050E	This monitor checks if: • LS Shorted to Battery • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris Asic sets XX LS SHORT TO GROUND spi bit= TRUE	• Polaris Asic sets XX LS SHORT TO GROUND spi bit= TRUE	• Wheel speed sensor supply is enabled • Tested only during power up or after clear DTC.	100 ms	Type A. MIL Illumination.
WSS_LS_SHORT_TO_GND_REAR_RIGHT	C0514	This monitor checks if: • LS Shorted to Battery • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Polaris Asic sets XX LS SHORT TO GROUND spi bit= TRUE	• Polaris Asic sets XX LS SHORT TO GROUND spi bit= TRUE	• Wheel speed sensor supply is enabled • Tested only during power up or after clear DTC.	100 ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_MISSING_FRONT_LEFT	C0505	This monitor checks if: • Wheel speed sensor not mounted correctly. • Wheel speed sensor to tone-ring gap out of tolerance. • Demagnetized tone-ring.	Missing Wheel Speed Sensor If one sensor shows a speed of less than 1.5 km/h (standstill detection threshold) while the other sensors indicate a speed greater than 6 km/h, then a missing sensor signal fault occurs. The detection is dependant on the speed of the wheels showing a valid signal. If the average speed of moving wheel (6km/h) is greater than 50 km/h and/or any undroven wheel speed is greater than 6km/h, the fault detection time is faster. The entire test sequence is bypassed whenever unexpected wheel acceleration is detected to induce ABS (DRP) activation. The purpose of this handling is to avoid erroneous fault detection. Special case is during TC, ABS or MOCO then the detection is run and the detection time is increased. The failsafe will not run in case • exactly one axle is moving (other axle is standstill) while the moving axle shows an average velocity of less than 10km/h (to prevent setting Missing Wss faults on a roller bench). • the dynamic failsafe is currently disabled because the system is currently in Diagnostic mode. Counter type: Counter up and the fault counter reset If all sensors show a speed greater than 6 km/h or the vehicle is in standstill (all sensors lower than 1.5 km/h) Fault maturation time for one Wss missing: a. TC active: 60 sec b. ABS or MOCO not active: 3 sec. c. ABS or MOCO active: 15 sec Fault maturation time for two Wss missing: a. ABS or MOCO active: 15 sec b. If ABS or MOCO not active: 1. If undriven wheel is moving then: Fault maturation if velocity greater than 50 km/hr: 3 sec. If velocity is less than 50 km/hr then fault maturation is: 10 sec. 2. If driven wheel is moving then: Fault maturation if velocity greater than 50 km/hr: 10 sec. If velocity is less than 50 km/hr then fault maturation is: 30 sec. Fault maturation time for three Wss missing: 120 sec	If one sensor shows a speed of less than 1.5 km/h (standstill detection threshold) while the other sensors indicate a speed greater than 6 km/h, then a missing sensor signal fault occurs. The detection is dependant on the speed of the wheels showing a valid signal. If the average speed of moving wheel (6km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6km/h the fault detection time is faster. The entire test sequence is bypassed whenever unexpected wheel acceleration is detected to induce ABS (DRP) activation. The purpose of this handling is to avoid erroneous fault detection. Special case is during ABS, only if the wheel is in pressure dump state, then the detection is run and the detection time is increased.	• Wheel speed sensor supply is enabled. • No Ohmic wheel speed sensor failure present. • No Wss Erratic or Wss Dropout fault present • At least one WSS > 6kph • No excessive high or low voltage • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	3-120s depending on number of missing wss and situation	Type B. MIL Illumination.
WSS_MISSING_FRONT_RIGHT	C050B	This monitor checks if: • Wheel speed sensor not mounted correctly. • Wheel speed sensor to tone-ring gap out of tolerance. • Demagnetized tone-ring.	Missing Wheel Speed Sensor If one sensor shows a speed of less than 1.5 km/h (standstill detection threshold) while the other sensors indicate a speed greater than 6 km/h, then a missing sensor signal fault occurs. The detection is dependant on the speed of the wheels showing a valid signal. If the average speed of moving wheel (6km/h) is greater than 50 km/h and/or any undroven wheel speed is greater than 6km/h, the fault detection time is faster. The entire test sequence is bypassed whenever unexpected wheel acceleration is detected to induce ABS (DRP) activation. The purpose of this handling is to avoid erroneous fault detection. Special case is during TC, ABS or MOCO then the detection is run and the detection time is increased. The failsafe will not run in case • exactly one axle is moving (other axle is standstill) while the moving axle shows an average velocity of less than 10km/h (to prevent setting Missing Wss faults on a roller bench). • the dynamic failsafe is currently disabled because the system is currently in Diagnostic mode. Counter type: Counter up and the fault counter reset If all sensors show a speed greater than 6 km/h or the vehicle is in standstill (all sensors lower than 1.5 km/h) Fault maturation time for one Wss missing: a. TC active: 60 sec b. ABS or MOCO not active: 3 sec. c. ABS or MOCO active: 15 sec Fault maturation time for two Wss missing: a. ABS or MOCO active: 15 sec b. If ABS or MOCO not active: 1. If undriven wheel is moving then: Fault maturation if velocity greater than 50 km/hr: 3 sec. If velocity is less than 50 km/hr then fault maturation is: 10 sec. 2. If driven wheel is moving then: Fault maturation if velocity greater than 50 km/hr: 10 sec. If velocity is less than 50 km/hr then fault maturation is: 30 sec. Fault maturation time for three Wss missing: 120 sec	If one sensor shows a speed of less than 1.5 km/h (standstill detection threshold) while the other sensors indicate a speed greater than 6 km/h, then a missing sensor signal fault occurs. The detection is dependant on the speed of the wheels showing a valid signal. If the average speed of moving wheel (6km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6km/h the fault detection time is faster. The entire test sequence is bypassed whenever unexpected wheel acceleration is detected to induce ABS (DRP) activation. The purpose of this handling is to avoid erroneous fault detection. Special case is during ABS, only if the wheel is in pressure dump state, then the detection is run and the detection time is increased.	• Wheel speed sensor supply is enabled. • No Ohmic wheel speed sensor failure present. • No Wss Erratic or Wss Dropout fault present • At least one WSS > 6kph • No excessive high or low voltage • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	3-120s depending on number of missing wss and situation	Type B. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_MISSING_REAR_LEFT	C0511	This monitor checks if: • Wheel speed sensor not mounted correctly. • Wheel speed sensor to tone-ring gap out of tolerance. • Demagnetized tone-ring.	Missing Wheel Speed Sensor If one sensor shows a speed of less than 1.5 km/h (standstill detection threshold) while the other sensors indicate a speed greater than 6 km/h, then a missing sensor signal fault occurs. The detection is dependant on the speed of the wheels showing a valid signal. If the average speed of moving wheel (6km/h) is greater than 50 km/h and/or any undroven wheel speed is greater than 6km/h, the fault detection time is faster. The entire test sequence is bypassed whenever unexpected wheel acceleration is detected to induce ABS (DRP) activation. The purpose of this handling is to avoid erroneous fault detection. Special case is during TC, ABS or MOCO then the detection is run and the detection time is increased. The failsafe will not run in case • exactly one axle is moving (other axle is standstill) while the moving axle shows an average velocity of less than 10km/h (to prevent setting Missing Wss faults on a roller bench). • the dynamic failsafe is currently disabled because the system is currently in Diagnostic mode. Counter type: Counter up and the fault counter reset If all sensors show a speed greater than 6 km/h or the vehicle is in standstill (all sensors lower than 1.5 km/h) Fault maturation time for one Wss missing: a. TC active: 60 sec b. ABS or MOCO not active: 3 sec. c. ABS or MOCO active: 15 sec Fault maturation time for two Wss missing: a. ABS or MOCO active: 15 sec b. If ABS or MOCO not active: 1. If undriven wheel is moving then: Fault maturation if velocity greater than 50 km/hr: 3 sec. If velocity is less than 50 km/hr then fault maturation is: 10 sec. 2. If driven wheel is moving then: Fault maturation if velocity greater than 50 km/hr: 10 sec. If velocity is less than 50 km/hr then fault maturation is: 30 sec. Fault maturation time for three Wss missing: 120 sec	If one sensor shows a speed of less than 1.5 km/h (standstill detection threshold) while the other sensors indicate a speed greater than 6 km/h, then a missing sensor signal fault occurs. The detection is dependant on the speed of the wheels showing a valid signal. If the average speed of moving wheel (6km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6km/h the fault detection time is faster. The entire test sequence is bypassed whenever unexpected wheel acceleration is detected to induce ABS (DRP) activation. The purpose of this handling is to avoid erroneous fault detection. Special case is during ABS, only if the wheel is in pressure dump state, then the detection is run and the detection time is increased.	• Wheel speed sensor supply is enabled. • No Ohmic wheel speed sensor failure present. • No Wss Erratic or Wss Dropout fault present • At least one WSS > 6kph • No excessive high or low voltage • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	3-120s depending on number of missing wss and situation	Type B. MIL Illumination.
WSS_MISSING_REAR_RIGHT	C0517	This monitor checks if: • Wheel speed sensor not mounted correctly. • Wheel speed sensor to tone-ring gap out of tolerance. • Demagnetized tone-ring.	Missing Wheel Speed Sensor If one sensor shows a speed of less than 1.5 km/h (standstill detection threshold) while the other sensors indicate a speed greater than 6 km/h, then a missing sensor signal fault occurs. The detection is dependant on the speed of the wheels showing a valid signal. If the average speed of moving wheel (6km/h) is greater than 50 km/h and/or any undroven wheel speed is greater than 6km/h, the fault detection time is faster. The entire test sequence is bypassed whenever unexpected wheel acceleration is detected to induce ABS (DRP) activation. The purpose of this handling is to avoid erroneous fault detection. Special case is during TC, ABS or MOCO then the detection is run and the detection time is increased. The failsafe will not run in case • exactly one axle is moving (other axle is standstill) while the moving axle shows an average velocity of less than 10km/h (to prevent setting Missing Wss faults on a roller bench). • the dynamic failsafe is currently disabled because the system is currently in Diagnostic mode. Counter type: Counter up and the fault counter reset If all sensors show a speed greater than 6 km/h or the vehicle is in standstill (all sensors lower than 1.5 km/h) Fault maturation time for one Wss missing: a. TC active: 60 sec b. ABS or MOCO not active: 3 sec. c. ABS or MOCO active: 15 sec Fault maturation time for two Wss missing: a. ABS or MOCO active: 15 sec b. If ABS or MOCO not active: 1. If undriven wheel is moving then: Fault maturation if velocity greater than 50 km/hr: 3 sec. If velocity is less than 50 km/hr then fault maturation is: 10 sec. 2. If driven wheel is moving then: Fault maturation if velocity greater than 50 km/hr: 10 sec. If velocity is less than 50 km/hr then fault maturation is: 30 sec. Fault maturation time for three Wss missing: 120 sec	If one sensor shows a speed of less than 1.5 km/h (standstill detection threshold) while the other sensors indicate a speed greater than 6 km/h, then a missing sensor signal fault occurs. The detection is dependant on the speed of the wheels showing a valid signal. If the average speed of moving wheel (6km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6km/h the fault detection time is faster. The entire test sequence is bypassed whenever unexpected wheel acceleration is detected to induce ABS (DRP) activation. The purpose of this handling is to avoid erroneous fault detection. Special case is during ABS, only if the wheel is in pressure dump state, then the detection is run and the detection time is increased.	• Wheel speed sensor supply is enabled. • No Ohmic wheel speed sensor failure present. • No Wss Erratic or Wss Dropout fault present • At least one WSS > 6kph • No excessive high or low voltage • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	3-120s depending on number of missing wss and situation	Type B. MIL Illumination.
WSS_ERRATIC_FRONT_LEFT	C0504	This monitor checks if: • Wheel speed sensor not mounted correctly. • Missing tooth or teeth on the wheel speed sensor tone-ring. • Electro-magnetic interference (EMI).	Erratic Wheel Speed Sensor • If the absolute value of the unfiltered wheel acceleration is greater than 491 m/s/s and the wheel or vehicle speed is above 3.58 m/s, an erratic wheel speed sensor may be present. The fault occurrence counter will be incremented by "Fault Maturation Weight". If the fault occurrence counter reaches "Fault Goal", then an erratic wheel speed sensor fault is set. • If the wheel acceleration is less than or equal to the above threshold, then the fault occurrence counter is decremented by monitor rate. This allows the system to slowly decay the fault occurrence counter so that only a very erratic wheel speed sensor with unrealistic acceleration values will set this fault. • Counter: 1000 - Monitor Rate: 5ms - Fault maturation time (Goal): 200ms	$\lvert Wheel\_Accel \rvert > 491\ m/s^2$	• reference_vehicle_velocity > 3.58 m/s • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	Goal: 40000 Continuous failure Time: 200ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_ERRATIC_FRONT_RIGHT	C050A	This monitor checks if: • Wheel speed sensor not mounted correctly. • Missing tooth or teeth on the wheel speed sensor tone-ring. • Electro-magnetic interference (EMI).	Erratic Wheel Speed Sensor • If the absolute value of the unfiltered wheel acceleration is greater than 491 m/s/s and the wheel or vehicle speed is above 3.58 m/s, an erratic wheel speed sensor may be present. The fault occurrence counter will be incremented by "Fault Maturation Weight". If the fault occurrence counter reaches "Fault Goal", then an erratic wheel speed sensor fault is set. • If the wheel acceleration is less than or equal to the above threshold, then the fault occurrence counter is decremented by monitor rate. This allows the system to slowly decay the fault occurrence counter so that only a very erratic wheel speed sensor with unrealistic acceleration values will set this fault. ▪Counter: 1000 ▪Monitor Rate: 5ms • Fault maturation time (Goal): 200ms	|Wheel_Accel| >491 m/s^2	• reference_vehicle_velocity > 3.58 m/s • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	Goal: 40000 Continuous failure Time: 200ms	Type A. MIL Illumination.
WSS_ERRATIC_REAR_LEFT	C0510	This monitor checks if: • Wheel speed sensor not mounted correctly. • Missing tooth or teeth on the wheel speed sensor tone-ring. • Electro-magnetic interference (EMI).	Erratic Wheel Speed Sensor • If the absolute value of the unfiltered wheel acceleration is greater than 491 m/s/s and the wheel or vehicle speed is above 3.58 m/s, an erratic wheel speed sensor may be present. The fault occurrence counter will be incremented by "Fault Maturation Weight". If the fault occurrence counter reaches "Fault Goal", then an erratic wheel speed sensor fault is set. • If the wheel acceleration is less than or equal to the above threshold, then the fault occurrence counter is decremented by monitor rate. This allows the system to slowly decay the fault occurrence counter so that only a very erratic wheel speed sensor with unrealistic acceleration values will set this fault. ▪Counter: 1000 ▪Monitor Rate: 5ms ▪Fault maturation time (Goal): 200ms	|Wheel_Accel| >491 m/s^2	• reference_vehicle_velocity > 3.58 m/s • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	Goal: 40000 Continuous failure Time: 200ms	Type A. MIL Illumination.
WSS_ERRATIC_REAR_RIGHT	0051 6	This monitor checks if: • Wheel speed sensor not mounted correctly. • Missing tooth or teeth on the wheel speed sensor tone-ring. • Electro-magnetic interference (EMI).	Erratic Wheel Speed Sensor • If the absolute value of the unfiltered wheel acceleration is greater than 491 m/s/s and the wheel or vehicle speed is above 3.58 m/s, an erratic wheel speed sensor may be present. The fault occurrence counter will be incremented by "Fault Maturation Weight". If the fault occurrence counter reaches "Fault Goal", then an erratic wheel speed sensor fault is set. • If the wheel acceleration is less than or equal to the above threshold, then the fault occurrence counter is decremented by monitor rate. This allows the system to slowly decay the fault occurrence counter so that only a very erratic wheel speed sensor with unrealistic acceleration values will set this fault. • Counter: 1000 - Monitor Rate: 5ms - Fault maturation time (Goal): 200ms	|Wheel_Accel| > 491 m/s^2	• reference_vehicle_velocity > 3.58 m/s • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	Goal: 40000 Continuous failure Time: 200ms	Type A. MIL Illumination.
WSS_DROPOUT_FRONT_LEFT	C0505	This monitor checks if: • Defective wheel speed sensor. • Wheel speed sensor not mounted correctly. • Defective wheel speed sensor wiring harness. • Missing tooth or teeth on the wheel speed sensor tone-ring.	• Wheel Speed Sensor Dropout • When wheel speed sensor acceleration is detected that is above 392 m/s/s, a timer is initialized to hold off wheel speed sensor dropout detection for 1000 msec. Once this sudden acceleration is detected (and the timer is greater than zero), subsequent accelerations/decelerations greater than 294 m/s/s will reset the timer to the greater of the current timer value or 500 msec. This is done to prevent setting a fault during subsequent performance activity. • Once the timer decays to zero (or is already zero), the wheel speed sensor dropout monitor checks if any wheel speed sensor edges have been detected. If wheel speed sensor edges have been detected then we check if the wheel velocity is greater than 0.2236 m/s. If it is then we can pass this failsafe. If not we reset the fault monitor because we can not monitor this fault condition at this time. • If no wheel speed sensor edges have been detected for more than 150ms while the last valid wheel velocity (which was calculated based on real speed edges) was greater than 30km/h a WSS Dropout fault will be detected. Furthermore the filtered vehicle velocity must be greater than 3.58m/s to detect the fault. • Counter: Count 1-up • Monitor Rate: 7ms	When wheel speed sensor acceleration is detected that is above 392 m/s/s, a timer is initialized to hold off wheel speed sensor dropout detection for 1000 msec. Once this sudden acceleration is detected (and the timer is greater than zero), subsequent accelerations/decelerations greater than 294 m/s/s will reset the timer to the greater of the current timer value or 500 msec. This is done to prevent setting a fault during subsequent performance activity. If no wheel speed sensor edges have been detected then we see which axle the wheel is on because there can be different wheel speed thresholds. We also check if the brake pedal is applied. Wheels can decelerate much faster when the brake pedal is applied than when it is not applied so the brake pedal is used to determine the speed threshold at which the sensor dropout monitor can be executed. If the brake pedal is applied, a higher wheel speed threshold is used than when the brake pedal is not applied. If the brake pedal is applied the wheel speed sensor velocity threshold is 9 m/s for wheels on the front axle and 9 m/s for wheels on the back axle. If the brake pedal is not applied then the wheel speed sensor velocity threshold is 5.38 m/s for wheels on the front axle and 5.38 m/s for wheels on the back axle. If the last valid wheel velocity is greater than the wheel speed velocity threshold set above, the difference in time from the last time we checked for this fault is greater than 40 msec, and the filtered vehicle velocity is above 3.58 m/s then a wheel speed sensor dropout fault is detected. If any of these conditions are not true then conditions are not correct to do dropout detection so reset the fault monitor.	• Wheel speed sensor supply is enabled. • No ohmic wheel speed sensor failure present • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	40 ms	Type B. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_DROPOUT_FRONT_RIGHT	C050B	This monitor checks if: • Defective wheel speed sensor. • Wheel speed sensor not mounted correctly. • Defective wheel speed sensor wiring harness. • Missing tooth or teeth on the wheel speed sensor tone-ring.	• Wheel Speed Sensor Dropout • When wheel speed sensor acceleration is detected that is above 392 m/s/s, a timer is initialized to hold off wheel speed sensor dropout detection for 1000 msec. Once this sudden acceleration is detected (and the timer is greater than zero), subsequent accelerations/decelerations greater than 294 m/s/s will reset the timer to the greater of the current timer value or 500 msec. This is done to prevent setting a fault during subsequent performance activity. • Once the timer decays to zero (or is already zero), the wheel speed sensor dropout monitor checks if any wheel speed sensor edges have been detected. If wheel speed sensor edges have been detected then we check if the wheel velocity is greater than 0.2236 m/s. If it is then we can pass this failsafe. If not we reset the fault monitor because we can not monitor this fault condition at this time. • If no wheel speed sensor edges have been detected for more than 150ms while the last valid wheel velocity (which was calculated based on real speed edges) was greater than 30km/h a WSS Dropout fault will be detected. Furthermore the filtered vehicle velocity must be greater than 3.58m/s to detect the fault. • Counter: Count 1-up • Monitor Rate: 7ms	When wheel speed sensor acceleration is detected that is above 392 m/s/s, a timer is initialized to hold off wheel speed sensor dropout detection for 1000 msec. Once this sudden acceleration is detected (and the timer is greater than zero), subsequent accelerations/decelerations greater than 294 m/s/s will reset the timer to the greater of the current timer value or 500 msec. This is done to prevent setting a fault during subsequent performance activity. If no wheel speed sensor edges have been detected then we see which axle the wheel is on because there can be different wheel speed thresholds. We also check if the brake pedal is applied. Wheels can decelerate much faster when the brake pedal is applied than when it is not applied so the brake pedal is used to determine the speed threshold at which the sensor dropout monitor can be executed. If the brake pedal is applied, a higher wheel speed threshold is used than when the brake pedal is not applied. If the brake pedal is applied the wheel speed sensor velocity threshold is 9 m/s for wheels on the front axle and 9 m/s for wheels on the back axle. If the brake pedal is not applied then the wheel speed sensor velocity threshold is 5.38 m/s for wheels on the front axle and 5.38 m/s for wheels on the back axle. If the last valid wheel velocity is greater than the wheel speed velocity threshold set above, the difference in time from the last time we checked for this fault is greater than 40 msec, and the filtered vehicle velocity is above 3.58 m/s then a wheel speed sensor dropout fault is detected. If any of these conditions are not true then conditions are not correct to do dropout detection so reset the fault monitor.	• Wheel speed sensor supply is enabled. • No ohmic wheel speed sensor failure present • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	40 ms	Type B. MIL Illumination.
WSS_DROPOUT_REAR_LEFT	C0511	This monitor checks if: • Defective wheel speed sensor. • Wheel speed sensor not mounted correctly. • Defective wheel speed sensor wiring harness. • Missing tooth or teeth on the wheel speed sensor tone-ring.	• Wheel Speed Sensor Dropout • When wheel speed sensor acceleration is detected that is above 392 m/s/s, a timer is initialized to hold off wheel speed sensor dropout detection for 1000 msec. Once this sudden acceleration is detected (and the timer is greater than zero), subsequent accelerations/decelerations greater than 294 m/s/s will reset the timer to the greater of the current timer value or 500 msec. This is done to prevent setting a fault during subsequent performance activity. • Once the timer decays to zero (or is already zero), the wheel speed sensor dropout monitor checks if any wheel speed sensor edges have been detected. If wheel speed sensor edges have been detected then we check if the wheel velocity is greater than 0.2236 m/s. If it is then we can pass this failsafe. If not we reset the fault monitor because we can not monitor this fault condition at this time. • If no wheel speed sensor edges have been detected for more than 150ms while the last valid wheel velocity (which was calculated based on real speed edges) was greater than 30km/h a WSS Dropout fault will be detected. Furthermore the filtered vehicle velocity must be greater than 3.58m/s to detect the fault. • Counter: Count 1-up • Monitor Rate: 7ms	When wheel speed sensor acceleration is detected that is above 392 m/s/s, a timer is initialized to hold off wheel speed sensor dropout detection for 1000 msec. Once this sudden acceleration is detected (and the timer is greater than zero), subsequent accelerations/decelerations greater than 294 m/s/s will reset the timer to the greater of the current timer value or 500 msec. This is done to prevent setting a fault during subsequent performance activity. If no wheel speed sensor edges have been detected then we see which axle the wheel is on because there can be different wheel speed thresholds. We also check if the brake pedal is applied. Wheels can decelerate much faster when the brake pedal is applied than when it is not applied so the brake pedal is used to determine the speed threshold at which the sensor dropout monitor can be executed. If the brake pedal is applied, a higher wheel speed threshold is used than when the brake pedal is not applied. If the brake pedal is applied the wheel speed sensor velocity threshold is 9 m/s for wheels on the front axle and 9 m/s for wheels on the back axle. If the brake pedal is not applied then the wheel speed sensor velocity threshold is 5.38 m/s for wheels on the front axle and 5.38 m/s for wheels on the back axle. If the last valid wheel velocity is greater than the wheel speed velocity threshold set above, the difference in time from the last time we checked for this fault is greater than 40 msec, and the filtered vehicle velocity is above 3.58 m/s then a wheel speed sensor dropout fault is detected. If any of these conditions are not true then conditions are not correct to do dropout detection so reset the fault monitor.	• Wheel speed sensor supply is enabled. • No ohmic wheel speed sensor failure present • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	40 ms	Type B. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_DROPOUT_REAR_RIGHT	C0517	This monitor checks if: • Defective wheel speed sensor. • Wheel speed sensor not mounted correctly. • Defective wheel speed sensor wiring harness. • Missing tooth or teeth on the wheel speed sensor tone-ring.	• Wheel Speed Sensor Dropout • When wheel speed sensor acceleration is detected that is above 392 m/s/s, a timer is initialized to hold off wheel speed sensor dropout detection for 1000 msec. Once this sudden acceleration is detected (and the timer is greater than zero), subsequent accelerations/decelerations greater than 294 m/s/s will reset the timer to the greater of the current timer value or 500 msec. This is done to prevent setting a fault during subsequent performance activity. • Once the timer decays to zero (or is already zero), the wheel speed sensor dropout monitor checks if any wheel speed sensor edges have been detected. If wheel speed sensor edges have been detected then we check if the wheel velocity is greater than 0.2236 m/s. If it is then we can pass this failsafe. If not we reset the fault monitor because we can not monitor this fault condition at this time. • If no wheel speed sensor edges have been detected for more than 150ms while the last valid wheel velocity (which was calculated based on real speed edges) was greater than 30km/h a WSS Dropout fault will be detected. Furthermore the filtered vehicle velocity must be greater than 3.58m/s to detect the fault. • Counter: Count 1-up • Monitor Rate: 7ms	When wheel speed sensor acceleration is detected that is above 392 m/s/s, a timer is initialized to hold off wheel speed sensor dropout detection for 1000 msec. Once this sudden acceleration is detected (and the timer is greater than zero), subsequent accelerations/decelerations greater than 294 m/s/s will reset the timer to the greater of the current timer value or 500 msec. This is done to prevent setting a fault during subsequent performance activity. If no wheel speed sensor edges have been detected then we see which axle the wheel is on because there can be different wheel speed thresholds. We also check if the brake pedal is applied. Wheels can decelerate much faster when the brake pedal is applied than when it is not applied so the brake pedal is used to determine the speed threshold at which the sensor dropout monitor can be executed. If the brake pedal is applied, a higher wheel speed threshold is used than when the brake pedal is not applied. If the brake pedal is applied the wheel speed sensor velocity threshold is 9 m/s for wheels on the front axle and 9 m/s for wheels on the back axle. If the brake pedal is not applied then the wheel speed sensor velocity threshold is 5.38 m/s for wheels on the front axle and 5.38 m/s for wheels on the back axle. If the last valid wheel velocity is greater than the wheel speed velocity threshold set above, the difference in time from the last time we checked for this fault is greater than 40 msec, and the filtered vehicle velocity is above 3.58 m/s then a wheel speed sensor dropout fault is detected. If any of these conditions are not true then conditions are not correct to do dropout detection so reset the fault monitor.	• Wheel speed sensor supply is enabled. • No ohmic wheel speed sensor failure present • Diagnostic Mode Inactive • Emissions Rolls Test Inactive	40 ms	Type B. MIL Illumination.
WSS_FAST_MISSING_FRONT_LEFT	C0505	This monitor checks if: • Wheel speed sensor not mounted correctly. • Wheel speed sensor to tone-ring gap out of tolerance. • Demagnetized tone-ring.	• Fast Missing Wheel Speed Sensor • This failsafe is only active from • Ignition On until the vehicle reaches • 15km/h for the first time. • During this time the wheel speeds and wheel • speed pulses are monitored	The wheel speed monitor starts at velocities above 4km/h. If a wheel speed sensor shows a velocity slower than 1.2km/h the wheel speed is considered to be missing and corresponding internal fault counter of the failsafe will be incremented. At the time the vehicle reaches 15km/h, these fault counters and the wheel speed pulse counters are used to decide whether a fault has to be latched or not. The failsafe will only latch a fault if only one wheel speed signal seems to be missing. If more than one wheel speed signal is missing, no fault will be latched by this failsafe because this is not required to be detected until 15km/h. If a fast missing fault has been detected the failsafe monitors the conditions until either the failure condition disappears for enough time to remove the fault code or the fault can be removed in case it has been confirmed by another wss fault code.	• Wheel speed sensor supply is enabled. • No other wheel speed sensor failure present • 15 km/h not reached this ignition cycle • Diagnostic Mode Inactive • Emissions Rolls Test Inactive SYSTEM_VOLTAGE_EXCESSIVE_LOW not latched	1 count	Type B. MIL Illumination.
WSS_FAST_MISSING_FRONT_RIGHT	C050B	This monitor checks if: • Wheel speed sensor not mounted correctly. • Wheel speed sensor to tone-ring gap out of tolerance. • Demagnetized tone-ring.	• Fast Missing Wheel Speed Sensor • This failsafe is only active from • Ignition On until the vehicle reaches • 15km/h for the first time. • During this time the wheel speeds and wheel • speed pulses are monitored	The wheel speed monitor starts at velocities above 4km/h. If a wheel speed sensor shows a velocity slower than 1.2km/h the wheel speed is considered to be missing and corresponding internal fault counter of the failsafe will be incremented. At the time the vehicle reaches 15km/h, these fault counters and the wheel speed pulse counters are used to decide whether a fault has to be latched or not. The failsafe will only latch a fault if only one wheel speed signal seems to be missing. If more than one wheel speed signal is missing, no fault will be latched by this failsafe because this is not required to be detected until 15km/h. If a fast missing fault has been detected the failsafe monitors the conditions until either the failure condition disappears for enough time to remove the fault code or the fault can be removed in case it has been confirmed by another wss fault code.	• Wheel speed sensor supply is enabled. • No other wheel speed sensor failure present • 15 km/h not reached this ignition cycle • Diagnostic Mode Inactive • Emissions Rolls Test Inactive SYSTEM_VOLTAGE_EXCESSIVE_LOW not latched	1 count	Type B. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_FAST_MISSING_REAR_LEFT	C0511	This monitor checks if: • Wheel speed sensor not mounted correctly. • Wheel speed sensor to tone-ring gap out of tolerance. • Demagnetized tone-ring. (should come from FMEA)	• Fast Missing Wheel Speed Sensor • This failsafe is only active from • Ignition On until the vehicle reaches • 15km/h for the first time. • During this time the wheel speeds and wheel • speed pulses are monitored	The wheel speed monitor starts at velocities above 4km/h. If a wheel speed sensor shows a velocity slower than 1.2km/h the wheel speed is considered to be missing and corresponding internal fault counter of the failsafe will be incremented. At the time the vehicle reaches 15km/h, these fault counters and the wheel speed pulse counters are used to decide whether a fault has to be latched or not. The failsafe will only latch a fault if only one wheel speed signal seems to be missing. If more than one wheel speed signal is missing, no fault will be latched by this failsafe because this is not required to be detected until 15km/h. If a fast missing fault has been detected the failsafe monitors the conditions until either the failure condition disappears for enough time to remove the fault code or the fault can be removed in case it has been confirmed by another wss fault code.	• Wheel speed sensor supply is enabled. • No other wheel speed sensor failure present • 15 km/h not reached this ignition cycle • Diagnostic Mode Inactive • Emissions Rolls Test Inactive SYSTEM_VOLTAGE_EXCESSIVE_LOW not latched	1 count	Type B. MIL Illumination.
WSS_FAST_MISSING_REAR_RIGHT	C0517	This monitor checks if: • Wheel speed sensor not mounted correctly. • Wheel speed sensor to tone-ring gap out of tolerance. • Demagnetized tone-ring.	• Fast Missing Wheel Speed Sensor • This failsafe is only active from • Ignition On until the vehicle reaches • 15km/h for the first time. • During this time the wheel speeds and wheel • speed pulses are monitored	The wheel speed monitor starts at velocities above 4km/h. If a wheel speed sensor shows a velocity slower than 1.2km/h the wheel speed is considered to be missing and corresponding internal fault counter of the failsafe will be incremented. At the time the vehicle reaches 15km/h, these fault counters and the wheel speed pulse counters are used to decide whether a fault has to be latched or not. The failsafe will only latch a fault if only one wheel speed signal seems to be missing. If more than one wheel speed signal is missing, no fault will be latched by this failsafe because this is not required to be detected until 15km/h. If a fast missing fault has been detected the failsafe monitors the conditions until either the failure condition disappears for enough time to remove the fault code or the fault can be removed in case it has been confirmed by another wss fault code.	• Wheel speed sensor supply is enabled. • No other wheel speed sensor failure present • 15 km/h not reached this ignition cycle • Diagnostic Mode Inactive • Emissions Rolls Test Inactive SYSTEM_VOLTAGE_EXCESSIVE_LOW not latched	1 count	Type B. MIL Illumination.
WSS_TOO_FAST_SENSOR_FRONT_LEFT	C0505	This monitor checks if: - Wheel speed sensor not mounted correctly. - Wheel speed sensor to tone-ring gap out of tolerance. - Demagnitized tone-ring	If this wheelspeed sensor reaches a speed over 3.73mph (6 km/h) while the other three show a speed of less than 0.93mph (1.5 km/h) the fault is detected.	If fault detection criteria is fulfilled then WSS_TOO_FAST_SENSOR_XX will latch if WSS_MISSING_XX or WSS_FAST_MISSING_XX or WSS_DROPOUT_XX faults are not latched.	• No electrical failure is currently present	40 msec	Type B. MIL Illumination.
WSS_TOO_FAST_SENSOR_FRONT_RIGHT	C050B	This monitor checks if: - Wheel speed sensor not mounted correctly. - Wheel speed sensor to tone-ring gap out of tolerance. - Demagnitized tone-ring	If this wheelspeed sensor reaches a speed over 3.73mph (6 km/h) while the other three show a speed of less than 0.93mph (1.5 km/h) the fault is detected.	If fault detection criteria is fulfilled then WSS_TOO_FAST_SENSOR_XX will latch if WSS_MISSING_XX or WSS_FAST_MISSING_XX or WSS_DROPOUT_XX faults are not latched.	• No electrical failure is currently present	40 msec	Type B. MIL Illumination.
WSS_TOO_FAST_SENSOR_REAR_LEFT	C0511	This monitor checks if: - Wheel speed sensor not mounted correctly. - Wheel speed sensor to tone-ring gap out of tolerance. - Demagnitized tone-ring	If this wheelspeed sensor reaches a speed over 3.73mph (6 km/h) while the other three show a speed of less than 0.93mph (1.5 km/h) the fault is detected.	If fault detection criteria is fulfilled then WSS_TOO_FAST_SENSOR_XX will latch if WSS_MISSING_XX or WSS_FAST_MISSING_XX or WSS_DROPOUT_XX faults are not latched.	• No electrical failure is currently present	40 msec	Type B. MIL Illumination.
WSS_TOO_FAST_SENSOR_REAR_RIGHT	C0517	This monitor checks if: - Wheel speed sensor not mounted correctly. - Wheel speed sensor to tone-ring gap out of tolerance. - Demagnitized tone-ring	If this wheelspeed sensor reaches a speed over 3.73mph (6 km/h) while the other three show a speed of less than 0.93mph (1.5 km/h) the fault is detected.	If fault detection criteria is fulfilled then WSS_TOO_FAST_SENSOR_XX will latch if WSS_MISSING_XX or WSS_FAST_MISSING_XX or WSS_DROPOUT_XX faults are not latched.	• No electrical failure is currently present	40 msec	Type B. MIL Illumination.
WSS_SHADOWZONE_FRONT_LEFT	C0501	This monitor checks if: • High resistance of wiring harness • High side wheel speed sensor supply shorted to battery voltage with a resistance (leakage current)	• Detection is handled by the Polaris ASIC	Polaris ASIC Low Grey Zone Detect bit = True (The low grey zone is 7 to 14mA) or Polaris ASIC High Grey Zone Detect bit = True (The high grey zone is 14 to 28mA)	• No electrical failure is currently present	100 ms	Type A. MIL Illumination.
WSS_SHADOWZONE_FRONT_RIGHT	C0507	This monitor checks if: • High resistance of wiring harness • High side wheel speed sensor supply shorted to battery voltage with a resistance (leakage current)	• Detection is handled by the Polaris ASIC	Polaris ASIC Low Grey Zone Detect bit = True (The low grey zone is 7 to 14mA) or Polaris ASIC High Grey Zone Detect bit = True (The high grey zone is 14 to 28mA)	• No electrical failure is currently present	100 ms	Type A. MIL Illumination.
WSS_SHADOWZONE_REAR_LEFT	C050D	This monitor checks if: • High resistance of wiring harness • High side wheel speed sensor supply shorted to battery voltage with a resistance (leakage current)	• Detection is handled by the Polaris ASIC	Polaris ASIC Low Grey Zone Detect bit = True (The low grey zone is 7 to 14mA) or Polaris ASIC High Grey Zone Detect bit = True (The high grey zone is 14 to 28mA)	• No electrical failure is currently present	100 ms	Type A. MIL Illumination.
WSS_SHADOWZONE_REAR_RIGHT	C0513	This monitor checks if: • High resistance of wiring harness • High side wheel speed sensor supply shorted to battery voltage with a resistance (leakage current)	• Detection is handled by the Polaris ASIC	Polaris ASIC Low Grey Zone Detect bit = True (The low grey zone is 7 to 14mA) or Polaris ASIC High Grey Zone Detect bit = True (The high grey zone is 14 to 28mA)	• No electrical failure is currently present	100 ms	Type A. MIL Illumination.
WSS_HS_OC_FRONT_LEFT	C0503	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC sets any of these bits = TRUE	Polaris ASIC sets HS Over Current = TRUE High Side Over Current (HS current > 40mA)	• Wheel speed sensor supply is enabled. • High Side failsafe is not blocked	100 msec	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_HS_OC_FRONT_RIGHT	C0509	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC sets any of these bits = TRUE	Polaris ASIC sets any of these bits = TRUE High Side Over Current (HS current > 40mA)	• Wheel speed sensor supply is enabled. • High Side failsafe is not blocked	100 msec	Type A. MIL Illumination.
WSS_HS_OC_REAR_LEFT	C050F	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC sets any of these bits = TRUE	Polaris ASIC sets any of these bits = TRUE High Side Over Current (HS current > 40mA)	• Wheel speed sensor supply is enabled. • High Side failsafe is not blocked	100 msec	Type A. MIL Illumination.
WSS_HS_OC_REAR_RIGHT	C0515	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC sets any of these bits = TRUE	Polaris ASIC sets any of these bits = TRUE High Side Over Current (HS current > 40mA)	• Wheel speed sensor supply is enabled. • High Side failsafe is not blocked	100 msec	Type A. MIL Illumination.
WSS_UNDER_VOLTAGE_FRONT_LEFT	C0502	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Detection is handled by the Polaris ASIC	Polaris ASIC sets WSS Undervoltage disable bit = TRUE Note: This bit will activate when Battery voltage drops below 5.6 V	• Wheel speed sensor supply is enabled • No voltage DTCs are set	100 msec	Type A. MIL Illumination.
WSS_UNDER_VOLTAGE_FRONT_RIGHT	C0508	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Detection is handled by the Polaris ASIC	Polaris ASIC sets WSS Undervoltage disable bit = TRUE Note: This bit will activate when Battery voltage drops below 5.6 V	• Wheel speed sensor supply is enabled • No voltage DTCs are set	100 msec	Type A. MIL Illumination.
WSS_UNDER_VOLTAGE_REAR_LEFT	C050E	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Detection is handled by the Polaris ASIC	Polaris ASIC sets WSS Undervoltage disable bit = TRUE Note: This bit will activate when Battery voltage drops below 5.6 V	• Wheel speed sensor supply is enabled • No voltage DTCs are set	100 msec	Type A. MIL Illumination.
WSS_UNDER_VOLTAGE_REAR_RIGHT	C0514	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASIC	• Detection is handled by the Polaris ASIC	Polaris ASIC sets WSS Undervoltage disable bit = TRUE Note: This bit will activate when Battery voltage drops below 5.6 V	• Wheel speed sensor supply is enabled • No voltage DTCs are set	100 msec	Type A. MIL Illumination.
ASIC_DECODE_THREE_LEVEL_FAULT_LF	C0555	This monitor checks if: • wrong vehicle config file used • misbuild using wrong WSS	Look for ASIC decoding a three level sensor when a two level sensor is configured: Check for the number of VDA bits received indicates that the ASIC is decoding for a three level sensor or Check for the tp out of range bit received indicates that the ASIC is decoding for a three level sensor	While a wheelspeed channel is expected to be configured for a 2-level sensor (i.e. decode modes 1 or 2), the MCU shall monitor the tp Out of Range and VDA Bit Counter SPI bits. If these bits are not zero, the MCU shall detect that the ASIC is incorrectly decoding in mode 3.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_THREE_LEVEL_DATA_READ_FAULT_LF	P0606	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	• When the ASIC updates the VDA Data, VDA Bit Counter, Standstill, and tp Out of Range SPI fields, the ASIC shall also set the Data Read SPI flag.	The MCU shall monitor each wheel's Data Read SPI flag, and verify that the bit is set at least every 195ms.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_TWO_LEVEL_DATA_READ_FAULT_LF	P0606	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	• When the ASIC updates the PWM Pulse Width and Standstill SPI register fields, the ASIC shall also set the Data Read SPI flag.	The MCU shall monitor each wheel's Data Read SPI flag, and verify that the bit is set after every sensor falling edge.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_DECODE_THREE_LEVEL_FAULT_RF	C0556	This monitor checks if: • wrong vehicle config file used • misbuild using wrong WSS	Look for ASIC decoding a three level sensor when a two level sensor is configured: Check for the number of VDA bits received indicates that the ASIC is decoding for a three level sensor or Check for the tp out of range bit received indicates that the ASIC is decoding for a three level sensor	While a wheelspeed channel is expected to be configured for a 2-level sensor (i.e. decode modes 1 or 2), the MCU shall monitor the tp Out of Range and VDA Bit Counter SPI bits. If these bits are not zero, the MCU shall detect that the ASIC is incorrectly decoding in mode 3.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_THREE_LEVEL_DATA_READ_FAULT_RF	P0606	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	• When the ASIC updates the VDA Data, VDA Bit Counter, Standstill, and tp Out of Range SPI fields, the ASIC shall also set the Data Read SPI flag.	The MCU shall monitor each wheel's Data Read SPI flag, and verify that the bit is set at least every 195ms.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_TWO_LEVEL_DATA_READ_FAULT_RF	P0606	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	• When the ASIC updates the PWM Pulse Width and Standstill SPI register fields, the ASIC shall also set the Data Read SPI flag.	The MCU shall monitor each wheel's Data Read SPI flag, and verify that the bit is set after every sensor falling edge.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_DECODE_THREE_LEVEL_FAULT_LR	C0557	This monitor checks if: • wrong vehicle config file used • misbuild using wrong WSS	Look for ASIC decoding a three level sensor when a two level sensor is configured: Check for the number of VDA bits received indicates that the ASIC is decoding for a three level sensor or Check for the tp out of range bit received indicates that the ASIC is decoding for a three level sensor	While a wheelspeed channel is expected to be configured for a 2-level sensor (i.e. decode modes 1 or 2), the MCU shall monitor the tp Out of Range and VDA Bit Counter SPI bits. If these bits are not zero, the MCU shall detect that the ASIC is incorrectly decoding in mode 3.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_THREE_LEVEL_DATA_READ_FAULT_LR	P0606	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	• When the ASIC updates the VDA Data, VDA Bit Counter, Standstill, and tp Out of Range SPI fields, the ASIC shall also set the Data Read SPI flag.	The MCU shall monitor each wheel's Data Read SPI flag, and verify that the bit is set at least every 195ms.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_TWO_LEVEL_DATA_READ_FAULT_LR	P0606	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	• When the ASIC updates the PWM Pulse Width and Standstill SPI register fields, the ASIC shall also set the Data Read SPI flag.	The MCU shall monitor each wheel's Data Read SPI flag, and verify that the bit is set after every sensor falling edge.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_DECODE_THREE_LEVEL_FAULT_RR	C0558	This monitor checks if: • wrong vehicle config file used • misbuild using wrong WSS	Look for ASIC decoding a three level sensor when a two level sensor is configured: Check for the number of VDA bits received indicates that the ASIC is decoding for a three level sensor or Check for the tp out of range bit received indicates that the ASIC is decoding for a three level sensor	While a wheelspeed channel is expected to be configured for a 2-level sensor (i.e. decode modes 1 or 2), the MCU shall monitor the tp Out of Range and VDA Bit Counter SPI bits. If these bits are not zero, the MCU shall detect that the ASIC is incorrectly decoding in mode 3.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_THREE_LEVEL_DATA_READ_FAULT_RR	P0606	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	• When the ASIC updates the VDA Data, VDA Bit Counter, Standstill, and tp Out of Range SPI fields, the ASIC shall also set the Data Read SPI flag.	The MCU shall monitor each wheel's Data Read SPI flag, and verify that the bit is set at least every 195ms.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ASIC_TWO_LEVEL_DATA_READ_FAULT_RR	P0606	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	• When the ASIC updates the PWM Pulse Width and Standstill SPI register fields, the ASIC shall also set the Data Read SPI flag.	The MCU shall monitor each wheel's Data Read SPI flag, and verify that the bit is set after every sensor falling edge.	• Polaris is initialized	15 msec	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_3L_INFO_MISSING_FRONT_LEFT	C0555	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	Monitors if an intelligent 3-level wss doesn't send pulses (standstill or wheel speed pulses) for too long.	Monitors if an intelligent 3-level wss doesn't send pulses (standstill or wheel speed pulses) for too long. Furthermore it checks the number of received data bits in the transmission. If less than the minimum number of data bits (3) are received, a fault will be latched.	• Polaris is initialized. • Wheel Speed Sensor supply is enabled • No WSS electrical fault is present • SYSTEM_VOLTAGE_EXCESSIVE_LOW fault is not present	Fault is monitored only if sensor edges is received by Polaris. As at zero speed, standstill pulse is received every ~150ms, WSS_3L_INFO_MISSING_XX fault could take about ~7.5sec to mature. As the speed increments, sensor edges are received faster and eventually at higher speed WSS_3L_INFO_MISSING_XX fault would mature at about 250ms.	Type A. MIL Illumination.
WSS_3L_INFO_MISSING_FRONT_RIGHT	C0556	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	Monitors if an intelligent 3-level wss doesn't send pulses (standstill or wheel speed pulses) for too long.	Monitors if an intelligent 3-level wss doesn't send pulses (standstill or wheel speed pulses) for too long. Furthermore it checks the number of received data bits in the transmission. If less than the minimum number of data bits (3) are received, a fault will be latched.	• Polaris is initialized. • Wheel Speed Sensor supply is enabled • No WSS electrical fault is present • SYSTEM_VOLTAGE_EXCESSIVE_LOW fault is not present	Fault is monitored only if sensor edges is received by Polaris. As at zero speed, standstill pulse is received every ~150ms, WSS_3L_INFO_MISSING_XX fault could take about ~7.5sec to mature. As the speed increments, sensor edges are received faster and eventually at higher speed WSS_3L_INFO_MISSING_XX fault would mature at about 250ms.	Type A. MIL Illumination.
WSS_3L_INFO_MISSING_REAR_LEFT	C0557	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	Monitors if an intelligent 3-level wss doesn't send pulses (standstill or wheel speed pulses) for too long.	Monitors if an intelligent 3-level wss doesn't send pulses (standstill or wheel speed pulses) for too long. Furthermore it checks the number of received data bits in the transmission. If less than the minimum number of data bits (3) are received, a fault will be latched.	• Polaris is initialized. • Wheel Speed Sensor supply is enabled • No WSS electrical fault is present • SYSTEM_VOLTAGE_EXCESSIVE_LOW fault is not present	Fault is monitored only if sensor edges is received by Polaris. As at zero speed, standstill pulse is received every ~150ms, WSS_3L_INFO_MISSING_XX fault could take about ~7.5sec to mature. As the speed increments, sensor edges are received faster and eventually at higher speed WSS_3L_INFO_MISSING_XX fault would mature at about 250ms.	Type A. MIL Illumination.
WSS_3L_INFO_MISSING_REAR_RIGHT	C0558	This monitor checks if: • Defective system ASIC ASIC data read flag is not updated properly	Monitors if an intelligent 3-level wss doesn't send pulses (standstill or wheel speed pulses) for too long.	Monitors if an intelligent 3-level wss doesn't send pulses (standstill or wheel speed pulses) for too long. Furthermore it checks the number of received data bits in the transmission. If less than the minimum number of data bits (3) are received, a fault will be latched.	• Polaris is initialized. • Wheel Speed Sensor supply is enabled • No WSS electrical fault is present • SYSTEM_VOLTAGE_EXCESSIVE_LOW fault is not present	Fault is monitored only if sensor edges is received by Polaris. As at zero speed, standstill pulse is received every ~150ms, WSS_3L_INFO_MISSING_XX fault could take about ~7.5sec to mature. As the speed increments, sensor edges are received faster and eventually at higher speed WSS_3L_INFO_MISSING_XX fault would mature at about 250ms.	Type A. MIL Illumination.
WSS_PARITY_FRONT_LEFT	C0555	This monitor checks if: VDA data bits are corrupted	Decodes the additional information of a Philips KMI22/1 wheelspeed sensor which is a 3-level VDA compliant sensor.	It's a VDA compliant Philips KMI22/1 sensor so use the following mask for the data bits: 0 airgap (1=too large) 1 mode state (1=initial mode, 0=active mode) 2 digital input state (1=input voltage low) 3 validity direction recognition (Indirection bit is valid) 4 direction recognition (Indirection positive (forward driving)) 5-7 sensing distance bits (air gap) (Bit 5 is LSB, 7 MSB) (8) parity (1=even parity) The even parity flag should be the same as the calculated even parity. Else, it indicates that atleast one data bit is corrupted.	• Polaris is initialized. • Wheel Speed Sensor supply is enabled	This fault is monitored only if sensor edges are received by the Polaris. As at zero speed, standstill pulse is received every ~150ms, WSS_PARITY_XX fault could take about ~900ms to mature. As the speed increments, sensor edges are received faster and eventually at higher speed WSS_PARITY_XX fault would mature at 35ms.	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_PARITY_FRONT_RIGHT	C0556	This monitor checks if: VDA data bits are corrupted	Decodes the additional information of a Philips KMI22/1 wheelspeed sensor which is a 3-level VDA compliant sensor.	It's a VDA compliant Philips KMI22/1 sensor so use the following mask for the data bits: 0 airgap (1=too large) 1 mode state (1=initial mode, 0=active mode) 2 digital input state (1=input voltage low) 3 validity direction recognition (1=direction bit is valid) 4 direction recognition (1=direction positive (forward driving)) 5-7 sensing distance bits (air gap) (Bit 5 is LSB, 7 MSB) (8) parity (1=even parity) The even parity flag should be the same as the calculated even parity. Else, it indicates that atleast one data bit is corrupted.	• Polaris is initialized. • Wheel Speed Sensor supply is enabled	This fault is monitored only if sensor edges are received by the Polaris. As at zero speed, standstill pulse is received every ~150ms, WSS_PARITY_XX fault could take about ~900ms to mature. As the speed increments, sensor edges are received faster and eventually at higher speed WSS_PARITY_XX fault would mature at 35ms.	Type A. MIL Illumination.
WSS_PARITY_REAR_LEFT	C0557	This monitor checks if: VDA data bits are corrupted	Decodes the additional information of a Philips KMI22/1 wheelspeed sensor which is a 3-level VDA compliant sensor.	It's a VDA compliant Philips KMI22/1 sensor so use the following mask for the data bits: 0 airgap (1=too large) 1 mode state (1=initial mode, 0=active mode) 2 digital input state (1=input voltage low) 3 validity direction recognition (1=direction bit is valid) 4 direction recognition (1=direction positive (forward driving)) 5-7 sensing distance bits (air gap) (Bit 5 is LSB, 7 MSB) (8) parity (1=even parity) The even parity flag should be the same as the calculated even parity. Else, it indicates that atleast one data bit is corrupted.	• Polaris is initialized. • Wheel Speed Sensor supply is enabled	This fault is monitored only if sensor edges are received by the Polaris. As at zero speed, standstill pulse is received every ~150ms, WSS_PARITY_XX fault could take about ~900ms to mature. As the speed increments, sensor edges are received faster and eventually at higher speed WSS_PARITY_XX fault would mature at 35ms.	Type A. MIL Illumination.
WSS_PARITY_REAR_RIGHT	C0558	This monitor checks if: VDA data bits are corrupted	Decodes the additional information of a Philips KMI22/1 wheelspeed sensor which is a 3-level VDA compliant sensor.	It's a VDA compliant Philips KMI22/1 sensor so use the following mask for the data bits: 0 airgap (1=too large) 1 mode state (1=initial mode, 0=active mode) 2 digital input state (1=input voltage low) 3 validity direction recognition (1=direction bit is valid) 4 direction recognition (1=direction positive (forward driving)) 5-7 sensing distance bits (air gap) (Bit 5 is LSB, 7 MSB) (8) parity (1=even parity) The even parity flag should be the same as the calculated even parity. Else, it indicates that atleast one data bit is corrupted.	• Polaris is initialized. • Wheel Speed Sensor supply is enabled	This fault is monitored only if sensor edges are received by the Polaris. As at zero speed, standstill pulse is received every ~150ms, WSS_PARITY_XX fault could take about ~900ms to mature. As the speed increments, sensor edges are received faster and eventually at higher speed WSS_PARITY_XX fault would mature at 35ms.	Type A. MIL Illumination.
WSS_VDA_TP_OUT_OF_RANGE_FRONT_LEFT	C0501	This monitor checks if: • standstill pulse width out of range • Defective system ASIC	• The ASIC shall measure the width of each speed pulse or speed replacement pulse (tp). If tp is less than tp minimum threshold or greater than tp maximum threshold, the ASIC shall set the tp Out of Range SPI flag.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse width is out of range (error bit equals 1) (3 level WSS only)	• Polaris is initialized	15 msec -375ms	Type A. MIL Illumination.
WSS_VDA_TP_OUT_OF_RANGE_FRONT_RIGHT	C0507	This monitor checks if: • standstill pulse width out of range • Defective system ASIC	• The ASIC shall measure the width of each speed pulse or speed replacement pulse (tp). If tp is less than tp minimum threshold or greater than tp maximum threshold, the ASIC shall set the tp Out of Range SPI flag.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse width is out of range (error bit equals 1) (3 level WSS only)	• Polaris is initialized	15 msec -375ms	Type A. MIL Illumination.
WSS_VDA_TP_OUT_OF_RANGE_REAR_LEFT	C050D	This monitor checks if: • standstill pulse width out of range • Defective system ASIC	• The ASIC shall measure the width of each speed pulse or speed replacement pulse (tp). If tp is less than tp minimum threshold or greater than tp maximum threshold, the ASIC shall set the tp Out of Range SPI flag.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse width is out of range (error bit equals 1) (3 level WSS only)	• Polaris is initialized	15 msec -375ms	Type A. MIL Illumination.
WSS_VDA_TP_OUT_OF_RANGE_REAR_RIGHT	C0513	This monitor checks if: • standstill pulse width out of range • Defective system ASIC	• The ASIC shall measure the width of each speed pulse or speed replacement pulse (tp). If tp is less than tp minimum threshold or greater than tp maximum threshold, the ASIC shall set the tp Out of Range SPI flag.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse width is out of range (error bit equals 1) (3 level WSS only)	• Polaris is initialized	15 msec -375ms	Type A. MIL Illumination.
WSS_STANDSTILL_FAST_FRONT_LEFT	C0501	This monitor checks if: • Defective system ASIC Standstill VDA transmission too short	• The MCU shall detect if standstill pulses occur faster than every 95ms, for 5 consecutive standstill pulses.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse transmission is too short - less than 105 msec (3 level WSS only)	• Polaris is initialized	Variable. See Fault Equation and detection rules. Range is from 25 - 475ms.	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_STANDSTILL_SLOW_FRONT_LEFT	C0501	This monitor checks if: • Defective system ASIC • Standstill VDA transmission too long	• The MCU shall detect if standstill pulses occur slower than every 205ms, or no standstill pulse at all for 1025ms.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse transmission is too long - more than 195 msec (3 level WSS only)	• Polaris is initialized	Variable. See Fault Equation and Detection Rules. Range is from 1025 - 5100ms.	Type A. MIL Illumination.
WSS_STANDSTILL_FAST_FRONT_RIGHT	C0507	This monitor checks if: • Defective system ASIC Standstill VDA transmission too short	• The MCU shall detect if standstill pulses occur faster than every 95ms, for 5 consecutive standstill pulses.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse transmission is too short - less than 105 msec (3 level WSS only)	• Polaris is initialized	Variable. See Fault Equation and detection rules. Range is from 25 - 475ms.	Type A. MIL Illumination.
WSS_STANDSTILL_SLOW_FRONT_RIGHT	C0507	This monitor checks if: • Defective system ASIC • Standstill VDA transmission too long	• The MCU shall detect if standstill pulses occur slower than every 205ms, or no standstill pulse at all for 1025ms.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse transmission is too long - more than 195 msec (3 level WSS only)	• Polaris is initialized	Variable. See Fault Equation and Detection Rules. Range is from 1025 - 5100ms.	Type A. MIL Illumination.
WSS_STANDSTILL_FAST_REAR_LEFT	C050D	This monitor checks if: • Defective system ASIC Standstill VDA transmission too short	• The MCU shall detect if standstill pulses occur faster than every 95ms, for 5 consecutive standstill pulses.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse transmission is too short - less than 105 msec (3 level WSS only)	• Polaris is initialized	Variable. See Fault Equation and detection rules. Range is from 25 - 475ms.	Type A. MIL Illumination.
WSS_STANDSTILL_SLOW_REAR_LEFT	C050D	This monitor checks if: • Defective system ASIC • Standstill VDA transmission too long	• The MCU shall detect if standstill pulses occur slower than every 205ms, or no standstill pulse at all for 1025ms.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse transmission is too long - more than 195 msec (3 level WSS only)	• Polaris is initialized	Variable. See Fault Equation and Detection Rules. Range is from 1025 - 5100ms.	Type A. MIL Illumination.
WSS_STANDSTILL_FAST_REAR_RIGHT	C0513	This monitor checks if: • Defective system ASIC Standstill VDA transmission too short	• The MCU shall detect if standstill pulses occur faster than every 95ms, for 5 consecutive standstill pulses.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse transmission is too short - less than 105 msec (3 level WSS only)	• Polaris is initialized	Variable. See Fault Equation and detection rules. Range is from 25 - 475ms.	Type A. MIL Illumination.
WSS_STANDSTILL_SLOW_REAR_RIGHT	C0513	This monitor checks if: • Defective system ASIC • Standstill VDA transmission too long	• The MCU shall detect if standstill pulses occur slower than every 205ms, or no standstill pulse at all for 1025ms.	POLARIS ASIC sends diagnostic information indicating that the standstill pulse transmission is too long - more than 195 msec (3 level WSS only)	• Polaris is initialized	Variable. See Fault Equation and Detection Rules. Range is from 1025 - 5100ms.	Type A. MIL Illumination.
SYS_ASIC_WSS_EDGE_MISMATCH_LF	P0606	This monitor checks if: • Nominal cause: Resistive short in the wheelspeed sensor wiring • other possible causes Wheel Speed Sensor fault • ASIC outputs shorted to neighboring pins • Open trace on circuit board. • Defective system ASIC	The Wheel Speed signal generated by the ASIC and the one received by the main Micro should match to insure correct wheel speed calculation.	1) The micro monitors the number of edges received every loop for plausability (less than a max number). 2) The micro will compare the edges detected by the internal timer with the SPI flags sent by the ASIC to make sure they match.	• Polaris is initialized • No other ASIC faults detected	25 msec	Type A. MIL Illumination.
SYS_ASIC_WSS_EDGE_MISMATCH_RF	P0606	This monitor checks if: • Nominal cause: Resistive short in the wheelspeed sensor wiring • other possible causes Wheel Speed Sensor fault • ASIC outputs shorted to neighboring pins • Open trace on circuit board. • Defective system ASIC	The Wheel Speed signal generated by the ASIC and the one received by the main Micro should match to insure correct wheel speed calculation.	1) The micro monitors the number of edges received every loop for plausability (less than a max number). 2) The micro will compare the edges detected by the internal timer with the SPI flags sent by the ASIC to make sure they match.	• Polaris is initialized • No other ASIC faults detected	25 msec	Type A. MIL Illumination.
SYS_ASIC_WSS_EDGE_MISMATCH_LR	P0606	This monitor checks if: • Nominal cause: Resistive short in the wheelspeed sensor wiring • other possible causes Wheel Speed Sensor fault • ASIC outputs shorted to neighboring pins • Open trace on circuit board. • Defective system ASIC	The Wheel Speed signal generated by the ASIC and the one received by the main Micro should match to insure correct wheel speed calculation.	1) The micro monitors the number of edges received every loop for plausability (less than a max number). 2) The micro will compare the edges detected by the internal timer with the SPI flags sent by the ASIC to make sure they match.	• Polaris is initialized • No other ASIC faults detected	25 msec	Type A. MIL Illumination.
SYS_ASIC_WSS_EDGE_MISMATCH_RR	P0606	This monitor checks if: • Nominal cause: Resistive short in the wheelspeed sensor wiring • other possible causes Wheel Speed Sensor fault • ASIC outputs shorted to neighboring pins • Open trace on circuit board. • Defective system ASIC	The Wheel Speed signal generated by the ASIC and the one received by the main Micro should match to insure correct wheel speed calculation.	1) The micro monitors the number of edges received every loop for plausability (less than a max number). 2) The micro will compare the edges detected by the internal timer with the SPI flags sent by the ASIC to make sure they match.	• Polaris is initialized • No other ASIC faults detected	25 msec	Type A. MIL Illumination.
MCU_WSS_EXCESSIVE_EDGES_DETECTED_FRONT_LEFT	C0504	This monitor checks if: • Nominal cause: Resistive short in the wheelspeed sensor wiring • other possible causes Wheel Speed Sensor fault • ASIC outputs shorted to neighboring pins • Open trace on circuit board • Defective system ASIC	This fault is latched when the edge counts exceeds the threshold.	Excessive Edge counts > 55	• Wheel speed sensor supply is enabled	25 msec	Type A. MIL Illumination.
MCU_WSS_EXCESSIVE_EDGES_DETECTED_FRONT_RIGHT	C050A	This monitor checks if: • Nominal cause: Resistive short in the wheelspeed sensor wiring • other possible causes Wheel Speed Sensor fault • ASIC outputs shorted to neighboring pins • Open trace on circuit board • Defective system ASIC	This fault is latched when the edge counts exceeds the threshold.	Excessive Edge counts > 55	• Wheel speed sensor supply is enabled	25 msec	Type A. MIL Illumination.
MCU_WSS_EXCESSIVE_EDGES_DETECTED_REAR_LEFT	C0510	This monitor checks if: • Nominal cause: Resistive short in the wheelspeed sensor wiring • other possible causes Wheel Speed Sensor fault • ASIC outputs shorted to neighboring pins • Open trace on circuit board • Defective system ASIC	This fault is latched when the edge counts exceeds the threshold.	Excessive Edge counts > 55	• Wheel speed sensor supply is enabled	25 msec	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MCU_WSS_EXCESSIVE_EDGES_DETECTED_REAR_RIGHT	C0516	This monitor checks if: • Nominal cause: Resistive short in the wheelspeed sensor wiring • other possible causes Wheel Speed Sensor fault • ASIC outputs shorted to neighboring pins • Open trace on circuit board • Defective system ASIC	This fault is latched when the edge counts exceeds the threshold.	Excessive Edge counts > 55	• Wheel speed sensor supply is enabled	25 msec	Type A. MIL Illumination.
WSS_TYPE_MISMATCH_FRONT_LEFT	C0555	This monitor checks if: • Incorrect WSS installed (Non-Directional or Infineon sensor)	• Probability counters are used to determine the likelihood of possible DWSS sensors. Therefore, no speed or time filtering is needed. Detection time depends on wheel speed. When the vehicle is at a stop, detection time is longest since no direction is transmitted (both sensor types look the same) and standstill pulses are used instead. At high-speeds, detection is shortest since missing or extra direction information will indicate the sensor installed. Looking for 30 speed pulses that match a particular wheel speed sensor type. Time depends on combination of expected wheel speed sensor and actual wheel speed sensor. Nominal calculations: Expecting 2 level nonIntelligent but have 3 level WSS (30*150 ms=4.5 sec). 2 level directional stand still pulses take 737 ms and for each puse the probablity counter increments by 3. Therefore it takes about ((30\3)*737 ms= 7.37 seconds) to detect.	Algorithm has detected that a directional WSS has incorrectly been installed	• WSS must be valid (supply enabled and no electrical problems)	Goal = 1 count Time = Depends on combination (about 4.5 sec if 3 level sensor installed and about 7.37 secs if 2 level with standstill sensor is installed for 2 level non intelligent sensor expected.	Type A. MIL Illumination.
WSS_TYPE_MISMATCH_FRONT_RIGHT	C0556	This monitor checks if: • Incorrect WSS installed (Non-Directional or Infineon sensor)	• Probability counters are used to determine the likelihood of possible DWSS sensors. Therefore, no speed or time filtering is needed. Detection time depends on wheel speed. When the vehicle is at a stop, detection time is longest since no direction is transmitted (both sensor types look the same) and standstill pulses are used instead. At high-speeds, detection is shortest since missing or extra direction information will indicate the sensor installed. Looking for 30 speed pulses that match a particular wheel speed sensor type. Time depends on combination of expected wheel speed sensor and actual wheel speed sensor. Nominal calculations: Expecting 2 level nonIntelligent but have 3 level WSS (30*150 ms=4.5 sec). 2 level directional stand still pulses take 737 ms and for each puse the probablity counter increments by 3. Therefore it takes about ((30\3)*737 ms= 7.37 seconds) to detect.	Algorithm has detected that a directional WSS has incorrectly been installed	• WSS must be valid (supply enabled and no electrical problems)	Goal = 1 count Time = Depends on combination (about 4.5 sec if 3 level sensor installed and about 7.37 secs if 2 level with standstill sensor is installed for 2 level non intelligent sensor expected.	Type A. MIL Illumination.
WSS_TYPE_MISMATCH_REAR_LEFT	C0557	This monitor checks if: • Incorrect WSS installed (Non-Directional or Infineon sensor)	• Probability counters are used to determine the likelihood of possible DWSS sensors. Therefore, no speed or time filtering is needed. Detection time depends on wheel speed. When the vehicle is at a stop, detection time is longest since no direction is transmitted (both sensor types look the same) and standstill pulses are used instead. At high-speeds, detection is shortest since missing or extra direction information will indicate the sensor installed. Looking for 30 speed pulses that match a particular wheel speed sensor type. Time depends on combination of expected wheel speed sensor and actual wheel speed sensor. Nominal calculations: Expecting 2 level nonIntelligent but have 3 level WSS (30*150 ms=4.5 sec). 2 level directional stand still pulses take 737 ms and for each puse the probablity counter increments by 3. Therefore it takes about ((30\3)*737 ms= 7.37 seconds) to detect.	Algorithm has detected that a directional WSS has incorrectly been installed	• WSS must be valid (supply enabled and no electrical problems)	Goal = 1 count Time = Depends on combination (about 4.5 sec if 3 level sensor installed and about 7.37 secs if 2 level with standstill sensor is installed for 2 level non intelligent sensor expected.	Type A. MIL Illumination.
WSS_TYPE_MISMATCH_REAR_RIGHT	C0558	This monitor checks if: • Incorrect WSS installed (Non-Directional or Infineon sensor)	• Probability counters are used to determine the likelihood of possible DWSS sensors. Therefore, no speed or time filtering is needed. Detection time depends on wheel speed. When the vehicle is at a stop, detection time is longest since no direction is transmitted (both sensor types look the same) and standstill pulses are used instead. At high-speeds, detection is shortest since missing or extra direction information will indicate the sensor installed. Looking for 30 speed pulses that match a particular wheel speed sensor type. Time depends on combination of expected wheel speed sensor and actual wheel speed sensor. Nominal calculations: Expecting 2 level nonIntelligent but have 3 level WSS (30*150 ms=4.5 sec). 2 level directional stand still pulses take 737 ms and for each puse the probablity counter increments by 3. Therefore it takes about ((30\3)*737 ms= 7.37 seconds) to detect.	Algorithm has detected that a directional WSS has incorrectly been installed	• WSS must be valid (supply enabled and no electrical problems)	Goal = 1 count Time = Depends on combination (about 4.5 sec if 3 level sensor installed and about 7.37 secs if 2 level with standstill sensor is installed for 2 level non intelligent sensor expected.	Type A. MIL Illumination.
SYS_ASIC_U_W S_OVE R_VOLT	C05A3	This monitor checks if: • Defective system ASIC	If VU_WS exceeds the rising LI_WS over-voltage detection threshold for the detection debounce time, the ASIC sets the U_WS Overvoltage Warning SPI flag and disable the four high-side switches.	The MCU shall configure the wheelspeed sensor overvoltage bypass configuration to LOW. If the WSS overvoltage warning bit is set, fault is set.	• Polaris is initialized	50 msec	Type A. MIL Illumination.
SYS_ASIC_WSS_SUPPLY_LOW	C05A4	This monitor checks if: • Defective system ASIC	• Within the ASIC, the U_WS and U12 voltages shall be internally divided down and shall feed dedicated ADC channels.	The MCU shall read the ASIC's U_WS Voltage Result SPI field and verify that "sufficient voltage" is present for wheelspeed operation. For ECUs with no U_WS voltage regulation: the MCU shall also read the ASIC's U12 Voltage Result SPI field and perform a plausibility check between U_WS and U12. Note: sufficient voltage for wheelspeed operation depends upon the type of wheelspeed sensor used.	• Polaris is initialized	100 msec	Type A. MIL Illumination.
WSS_OVER_TEMP_WARNING	P0606	This monitor checks if: • Defective system ASIC • internal overheating	• MCU shall monitor the U_WS OverTemp Warning SPI flag received from the ASIC	MCU detects that the U_WS OverTemp Warning SPI flag received from the ASIC is TRUE	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_WSS_HS_STUCK_ON	C05A3	This monitor checks if: • Defective system ASIC	• The ASIC's open circuit detection (SM42) shall remain operational even if the channel's high-side supply is turned off or disabled. • Periodically (e.g. once per ignition cycle), the MCU shall enable the low-side wheelspeed supplies but shall leave the high-side supplies off. The MCU shall detect if an open-circuit is not detected on any channel. • Periodically (e.g. once per ignition cycle), the MCU shall command the wheelspeed high-side supplies off, low-side supplies on, and verify that each channel's Open Circuit SPI bit is set.	Any one wheel fails to detect an open-circuit during either the high-side or low-side supply ON check.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
MISMATCH_TIRE	C10EE	This monitor checks if: • Significantly different size tires installed on the vehicle. • Missing target ring (sensor picking up lug nuts) • Anything that generates consistent differences in apparent wheel rotational speed. • Different number of teeth on the exciter rings.	• Wheel Velocity difference between one and the others > 26 % • The mismatch tire ratio adjustment is disabled if: • Vehicle Velocity < 8.9 mph, • Cornering is detected, • Spinning wheels are detected, • Braking is detected, • Wheel speed sensor faults exist. • Counter: Count 1-up • Monitor Rate: 10ms	Wheel Velocity difference between one and the others > 26 %	• The mismatch tire ratio adjustment is disabled if: • Vehicle Velocity < 8.9 mph, • Cornering is detected, • Spinning wheels are detected, • Braking is detected, • Wheel speed sensor faults exist, • Emissions Rolls Test is active	1 Count	Type B. MIL Illumination.
Group 3 - Solenoid and Valve							

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SOL_OPEN_ISO_FRONT_LEFT	C0010	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_ISO_FRONT_RIGHT	C0014	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On and not faulted 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_ISO_REAR_LEFT	C0018	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_ISO_REAR_RIGHT	C001C	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_DUMP_FRONT_LEFT	C0011	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_DUMP_FRONT_RIGHT	C0015	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_DUMP_REAR_LEFT	C0019	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_DUMP_REAR_RIGHT	C001D	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_3WAY_PRIMARY	C0001	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SOL_OPEN_3WAY_SECONDARY	C0003	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_FDBK_UNEQUAL_TO_CMD_3WAY_PRIMARY	C0001	This monitor checks if: • Deviation in PWM output status • Defective microprocessor. • Defective printed circuit board. • Defective solenoid. • Defective solenoid driver FET.	Whenever the power switch is closed and the driver FET is not turned on (solenoid commanded off) then the feedback voltage should be high. If the solenoid feedback voltage is measured to be > 43.49% and < 65.23% of the coil supply voltage for 30 msec, an open solenoid fault is indicated	For too short on time = Ontime - 7.5% period For too long on time = Ontime + 7.5% period	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	60 ms	Type A. MIL Illumination.
SOL_FDBK_UNEQUAL_TO_CMD_3WAY_SECONDARY	C0003	This monitor checks if: • Deviation in PWM output status • Defective microprocessor. • Defective printed circuit board. • Defective solenoid. • Defective solenoid driver FET.	Whenever the power switch is closed and the driver FET is not turned on (solenoid commanded off) then the feedback voltage should be high. If the solenoid feedback voltage is measured to be > 43.49% and < 65.23% of the coil supply voltage for 30 msec, an open solenoid fault is indicated.	For too short on time = Ontime - 7.5% period For too long on time = Ontime + 7.5% period	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	60 ms	Type A. MIL Illumination.
SOL_OPEN_NORMAL_CLOSE_DAP	C0004	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_PEDAL_SIM_ISO	C0024	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_NORMAL_OPEN_DAP	C0002	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_OPEN_SIM_TEST	C05D5	This monitor checks if: • Defective solenoid. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Leaky FET Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	After the driver is commanded on, the ASIC shall wait the open driver mask time, and then observe the filtered drain comparator feedback. If the drain feedback is high, the ASIC shall set the DRDx Open Driver Warning SPI bit. Drain comparator threshold: min value = 2.375 V max value = 2.625 V	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_ISO_FRONT_LEFT	C0010	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver • Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_ISO_FRONT_RIGHT	C0014	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver • Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_ISO_REAR_LEFT	C0018	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver • Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_ISO_REAR_RIGHT	C001C	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver • Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_DUMP_FRONT_LEFT	C0011	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver • Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
DRIVER_SHORT_DUMP_FRONT_RIGHT	C0015	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver • Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_DUMP_REAR_LEFT	C0019	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver • Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_DUMP_REAR_RIGHT	C001D	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver • Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_3WAY_PRIMARY	C0001	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_3WAY_SECONDARY	C0003	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_NORMAL_CLOSE_DAP	C0004	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_PEDAL_SIM_ISO	C0024	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_NORMAL_OPEN_DAP	C0002	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
DRIVER_SHORT_SIM_TEST	C05D5	This monitor checks if: • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• Shorted Solenoid Driver Vehicle battery voltage is applied to the high side of the solenoid coils in the ECU assembly by the power switch. The solenoids are energized using a field effect transistor (FET) to connect the low side of the coil to ground.	Solenoid_feedback ? 43%	1. Solenoid is commanded off for 20 msec 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	30 ms	Type A. MIL Illumination.
SOL_SHORT_ISO_FRONT_LEFT	C0010	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage high when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_ISO_FRONT_RIGHT	C0014	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage high when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOLSHORTJSOREARLEFT	C0018	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage high when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_ISO_REAR_RIGHT	C001C	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage high when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_DUMP_FRONT_LEFT	C0011	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage high when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SOL_SHORT_DUMP_FRONT_RIGHT	C0015	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage high when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_DUMP_REAR_LEFT	C0019	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage high when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_DUMP_REAR_RIGHT	C001D	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage high when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. • The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_3WAY_PRIMARY	C0001	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_3WAY_SECONDARY	C0003	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_NORMAL_CLOSE_DAP	C0004	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_PEDAL_SIM_ISO	C0024	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_NORMAL_OPEN_DAP	C0002	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_SHORT_SIM_TEST	C05D5	This monitor checks if: • Solenoid coils shorted internally. • Solenoid shorted to a voltage supply or ground. • Defective solenoid driver FET. • Defective printed circuit board. • Defective microprocessor. • Anything that keeps solenoid feedback voltage low when the solenoid is not energized.	• The ASIC shall detect an open driver condition or a shorted coil condition on the external driver FETs by monitoring the drain voltage while the driver is commanded on. The ASIC shall generate a filtered drain comparator feedback signal by comparing the DRDx pin voltage to the drain comparator threshold, and by then filtering the result for the drain comparator feedback debounce time.	The MCU can make the distinction between open driver and shorted coil by performing a coil test pulse on the faulted channel with all other coil channels off. Drain comparator threshold: • min value = 2.375 V • max value = 2.625 V	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	15 ms	Type A. MIL Illumination.
SOL_OVERTEMPJSO_FRONT_LEFT	C0010	This monitor checks if: • Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type C, No MIL, "Emissions Neutral Diagnostic "
SOL_OVERTEMP_ISO_FRONT_RIGHT	C0014	This monitor checks if: • Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type C, No MIL, "Emissions Neutral Diagnostic "
SOL_OVERTEMP_ISO_REAR_LEFT	C0018	This monitor checks if: • Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type C, No MIL, "Emissions Neutral Diagnostic "

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SOL_OVERTEMP_ISO_REAR_RIGHT	C001C	This monitor checks if: • Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type C, No MIL, "Emissions Neutral Diagnostic "
SOL_OVERTEMP_DUMP_FRONT_LEFT	C0011	This monitor checks if: • Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type C, No MIL, "Emissions Neutral Diagnostic "
SOL_OVERTEMP_DUMP_FRONT_RIGHT	CO015	This monitor checks if: • Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type C, No MIL, "Emissions Neutral Diagnostic "
SOL_OVERTEMP_DUMP_REAR_LEFT	C0019	This monitor checks if: • Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type C, No MIL, "Emissions Neutral Diagnostic "
SOL_OVERTEMP_DUMP_REAR_RIGHT	C001D	This monitor checks if: • Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type C, No MIL, "Emissions Neutral Diagnostic "
SOL_OVERTEMP_3WAY_PRIMARY	C0001	This monitor checks if: Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type A. MIL Illumination.
SOL_OVERTEMP_3WAY_SECONDARY	C0003	This monitor checks if: Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type A. MIL Illumination.
SOL_OVERTEMP_NORMAL_CLOSE_DAP	C0004	This monitor checks if: Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type A. MIL Illumination.
SOL_OVERTEMP_PEDAL_SIM_ISO	C0024	This monitor checks if: Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type A. MIL Illumination.
SOL_OVERTEMP_NORMAL_OPEN_DAP	C0002	This monitor checks if: Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type A. MIL Illumination.
SOL_OVERTEMP_SIM_TEST	C05D5	This monitor checks if: Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Solenoid Over Temperature • At power up the solenoids are set to the maximum of the ambient temperature as reported by the Polaris ASIC or the solenoid temperature reading stored in NVRAM from the last ignition cycle.	Solenoid_Temperature > 265 °C	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	1 s	Type C, No MIL, "Emissions Neutral Diagnostic "
SOL_DRIVER_OVERTEMP_ISO_FRONT_LEFT	C0010	This monitor checks if: • Anything that causes the solenoid driver to be active for excessive (usually unintended) period of time	• Driver Overtemp info transmitted via SPI from Polaris ASIC	Polaris ASIC sends diagnostic information that the driver used to control the coil has exceeded the maximum alloted temperature. Microprocessor recieves the information via SPI from the ASIC	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	5 msec	Type A. MIL Illumination.
SOL_DRIVER_OVERTEMP_ISO_FRONT_RIGHT	C0014	This monitor checks if: • Anything that causes the solenoid driver to be active for excessive (usually unintended) period of time	• Driver Overtemp info transmitted via SPI from Polaris ASIC	Polaris ASIC sends diagnostic information that the driver used to control the coil has exceeded the maximum alloted temperature. Microprocessor recieves the information via SPI from the ASIC	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	5 msec	Type A. MIL Illumination.
SOL_DRIVER_OVERTEMP_ISO_REAR_LEFT	C0018	This monitor checks if: • Anything that causes the solenoid driver to be active for excessive (usually unintended) period of time	• Driver Overtemp info transmitted via SPI from Polaris ASIC	Polaris ASIC sends diagnostic information that the driver used to control the coil has exceeded the maximum alloted temperature. Microprocessor recieves the information via SPI from the ASIC	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	5 msec	Type A. MIL Illumination.
SOL_DRIVER_OVERTEMP_ISO_REAR_RIGHT	C001C	This monitor checks if: • Anything that causes the solenoid driver to be active for excessive (usually unintended) period of time	• Driver Overtemp info transmitted via SPI from Polaris ASIC	Polaris ASIC sends diagnostic information that the driver used to control the coil has exceeded the maximum alloted temperature. Microprocessor recieves the information via SPI from the ASIC	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	5 msec	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SOL_DRIVER_OVERTEMP_PEDAL_SIM_ISO	C0024	This monitor checks if: Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Driver Overtemp info transmitted via SPI from Polaris ASIC	Polaris ASIC sends diagnostic information that the driver used to control the coil has exceeded the maximum alloted temperature. Microprocessor recieves the information via SPI from the ASIC	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	5 msec	Type A. MIL Illumination.
SOL_DRIVER_OVERTEMP_NORMAL_OPEN_DAP	C0002	This monitor checks if: Anything that causes the solenoid to be active for excessive (usually unintended) period of time	• Driver Overtemp info transmitted via SPI from Polaris ASIC	Polaris ASIC sends diagnostic information that the driver used to control the coil has exceeded the maximum alloted temperature. Microprocessor recieves the information via SPI from the ASIC	1. Solenoid is commanded On 2. Power Switch is On 3. {EXCESSIVE_LOW_SYSTEM_VOLTAGE} 7.5 V < Supply Voltage < 18 V {EXCESSIVE_HIGH_SYSTEM_VOLTAGE}	5 msec	Type A. MIL Illumination.
CLAMP_ACTIVATION_FAILURE_ISO_FRONT_LEFT	C0010	This monitor checks if: • Defective / Missing Flyback Diode • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC monitors the solenoid back EMF. If it is above +40V then the Polaris triggers a Clamping Response. If this occurs on two consecutive shut-offs then the Clamp Activation bit is set and the coil output is shut off. Microprocessor receives the information via SPI from the ASIC	Microprocessor receives the information via SPI from the ASIC every 5 msec. If the Clamp Activation bit is set then the bit and coil output are reset to allow another test run until the Clamp Activation Fault has matured.	1. Coil Overcurrent DTC is not set 2. No CLAMP_ACTIVATION_FAILURE DTC is set 3. execute as part of Power-Up System Test, Periodic Coil Test or anytime ABS Iso is activated during performance	45 counts (minimum 3 failures in 10 attempts)	Type A. MIL Illumination.
CLAMP_ACTIVATION_FAILURE_ISO_FRONT_RIGHT	C0014	This monitor checks if: • Defective / Missing Flyback Diode • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC monitors the solenoid back EMF. If it is above +40V then the Polaris triggers a Clamping Response. If this occurs on two consecutive shut-offs then the Clamp Activation bit is set and the coil output is shut off. Microprocessor receives the information via SPI from the ASIC	Microprocessor receives the information via SPI from the ASIC every 5 msec. If the Clamp Activation bit is set then the bit and coil output are reset to allow another test run until the Clamp Activation Fault has matured.	1. Coil Overcurrent DTC is not set 2. No CLAMP_ACTIVATION_FAILURE DTC is set 3. execute as part of Power-Up System Test, Periodic Coil Test or anytime ABS Iso is activated during performance	45 counts (minimum 3 failures in 10 attempts)	Type A. MIL Illumination.
CLAMP_ACTIVATION_FAILURE_ISO_REAR_LEFT	C0018	This monitor checks if: • Defective / Missing Flyback Diode • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC monitors the solenoid back EMF. If it is above +40V then the Polaris triggers a Clamping Response. If this occurs on two consecutive shut-offs then the Clamp Activation bit is set and the coil output is shut off. Microprocessor receives the information via SPI from the ASIC	Microprocessor receives the information via SPI from the ASIC every 5 msec. If the Clamp Activation bit is set then the bit and coil output are reset to allow another test run until the Clamp Activation Fault has matured.	1. Coil Overcurrent DTC is not set 2. No CLAMP_ACTIVATION_FAILURE DTC is set 3. execute as part of Power-Up System Test, Periodic Coil Test or anytime ABS Iso is activated during performance	45 counts (minimum 3 failures in 10 attempts)	Type A. MIL Illumination.
CLAMP_ACTIVATION_FAILURE_ISO_REAR_RIGHT	C001C	This monitor checks if: • Defective / Missing Flyback Diode • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC monitors the solenoid back EMF. If it is above +40V then the Polaris triggers a Clamping Response. If this occurs on two consecutive shut-offs then the Clamp Activation bit is set and the coil output is shut off. Microprocessor receives the information via SPI from the ASIC	Microprocessor receives the information via SPI from the ASIC every 5 msec. If the Clamp Activation bit is set then the bit and coil output are reset to allow another test run until the Clamp Activation Fault has matured.	1. Coil Overcurrent DTC is not set 2. No CLAMP_ACTIVATION_FAILURE DTC is set 3. execute as part of Power-Up System Test, Periodic Coil Test or anytime ABS Iso is activated during performance	45 counts (minimum 3 failures in 10 attempts)	Type A. MIL Illumination.
CLAMP_ACTIVATION_FAILURE_NORMAL_OPEN_DAP	C0002	This monitor checks if: • Defective / Missing Flyback Diode • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC monitors the solenoid back EMF. If it is above +40V then the Polaris triggers a Clamping Response. If this occurs on two consecutive shut-offs then the Clamp Activation bit is set and the coil output is shut off. Microprocessor receives the information via SPI from the ASIC	Microprocessor receives the information via SPI from the ASIC every 5 msec. If the Clamp Activation bit is set then the bit and coil output are reset to allow another test run until the Clamp Activation Fault has matured.	1. Coil Overcurrent DTC is not set 2. No CLAMP_ACTIVATION_FAILURE DTC is set 3. execute as part of Power-Up System Test, Periodic Coil Test or anytime ABS Iso is activated during performance	45 counts (minimum 3 failures in 10 attempts)	Type A. MIL Illumination.
CLAMP_ACTIVATION_FAILURE_PEDAL_SIM_ISO	C0024	This monitor checks if: • Defective / Missing Flyback Diode • Defective printed circuit board • Defective Polaris ASIC	Polaris ASIC monitors the solenoid back EMF. If it is above +40V then the Polaris triggers a Clamping Response. If this occurs on two consecutive shut-offs then the Clamp Activation bit is set and the coil output is shut off. Microprocessor receives the information via SPI from the ASIC	Microprocessor receives the information via SPI from the ASIC every 5 msec. If the Clamp Activation bit is set then the bit and coil output are reset to allow another test run until the Clamp Activation Fault has matured.	1. Coil Overcurrent DTC is not set 2. No CLAMP_ACTIVATION_FAILURE DTC is set 3. execute as part of Power-Up System Test, Periodic Coil Test or anytime ABS Iso is activated during performance	45 counts (minimum 3 failures in 10 attempts)	Type A. MIL Illumination.
LEAKY_DRIVER_UNKNOWN_ABS_CIRCUITS	C0024	This monitor checks if: • Defective FET • Defective printed circuit board	• Slip Control Power Switch must be commanded ON than subsequently commanded OFF	If the 8 or more coil supply voltages decreased at a rate that is faster than expected, fault will be set.	• Power Switch is ON, then OFF • will only be retested after a power cycle	8 Count	Type A. MIL Illumination.
LEAKY_DRIVER_UNKNOWN_BOOST_CIRCUITS	C0024	This monitor checks if: • Defective FET • Defective printed circuit board	• Slip Control Power Switch must be commanded ON than subsequently commanded OFF	If the 8 or more coil supply voltages decreased at a rate that is faster than expected, fault will be set.	• Power Switch is ON, then OFF • will only be retested after a power cycle	8 Count	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_HIGH_ISO_FRONT_RIGHT	C0014	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_LOW_ISO_FRONT_RIGHT	C0014	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_HIGH_ISO_FRONT_LEFT	C0010	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_LOW_ISO_FRONT_LEFT	C0010	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_HIGH_ISO_REAR_RIGHT	C001C	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_LOW_ISO_REAR_RIGHT	C001C	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SOL_CC_DC_SATURATED_HIGH_ISO_REAR_LEFT	C0018	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_LOW_ISO_REAR_LEFT	C0018	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_HIGH_NORMAL_OPEN_DAP	C0002	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_LOW_NORMAL_OPEN_DAP	C0002	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_HIGH_PEDAL_SIM_ISO	C0024	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100 ms	Type A. MIL Illumination.
SOL_CC_DC_SATURATED_LOW_PEDAL_SIM_ISO	C0024	This monitor checks if: Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	If a closed loop current control loop is broken, or if the target current is not physically achievable due to external limitations (e.g. coil resistance or supply voltage) or due the minimum on-time, the control loop's integrator shall cause the duty cycle command to saturate high or low. The time to reach saturation depends upon the tuning of the controller coefficients and the current feedback error.	Duty cycle is out of range	Polaris is initialized	100ms	Type A. MIL Illumination.
SOL_OVER_VOLTAGE_NORMAL_CLOSE_DAP	C0004	This monitor checks if: Defective/Missing Suppression diode Defective PCB	If the suppression diode is missing or failed the ASIC detects it by monitoring the solenoid back EMF. Reading above +40V sets the Overvoltage Warning SPI flag. The coils output is not shut-off by the ASIC. Software matures the fault by monitoring the SPI flag. NOTE: There are no suppression diodes on any of the Dump coils because they are not PWM'd.	Duty cycle is out of range	Polaris is initialized	100ms	Type A. MIL Illumination.
SOL_OVER_VOLTAGE_SIM_TEST	C05D5	This monitor checks if: Defective/Missing Suppression diode Defective PCB	If the suppression diode is missing or failed the ASIC detects it by monitoring the solenoid back EMF. Reading above +40V sets the Overvoltage Warning SPI flag. The coils output is not shut-off by the ASIC. Software matures the fault by monitoring the SPI flag. NOTE: There are no suppression diodes on any of the Dump coils because they are not PWM'd.	Duty cycle is out of range	Polaris is initialized	100ms	Type A. MIL Illumination.
DC_SOL_REGULATION_FAILURE	P0606	This monitor checks if: • Defective system ASIC	• The ASIC shall monitor the state of each DROx output and report if it does not match the commanded state.	The MCU shall monitor ASIC's "DROx Gate Monitor Fault" SPI bits.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SOL_DUTY_CYCLE_FDBK_PLAUS_FAULT	P0606	This monitor checks if: • Defective system ASIC Problem writing coil temperature to NVRAM (Controlled_SHUTDOWN_FAILURE (loss of battery), SPI failure, NVRAM failure etc) Problem reading Engine OFF time, used to estimate temperature cooling (Missing message, corrupted message, CAN failure etc)	The MCU shall monitor battery voltage and maintain an estimated coil temperature/resistance model. For a given current command, the MCU shall estimate the required duty cycle. The MCU shall verify that the estimated duty cycle against the ASIC's reported "CC_DRx Duty Cycle Command Feedback" match within a TBD tolerance. Current threshold is 20%	The MCU shall monitor battery voltage and maintain an estimated coil temperature/resistance model. For a given current command, the MCU shall estimate the required duty cycle. The MCU shall verify that the estimated duty cycle against the ASIC's reported "CC_DRx Duty Cycle Command Feedback" match within a TBD tolerance. Current threshold is 10%	• Polaris is initialized	15 msec	Type A. MIL Illumination.
COIL_CURRENT_FDBK_PLAUS_FAULT	P0606	This monitor checks if: • Defective system ASIC ASIC cannot control sol current properly	For CC_DRx channels in duty-cycle control mode: While a CC_DRx coil drive is commanded to greater than 0% duty cycle, the MCU shall monitor the ASIC's CC_DRx Current Result SPI field and verity the result matches the expected current. When a duty cycle command results in an CC_DRx on-time less than the minimum on time, no coil current measurement is possible. The reported CC_DRx Current Result will retain its prior value, and the corresponding Data Read bit will be 0. SW shall suspend SM102 while Data Read is 0.	For CC_DRx channels in duty-cycle control mode: While a CC_DRx coil drive is commanded to greater than 0% duty cycle, the MCU shall monitor the ASIC's CC_DRx Current Result SPI field and verity the result matches the expected current. When a duty cycle command results in an CC_DRx on-time less than the minimum on time, no coil current measurement is possible. The reported CC_DRx Current Result will retain its prior value, and the corresponding Data Read bit will be 0. SW shall suspend SM102 while Data Read is 0.	• Polaris is initialized • Coil Commanded in Duty Cycle mode	50 msec	Type A. MIL Illumination.
Group 4 - Electronic Control Unit (ECU)							
SPI_FAILURE_ASIC	P0606	This monitor checks if: • Defective printed circuit board. • Defective Polaris ASIC. • Defective microprocessor. • Noisy Power	• This fault can be set by problems communicating over SPI between the MICRO and the Polaris ASIC. It is checked ONCE at power up, • The SPI initialization will fail if the driver has not finished a previous transmission when a new transmission is required (not enough SPI throughput). • The SPI initialization will also fail if the driver detects an error (bad parity, control register data echo over the SPI or control register data read does not match). • If the Polaris ASIC fails to initialize SPI communication after 2 retries (3 attempts total) then this fault is set • Counter: Count 1-up • Monitor Rate: 1ms	Polaris Error Flag = TRUE Polaris. Error_Flags != 0 Polaris. Error_Flags_Observed |= Polaris.Error_Flags	• Power Switch is ON	3 ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
FSC_SPI_TRANSMIT_FAILURE	P0606	This monitor checks if: • Defective printed circuit board. • Defective Polaris ASIC. • Defective microprocessor. • Noisy Power	• This fault can be set by problems communicating over SPI with the Polaris ASIC. The fault will set if the driver has not finished a previous transmission when a new transmission is required (not enough SPI throughout). The fault will also set if the driver detects an error (bad parity, control register data echo over the spi or control register data read does not match) in a single transmission and is unable to complete this transmission after 2 retries (3 attempts total). • Counter: Count 1-up • Monitor Rate: 1ms	Polaris Error Flag = TRUE Polaris. Error_Flags != 0 Polaris. Error_Flags_Observed |= Polaris. Error_Flags	• Power Switch is ON	3 ms	Type A. MIL Illumination.
NVRAM_DEVICEJNOPERATIVE	P062F	This monitor checks if: • Problem in chip select line • fault in SPI driver related code/circuit.	• This fault is set 1. When SPI driver is unable to do message transfer 2. If unable to write or time out before write operation could complete. 3. If requested message transfer not in time (including wait time)	device operational flag = FALSE (error during read write request occured)	• Power Switch is ON	5ms	Type A. MIL Illumination.
NVRAM_WRITE_FAILURE	P062F	This monitor checks if: • Communication problem with NVRAM chip • NVRAM hardware problem • PCB problem	• This fault is detected by the NVRAM handler. The NVRAM handler verifies a successful write event by reading back the information that is expected to be stored in NVRAM and also verifying the checksum.	If the NVRAM handler detects an unsuccessful write event three times, the fault is set.	• Power Switch in ON	60 msec	Type A. MIL Illumination.
COIL_DRIVER_SPI_FAILURE	P0606	This monitor checks if: • Defective system ASIC	• After a rising SYNC pin edge has occurred, the SW shall read the ASIC's "SYNC Armed Status" flag and detects if the bit is still high (indicating the rising SYNC pin edge was not detected).	The ASIC clears the "SYNC Armed" bit after a rising edge has occurred on the SYNC pin. The ASIC provides the "SYNC Armed Status" SPI flag, which reflects the state of the "SYNC Armed" SPI bit. After a rising SYNC pin edge has occurred, the SW reads the ASIC's "SYNC Armed Status" SPI bit and detects if the bit is still high (indicating the rising SYNC pin edge was not detected).	• Polaris is initialized	15 msec	Type A. MIL Illumination.
EXT_WATCHDOG_FAIL	P0606	This monitor checks if: • Defective system ASIC	• None.	Periodically (e.g. once per ignition cycle), the MCU shall perform the following watchdog test (or equivalent): (1) Start with the Watchdog Counter Value SPI field = 0, the WDEN pin high, and all other "watchdog-enabled functions" otherwise enabled. (2) Verify Watchdog Status SPI bit is 0 and all "watchdog-enabled functions" are disabled. (3) Service watchdog until the Watchdog Counter Value = 6. Verify the conditions from (2) remain. (4) Set the WDEN pin low, then service the watchdog. (5) Confirm the Watchdog Counter Value = 7 and all "watchdog-enabled functions" are disabled. (6) Allow the watchdog to timeout, then set the WDEN pin high. (7) Confirm the Watchdog Counter Value = 0, Watchdog Status bit is 0, and all "watchdog-enabled functions" are disabled. Watchdog-enable functions are: (1) solid state relay driver pin (VDG), (2) the motor !/2 bridge pre-driver pins (PDG and PRG), (3) the ENQ digital output pin, and (4) the low-side coil drivers (CCJDRx) and pre-drivers (DROx).	• Polaris is initialized	10 msec	Type A. MIL Illumination.
AD_PERIPHERAL_TIMEOUT_FAILURE	P060B	This monitor checks if: • Defective printed circuit board. • Defective Polaris ASIC. • Defective microprocessor.	• A/D Peripheral Timeout Failure • When reading an A/D channel, the software enters a "wait" loop where it looks for a bit in an A/D register to be set, indicating that the conversion is complete. A "timeout" mechanism exists that breaks out of the wait loop after 100 usee (well longer than it is ever expected to complete an A/D conversion) has elapsed. If this timeout mechanism is executed, a fault code is set. • Counter: Count 1-up • Monitor Rate: 10ms	Adc Port Lockup Detected = TRUE	• Power Switch is ON	5ms	Type A. MIL Illumination.
AD_EVENT_LOCKUP	P060B	This monitor checks if: • Defective printed circuit board. • Defective Polaris ASIC. • Defective microprocessor.	A/D Event Lockup Failure Two detection methods: No A/D conversions in the last 5 msec: A counter is incremented when A/D conversion results are retrieved. Every 5 msec this counter is checked. If it is 0, then the AD_EVENT_LOCKUP fault will begin to mature. If greater than 0, then it is cleared. 2 consecutive failures are needed to set the fault. Adc_Synchronization_Failed flag is TRUE: The ASIC will set this flag TRUE when the conversion count (number of channels converted) is larger than what is expected (9). 2 consecutive failures are needed to set the fault.	Adc Lockup Count = 0 or Adc Synchronization Failed = TRUE	• Power Switch is ON	5ms	Type A. MIL Illumination.
SOLENOID_TIMEOUT_FAILURE	P0606	This monitor checks if: • Defective microprocessor. • Incorrect microprocessor application code.	• Solenoid Timeout Failure Each solenoid in the system is expected to generate a HET interrupt command to indicate the end of a solenoid pulse duration., Each solenoid timeout interrupt results in logic that sums the total number of HET interrupts. This is done independently for each channel. At the completion of the System Self-Test, the number of valid HET interrupts, are compared. The total number of HET interrupts is expected to be equal to the number of solenoids in the system. If the number of interrupts that occurred does not equal the expected number, a failure is indicated and this fault is set. • After the system self test is complete, each solenoid is test again once per every 5 sec, as described above. • The fault is cleared when above condition does not exist. • Counter: Count 1-up • Monitor Rate: 10MS	At least one solenoid fails to get all timeout interrupts for all 0.5 ms pulses	• Mode manager is normal mode • Power switch is not faulted • System is not initializing • System is not re-initializing • Engine is not being cranked • Diagnostic commands are not requested • System is not shutting down	5ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SOLENOID_PERIODIC_INTERRUPT_FAILURE	P0606	This monitor checks if: • Defective microprocessor. Incorrect microprocessor application code, ex. Bad scheduler	HET Periodic Interrupt Failure Verifies that one particular High End Timer interrupt (HET) feedback; occurs every pass through the schedule loop time (10MS). This fault is set if no HET interrupt feedback has occurred for 3 consequentive schedule loop time (10MS). The HET interrupt feedback that is checked is the solenoid feedback interrupts, This Solenoid feedback interrupt is scheduled every interval of the operating system. The fault is cleared when above condition does not exist. Counter: Count 1-up-Reset Monitor Rate: 10MS	periodic het interrupt flag = FALSE (periodic interrupt did not occur)	Power Switch is ON	5ms	Type A. MIL Illumination.
SYS_ASIC_U3_SELECT_FAILURE	P0606	This monitor checks if: Defective system ASIC Missing external U3 FET when external U3 FET is expected (less current delivered with internal FET) Existing U3 FET when U3 FET is not expected (Note: No system reaction required)	If the external U3 FET is present, the ASIC shall set the U3 External FET SPI bit, if not present it will clear the bit. Software sets fault if bit is opposite of what is expected.	The MCU shall read the ASIC's U3 External FET status bit and compares against the expected value.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_WDEN_STATUS_CORR	P0606	This monitor checks if: • Defective system ASIC	• The ASIC shall provide the WDEN Status SPI bit which reflects the filtered state of the WDEN pin. The MCU shall monitor the ASIC's WDEN Status SPI flag and verify it is the expected value.	WDEN Status SPI flag <> WDEN PIN status	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_EXCESS_STARTUP	P0606	This monitor checks if: • Defective system ASIC	• During the power-on sequence, the ASIC shall monitor the U5, U3, and U1 voltages, with respect to the discharge voltage threshold. • If the power-on sequence is delayed (e.g. due to a slow U5, U3, U1, discharge), the ASIC shall report the Excessive Startup Time SPI flag.	The MCU shall monitor the ASIC's Excessive Startup Time SPI flag.	• Polaris is initialized	5 msec	Type A. MIL Illumination.
SYS_ASIC_EXCESS_STARTUP_AT_SPEED	P0606	This monitor checks if: • Defective system ASIC	• During the power-on sequence, the ASIC shall monitor the U5, U3, and U1 voltages, with respect to the discharge voltage threshold. • If the power-on sequence is delayed (e.g. due to a slow U5, U3, U1, discharge), the ASIC shall report the Excessive Startup Time SPI flag. • The fault linked to heading of this section is set at speed and cleared below a speed. Although there is no hardware failure once electronics power up, IBC projects currently are sensitive to drivers going from push through to boosted brakes. Therefore, system will set fault if above a defined vehicle speed when bit is set. Note: Since bit is set first thing at power up, care shall be taken to ensure the bit is saved until the ability to check vehicle speed.	The MCU shall monitor the ASIC's Excessive Startup Time SPI flag. AND ((vehicle speed > 3 kph) OR (any nonfailed wheel speed sensor > 3 kph) OR all wheel speeds are failed)	• Polaris is initialized	5 msec	Type A. MIL Illumination.
SYS_ASIC_ADC_REF_HIGH	P060B	This monitor checks if: • Defective system ASIC	• The ASIC shall provide three ADC test voltage channels fixed to internal voltage references: Vhigh (ADREFHI).Vlow (GND_Q1), and Vmid (ADREFHI/2).	Each software loop, the MCU shall read the ADC conversion results for the Vhigh, Vlow and Vmid ASIC ADC channels over SPI, and compare them against fixed detection thresholds. Note: This MCU requirement is the same as in SM137.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_ADC_REF_MID	P060B	This monitor checks if: • Defective system ASIC	• The ASIC shall provide three ADC test voltage channels fixed to internal voltage references: Vhigh (ADREFHI).Vlow (GND_Q1), and Vmid (ADREFHI/2).	Each software loop, the MCU shall read the ADC conversion results for the Vhigh, Vlow and Vmid ASIC ADC channels over SPI, and compare them against fixed detection thresholds. Note: This MCU requirement is the same as in SM137.	• Polaris is initialized	25 msec	Type A. MIL Illumination.
SYS_ASIC_ADC_REF_LOW	P060B	This monitor checks if: • Defective system ASIC	• The ASIC shall provide three ADC test voltage channels fixed to internal voltage references: Vhigh (ADREFHI).Vlow (GND_Q1), and Vmid (ADREFHI/2).	Each software loop, the MCU shall read the ADC conversion results for the Vhigh, Vlow and Vmid ASIC ADC channels over SPI, and compare them against fixed detection thresholds. Note: This MCU requirement is the same as in SM137.	• Polaris is initialized	50 msec 10 Counts	Type A. MIL Illumination.
SYS_ASIC_ADC_ATTN_BIT_STUCK	P060B	This monitor checks if: • Defective system ASIC	The MCU once per power cycle commands each ASIC external ADC channel with the attenuation mode opposite of normal operation and verify that its attenuation enable feedback SPI bit is not stuck. Commanded 10 times and if 3 in a row are failed the fault is set.	Any one of the 10 ASIC external ADC channel's attenuation enable feedback SPI bits is stuck	• Polaris is initialized	Time 3 ms = Goal 3 counts	Type A. MIL Illumination.
SYS_ASIC_ADC_ATTN_FACTOR	P060B	This monitor checks if: • Defective system ASIC	• Each background conversion loop, the ASIC shall perform the conversion of the internal Vmid voltage both with and without the selectable attenuation switched in. The conversion results shall be stored respectively in the separate ADC Vmid with Attenuation Test Result and ADC Vmid Test Result SPI fields. • Each software loop, the MCU shall calculate the ASIC's ADC attenuation factor by reading the ADC Vmid with Attenuation Test Result and ADC Vmid Test Result SPI fields, calculate the ASIC's ADC attenuation factor by dividing the attenuated result by the non-attenuated result, and verify the resulting attenuation factor is within limits.	Calculated ADC attenuation factor < 0.6176 OR Calculated ADC attenuation factor > 0.6320	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_EXT_ADC_FAILURE	P060B	This monitor checks if: • Defective Polaris ASIC.	The ASIC reports the state of the attenuation (selected or not selected) for each external ADC channel via the "ADx Attenuation Feedback" SPI bits within the ADC result registers. For fault detection purposes, the feedback bits directly monitor the control signal state within the SAR Logic, as opposed to only echoing the "ADx Attenuation Select" command. Each time an ASIC external ADC channel is read over SPI, the SW also reads the "ADx Attenuation Feedback" bit and compare the result against the expected (i.e. commanded) attenuation setting.	Compare the ASIC external ADC channel read of SPI and the ADx Attenuation feedback bit against expected attenuation setting	• Polaris is initialized	50 msec	Type A. MIL Illumination.
SYS_ASIC_SYNC_PULSE_DETECT	P0606	This monitor checks if: • Defective system ASIC	• ASIC provides SYNC ARMED SPI mapped bit that can be set and cleared through SPI, or cleared by detected valid SYNC rising edge event. • Provide un-armed SYNC edge detected SPI mapped bit.	Periodically (e.g. once per ignition cycle) the MCU shall send a rising edge on the SYNC pin, while the SYNC Armed SPI bit is low. The MCU shall verify that the Unarmed SYNC Edge Detected SPI flag is set.	• Polaris is initialized	15 msec	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SYS_ASIC_SPI_DETECT	P0606	This monitor checks if: • Defective system ASIC	• None.	Periodically, and within the fault response time, the MCU shall send separate SPI frames with: (1) an incorrect CRC (2) an incorrect number of SPI bits (3) an invalid command (invalid address) (4) invalid data The MCU shall then verify that the CRC is corrupted in the ASIC's response frame to each of the above errors.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_REGISTER	P0606	This monitor checks if: • Defective system ASIC	• The ASIC shall provide the Storage SPI register. The register contents shall have no effect on the ASIC operation. Register contents shall only be modified by a SPI write and not by any internal ASIC action.	Every major software loop (e.g. 5 - 10ms), the MCU shall perform a write to, normal mode read from and dump mode read from the Storage SPI register. Each loop, the value written shall change, and shall include checkerboard (OxAA, 0x55), walking 1s and walking Os). The MCU shall verify the written and read values match. After performing a write to a safety critical SPI register, the MCU shall perform a read back of the same register, and verify that the contents were written. The read shall occur within the same software loop, in order to allow the MCU to correct any mis-write within the fault response time. Note: The read back refers to a separate read request, and is not the same as verifying the write echo.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_DUPL_SEED	P0606	This monitor checks if: • Defective system ASIC	• None.	The MCU shall detect if ASIC provides the same seed value 3 times in a row.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_AD_REFRESH_FAILURE	P060B	This monitor checks if: • Defective system ASIC	• The ASIC shall set the Data Read bit to indicate that an individual ADC result has been updated since the register was last read.	Each time an ASIC ADC channel is read over SPI, the MCU shall also read the Data Read bit. If the Data Read bit is not set, the MCU treats the result as old data. If the Data Read bit is not set and the time since the prior ADC read is longer than the ASIC ADCs background loop time, the MCU shall detect a fault Periodically (e.g. once per ignition cycle), the MCU shall read each ADC result register immediately 3 times in a row. If the Data Read bit is never low during the 3 reads, flag a fault that the Data Read bit is stuck high. Repeat for all ASIC ADC channels. Note: Because the ASIC could update the result register between two register reads (resulting in two high Data Read bits), 3 successive reads are required.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_AD_DATA_READ_STUCK	P060B	This monitor checks if: • Defective system ASIC	• The ASIC shall set the Data Read bit to indicate that an individual ADC result has been updated since the register was last read.	Periodically (e.g. once per ignition cycle), the MCU shall read each ADC result register immediately 3 times in a row. If the Data Read bit is never low during the 3 reads, flag a fault that the Data Read bit is stuck high. Repeat for all ASIC ADC channels. Note: Because the ASIC could update the result register between two register reads (resulting in two high Data Read bits), 3 successive reads are required.	• Polaris is initialized	1 msec	Type A. MIL Illumination.
SYS_ASIC_MISSING_SYNC_EDGE	P0606	This monitor checks if: • Defective system ASIC	• After a rising SYNC pin edge has occurred, the SW shall read the ASIC's "SYNC Armed Status" flag and detects if the bit is still high (indicating the rising SYNC pin edge was not detected).	The ASIC clears the "SYNC Armed" bit after a rising edge has occurred on the SYNC pin. The ASIC provides the "SYNC Armed Status" SPI flag, which reflects the state of the "SYNC Armed" SPI bit. After a rising SYNC pin edge has occurred, the SW reads the ASIC's "SYNC Armed Status" SPI bit and detects if the bit is still high (indicating the rising SYNC pin edge was not detected).	• Polaris is initialized	15 msec	Type A. MIL Illumination.
DC_SOL_ON_TIME_MON_FAILED	P0606	This monitor checks if: • Defective system ASIC ASIC is not controlling PWM properly	The ASIC shall monitor the filtered DRDx feedback voltage and shall provide an on-time counter (for each channel) which shall accumulate the QDRx on-time. At each valid SYNC edge, the ASIC shall latch the current accumulated value into the DRDx On-Time Feedback Register and clear the on-time counter. The MCU shall integrate the commanded on-time between valid SYNC pulses and verify it matches the ASIC's reported result. Current threshold is 250 * MICROSECOND	Compare the solenoid commanded on time to the measured on time. If the difference in the two times is >250 microsec for 10 consecutive checks then the fault is immediately matured	• Polaris is initialized	50 msec	Type A. MIL Illumination.
SYS_ASIC_UNEXPECTED_SYNC_PULSE	P0606	This monitor checks if: • Defective Polaris ASIC.	• The MCU shall monitor the ASIC's Unarmed SYNC Edge Detected SPI bit and verify no expected SYNC pin edges have occurs. • After a rising SYNC pin edge has occurred (e.g. at the start of the next software loop), the MCU shall read the ASIC's SYNC Armed Status SPI bit and confirm that the rising SYNC pin edge occurred (in which case the bit will be low).	Fault will set if the MCU detects an unexpected sync pulse from the ASIC by monitoring the Unarmed SYNC Edge Detected SPI bit	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_SYNC_TIMEOUT	P0606	This monitor checks if: • Defective Polaris ASIC. • Defective microprocessor. • Operating system failure	The ASIC detects if the time since the prior valid rising SYNC edge exceeds the SYNC timeout time, Then the ASIC turns off the coil drivers and sets the "SYNC Timeout" SPI bit. The SW monitors the ASIC's "SYNC Timeout" SPI bit to detect if a SYNC Timeout has occurred.	This fault would be set if the SPI bit SYNC Timeout is set for 25msec	• Polaris is initialized	max 17ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SYS_ASIC_CONFIG_REG_FAILURE	P0606	This monitor checks if: • register error • register rewrite error	• Configuration Registers: (These are written once at startup.) After writing once, read back and verify their contents during every subsequent 5ms SPI loop.	Rewrite registers with an incorrect value Verify if the write was successful during the following 5ms SPI loop's read & verify. If the rewrite is not successful after 3 attempts in a row, set a fault.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_CONTROL_REG_FAILURE	P0606	This monitor checks if: • register error • register rewrite error	• Control Registers: (These are written every 5ms loop for control or failsafing purposes.) For those registers not covered by other SMs, read and verify every 5ms loop, prior to performing the write.	Rewrite registers with an incorrect value Verify if the write was successful during the following 5ms SPI loop's read & verify. If the rewrite is not successful after 3 attempts in a row, set a fault.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
ENQ_PIN_FAILED	P0606	This monitor checks if: • Defective ASIC.	• The Polaris ASIC provides a digital push-pull output, ENQ. ENQ is high when the ENQ Enable SPI bit is set, the Watchdog Status is "in range", WDEN Status is high, and nRST Status is high. Otherwise ENQ is low. ENQ is used as a pre-driver to enable ECU circuitry.	The MCU shall continuously monitor the ASIC ENQ feedback signal state and verify that it has the expected state. The HW shall provide a digital feedback signal of ASIC ENQ signal to MCU digital input.	• Polaris is initialized	10 msec	Type A. MIL Illumination.
BROKEN_WIRE_BPWM_SWITCH_1	P060B	This monitor checks if: • Improper (broken wire) connection between the external analog sensor and the input pin. • Defective microprocessor.	• Conversion results for VHigh and VLow ADC channels are out of range, then Broken Wire fault is set.	• Each software loop, ADC conversion results for VHigh and VLow MMC ADC Channels are read. • If conversion results for VHigh and VLow are out of range, then Broken Wire fault is set.	• Power Switch is ON	5 msec	Type A. MIL Illumination.
BROKEN_WIRE_BPWM_SWITCH_5	P060B	This monitor checks if: • Improper (broken wire) connection between the external analog sensor and the input pin. • Defective microprocessor.	• Conversion results for VHigh and VLow ADC channels are out of range, then Broken Wire fault is set.	• Each software loop, ADC conversion results for VHigh and VLow MMC ADC Channels are read. • If conversion results for VHigh and VLow are out of range, then Broken Wire fault is set.	• Power Switch is ON	5 msec	Type A. MIL Illumination.
BROKEN_WIRE_BFL_SWITCH_2	P060B	This monitor checks if: • Improper (broken wire) connection between the external analog sensor and the input pin. • Defective microprocessor.	• Conversion results for VHigh and VLow ADC channels are out of range, then Broken Wire fault is set.	• Each software loop, ADC conversion results for VHigh and VLow MMC ADC Channels are read. • If conversion results for VHigh and VLow are out of range, then Broken Wire fault is set.	• Power Switch is ON	5 msec	Type C, No MIL, "Emissions Neutral Diagnostic "
BROKEN_WIRE_TEMP_FDBK_A	P060B	This monitor checks if: • Improper (broken wire) connection between the external analog sensor and the input pin. • Defective microprocessor.	• Conversion results for VHigh and VLow ADC channels are out of range, then Broken Wire fault is set.	• Each software loop, ADC conversion results for VHigh and VLow MMC ADC Channels are read. • If conversion results for VHigh and VLow are out of range, then Broken Wire fault is set.	• Power Switch is ON	5 msec	Type A. MIL Illumination.
SYS_ASIC_U1_SELECT_FAILURE	P0606	This monitor checks if: • Defective printed circuit board. • Defective ASIC. • Defective microprocessor.	• The U1 operating mode and voltage level selections are viewable via the U1 Mode Select Status and U1 Voltage Select Status SPI fields. The SPI feedback signals are internally routed so that they monitor the true state of the mode and voltage control circuits.	The MCU verifies that the U1 Mode Select Status and U1 Voltage Select Status SPI fields in register 0x45 match the values which are hard-coded into SW corresponding the application's intended HW population. If a mismatch is detected, fault is set.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_NVM_FAIL	P062F	This monitor checks if: • Defective printed circuit board. • Defective ASIC. • Defective microprocessor.	• During the ASIC's full active logic reset sequence (within the active mode), the ASIC shall read and compare the primary and inverted U1 mode and voltage SPI fields. • If primary and inverted SPI fields do not match, the ASIC shall configure the U1 regulator in the 1.1V, supervisor mode configuration and shall set the TRW NVM Fail SPI bit in registers 0x45 and 0x61.	The MCU shall periodically verify that the TRW NVM Fail SPI bit (reg 0x45) is low. If the bit is read as high, fault is set.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_SM_DISABLED	P0606	This monitor checks if: • Defective printed circuit board. • Defective ASIC. • Defective microprocessor.	• The ASIC shall set the Safety Mechanisms Disabled SPI bit when a test mode is active which prevents the ASIC from resetting the MCU or disabling power supplies in reaction to a fault.	The MCU shall periodically verify that the Safety Mechanisms Disabled SPI bit is low. If the bit is read as high, fault is set.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_SPI_TRANSFER_ERROR	P0606	This monitor checks if: • SPI transfer error • ASIC problem • PCB problem	• The micro monitors the SPI data transmissions and checks for SPI transfer errors	If any of the below errors are observed in Spi Data transmission this fault will set. POLARIS_SPI_NOT_INITIALIZED POLARIS_SPI_TRANSFER_REJECTED POLARIS_SPI_TX_MSG_LENGTH_ERROR	• Continuous failsafing	15 msec	Type A. MIL Illumination.
Group 5 - Microcontroller							
ROM_CRC_FAILURE	P0606	This monitor checks if: • Defective microprocessor • Incorrect fault detection algorithm	• CRC ROM Failure R4 • The ROM self-test is a dynamic test that is called from the scheduler at a rate of 5 msec. Each ROM section is checksummed byte by byte. Each byte will be added to the current checksum for a section. If the byte being checked is the last byte of a section, then the setion is verified for a correct checksum stored at the end of the section.	calculated CRC != stored CRC	• Power Switch is ON	5 msec	Type A. MIL Illumination.
LMU_DATA_PATH_TEST_FAILURE	P0606	This monitor checks if: Permanent failure of the LMU (Local Memory Unit) SRAM data path	The fault will be set if the data written to the LMU SRAM does not match the data read back from the same location of the LMU SRAM	The test consists of the following sequence: 1. Write 8 different 8-bit values to sequential addresses in LMU SRAM. Data pattern: 0x1122334455667788 2. Perform a 64-bit read and compare against expected values 3. Write 4 different 16-bit values to sequential addresses in LMU SRAM. Data pattern: 0xEEDDCCBBAA998877 4. Perform a 64-bit read and compare against expected values 5. Write 2 different 32-bit values to sequential addresses in LMU SRAM. Data pattern: 0XA5A5A5A5A5A5A5A5 6. Perform a 64-bit read and compare against expected values	Always runs during initialization	1 Count	Type A. MIL Illumination.
SPINLOCK_FAULT_BUFFER_ERROR	P0606	This monitor checks if: Software Error CPU Failure	Spinlock variable fails to go to available value before timeout expires.	None	Always Enabled	10 msec	Type A. MIL Illumination.
SPINLOCK_ONSTAR_FAULT_LATCHED_ERROR	P0606	This monitor checks if: Software Error CPU Failure	Spinlock variable fails to go to available value before timeout expires.	None	Always Enabled	10 msec	Type A. MIL Illumination.
SPINLOCK_ONSTAR_FAULT_CLEARED_ERROR	P0606	This monitor checks if: Software Error CPU Failure	Spinlock variable fails to go to available value before timeout expires.	None	Always Enabled	10 msec	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SPINLOCK_FMM_BLOCK_ERROR	P0606	This monitor checks if: Software Error CPU Failure	Spinlock variable fails to go to available value before timeout expires.	None	Always Enabled	10 msec	Type A. MIL Illumination.
SPINLOCK_NVRAM_FAULT_BIT_ERROR	P062F	This monitor checks if: Software Error CPU Failure	Spinlock variable fails to go to available value before timeout expires.	None	Always Enabled	10 msec	Type A. MIL Illumination.
OS_TASK_MONITOR_FAULT_COREO	P0606	This monitor checks if: Software Error Partial Microcontroller Failure	Checks to be sure that all tasks on CPUO are running	None	Always Enabled	1 count	Type A. MIL Illumination.
OS_TASK_MONITOR_FAULT_CORE1	P0606	This monitor checks if: Software Error Partial Microcontroller Failure	Checks to be sure that all tasks on CPU1 are running	None	Always Enabled	1 count	Type A. MIL Illumination.
OS_TASK_MONITOR_FAULT_CORE2	P0606	This monitor checks if: Software Error Partial Microcontroller Failure	Checks to be sure that all tasks on CPU2 are running	None	Always Enabled	1 count	Type A. MIL Illumination.
OS_INTERNAL_FAILURE_COREO	P0606	This monitor checks if: Failure in a hardware system that the OS depends on.	The OS has detected a serious failure such that, as determined by the OS vendor, it cannot continue safe operation on at least 1 CPU. This is most likely because of a failure in a hardware system that the OS depends on.	None	Always Enabled	10 msec	Type A. MIL Illumination.
OS_INTERNAL_FAILURE_CORE1	P0606	This monitor checks if: Failure in a hardware system that the OS depends on.	The OS has detected a serious failure such that, as determined by the OS vendor, it cannot continue safe operation on at least 1 CPU. This is most likely because of a failure in a hardware system that the OS depends on.	None	Always Enabled	10 msec	Type A. MIL Illumination.
OS_INTERNAL_FAILURE_CORE2	P0606	This monitor checks if: Failure in a hardware system that the OS depends on.	The OS has detected a serious failure such that, as determined by the OS vendor, it cannot continue safe operation on at least 1 CPU. This is most likely because of a failure in a hardware system that the OS depends on.	None	Always Enabled	10 msec	Type A. MIL Illumination.
RTOS_FAILURE_COREO	P0606	This monitor checks if: Software Error	EB OS detects an error situation and calls ErrorHook with a status code for which there is no other fault code.	None	Always Enabled	5*Number of errors in 10ms update Cycle	Type A. MIL Illumination.
RTOSFAILURECORE1	P0606	This monitor checks if: Software Error	EB OS detects an error situation and calls ErrorHook with a status code for which there is no other fault code.	None	Always Enabled	5*Number of errors in 10ms update Cycle	Type A. MIL Illumination.
RTOS_FAILURE_CORE2	P0606	This monitor checks if: Software Error	EB OS detects an error situation and calls ErrorHook with a status code for which there is no other fault code.	None	Always Enabled	5*Number of errors in 10ms update Cycle	Type A. MIL Illumination.
UNEXPECTED_EXCEPTION_COREO	P0606	This monitor checks if: Software Error Partial Microcontroller Failure	The CPU detects a situation where it cannot successfully complete an instruction, such no memory exists at the read/write address or instruction code is invalid. The CPU branches to a predefined Trap address and control is transferred to the Elektrobit OS. The EB OS will call ProtectionHook with status code E_OS_PROTECTION_EXCEPTION provided the following two aspects are true. 1 —The trap was not a normal function of the OS. 2 —The OS does not have another more specific error code to use, such as E_OS_PROTECTION_MEMORY for a MPU violation.	None	Always Enabled	10 msec	Type A. MIL Illumination.
UNEXPECTED_EXCEPTION_CORE1	P0606	This monitor checks if: Software Error Partial Microcontroller Failure	The CPU detects a situation where it cannot successfully complete an instruction, such no memory exists at the read/write address or instruction code is invalid. The CPU branches to a predefined Trap address and control is transferred to the Elektrobit OS. The EB OS will call ProtectionHook with status code E_OS_PROTECTION_EXCEPTION provided the following two aspects are true. 1 —The trap was not a normal function of the OS. 2 —The OS does not have another more specific error code to use, such as E_OS_PROTECTION_MEMORY for a MPU violation.	None	Always Enabled	10 msec	Type A. MIL Illumination.
UNEXPECTED_EXCEPTION_CORE2	P0606	This monitor checks if: Software Error Partial Microcontroller Failure	The CPU detects a situation where it cannot successfully complete an instruction, such no memory exists at the read/write address or instruction code is invalid. The CPU branches to a predefined Trap address and control is transferred to the Elektrobit OS. The EB OS will call ProtectionHook with status code E_OS_PROTECTION_EXCEPTION provided the following two aspects are true. 1 - The trap was not a normal function of the OS. 2 - The OS does not have another more specific error code to use, such as E_OS_PROTECTION_MEMORY for a MPU violation.	None	Always Enabled	10 msec	Type A. MIL Illumination.
FSMC_MISMATCH_VELOCITY	P0606	This monitor checks if: • Defective • Microprocessor • At least one • wheel velocity • calculation • between • Micro 1 and • Micro 2 does not agree	• Mismatched Wheel Velocity Failure • Both micro 1 and micro 2 are calculating the velocity for each wheel. All wheel speeds computed by the micro 1 are transmitted to the micro 2 every loop time. The micro 2 compares them to the appropriate velocities received from the micro 1.	Tolerance of any wheel velocity calculations is > +/- 10 km/h	• High wheel acceleration inhibits this routine	35 ms	Type A. MIL Illumination.
LOGICAL_SEQUENCE_FAULT_COREO	P0606	This monitor checks if: Improper sequencing of runnables	If the software finds mismatch in current sequence compared to predefined sequence of the runnables then LSM flag in Core 0 is set.	Fault is set if LSM flag in Core 0 is set.	Continuous Failsafing	1 count	Type A. MIL Illumination.
LOGICAL_SEQUENCE_FAULT_CORE1	P0606	This monitor checks if: Improper sequencing of runnables	If the software finds mismatch in current sequence compared to predefined sequence of the runnables then LSM flag in Core 1 is set.	Fault is set if LSM flag in Core 1 is set.	Continuous Failsafing	1 count	Type A. MIL Illumination.
LOGICAL_SEQUENCE_FAULT_CORE2	P0606	This monitor checks if: Improper sequencing of runnables	If the software finds mismatch in current sequence compared to predefined sequence of the runnables then LSM flag in Core 2 is set.	Fault is set if LSM flag in Core 2 is set.	Continuous Failsafing	1 count	Type A. MIL Illumination.
CPU_FAILURE_SEVERITY_X	P0606	This monitor checks if: • Defective microprocessor • Improper Application Code	The SW shall configure the MCU's fault manager to signal MCU faults via alarm but don't require the MCU to be held in reset.	See Aurix_Alarms_Update.xlxs for which alarm indicates what MCU faults and set the CPU_FAILURE_SEVERITY_X fault.	• Power Switch in ON	Checked continuously set on first occurrence.	Type A. MIL Illumination.
CPU_FAILURE_SEVERITY_Y	P0606	This monitor checks if: • Defective microprocessor • Improper Application Code	Activates the FSP then checks to see if it truly got activated. Also, checks to see if the ASIC saw the FSP pin activate.	If Polaris feedback does not match FSP command OR If Aurix feedback does not match FSP command	• Power Switch in ON	Checked once at power up, sets for signal occurrence of feedback not matching expectation.	Type A. MIL Illumination.
CPU_FAILURE_SEVERITY_TRANSIENT	P0606	This monitor checks if: • Defective microprocessor • Improper Application Code	The SW shall configure the MCU's fault manager to signal MCU faults via alarm and configures hardware intervention to hold MCU in reset. When the alarm occurs, SW stores information in NVRAM. On the next Ignition cycle if SW sees indication stored in NVRAM that indicates we had an FSP occur, we set the fault. Note: There is no gaurantee that SW is able to write to NVRAM depending on what has failed.	See Aurix_Alarms_Update.xlxs for which alarm indicates what MCU faults and set the CPU_FAILURE_SEVERITY_TRANSIENT fault.	• Power Switch in ON	Checked once at power up.	Type A. MIL Illumination.
SYS_ASIC_SYNC_TIME_MISMATCH_FAULT	P0606	This monitor checks if: • Defective system ASIC	• At each valid SYNC edge, the ASIC shall store the time between that edge and the prior valid SYNC edge in the Prior SYNC Interval Time SPI register field.	The MCU shall measure time between SYNC edges (based upon the MCU clock) and verify the time matches the ASIC's Prior SYNC Interval Time SPI field.	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_DRIVER_SHORT_DETECT	P0606	This monitor checks if: • Defective system ASIC	• The ASIC shall not automatically inhibit the Shorted Driver Detection (SM37) when the SSR is off.	Periodically (e.g. once per ignition cycle), the MCU shall disable the SSR, enable the CC_DRx and DROx drivers, command 0A or 0% duty cycle, and verify that the Open Coil / Shorted Driver Warning Valid bits are set, and verify that a Shorted Driver Warning is reported on each driver channel.	• Polaris is initialized	15 msec	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SYS_ASIC_SSR_SELF_TEST_FAILED	P0604	This monitor checks if: • Solid State Relay problem • Defective ASIC • PCB problem	• The MCU performs various tests on the Solid State Relay during System Self Test.	(Ia) Se/Command: Watchdog Counter Value SPI field = 0, WDEN pin low, the Enable Failsafe SSR SPI bit = 0, and the SSR Shut Off Pin low (= off). (Ib) Verify the Coil Supply Voltage is low. (2a) Set the WDEN pin high, the Enable Failsafe SSR SPI bit = 1, and the SSR Shut Off Pin high (= on). Do not service the Watchdog. (2b) Verify the Coil Supply Voltage is low. (3a) Service Watchdog until the Watchdog Counter Value SPI field = 6. (3b) Verify the Coil Supply Voltage is low. (4a) Set the WDEN pin low, then service the Watchdog once, such that the Watchdog Counter Value SPI field = 7. (4b) Verify the Coil Supply Voltage is low. (5a) Set the Enable Failsafe SSR SPI bit = 0, then set the WDEN pin high. (5b) Verify the Coil Supply Voltage is low. (6a) Set the SSR Shut Off Pin low (= off), then set the Enable Failsafe SSR SPI bit = 1. (6b) Verify the Coil Supply Voltage is low. (7a) Allow the Watchdog to timeout, then set the SSR Shut Off Pin high (= on). The time between (4a) and (7a) should be counted toward the required timeout time. If the time between (4a) and (7a) is more than 34ms, a watchdog service event must be added in-between to prevent the Watchdog from timing out before (7a). (7b) Verify the Coil Supply Voltage is low and verify the Watchdog Counter Value SPI field = 0. If any of the above tests failed , retry the re enable all the inputs that are being disabled for this test, and re run this	• Runs during initialization	30 msec	Type A. MIL Illumination.
SYS_ASIC_WDOG_COUNT_TEST_FAILED	P0606	This monitor checks if: • Watchdog problem • Defective ASIC • PCB problem	• This fault tests the watchdog by purposefully allowing the watchdog to time out and checking to see how the watchdog reacts	Allow the Watchdog to timeout. Timeout shall occur 34ms to 42ms after the last watchdog service occurred, The time taken to timeout the watchdog counter should be counted toward the required timeout time. If the time is not in a range of 34 to 42 msec this fault should set	• Runs during initialization	34 msec	Type A. MIL Illumination.
WDOG_DYNAMIC_TEST_FAILURE	P0606	This monitor checks if: • Defective printed circuit board. • Defective ASIC. • Defective microprocessor.	• Watchdog Dynamic Test Failure • The micro sends a bad watchdog response value back to the ASIC periodically to verify that the ASIC does move towards disabling the system when the watchdog is not correctly being updated. Each loop, the watchdog status counter is checked. After the bad value is sent, the logic tests the status counter to verify that it moved towards disabling the system. If the ASIC operation did not move towards disabling the system, the logic assumes that the watchdog is not able to function properly. As a result, the logic disables the system because the watchdog operation cannot be assumed to be correct. 2 occurrences of this failure is needed to set the fault.	If the ASIC operation has not moved towards disabling the system, the logic assumes that the watchdog is not able to function properly. As a result, the logic disables the system because the watchdog operation cannot be assumed to be correct. 2 occurrences of this failure is needed to set the fault.	• Power Switch is ON	10 msec	Type A. MIL Illumination.
SYS_ASIC_U1_UV_RESET_FAULT	P0606	This monitor checks if: • ASIC power supply block problem • Defective ASIC • PCB problem	When the U5 or U3 Undervoltage Diagnostic SPI bit is set, the ASIC raises the effective U5 out of range lower warning level, or the U3 undervoltage fault threshold above the maximum U5 or U3 regulation voltage, thus forcing a U5 out of range warning or U3 undervoltage fault. Periodically, the MCU shall store a flag in NVM indicating that it will perform a U5, U3 or U1 undervoltage diagnostic. The MCU shall then force one of the three test modes and start a timer.	The MCU shall detect a fault if it does not receive a reset within the expected time. If a reset occurs, the MCU shall check NVM and the ASIC's Reset Source SPI Register, and verify that the reset was due to a planned test.	• Runs during initialization	10 msec	Type A. MIL Illumination.
SYS_ASIC_OSCI_RESET_TEST_FAULT	P0606	This monitor checks if: • Oscillator problem • Defective ASIC • PCB problem	• The ASIC shall provide a means to periodically verify that the ASIC is capable of detecting an Oscillator Fault condition and entering the Oscillator Fault Power-down Mode. • From within TRW Test Mode, the ASIC shall provide Main and Supervisor Oscillator Diagnostic bits, which are capable of diving the main oscillator frequency by 2, stopping the main oscillator, dividing the supervisor oscillator frequency by 2, and stopping the supervisor oscillator. • Periodically (e.g. once per ignition cycle) the MCU shall store a flag in NVM indicating that it will perform a oscillator diagnostic. The MCU shall then force one of the four oscillator test modes and start a timer.	The MCU shall detect a fault if it does not receive a reset within the expected time. If a reset occurs, the MCU shall check NVM and the ASIC's Reset Source SPI Register, and verify that the reset was due to a planned test.	• Runs during initialization	10 msec	Type A. MIL Illumination.
SYS_ASIC_DBO1_OVERCURRENT	P0606	This monitor checks if: • Digital buffered output is overcurrent • ASIC problem • PCB problem	• The ASIC shall limit the DBOx current and, after the over-current warning debounce time, set the DBOx Overcurrent Warning SPI flag specific to the faulted output. If the ASIC's Central Overtemperature Warning and the debounced DBOx Overcurrent Warning are both active, the ASIC shall also disable the shorted switch.	The MCU shall read the ASIC's DBOx Overcurrent Warning SPI field. If the SPI bit is high, fault is set.	• Continuous failsafing	30 msec	Type A. MIL Illumination.
SYS_ASIC_DBO2_OVERCURRENT	P0606	This monitor checks if: • Digital buffered output is overcurrent • ASIC problem • PCB problem	• The ASIC shall limit the DBOx current and, after the over-current warning debounce time, set the DBOx Overcurrent Warning SPI flag specific to the faulted output. If the ASIC's Central Overtemperature Warning and the debounced DBOx Overcurrent Warning are both active, the ASIC shall also disable the shorted switch.	The MCU shall read the ASIC's DBOx Overcurrent Warning SPI field. If the SPI bit is high, fault is set.	• Continuous failsafing	30 msec	Type A. MIL Illumination.
SYS_ASIC_LOGIC_RST_STUCK_DETECT	P0606	This monitor checks if: • Reset source register problem • ASIC problem • PCB problem	• The MCU continuously monitors the External LOGIC_RST Reset SPI bit within the Reset Source Register.	The MCU shall read the ASIC's External LOGIC_RST Reset SPI field. If the SPI bit is high, fault is set.	• Continuous failsafing	15 msec	Type A. MIL Illumination.
MULTIPLE_STARTUP_FAILURE	P0606	This monitor checks if: • Defective CPU	The library of micro safety tests are run at every power-up. If any test fails the results are stored and the system is soft reset. If after the reset, any different test or procedure fails then a MULTIPLE_STARTUP_FAILURE is latched	Any two different Safety Test flags are reported as FAILED in two consecutive tests	Enabled at power up	1 count	Type A. MIL Illumination.
SBST_CORE2_FAILURE	P0606	This monitor checks if: Failure of the CPU core	Fault is set if SafeTlib test "CpuTst_CpuSbstPTst()" fails	Every 1 second the SafeTlib test "CpuTst_CpuSbstPTst()" is run. The fault is set if it returns a failure.	Continous - Always enabled	1 Count	Type A. MIL Illumination.
UNIMPLEMENTED_INTERRUPT_COREO	P0606	This monitor checks if: Defective CPU	When the failsafe is called during runtime, it will loop through all the SRC registers to find if there is any pending interrupt from disabled interrupt source	If SRPN bits in SRC register of Interrupt router is zero then the fault will set if SRR bit of SRC register is set	Continuous Failsafing	300 counts	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
ADC_FAILURE	P060B	This monitor checks if: • Defective CPU	Fault sets under the following circumstances: An AD pin is read. Using the Conversion Diagnostics, a pull down is tied to the pin and read again. Then, a pull up is tied to the pin, and read again. Then, the pull devices are removed, and the pin is read a 4th time. The fault will be set if the pull down did not pull the value down by at least 20%, or, the pull up did not pull the value up by at least 20%, or the reread value changed from the initial value by more than 3%. Repeat on another AD pin.	If (pulled down value read > initial value read * 0.8) OR If (pulled up value read < initial value read * 1.2) OR If (reread value > initial value read*1.03) OR If (reread value < initial value read *0.97) THEN Set ADC_FAILURE	performed at power up	1 count	Type A. MIL Illumination.
RESETSSCHECKFAILURE	P0606	This monitor checks if: • Defective CPU	After a warm reset the RSTCON2.CSS bits are checked. If any are 0, then the fault will be set	If (warm reset == TRUE) AND (RSTCON2.CSS == 0)	performed at power up	1 count	Type A. MIL Illumination.
SPB_FAILURE	P0606	This monitor checks if: failed System Peripheral Bus	The correct value of different registers shall be tested to ensure the proper functioning of the SPB address lines. Fault set if any of the registers have an unexpected value after 5 consecutive checks in the 20 ms task .	Each of the required registers will be read during runtime to see if they provide the expected value that was loaded during initialization.	Power Switch is ON	100msec	Type A. MIL Illumination.
SMU_CONFIG_REGISTER_READBACK_FAILURE	P0606	This monitor checks if: • Defective CPU	after the SMU has been initialized it will loop through a table of SMU registers and compare each register value to the value that the MCAL has previously written to it. If there is a difference, then the SMU will be unlocked, the register updated, and then the SMU will be put back to it's previous state. The register will then be checked again. If it fails 3 times, then the SMU_CONFIG_REGISTER_READBACK_FAILURE will be set.	register value is not equal to test value written to it	performed at power up	1 count	Type A. MIL Illumination.
SBCU_CONFIG_REGISTER_READBACK_FAILURE	P0606	This monitor checks if: • Defective CPU	after the SMU has been initialized it will loop through a table of SMU registers and compare each register value to the value that the MCAL has previously written to it. If there is a difference, then the SMU will be unlocked, the register updated, and then the SMU will be put back to it's previous state. The register will then be checked again. If it fails 3 times, then the SMU_CONFIG_REGISTER_READBACK_FAILURE will be set.	register value is not equal to test value written to it	performed at power up	1 count	Type A. MIL Illumination.
WDT_CONFIG_REGISTER_READBACK_FAILURE	P0606	This monitor checks if: • Defective CPU	On initialization: One or more of these Safety Watchdog registers has an incorrect value: WDTSCONO.REL WDTSCON1.IRO WDTSCON1.IR1 WDTSCON1.DR WDTSCON1.UR WDTSCON1.TCTR During runtime: One or more of these CPUO Watchdog registers has an incorrect value for 4 consecutive checks: WDTCPUOCONO.REL WDTCPUOCON1.IRO WDTCPUOCON1.IR1 WDTCPUOCON1.DR WDTCPUOCON1.UR WDTCPUOCON1.TCTR	any register has an incorrect value for four consecutive checks	Enabled at power up	4 count	Type A. MIL Illumination.
CPU_BUS_MPU_CONFIG_REGISTER_READBACK_FAILURE	P0606	This monitor checks if: • Defective CPU	after the MPU has been initialized it will loop through a table of MPU registers and compare each register value to the value that the MCAL has previously written to it. If there is a difference, then the MPU will be unlocked, the register updated, and then the SMU will be put back to it's previous state. The register will then be checked again. If it fails 3 times, then the CPU_MPU_CONFIG_REGISTER_READBACK_FAILURE will be set.	register value is not equal to test value written to it	performed at power up	1 count	Type A. MIL Illumination.
LMU_MPU_CONFIG_REGISTER_READBACK_FAILURE	P0606	This monitor checks if: • Defective CPU	after the MPU has been initialized it will loop through a table of MPU registers and compare each register value to the value that the MCAL has previously written to it. If there is a difference, then the MPU will be unlocked, the register updated, and then the SMU will be put back to it's previous state. The register will then be checked again. If it fails 3 times, then the CPU_MPU_CONFIG_REGISTER_READBACK_FAILURE will be set.	register value is not equal to test value written to it	performed at power up	1 count	Type A. MIL Illumination.
PB_MICRO_REGISTER_READBACK_FAILURE	P0606	This monitor checks if: • Defective CPU	The ECU provides the capability to ensure the data integrity of register configuration. The software shall ensure the data integrity of the register configuration and compare the calculated checksum against an expected value.	register value is not equal to test value written to it	performed at power up	1 count	Type A. MIL Illumination.
SAFETY_LIB_DETECTED_FAILURE	P0606	This monitor checks if: • Defective CPU	The library of micro safety tests are run at every power-up. If any test fails the results are stored and the system is soft reset. If after the reset, the same test or procedure fails then a SAFETY_LIB_DETECTED_FAILURE is latched	Any one Safety Test flag is reported as FAILED in two consecutive tests	Enabled at power up	1 count	Type A. MIL Illumination.
STM_PLAUSIBILITY_FAILURE	P0606	This monitor checks if: • Defective CPU	STM and TBU timers are read without interrupt between, then after 20 ms, STM and TBU elaspsed times are read without interrupt between the readings, the 2.5% error is checked and Up/down failsafe monitor function is called. The fault is continiously checked every 20 ms.	The difference between the System Timer and Time Base Unit channel 1 >= 2.5%	Enabled at power up	105 msec	Type A. MIL Illumination.
EVR_CFGMON_FAILURE	P0606	This monitor checks if: • Defective CPU	The Power Management Status Register is checked at power-up. Two configuration bits are checked. Also the EVR Active flag is checked.	If any of the checked flags are FALSE then the fault is set immediately	performed at power up	1 count	Type A. MIL Illumination.
RAM_STARTUP_MBIST_FAILURE	P0604	This monitor checks if: • Defective CPU	The micro runs a RAM self test at power-up. If a failure is detected the the BIST is rerun after a warm reset. If a failure still exists then the failed bit will be set	If the failed bit is TRUE then set the fault	performed at power up	1 count	Type A. MIL Illumination.
Group 6 - ABS Pump Motor							
Group 7 - IBC Motor							
MD_PU_I_SENSE_COMMON_MODE_FAULT	C0596	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	If {common mode Isense offset - zero Isense offset} is outside the normal range (+/- SPUT_ISENSE_MAX_CM_ISHIFT), this fault is set.	If the current sampled at power-up with an injected common mode I-sense offset (positive & negative together), is outside +/- maximum common mode offset range (from the zero offset reading), this fault is raised.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1 ms	Type A. MIL Illumination.
MDPUISENSENEGATIVEFAULT	C0596	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	If {zero Isense offset - negative Isense offset } is outside the normal range (SPUT_ISENSE_MIN_NEG_ISHIFT to SPUT_ISENSE_MAX_NEG_ISHIFT), this fault is set	If the current sampled at power-up with an injected negative I-sense offset, is outside minimum to maximum negative offset range (from the zero offset reading), this fault is raised.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1 ms	Type A. MIL Illumination.
MD_PUJ_SENSE_POSITIVE_FAULT	C0596	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	If {positive Isense offset - zero Isense offset} is outside the normal range (SPUT_ISENSE_MIN_POS_ISHIFT to SPUT_ISENSE_MAX_POS_ISHIFT), this fault is set.	If the current sampled at power-up with an injected positive I-sense offset, is outside minimum to maximum positive offset range (from the zero offset reading), this fault is raised.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1 ms	Type A. MIL Illumination.
MD_IEM_OCCURRENCE_FAULT	C0582	This monitor checks if: • Bridge FET failure • Invalid execution rate of a motor interrupt.	Compares the number of times each electric drive interrupt has occurred in a 4ms period, and sets if the interrupt count does not fall in an acceptable range	The occurrence counter of any enabled motor interrupt is outside an expected interval.	ECU is not shutting down.	1 count/4 ms	Type A. MIL Illumination.
MD_IEM_PLAUSIBILITY_FAULT	C0582	This monitor checks if: • Bridge FET failure • Invalid execution reason of a motor interrupt.	This fault sets if a motor control interrupt is executed with the wrong proirity level, or an interrupt is executed when it should be disabled.	Either a motor interrupt has been executed which wasn't explicitly enabled.	Motor Drive is in either "Running" or "Paused" state (i.e. not in "Init" or intermediate "Resuming" or "Terminated" state)	1 count	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MD_MOTOR_PHASE_VOLTAGE_1_HIGH_FAULT	C057F	This monitor checks if: Bridge FET failure	When phase 1 voltage is high, the microcontroller shall capture {M1_PH1_SEN phase voltage high}, if {M1_PH1_SEN phase voltage high} is less than RT_PHASE_VOLTAGE_HIGH_MIN then this fault is raised. Motor Phase Voltage HIGH Test is executed when the Inverter FET is switched on. IF motor phase <n> voltage < PHASE VOLTAGE THRESHOLD HIGH THEN faulty bucket is incremented	M1_PH1_SEN phase voltage high < 3.46V	executed when the Inverter FET is switched on. Motor PWM is on	18 msec/128 counts	Type A. MIL Illumination.
MD_MOTOR_PHASE_VOLTAGE_1_LOW_FAULT	C0580	This monitor checks if: Bridge FET failure	When phase 1 voltage is low, the microcontroller shall capture {M1_PH1_SEN phase voltage low}, if {M1_PH1_SEN phase voltage low} is greater than RT_PHASE_VOLTAGE_LOW_MAX then this fault is raised Motor Phase Voltage LOW Test is executed when the lower Inverter FET is switched on. IF motor phase <n> voltage > PHASE VOLTAGE THRESHOLD LOW THEN faulty bucket is incremented	M1_PH1_SEN phase voltage low > 0.99V	executed when the lower Inverter FET is switched on. Motor PWM is on	18 msec/128 counts	Type A. MIL Illumination.
MD_MOTOR_PHASE_VOLTAGE_2_HIGH_FAULT	C057F	This monitor checks if: Bridge FET failure	When phase 2 voltage is high, the microcontroller shall capture {M1_PH2_SEN phase voltage high}, if {M1_PH2_SEN phase voltage high} is less than RT_PHASE_VOLTAGE_HIGH_MIN then this fault is raised. Motor Phase Voltage HIGH Test is executed when the Inverter FET is switched on. IF motor phase <n> voltage < PHASE VOLTAGE THRESHOLD HIGH THEN faulty bucket is incremented	M1_PH1_SEN phase voltage high < 3.46V	executed when the Inverter FET is switched on.	18 msec/128 counts	Type A. MIL Illumination.
MD_MOTOR_P HASE_VOLTAGE_2_LOW_FAULT	C0580	This monitor checks if: Bridge FET failure	When phase 2 voltage is low, the microcontroller shall capture {M1_PH2_SEN phase voltage low}, if {M1_PH2_SEN phase voltage low} is greater than RT_PHASE_VOLTAGE_LOW_MAX then this fault is raised. Motor Phase Voltage LOW Test is executed when the lower Inverter FET is switched on. IF motor phase <n> voltage > PHASE VOLTAGE THRESHOLD LOW THEN faulty bucket is incremented	M1_PH1_SEN phase voltage low > 0.99V	executed when the lower Inverter FET is switched on.	18 msec/128 counts	Type A. MIL Illumination.
MD_MOTO R_PHASE_VOLTAG E_3_H IGH_F AULT	C057F	This monitor checks if: Bridge FET failure	When phase 3 voltage is high, the microcontroller shall capture {M1_PH3_SEN phase voltage high}, if {M1_PH3_SEN phase voltage high} is less than RT_PHASE_VOLTAGE_HIGH_MIN then this fault is raised. Motor Phase Voltage HIGH Test is executed when the Inverter FET is switched on. IF motor phase <n> voltage < PHASE VOLTAGE THRESHOLD HIGH THEN faulty bucket is incremented	M1_PH1_SEN phase voltage high < 3.46V	executed when the Inverter FET is switched on.	18 msec/128 counts	Type A. MIL Illumination.
MD_MOTOR_PHASE_VOLTAGE_3_LOW_FAULT	C0580	This monitor checks if: Bridge FET failure	When phase 3 voltage is low, the microcontroller shall capture {M1_PH3_SEN phase voltage low}, if {M1_PH3_SEN phase voltage low} is greater than RT_PHASE_VOLTAGE_LOW_MAX then this fault is raised. Motor Phase Voltage LOW Test is executed when the lower Inverter FET is switched on. IF motor phase <n> voltage > PHASE VOLTAGE THRESHOLD LOW THEN faulty bucket is incremented	M1_PH1_SEN phase voltage low > 0.99V	executed when the lower Inverter FET is switched on.	18 msec/128 counts	Type A. MIL Illumination.
MD_PU_PHASE_1_STUCK_HIGH_FAULT	C057F	This monitor checks if: • Top FET shorted • Top FET drive stuck on or • Phase sense stuck high	Prior to initialising and enabling the bridge driver a power up test shall be performed to check no top or bottom FET is short circuit Drive stage power up tests confirm that with all FETs off, no phases are driven, Phase voltages checked against expectation, if high raise fault	If the motor phase 1 voltage is near to battery level, before the bridge is activated, probably caused by a short circuit top motor FET, the fault is raised.	Battery/link between 7.1v and 18v	40 ms	Type A. MIL Illumination.
MD_PU_PHASE_1_STUCK_LOW_FAULT	C0580	This monitor checks if: • Bottom FET shorted • Bottom FET drive stuck on or • Phase sense stuck low	Prior to initialising and enabling the bridge driver a power up test shall be performed to check no top or bottom FET is short circuit Drive stage power up tests confirm that with all FETs off, no phases are driven, Phase voltages checked against expectation, if low raise fault	If the motor phase 1 voltage is near to Ov, before the bridge is activated, probably caused by a short circuit bottom motor FET, the fault is raised.	Battery/link between 7.1v and 18v	40 ms	Type A. MIL Illumination.
MD_PU_PHASE_2_STUCK_HIGH_FAULT	C057F	This monitor checks if: • Top FET shorted • Top FET drive stuck on or • Phase sense stuck high	Prior to initialising and enabling the bridge driver a power up test shall be performed to check no top or bottom FET is short circuit Drive stage power up tests confirm that with all FETs off, no phases are driven, Phase voltages checked against expectation, if high raise fault	If the motor phase 1 voltage is near to battery level, before the bridge is activated, probably caused by a short circuit top motor FET, the fault is raised.	Battery/link between 7.1v and 18v	40 ms	Type A. MIL Illumination.
MD_PU_PHASE_2_STUCK_LOW_FAULT	C0580	This monitor checks if: • Bottom FET shorted • Bottom FET drive stuck on or • Phase sense stuck low	Prior to initialising and enabling the bridge driver a power up test shall be performed to check no top or bottom FET is short circuit Drive stage power up tests confirm that with all FETs off, no phases are driven, Phase voltages checked against expectation, if low raise fault	If the motor phase 2 voltage is near to Ov, before the bridge is activated, probably caused by a short circuit bottom motor FET, the fault is raised.	Battery/link between 7.1v and 18v	40 ms	Type A. MIL Illumination.
MD_PU_PHASE_3_STUCK_HIGH_FAULT	C057F	This monitor checks if: • Top FET shorted • Top FET drive stuck on or • Phase sense stuck high	Prior to initialising and enabling the bridge driver a power up test shall be performed to check no top or bottom FET is short circuit Drive stage power up tests confirm that with all FETs off, no phases are driven, Phase voltages checked against expectation, if high raise fault	If the motor phase 1 voltage is near to battery level, before the bridge is activated, probably caused by a short circuit top motor FET, the fault is raised.	Battery/link between 7.1v and 18v	40 ms	Type A. MIL Illumination.
MD_PU_PHASE_3_STUCK_LOW_FAULT	C0580	This monitor checks if: • Bottom FET shorted • Bottom FET drive stuck on or • Phase sense stuck low	Prior to initialising and enabling the bridge driver a power up test shall be performed to check no top or bottom FET is short circuit Drive stage power up tests confirm that with all FETs off, no phases are driven, Phase voltages checked against expectation, if low raise fault	If the motor phase 3 voltage is near to Ov, before the bridge is activated, probably caused by a short circuit bottom motor FET, the fault is raised.	Battery/link between 7.1v and 18v	40 ms	Type A. MIL Illumination.
MD_PU_BRIDGE_BH1_UV_FAULT	C0580	This monitor checks if: • ECU hardware failure	Bridge driver boostrap high side 1 capacitor under voltage fault reported during Bridge driver configuration.	With bridge enabled and SOFF off, the FET IL1 is driven for 200us. After 200us, "high side buffer capacitor 1 under voltage" error in internal error register is still set.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1ms	Type A. MIL Illumination.
MD_PU_BRIDGE_ERR_STUCK_HI_FAULT	C0582	This monitor checks if: • Bridge Driver ERR line connectivity • Bridge driver incorrect operation.	Verify Error line goes active (low), when error condition is injected.	During self test, the Bridge Driver HW error output pin (IOHWAB_BRIDGE_1_ERROR) was not active, when Current Sense Amplifier 1&2 - Gain 2 was set to a invalid value	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	20ms	Type A. MIL Illumination.
MD_PU_BRIDGE_ERR_STUCK_LO_FAULT	C0582	This monitor checks if: • Bridge Driver ERR signal connectivity.	Verify Error line goes inactive (high), when injected error condition is removed.	When Bridge configuration is started by driving the HW output Pin (IOHWAB_BRIDGE_1 JNHIBIT) inactive, the HW Input Pin (IOHWAB_BRIDGE_1_ERROR) stays active.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	20 ms	Type A. MIL Illumination.
MD_PU_BRIDGE_INIT_TIMEOUT_FAULT	C0582	This monitor checks if: • Micro controller SPI failure. • Bridge Driver failure.	Verify Bridge Driver initialization completed within SPUT_DRV_INIT_MAX_TIME.	If initialization of the bridge driver does not occur within 100ms @ 1ms /bit	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	100ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MD_PU_ BRIDGE_MAX_POWER_DOW N_FAULT	C0582	This monitor checks if: • Incorrect Bridge Driver operation	Allow only BD_PU_MAX_POWER_DOWN_CYCLES of retry, during Bridge Driver power up sequence.	the number of power down cycles during a bridge driver power up sequence exceeds 3	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1ms	Type A. MIL Illumination.
MD_PU_ BRIDGE—OC_TIMEOUT_ FAULT	C0582	This monitor checks if: • Incorrect Bridge Driver operation	Verify intermediate over current tests are completed within SPUT_ DRV_OVER_CURRENT_MAX_TIME.	Immediate overcurrent tests are not completed within 10ms @ 0.1us/bit	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	40ms	Type A. MIL Illumination.
MD_PU_ BRIDGE—OCT_NOT_ COMPLETED	C0582	This monitor checks if: • Incorrect Bridge Driver operation	Verify over current test is completed within SPUT_DRV_OCT_MAX_EXECUTION_TIME.	overcurrent tests are not completed within 50ms @ 0.1us/bit	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	100ms	Type A. MIL Illumination.
MD_PU_ BRIDGE—UNACCEPTABLE—ERR	C0582	This monitor checks if: • Incorrect Bridge Driver operation	Verify no un-acceptable errors are reported by Bridge device during power up.	If the below unacceptable error bits are set. - Global test mode (gtm) - Overvoltage Internal Regulator 6 Error (err_ov_reg6) - Charge Pump 1 Overload Error(err_cp1) - Charge Pump 2 Overload Error (err_cp2) - Overtemperature Shutdown (sd_ot) - Charge PumpOvervoltage Shutdown at Pin CB or Pin CH2-CL2 (sd_ov_cp), - Vs Path Charge Pump Input Overload (sd_cp1), - Overtemperature Detection (err_ot_w) - Latent Fault Warning (lfw) - Error Correction of Control Register Failed(ctrl_reg_invalid), - err_ov_ld_vdh in External Errors.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	70ms	Type A. MIL Illumination.
MD_PU_ ISENSE_ZERO_OFFSET_FAULT	C0596	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	Zero I sense outside valid range The microcontroller shall test that while M1_ITP (positive) offset is inactive and M1_ITN (negative) offset is inactive, M1_ISENSE_1 (zero I-sense offset) is within SPUT_ ISENSE1_ OFFSET_MAX_ ERROR	zero Isense offset (M1_ISENSE_1) is outside the normal range	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1ms	Type A. MIL Illumination.
MD_PU_MCU_FET_OP_STUCK_ON_FAULT	C0582	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	While bridge driver is enabled and prior to driving top or bottom FETs a power up test shall be performed to check no top or bottom FET is stuck on Turn all FETs off (MCU outputs off, bridge should drive FETs off) Monitor phase voltage whether is high/low	Top and Bottom FET stuck on during a Power up test. (Phase voltage is high when FETs are turned OFF)	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	40 ms	Type A. MIL Illumination.
MD_PU_BRIDGE_CONFIGSTATE_CHG_ FAULT	C0594	This monitor checks if: • Micro controller SPI failure. • Bridge Driver failure.	This failsafe guarantees that the bridge driver is in an acceptable mode (Normal, Safe Off, Config, or Error) during the power-up test sequence. Unknown, Idle, Config Lock, Self Test, Rectification, and Sleep modes will cause this fault to latch.	Bridge Driver remains in "Idle Mode" for 5ms in which it was expected that it transits to "Configuration Mode", after the configuraion has been sent via SPI.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	145 ms	Type A. MIL Illumination.
MD_PU_BRIDGE_OVER_CURRENT_FAULT	C0590	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	This failsafe tests that over current detection on the bridge driver is working as it should. This failsafe operates during the power-up test.	Self test was started and Current Sense Amplifier 1&2 - Gain 2 was set to a invalid value and bridge driver error output pin (IOHWAB_BRIDGE_1_ERROR) was active, but over current fault bit was not set in sBridgeDriver.CurrentSenseAmpErrorStatus. OR Self test was startedandCurrent Sense Amplifier 1&2 - Gain 2 was set to a valid value and bridge driver error output pin (IOHWAB_BRIDGE_1_ERROR) was inactive, but over current fault bit was set in sBridgeDriver.CurrentSenseAmpErrorStatus.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	25 msec	Type A. MIL Illumination.
MD_MOTOR_OPEN_PHASE1_FAULT	C0580	This monitor checks if: • Open Phase	d-axis and q-axis demand is compared with phase 1 measured current, if difference is less than threshold and if actual current is less then threshold, raise a fault	Low Speed Detection (0rpm..400rpm): average D-axis current errors (over last 12 samples in 200ps cycle) > 6A (ID_OPEN_PHASE_ERR_THRESHOLD) AND maximum of phase current amplitude > 10A (PHASE—CURRENT_DIAG_ENABLE)AND last 3 samples A1 or C1 < 0.5A (ZERO CURRENT SAMPLE THRESHOLD) AND motor phase 1 current < 1A (ZERO_PHASE_CURRENT_THRESHOLD) High Speed Detection (400rpm..2400rpm): last 4 samples of Q-axis current demand > 10A (CURR DEM THRESHOLD) AND motor phase 1 current < 1A (ZERO_PHASE_CURRENT_THRESHOLD)	• NOT in Motor Open Phase Back-Up Mode AND • motor mechanical speed < 2400 rpm (MAX_MECH_SPD_OPEN_PHASE_DIAG_EN) AND • ECU assist enabled	30 msec	Type A. MIL Illumination.
MD_MOTOR_OPEN_PHASE2_FAULT	C0580	This monitor checks if: • Open Phase	d-axis and q-axis demand is compared with phase 2 measured current, if difference is less than threshold and if actual current is less then threshold, raise a fault	Low Speed Detection (0rpm..400rpm): average D-axis current errors (over last 12 samples in 200ps cycle) > 6A (ID_OPEN_PHASE_ERR_THRESHOLD) AND maximum of phase current amplitude > 10A (PHASE—CURRENT_DIAG_ENABLE)AND last 3 samples A1 or C1 < 0.5A (ZERO CURRENT SAMPLE THRESHOLD) AND motor phase 2 current < 1A (ZERO_PHASE_CURRENT_THRESHOLD) High Speed Detection (400rpm..2400rpm): last 4 samples of Q-axis current demand > 10A (CURR DEM THRESHOLD) AND motor phase 1 current < 1A (ZERO_PHASE_CURRENT_THRESHOLD)	• NOT in Motor Open Phase Back-Up Mode AND • motor mechanical speed < 2400 rpm (MAX_MECH_SPD_OPEN_PHASE_DIAG_EN) AND • ECU assist enabled	30 msec	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MD_MOTOR_ OPEN_PHASE3_FAULT	C0580	This monitor checks if: • Open Phase	d-axis and q-axis demand is compared with phase 3 measured current, if difference is less than threshold and if actual current is less then threshold, raise a fault	Low Speed Detection (0rpm..400rpm): average D-axis current errors (over last 12 samples in 200ps cycle) > 6A (ID_OPEN_PHASE_ ERR_ THRESHOLD) AND maximum of phase current amplitude > 10A (PHASE—CURRENT—DIAG_ENABLE)AND last 3 samples A1 or C1 < 0.5A (ZERO CURRENT SAMPLE THRESHOLD) AND motor phase 3 current < 1A (ZERO_PHASE_CURRENT-THRESHOLD) High Speed Detection (400rpm..2400rpm): last 4 samples of Q-axis current demand > 10A (CURR DEM THRESHOLD) AND motor phase 1 current < 1A (ZERO_PHASE_CURRENT-THRESHOLD)	• NOT in Motor Open Phase Back-Up Mode AND • motor mechanical speed < 2400 rpm (MAX_MECH—SPD_OPEN—PHASE—DIAG—EN) AND • ECU assist enabled	30 msec	Type A. MIL Illumination.
MD_ MOTOR—1_SENSE—DYNAMIC—COMM_ MODE_ FAULT	C0582	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	If ({common mode l-sense offset} - {zero l-sense offset}) is outside RT_ISENSE1_MAX_CM_ISHIFT_RANGE then this fault is raised. reference value is taken before applying both voltage offsets (Common), diagnostic_sample point is measured, if diagnostic_sample > reference +/- threshold then raise a fault	Either current sample is outside a valid range set by the respective reference sample plus /minus [-35A (DMJSenseRtMaxCmlShiftNeg)...+35A (DM JSenseRtMaxCm IShiftPos)]	• ECU assist enabled AND • ECU is not initializing or shutting down	4count/16ms	Type A. MIL Illumination.
MD_ MOTOR—1_SENSE_ DYNAMIC—POSITIVE—FAULT	C0582	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	If {M1_ISENSE1 positive offset current} is outside expected limits then this fault is raised. reference value is taken before applying positive voltage offset (P), diagnostic_sample point is measured, if reference is not saturated and if diagnostic_sample < reference + threshold then raise a fault	the absolute current sample during test is lower than the induced offset	• ECU assist enabled AND • ECU is not initializing or shutting down	4count/16ms	Type A. MIL Illumination.
MD_MOTOR_I_SENSE_DYNAMIC_NEGATIVE_ FAULT	C0582	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	If {M1_ISENSE1 negative offset current} is outside expected limits then this fault is raised. reference value is taken before applying negative voltage offset (N), diagnostic_sample point is measured, if reference is not saturated and if diagnostic_sample > reference + threshold then raise a fault	the absolute current sample during test is lower than the induced offset	• ECU assist enabled AND • ECU is not initializing or shutting down	4count/16ms	Type A. MIL Illumination.
MD_MOTOR_POSITION_SENSOR_FAULT	C058A	This monitor checks if: • The MPS indicates a failure or a "not normal" mode • The MPS has detected an internal problem • The SPI message has a CRC failure • The motor position data is not in the valid range	SPI error bits set during communication with MPS, or CRC error detected in SPI message.	mode_not_normal or fail bits set, incorrect CRC calculation, or invalid MPS data	• ECU is not shutting down.	5 msec	Type A. MIL Illumination.
MD_MOTOR_POSITION_MISSING_CALIB_FAULT	P0602	This monitor checks if: • Malfunctioning MPS • Unpowered MPS	The motor position sensor electrical offset calibration has failed or has not yet been completed.	• Fail if motor position calibration state = MPS_CALIB_OFF, MPS_CALIB_FAILED_VARIANCE, or MPS_CALIB_FAILED_FORWARD • Pass if motor position calibration state = MPS_ CALIB_COMPLETED	• ECU is not shutting down.	1 ms	Type A. MIL Illumination.
MD_MOTOR_POSITION_SENSOR_EEPROM_FAULT	C0596	This monitor checks if: • Malfunctioning MPS • Unpowered MPS	▪SPI error bits set during communication with EEPROM on MPS sensor, or incorrect data fingerprint found in EEPROM data read from sensor	o QSPIO_STATUS bit 3 or bit 6 are set during communication with EEPROM o EEPROM identification page[0] != 0x20 || EEPROM identification page[1] != 0x00 || EEPROM identification page[2] != 0x09	N/A	1 count	Type A. MIL Illumination.
MD_ISENSE_CROSS_ CHECK_ FAULT	C0582	This monitor checks if: • Current Sense Circuitry	The microcontroller shall capture M1_ISENSE1 and M1_ISENSE2 current samples, if average difference between M1ISENSE1 and M1_ISENSE2 over five samples is greater than RT_ISENSE_CROSS_CHECK_LIMIT, then this fault is raised and assist removed reads two independent ADC by 5 samples and averages it to measure current flow and compares, if difference is more than allowed,	The sum of the error between phase current samples (internal and external amplifier) is not in the range [-47A (MIN_ISENSE_DIFFERENCE) ...+47A (MAX_ISENSE_DIFFERENCE)] OR no new data from current sensors received	• ECU assist enabled AND • ECU is not initializing or shutting down	20 counts/80ms	Type A. MIL Illumination.
MD_IEM_SEQUENCE_ERROR_FAULT	C0595	This monitor checks if: • Interrupt failure	Motor Control tasks are deemed to not be executing in the correct order. For every configured interrupt, read out any complete sequences that are in the log. For each sequence read out, the CRC is calculated for the observation points, and is compared against the expected value for that interrupt/mode. Mode is determined from the first observation point in the sequence. A fault is raised when there is a mismatch and the CRC check is stopped for that interrupt.	Whenever a motor interrupt is entered and exited, everytime it writes a unique number into a rolling buffer. The diagnostic calculates the CRC over complete interrupt sequences (depending on the motor state) in the buffer and raises a fault if there is a mismatch.	• ECU is not shutting down	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_CLOCK_FAIL_FAULT	C0595	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	During run time Bridge Driver reports internal clock failure (using ERR line and SPI error registers).	• bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND • In register shutdown error "Internal Clock Supervision Shutdown" is set.	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_CONFIG_COMP_FAULT	C0595	This monitor checks if: • Bridge Driver incorrect operation.	To ensure correct configuraiton data is written into Bridge Driver IC. Configuration failure detection is required in order to mitigate: - Micro controller SPI failure. - Bridge Driver failure..	During initialization, if Bridge Driver state changes to CONFIG_LOCK, report config invalid fault.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	135ms	Type A. MIL Illumination.
MD_BRIDGE_CONFIG_ERROR_FAULT	C0595	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	During run time Bridge Driver reports config error (using ERR line and SPI error registers).	• bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) AND • SPI status "config valid" bit is not set AND • the fault has occurred more than once in this ignition cycle.	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MD_BRIDGE_CONFIG_ INVALID-FAULT	C0595	This monitor checks if: • Incorrect CRC transmitted during initialisation. • Micro controller SPI failure. • Bridge Driver failure.	During initialisation, if Bridge Driver state changes to CONFIG_LOCK, report config invalid fault.	Bridge Driver has entered the "Configuration Lock Mode" during configuration.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	135ms	Type A. MIL Illumination.
MD_BRIDGE_CONFIG_STALLED_FAULT	C0595	This monitor checks if: • Micro controller SPI failure. • Bridge Driver failure.	Verify configuration check is completed within BRIDGE_DRV_CFG_STALLED_TIMEOUT.	Bridge Driver configuration data check was not completed within 20ms.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	200 ms	Type A. MIL Illumination.
MD_BRIDGE_CB_UNDER_VOLTAGE_FAULT	C0580	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	During run time, the Bridge Driver reports charge pump buffer under voltage error on the CB pin of the Bridge driver ASIC (using ERR line and SPI error registers).	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND (In register shutdown error "CB undervoltage shutdown" is set AND In register internal error "CB undervoltage detection error" is set).	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_CF_BRIDGE_ CONFIG_FAULT	C0595	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	During run time Bridge Driver reports error (using ERR line and SPI error registers).	• bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) AND • SPI status "config valid" bit is not set AND • the fault has occurred more than once in this ignition cycle.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/Ims	Type A. MIL Illumination.
MD_BRIDGE_CF_BRIDGE_ECC_FAULT	C0595	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	During run time Bridge Driver reports error (using ERR line and SPI error registers).	special event register of bridge driver indicates that error correction of control register failed AND the fault has occurred more than once in this ignition cycle.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_CF_REG1_OVER_VOLTAGE_FAULT	C057F	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	During run time Bridge Driver reports error (using ERR line and SPI error registers).	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register internal errors "overvoltage internal regulator 1 error" is set AND the fault has occurred only once in this ignition cycle.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_REFERENCE_VOLTAGE_FAULT	C0580	This monitor checks if: • Micro controller • Bridge Driver amplifier reference voltage ADC failure.	Verify Bridge Driver reference voltage is within limits.	HW Pin for reference voltage (IOHWAB_BRIDGE_1_REF_VOLTAGE) is not between 2.25V and 2.75V.	• ECU provides assist AND • No safe state on bridge driver	18ms/128 counts	Type A. MIL Illumination.
MD_BRIDGE_3V3_ UNDER_VOLTAGE_FAULT	C0580	This monitor checks if: • Bridge Driver incorrect operation.	Monitor Bridge Driver reporting under voltage error on its VCC (V3V3) pin.	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register external errors "VCC Undervoltage Detection Error" is set.	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_3V3_OVER_VOLTAGE_FAULT	C057F	This monitor checks if: • Bridge Driver incorrect operation.	Bridge Driver is reporting over voltage on its VCC (V3V3) pin.	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register external errors "VCC Undervoltage Detection Error" is set.	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_ERR_STUCK_LO_FAULT	C0582	This monitor checks if: • Bridge Driver ERR line connectivity • Bridge driver incorrect operation.	Check M1_BD_ERR line state.	During self test, the bridge driver error output pin is active (IOHWAB_BRIDGE_1 -ERROR), when Current Sense Amplifier 1&2 - Gain 2 (=BD_REG_ OP_GAI_2) was set to a valid value.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	40ms	Type A. MIL Illumination.
MD_BRIDGE_ VS_OVER_ VOLTAGE—FAULT	C057F	This monitor checks if: • Bridge Driver incorrect operation • Battery Voltage	During run time Bridge Driver reports VS over voltage error (using ERR line and SPI error registers).	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND (In register shutdown error "Vs Overvoltage Shutdown" is set OR In register external error "Vs Overvoltage Detection Error" is set).	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MD_BRIDGE_VS_UNDER_VOLTAGE_A_FAULT	C0580	This monitor checks if: • Low battery voltage	Bridge driver will detect undervoltage condition. The software shall interrogate the Bridge Driver to determine whether the fault is valid and if valid raises the fault.	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register external errors "Vs Undervoltage Detection Error" is set.	• ECU provides assist AND • No safe state on bridge driver	18ms/128 counts	Type A. MIL Illumination.
MD_BRIDGE_VS_UNDER_VOLTAGE_B_FAULT	C0580	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports VS under voltage error (using ERR line and SPI error registers), but battery voltage is greater than BD_VSU_UV_DETECT_THRESHOLD.	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register external errors "VS Undervoltage Detection Error" is set AND battery voltage is >= 6.5V.	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_VDHP_OVER_VOLTAGE_FAULT	C057F	This monitor checks if: • Bridge Driver incorrect operation • Battery Voltage	During run time Bridge Driver reports VDHP over voltage error (using ERR line and SPI error registers).	• The voltage on the VS pin of the bridge driver ASIC is above 39.95V • Bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND (In register shutdown error "VDHP Overvoltage Shutdown" is set AND In register external error "VDHP Overvoltage Detection Error" is set).	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_VDHP_UV_A_FAULT	C0580	This monitor checks if: • Excessive local temperature OR failures that cause incorrect detection of over temperature.	Data read from Bridge Driver over SPI indicates an undervoltage on the VDHP pin of the Bridge Driver ASIC.	• The voltage on the VS pin of the bridge driver ASIC is below 3.96V • Bridge driver error output pin is active IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register External errors "VDHP Undervoltage Detection Error" is set	• ECU provides assist AND • No safe state on bridge driver	18msec/128 counts	Type A. MIL Illumination.
MD_BRIDGE_VDHP_UV_B_FAULT	C0580	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports VDHP under voltage error (using ERR line and SPI error registers), but battery voltage is greater than BD_VDHU_UV_DETECT_THRESHOLD.	• The voltage on the VS pin of the bridge driver ASIC is below 3.96V • Bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register External errors "VDHP Undervoltage Detection Error" is set AND battery voltage is > 6.5V.	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_UNDEFINED_ERROR_FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	During run time SPI error status flag OR Bridge ERR line is active, but no faults are reported in SPI error registers.	Bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set	• ECU provides assist AND • No safe state on bridge driver	1 count/1 ms	Type A. MIL Illumination.
MD_BRIDGE_UNEXPECTED_ MODE_FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	Bridge Driver reports unexpected state.	Below conditions are not satisfied. ((sBridgeDriver.ICMode == BRDG_NORMAL_OPERATION) || (sBridgeDriver.State == BD_SHUTDOWN) || ((sBridgeDriver.ICMode == BRDG_ERROR_MODE) && (IOHWAB_BRIDGE_1_ERROR == ACTIVE)))	• ECU provides assist AND • No safe state on bridge driver	16 counts/ 16ms	Type A. MIL Illumination.
MD_BRIDGE_UNEXPECTED_STATE_FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	Verify Bridge driver state is as expected during initialisation.	Bridge driver mode is not at the expected state during configuration.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	32ms	Type A. MIL Illumination.
MD_BRIDGE_SOFF_STUCK_LO_FAULT	C0582	This monitor checks if: • M1_BD_SOFF signal not working correctly.	Check bridge driver status is reported as "normal" mode" when M1_BD_SOFF is inactive.	When bridge test pin (IOHWAB_BRIDGE_1_TEST) is driven active, bridge driver state (sBridgeDriver.State) did not change to BD_NORMAL.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	200 ms	Type A. MIL Illumination.
MD_BRIDGE_SPI_MSG_FAILED_FAULT	C0595	This monitor checks if: • Bridge Driver incorrect operation • Microcontroller SPI failure.	Bridge Driver reports SPI errors (using SPI error registers) OR received SPI message CRC is invalid.	("SPI error flag" is set in SPI status AND Either "Invalid Address Access", "SPI Time-out", "SPI Frame error", "SPI Time-out", "SPI CRC error" is set in SPI communication and configuration error register) OR Invalid SPI response is received.	Ignition State = ON OR Wake ON CAN	1000ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MD_BRIDGE_SPI_ RESP_TIMEOUT—FAULT	C0595	This monitor checks if: • Incorrect low level SPI driver operation.	Verify Bridge Driver low level SPI communication is working.	Low level SPI driver is not responding.	(Ignition State = ON OR Wake ON CAN AND Battery Voltage > 6V AND Bridge Driver is not reporting under voltage	Ums	Type A. MIL Illumination.
MD_BRIDGE_REG_UNDER_VOLTAGE_FAULT	C0580	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports internal regulator under voltage error (using ERR line and SPI error registers), but battery voltage is greater than BD_IRU_UV_DETECT_THRESHOLD.	• Bridge Driver internal regulator voltage < 6.5V @1/256V/bit • Bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register internal error "Undervoltage Internal Regulator 4 or 5 or 6 Error" is set.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1 ms	Type A. MIL Illumination.
MD_BRIDGE_REG1_OVER_VOLTAGE_FAULT	C057F	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports Internal regulator over voltage error (using ERR line and SPI error registers).	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register internal errors "overvoltage internal regulator 1 error" is set AND the fault has occurred only once in this ignition cycle.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1 ms	Type A. MIL Illumination.
MD_BRIDGE_REG6_OVER_VOLTAGE_FAULT	C057F	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports Internal regulator over voltage error (using ERR line and SPI error registers).	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register internal errors "overvoltage internal regulator 6 error" is set	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1 ms	Type A. MIL Illumination.
MD_BRIDGE_RECONFIGURED_EVENT	C0582	This monitor checks if: • Faults detected which require reconfiguration of Bridge driver.	To indicate when Bridge driver reconfiguration was performed.	Bridge Driver reconfiguration was requested.	EcuC.rootState_active == EcuC_MotorDriveOn AND DrvStg.SafeStateRequired == FALSE AND Battery Voltage > 6V AND Bridge Driver is not reporting under voltage	1 count/1 ms	Type A. MIL Illumination.
MD_BRIDGE_OVER_CURRENT_FAULT	C0590	This monitor checks if: • Bridge Driver incorrect operation.	Bridge Driver reporting amplifier over current errors.	IOHWAB_BRIDGE_1_ERROR is active OR in SPI status "error flag" is set AND In register current sense amplifier errors "err_oc_op1 or err_oc_ op2 or err_oc_op3" are set.	EcuC.rootState_active == EcuC_MotorDriveOn AND DrvStg.SafeStateRequired == FALSE AND Battery Voltage > 6V AND Bridge Driver is not reporting under voltage	1 count/1 ms	Type A. MIL Illumination.
MD_BRIDGE_OVER_TEMP_ERROR_FAULT	C05C2	This monitor checks if: • Excessive local temperature OR failures that cause incorrect detection of over temperature.	During run time Bridge Driver reports over temperature error (using SPI error registers).	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register shutdown error "Overtemperature Shutdown" is set.	• ECU provides assist AND • No safe state on bridge driver	1 count/1 ms	Type A. MIL Illumination.
MD_ BRIDGE—OSF_ FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports output stage feedback failure (using ERR line and SPI error registers).	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register for output stage feedback errors any error is set	• ECU provides assist AND • No safe state on bridge driver	1 count /1ms	Type A. MIL Illumination.
MD_BRIDGE_ ECC_FAIL_ FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports ECC failure (using SPI error registers).	special event register of bridge driver indicates that error correction of control register failed AND the fault has occurred more than once in this ignition cycle.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MD_BRIDGE_HS_OVER_VOLTAGE_FAULT	C057F	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports high side capacitor over voltage error (using ERR line and SPI error registers).	• Bridge Driver highside capacitor voltage < 6.5V @1/256V/bit • bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register internal error "High-side Buffer Capacitor 1 or 2 or 3 Overvoltage Detection Error" is set.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_HS_UNDER_VOLTAGE_FAULT	C0580	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports high side capacitor under voltage error (using ERR line and SPI error registers), but battery voltage is greater than BD_HBCU_UV_DETECT_THRESHOLD.	• Bridge Driver highside capacitor voltage < 6.5V @1/256V/bit • bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register internal error "High-side Buffer Capacitor 1 or 2 or 3 Undervoltage Detection Error" is set.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/Ims	Type A. MIL Illumination.
MD_BRIDGE_NOT_ DISABLED—FAULT	C0582	This monitor checks if: • Bridge Driver enable signal connectivity.	The microprocessor shall test that when M1_BD_ ENA (bridge driver enable) is inactive, motor FETs can not be driven.	Set bridge driver HW enable Pin (IOHWAB_BRIDGE_1-ENABLE) inactive and set all three bottom FETs ON. After 100us all bottom FETS were not disabled.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	6 ms	Type A. MIL Illumination.
MD_BRIDGE_SOFF_NOT_DISABLED_FAULT	C0582	This monitor checks if: • Bridge Driver SOFF signal connectivity.	The microprocessor shall test that when SOFF pin is inactive, motor FETs can not be driven.	Set bridge driver HW SOFF Pin inactive and set all three bottom FETs ON. After 100us all bottom FETS were not disabled.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	8 ms	Type A. MIL Illumination.
MD_BRIDGE_LATENT_ WARNING-EVENT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	The BD has reported a 'latent fault' (over SPI)	In SPI status "SPI special event" is set AND In special events register "SPI Latent Fault Warning" is set.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_NOT_ ENABLED—FAULT	C0582	This monitor checks if: • Bridge Driver enable signal connectivity.	The microprocessor shall test that when M1_BD_ENA (bridge driver enable) is active motor FETs can be driven.	Set bridge driver HW enable Pin (IOHWAB_BRIDGE_1-ENABLE) active with all three bottom FETS already ON. After 100us even one bottom FET was not enabled.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	8 msec	Type A. MIL Illumination.
MD_BRIDGE_SOFF_NOT_ENABLED_FAULT	C0582	This monitor checks if: • Bridge Driver SOFF signal connectivity.	The microprocessor shall test that whenSOFF pin is active motor FETs can be driven.	Set bridge driver HW SOFF Pin active with all three bottom FETS already ON. After 100us even one bottom FET was not enabled.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	6 msec	Type A. MIL Illumination.
MD_BRIDGE_CP_OVER_VOLTAGE_FAULT	C057F	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports charge pump over voltage error (using ERR line and SPI error registers).	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register external error "charge pump overvoltage detection error" is set.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_CP1_OVERLOAD_FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports CP1 overload error (using ERR line and SPI error registers).	special event register of bridge driver indicates that error correction of control register failed AND (In register internal errors "Charge Pump 1 Overload Error" is set OR In register shutdown errors "Vs Path Charge Pump Input Overload" is set).	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_CP2_OVERLOAD_FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports CP2 overload error (using ERR line and SPI error registers).	special event register of bridge driver indicates that error correction of control register failed AND (In register internal errors "Charge Pump 2 Overload Error" is set	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE—DDP_ FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports digital driving path failure (using ERR line and SPI error registers).	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register shutdown error "Digital Driving Path Stocked Shutdown" is set.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	1 count/1ms	Type A. MIL Illumination.
MD_BRIDGE_ DRV_BIST_CB_UV_FAULT	C0580	This monitor checks if: • Bridge Driver incorrect operation.	Perform Bridge driver charge pump buffer (CB) under voltage self test.	When Bridge Driver was put into CB under voltage self test mode and after 5msec, bridge driver error output pin was not active (IOHWAB_BRIDGE_1_ERROR)	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	45 ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MD_BRIDGE_ DRV_BIST_CSA_FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	Perform Bridge driver amplifier gain BIST.	When Bridge Driver was put into CSA Gain self test mode, bridge driver error output pin is not active (IOHWAB_BRIDGE_1_ERROR) OR Isense reading was not within limits.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	60 ms	Type A. MIL Illumination.
MD_BRIDGE_DRV_BIST_CSA_VRO_FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	Perform Bridge driver CSA VRO BIST.	When Bridge Driver was put into CSA VRO self test and self test was finished, one of the CSA 1/2/3 supply over voltage/under voltage error bit was not set.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	90 ms	Type A. MIL Illumination.
MD_BR|DGE_DRV_BIST_SHORT_CCT_FAULT	C0582	This monitor checks if: • Bridge Driver short circuit detection not working.	Bridge driver built in high/low side short circuit detection test.	When Bridge Driver was put into short circuit test mode and FET was driven, bridge driver error output pin was not active (IOHWAB_BRIDGE_1_ERROR) OR Short circuit error bits were not set in register OR High-side 1/2/3 Drain Source Measurement were not at expected value.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	120 ms	Type A. MIL Illumination.
MD_BRIDGE_DRV_BIST_TIMEOUT—FAULT	C0582	This monitor checks if: • Bridge Driver BIST not working correctly.	Built-in selftest timeout.	Bridge Driver built in self test was not completed within 100msec.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	1000ms	Type A. MIL Illumination.
MD_BRIDGE_DRV_BIST_VCC_ FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	Perform Bridge Driver's VCC built in self test.	When Bridge Driver was put into VCC self test mode, bridge driver error output pin was not active (IOHWAB_BRIDGE_1_ERROR) OR VCC under voltage error bit was not set in external error register	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	40 ms	Type A. MIL Illumination.
MD_BRIDGE_DRV_INHIBIT—FAULT	C0582	This monitor checks if: • Bridge Driver inhibit signal connectivity • Bridge Driver incorrect operation.	Verify Bridge Driver will be in SLEEP mode, if Bridge driver is inhibited.	When HW inhibit Pin (IOHWAB_BRIDGE_1_INHIBIT) is active, the bridge driver operation mode register did not indicate that it is in the expected Sleep Mode.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	20 ms	Type A. MIL Illumination.
MD_BRIDGE_DRV_ WAKE_UP_FAULT	C0582	This monitor checks if: • Bridge Driver inhibit signal connectivity • Bridge Driver incorrect operation.	Remove Bridge inhibit and verify SPI comms is started and Bridge Driver state changes to IDLE.	When HW inhibit Pin (IOHWAB_BRIDGE_1_INHIBIT) is driven inactive, the bridge driver operation mode register did not transit from Sleed Mode to the expected Idle Mode.	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	20 ms	Type A. MIL Illumination.
MD_BRIDGE_SHORT_CIRCUIT_FAULT	C0582	This monitor checks if: • Bridge Driver incorrect operation.	This failsafe checks the SPI communication from the bridge driver to see if it is reporting a short circuit fault. This failsafe operates at run-time	bridge driver error output pin is active (IOHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register Short Circuit Errors any of the "Short Circuit at High/Low-side 1 or 2 or 3" are set.	• ECU provides assist AND • No safe state on bridge driver Note: ECU provides assist includes that the measured battery voltage is above 6V and that there is no undervoltage reported from the bridge driver internal voltage monitoring.	3 msec	Type A. MIL Illumination.
MOTOR_DEMAG_WARN	C05C2	This monitor checks if: Motor magnet over temperature.	Motor magnet temperature is greater than threshold.	Sets when the estimated motor magnet temperature is > 140°C	Power ON, Continuous Failsafing	5 msec	Type A. MIL Illumination.
MOTOR_ DEMAG_ FAIL	C05C2	This monitor checks if: Motor magnet over temperature.	Motor magent temperature is greater than threshold.	Sets when the estimated motor magnet temperature is > 160°C	Power ON, Continuous Failsafing	20 msec	Type A. MIL Illumination.
MOTOR_OVER_TEMP_ WARN	C05C2	This monitor checks if: Motor winding over temperature.	Motor winding temperature is greater than threshold.	Sets when the estimated motor winding temperature is > 190°C	Power ON, Continuous Failsafing	20 msec	Type A. MIL Illumination.
MOTOR_OVER TEMP FAIL	C05C2	This monitor checks if: Motor winding over temperature.	Motor winding temperature is greater than threshold.	Sets when the estimated motor winding temperature is > 220°C	Power ON, Continuous Failsafing	20 msec	Type A. MIL Illumination.
MD_PU_BRIDGE_PIR_CLOSE1_LSD_FAULT	C0580	This monitor checks if: o Bridge driver disabled o Bridge driver in safe off mode o Bridge driver malfunctioning	▪Driven phase is detected as not low when it should be driven low.	▪Driven phase voltage > 1.2V when < 1.2V expected	Battery voltage between 7.1v and 18v AND Motor rotating below +/-8.3mrev/s	10 ms	Type A. MIL Illumination.
MD_PU_BRIDGE_PIR_CLOSE1_OPEN_CCT_FAULT	C0580	This monitor checks if: o Open motor phase	Non-driven phase voltages not pulled low while FETs are driven closed.	▪phase voltage > 1.2V when < 1.2V expected	• If MD_PU_BRIDGE_PIR_CLOSE1_LSD_FAULT detects, this fault will not detect.	690ms	Type A. MIL Illumination.
Group 8 - Brake Hydraulic Monitor							
Group 10 - Ground Monitor							
Group 11 - Switches							
BASE_ BRAKE_ FAILURE	C0049	This monitor checks if: • Anything that causes the fluid level feedback to indicate low fluid level. • Master cylinder loss of fluid on a hydraulic circuit • Fluid leaks • Wiring	• The Brake Fluid Level switch is a hardwired input to the EBCM. Whenever the voltage level is below the threshold, the failure timer will be triggered.	Brake Fluid Level feedback voltage < 15% of battery voltage	• Power ON, Continuous Failsafing	25 ms	Type C, No MIL, "Emissions Neutral Diagnostic "
Group 12 ▪Pressure Sensor							
SCP1_ CORRELATION-ERROR	C0574	This monitor checks if: SCP1 signal failure	The SCP1,SCP2 and PTS sensor signals are used to compare and identify a single failed sensor signal. This fault is set if the difference exceeds the error threshold value.	|SCP_1 - SCP_2| > 5 Bar	Input signals valid for some time (allow system/signal to initialize)	125-500 ms 18000 Counts	Type A. MIL Illumination.
SCP2_CORRELATION—ERROR	C0574	This monitor checks if: SCP2 signal failure	The SCP1,SCP2 and PTS sensor signals are used to compare and identify a single failed sensor signal. This fault is set if the difference exceeds the error threshold value.	|SCP_1 - SCP_2| > 5 Bar	Input signals valid for some time (allow system/signal to initialize)	125-500 ms 18000 Counts	Type A. MIL Illumination.
SCP1_ OFFSET—ERROR	C0574	This monitor checks if: SCP1 signal failure	The offset required to zero the Secondary circuit pressure sensor is larger than the specification limit.	|SCP_1_Off|> 10 Bar	The fault itself does not have much enable condition. Whenever an offset is learned, it is checked for result. To allow the learning, vehicle faster than some speed, vehicle accelerating, driver not on brake,	100 ms Goal: 18000	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SCP2_OFFSET_ERROR	C0574	This monitor checks if: SCP2 signal failure	The offset required to zero the Secondary circuit pressure sensor is larger than the specification limit.	|SCP_2_Off| > 10 Bar	The fault itself does not have much enable condition. Whenever an offset is learned, it is checked for result. To allow the learning, vehicle faster than some speed, vehicle accelerating, driver not on brake,	100 ms Goal: 18000	Type A. MIL Illumination.
BP_MODEL_TOO_HIGH_ERROR	C053D	This monitor checks if: Common cause Boost Pressure Sensor failure (in-range high)	The system models an expected boost pressure based on motor position change. This fault indicates that the boost pressure sensor indicates higher pressure than predicted by the model and than evidenced by the vehicle deceleration.	• Valid braking request (driver or autonomous) • BP_Model (MPS) < Boost pressure - 50 Bar • Vehicle deceleration is not observed	• Signal valid; • No ABS; • vehicle at speed and is slowing down. • driver not on throttle and requested enough pressure	500 ms Goal: 18000	Type A. MIL Illumination.
BP_MODEL_TOO_LOW_ERROR	C053D	This monitor checks if: Common cause Boost_P failure (in-range-low)	The system models an expected boost pressure based on motor position change. This fault indicates that the boost pressure sensor indicates lower pressure than predicted by the model and than evidenced by the vehicle deceleration.	• Valid braking request (driver or autonomous) • BP_Model (MPS) > Boost pressure + 5 Bar • Vehicle deceleration is observed	• Signal valid; • No ABS; • DAP close to end position; • vehicle at speed not slowing down much; • driver not on throttle and requested enough pressure	500 ms Goal: 18000	Type A. MIL Illumination.
BP1_CORRELATION_ERROR	C053D	This monitor checks if: BP1 signal failure	The BP1, BP2, and DAP position signals are used to compare and identify a single failed sensor signal	|Boost_P_1 - Boost_P_2| > 5 Bar	Input signals valid for some time (allow system/signal to initialize)	125-500 ms 18000 Counts	Type A. MIL Illumination.
BP2_CORRELATION_ERROR	C053D	This monitor checks if: BP2 signal failure	The BP1, BP2, and DAP position signals are used to compare and identify a single failed sensor signal	|Boost_P_1 - Boost_P_2| > 5 Bar	Input signals valid for some time (allow system/signal to initialize)	125-500 ms 18000 Counts	Type A. MIL Illumination.
BP_RAW_OFFSET_ERROR	C053D	This monitor checks if: Boost Pressure Sensor Failure	The offset required to zero the Boost Pressure sensor is larger than the specification limit of 50 bar.	|BP_RAW_Off| > 50 BAR	• Input signal valid; • Driver request, DAP position, suggest there should be no pressure; • Vehicle acceleration, vehicle at speed.	500 ms Goal: 18000	Type A. MIL Illumination.
BP1_OFFSET_ERROR	C053D	This monitor checks if: BP1 signal failure	The offset required to zero the Boost Pressure sensor is larger than the specification limit	|BOOST_P_1_Off] > 10 Bar	The fault itself does not have much enable condition. Whenever an offset is learned, it is checked for result. To allow the learning, vehicle faster than some speed, vehicle accelerating, driver not on brake.	100 ms Goal: 18000	Type A. MIL Illumination.
BP2_OFFSET_ERROR	C053D	This monitor checks if: BP2 signal failure	The offset required to zero the Boost Pressure sensor is larger than the specification limit	|BOOST_P_2_Off] > 10 Bar	The fault itself does not have much enable condition. Whenever an offset is learned, it is checked for result. To allow the learning, vehicle faster than some speed, vehicle accelerating, driver not on brake.	100 ms Goal: 18000	Type A. MIL Illumination.
MC_PRES_SEN_ERRATIC	C053D	This monitor checks if: • Intermittent failure of the pressure sensor. • Intermittent open or short in the internal circuitry of the printed circuit board.	• Pressure Sensor Erratic • This diagnostic checks both raw Boost Pressure principle and reference signals.	Ohmic Status Faulted = Sensor open or shorted to sensor supply (conditions for MC_PRES_SEN_OPEN_OR_SHRT_HIGH) or Sensor shorted to ground (conditions for MC_PRES_SEN_SHORTED_LOW) Fault counts toward setting each time Ohmic Faulted status changes from Passed to Faulted or from Faulted to Passed.	• Sensor voltage supply in range • Boost Pressure Sensor is enabled	80 ms Goal: 800	Type A. MIL Illumination.
MC_PRES_SEN_SHORTED_LOW	C053E	This monitor checks if: • Defective pressure sensor. • Defective pressure sensor connector. • Defective printed circuit board. • Defective microprocessor feedback input port.	• Pressure Sensor Shorted Low • This diagnostic checks both raw Boost Pressure principle and reference signals.	principal sensor voltage < 4.61% of principle sensor supply voltage OR reference sensor voltage < 4.85% of reference sensor supply voltage	• Sensor voltage supply in range • Boost Pressure Sensor is enabled	100 ms	Type A. MIL Illumination.
MC_PRES_SEN_OPEN_OR_SHRT_HIGH	C053F	This monitor checks if: • Defective pressure sensor. • Defective pressure sensor connector. • Defective printed circuit board. • Defective microprocessor feedback input port.	• Pressure Sensor Open or Shorted High • This diagnostic checks both raw Boost Pressure principle and reference signals.	principal sensor voltage > 95.24% of principle sensor supply voltage OR reference sensor voltage > 94.50% of reference sensor supply voltage	• Sensor voltage supply in range • Boost Pressure Sensor is enabled	100 ms	Type A. MIL Illumination.
SC_PRES_SEN_SHORTED_LOW	C0571	This monitor checks if: • Defective pressure sensor. • Defective pressure sensor connector. • Defective printed circuit board. Defective microprocessor feedback input port.	• Pressure Sensor Shorted Low • This diagnostic checks both raw Boost Pressure principle and reference signals.	principal sensor voltage < 4.61% of principle sensor supply voltage OR reference sensor voltage < 4.85% of reference sensor supply voltage	• Sensor voltage supply in range • Secondary Circuit Pressure Sensor is enabled	100 ms	Type A. MIL Illumination.
SC_PRES_SEN_OPEN_OR_SHRT_HIGH	C0572	This monitor checks if: • Defective pressure sensor. • Defective pressure sensor connector. • Defective printed circuit board. Defective microprocessor feedback input port.	• Pressure Sensor Open or Shorted High • This diagnostic checks both raw Boost Pressure principle and reference signals.	principal sensor voltage > 95.24% of principle sensor supply voltage OR reference sensor voltage > 94.50% of reference sensor supply voltage	• Sensor voltage supply in range • Secondary Circuit Pressure Sensor is enabled	100 ms	Type A. MIL Illumination.
SC_PRES_SEN_ERRATIC	C0574	This monitor checks if: • Intermittent failure of the pressure sensor. • Intermittent open or short in the internal circuitry of the printed circuit board.	• Pressure Sensor Erratic • This diagnostic checks both raw Boost Pressure principle and reference signals.	Ohmic Status Faulted = Sensor open or shorted to sensor supply (conditions for SC_PRES_SEN_OPEN_OR_SHRT_HIGH) or Sensor shorted to ground (conditions for SC_PRES_SEN_SHORTED_LOW) Fault counts toward setting each time Ohmic Faulted status changes from Passed to Faulted or from Faulted to Passed.	• Sensor voltage supply in range • Secondary Circuit Pressure Sensor is enabled	80 ms Goal: 800	Type A. MIL Illumination.
PRESSURE_SENSOR_MISSING_CALIBRATION	C0560	This monitor checks if: • Missing Calibration • NVRAM error	This fault only checks if the EOL calibration is sucessful or not. If the calibration was not yet done or if the calibration is not successful, then this fault is set. The NVRAM contains both calibrated offset and status, but only the status is checked to set the fault.	status != SUCCESSFUL	Any time after system wake up and read NVRAM	500 ms Goal: 18000	Type A. MIL Illumination.
Group 13 - Vacuum Sensor							
Group 14 - Steering Angle Sensor							

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SWA_GAIN_ERROR	C0051	This monitor checks if: • Defective steering angle sensor. • Defective cable. • Defective printed circuit board. • Defective microprocessor feedback input port.	• Steering Wheel Angle Sensor - Gain Error • The monitoring recognizes offset faults as well as amplification fault.	Tight Check: Difference between zeroed measured SWA signal and estimated SWA signal > Tight Check threshold Tight check threshold is based on a function of vehicle speed, Ay and Yaw Rate with minimum threshold of 50 deg. Loose Check: Difference between zeroed SWA signal and estimated SWA signal > Loose Check threshold Loose check threshold is based on a function of vehicle speed, Ay and Yaw Rate with minimum threshold of 100 deg.	1. Yaw Rate, Lat Acc, SWA and wheel speed info are valid 2. MCP is initialized 3. Vehicle speed > 4.0 m/s while driving forward 4. Emissions Rolls Test Inactive Tight Check: 1. Driving is stable Loose Check: 1. Driving is marginally stable	If SWA gain error= 2*threshold Goal: 900 ms else Goal: 1.8 s	Type C, No MIL, "Emissions Neutral Diagnostic "
SWAOFFSETERROR	C0051	This monitor checks if: • electronic or mechanical fault in sensor • mechanical attachment of the sensor • incorrect wheel geometry	• Steering Angle Sensor - Offset Error • The SWA signal shows an offset out of specification.	Before Initialization: High offset: [Learned offset-Stored End of line offset from NVRAM| > 23° Low offset: [Learned offset-Stored End of line offset from NVRAM| > 18° After Initialization: [Learned offset-Stored End of line offset from NVRAM| > 18°	1. Yaw Rate, Lat Acc, SWA and wheel speed info are valid 2. MCP is initialized 3. Vehicle speed > 4.0 m/s while driving forward 4. Emissions Rolls Test Inactive Tight Check: 1. Driving is stable Loose Check: 1. Driving is marginally stable	Before initialization: High offset: 100 ms Low offset: 1.8 s After Initialization: 100 ms	Type C, No MIL, "Emissions Neutral Diagnostic "
SWA_RAW_OFFSET_ERROR	C0051	This monitor checks if: • electronic or mechanical fault in sensor • mechanical attachment of the sensor • incorrect wheel geometry	• Steering Wheel Angle Sensor - Raw Offset • The SWA signal has to show an implausible high value before the initialization.	Difference between measured SWA and estimated SWA > 175° ABS(ABS(Yaw_Rate.Conv_To_Swa_s16) - ABS(Swa.Turn_Corrected_Del ayed_s16)) > SWA_RAW_OFFSET_ERROR_THR_S16 SWA_RAW_OFFSET_ERROR_THR_S16= 175 deg	1. Yaw Rate, Lat Acc, SWA and wheel speed info are valid 2. MCP is initialized 3. Vehicle speed > 4.0 m/s while driving forward 4. Emissions Rolls Test Inactive Tight Check: 1. Driving is stable Loose Check: 1. Driving is marginally stable	200 ms	Type C, No MIL, "Emissions Neutral Diagnostic "
SWA_MAX_VALUE_ERROR	C0051	This monitor checks if: • electronic or mechanical fault in sensor • mechanical attachment of the sensor • Incorrect wheel geometry	• Steering Angle Sensor - Max Value Error • The SWA signal shows a greater value than physically possible in the vehicle.	Absolute SWA sensor: |Swa Turn Corrected) > 720° OR Relative SWA sensor: |Swa Turn Corrected) > 1440° before initialization OR Relative SWA sensor: |Swa zeroed| > 720° after initialization	1. SWA is valid and calibrated 2. Emissions Rolls Test Inactive	200 ms OR 200 ms before initialization OR 200 ms after initialization	Type C, No MIL, "Emissions Neutral Diagnostic "
SWANOTALIVEERROR	C0051	This monitor checks if: • electronic or mechanical fault in sensor hardware	• Steering Wheel Angle - Not Alive Error, Also known as "Constant Value Fault" • The SWA signal does not change while the Yaw Rate changes:	|Yaw rate derivative) > 57s [2]	1. Yaw rate and SWA valid 2. Emissions Rolls Test Inactive 3. Wheel speed information valid 4. Vehicle speed > 2.5 m/s 5. Difference between wheel speeds front and rear ? 5 m/sec 6. Difference between measured and estimated Yaw rate < 67s 7. Yaw Rate has to be > 37s once and < -37s once	3s	Type C, No MIL, "Emissions Neutral Diagnostic "
SWA_STEP_ERROR	C0051	This monitor checks if: • electronic or mechanical fault in sensor hardware	• Steering Wheel Angle Sensor - Step Error • The SWA signal has to show a gradient above a certain threshold.	Raw SWA signal change > 30007s Set previous signal for next cycle.	1. SWA is valid 2. Emissions Rolls Test Inactive	50 ms	Type C, No MIL, "Emissions Neutral Diagnostic "
SWA_MISSING_CALIBRATION_ERROR	U0420	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• When the incoming message is unpacked, the calibration bit will be checked immediately.	StrWhlAngSenCalStat == 0x0	• Fault will not be set during the following conditions: • within the first 5 seconds after System Power Mode has transitioned to RUN • Supply Voltage is not in the range 9V <= V <= 16V • Within the first 5 seconds of recovery from an under or over voltage condition • CAN Bus Off Failure is latched	10 count	Type C, No MIL, "Emissions Neutral Diagnostic "
Group 15 - Lateral Acceleration Sensor							
LAT_SENSOR_NOT_ALIVE_ERROR	C0061	This monitor checks if: • electronic fault in sensor	• Lat Acceleration Sensor - Not Alive Fault • The Lat Acc signal does not change or is locked at a rail value. • This failure is set if the lateral acceleration sensor is not able to change its value anymore or if it is outside the specified max range.	1. lat acc signal ? +/- 25 m/s^2 OR 2. Lat Acc is constant lat acc signal < +/- 14 m/s^2 AND Vehicle Speed > 3 m/s^2	Emissions Rolls Test Inactive AND 1. Lat Acc is valid Wheel speed is valid vehicle speed > 3 m/s^2	1. 1 s 2. 100 msec	Type C, No MIL, "Emissions Neutral Diagnostic "
LAT_SENSOR_STEP_ERROR	C0061	This monitor checks if: • electronic fault in sensor • mechanical mounting of sensor	• Lat Acceleration Sensor - Step Error • The Lat Acc signal has to show a gradient above a certain threshold.	Raw Lat Acc signal change is > 800 m/s^3	Lat accel is valid ABS is not active	100 msec	Type C, No MIL, "Emissions Neutral Diagnostic "

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
LAT_SENSOR_RAW_OFFSET_ERROR	C0061	This monitor checks if: • Sensor Open • Open circuit in ECU in series with sensor input	• Lat Acceleration Sensor - Raw Offset Error • The Lat Acc signal has to show an implausible high value while standing still.	Lat Acc signal > 6.5 m/sec^2	• Lat Acc is valid • Wheel speed info is valid • Vehicle is standing still	200 ms	TypeC, No MIL, "Emissions Neutral Diagnostic "
LAT_SENSOR_OFFSET_ERROR	C0061	This monitor checks if: • Sensor Open • Open circuit in ECU in series with sensor input	• Lat Acceleration Sensor - Offset Error • The Lat Acc signal shows an offset out of specification.	Before Initialization: 1. 1 Continuously learned offset is > 4 m/sec^2 OR 2. 2 Continuously learned offsets > 1.8 m/sec^2 for 4 sec WHILE vehicle speed > 13.8 m/s OR driving distance > 150m before initialization OR 3. 3 Continuously learned offsets > 3 m/s^2 for 4 sec WHILE vehicle speed < 13.8 m/sec AND driving distance < 150 m before initialization After Initialization: 4. 8 "extended learn" offsets are > 1.8 m/s^2 (Extended learn offsets are determined while vehicle driving straight over accumulated distances on the order of 250m)	• Lat Acc valid • Yaw Rate, wheel speed information and steering angle are valid • Vehicle speed > 4.2 m/sec • Stable forward driving	1. 100 ms 2. 1.8 s 3. 1.8 s 4. 100 ms	TypeC, NoMIL, "Emissions Neutral Diagnostic "
LAT_SENSOR_GAIN_ERROR	C0061	This monitor checks if: • electronic fault in sensor	• Lat Acceleration Sensor - Gain Error • This function computes the difference between the measured ay signal and an ay estimate, based on a vehicle model. If the difference between the two is above a threshold for a certain period of time, a sensor fault is set.	1. The difference between the measured Lat Acc (zeroed) and the estimated Lat Acc is > failure threshold OR 2. The difference between the measured Lat Acc (zeroed) and the estimated Lat Acc is > two times the failure threshold The fault basic threshold is based on the initialization state: Before Initialization: 4 m/sec^2 + delta After Initialization: 2 m/sec^2 + delta Where delta is based on the driving situation, a function of vehicle speed, Yaw Rate, or steering angle. The model based on steering angle is considered to be the most robust one.	• No active Lat Accel fault • ay-signal is valid • Yaw Rate signal is valid • No active Wss faults • Vehicle-speed > 4.2 m/sec, while driving forward	1. 1.5s 2. ,75 s	TypeC, NoMIL, "Emissions Neutral Diagnostic "
Group 16 - Longitudinal Acceleration Sensor							
LONG_SENSOR_NOT_ALIVE_ERROR	C0551	This monitor checks if: • electronic fault in sensor	• Longitudinal Sensor - Constant Error • The Long Acc signal does not change or is locked at a rail value.	1. long acc signal >= +/- 25 m/s^2 OR 2. Long Acc is constant AND long acc signal < +/- 14 m/s^2 AND Vehicle Speed > 3 m/s^2	• Emissions Rolls Test Inactive AND • Long Acc is valid • Wheel speed is valid • vehicle speed > 3 m/sec	1. 1 s 2. 100 ms	TypeC, NoMIL, "Emissions Neutral Diagnostic "
LONG_SENSOR_STEP_ERROR	C0551	This monitor checks if: • electronic fault in sensor • mechanical mounting of sensor	• Long Acceleration Sensor - Step Error • The Long Acceleration signal has to show a gradient above a certain threshold.	Raw Long Acc signal change is > 800 m/s^3	• Long Acc is valid • ABS not active • Emissions Rolls Test Inactive	100 msec	TypeC, No MIL, "Emissions Neutral Diagnostic "
LONG_SENSOR_RAW_OFFSET_ERROR	C0551	This monitor checks if: • electronic fault in sensor • mechanical mounting of the sensor	• Long Acceleration Sensor - Raw Offset Error • The Long Acc signal has to show an implausible high value while standing still.	Long Acc signal > 8 m/s^2	• Long Acc is valid • Wheel speed info is valid • Vehicle is standing still • Emissions Rolls Test Inactive	200 ms	TypeC, No MIL, "Emissions Neutral Diagnostic "
LONG_SENSOR_OFFSET_ERROR	C0551	This monitor checks if: • electronic fault in sensor • mechanical mounting of sensor	• Long Acceleration Sensor - Offset Error • The Long Acc signal shows an offset out of specification.	3 continuously learned offsets are > 2.5 m/s^2	• Long Acc is valid • Wheel speed information is valid • All four wheel speeds > 3 m/s • stable forward driving • No vehicle control activities such as ABS, TO, and VSC • Emissions Rolls Test Inactive	1. 100 ms 2. 1.8 s 3. 1.8 s 4. 10 ms	TypeC, NoMIL, "Emissions Neutral Diagnostic "
LONG_SENSOR_GAIN_ERROR	C0551	This monitor checks if: • electronic fault in sensor	• Long Acceleration Sensor - Gain Error • This monitoring recognizes offset faults as well as amplification faults.	Change in estimated Long Acc > 0.2 m/s^2 AND Measured Long Acc-Estimated Long Acc > 0.8 m/s^2	• Long Acc and wheel speed information are valid • All four wheel speeds > 3 m/s • Stable forward driving • Accelerator position gradient < 600%/sec • Emissions Rolls Test Inactive	200 msec	TypeC, No MIL, "Emissions Neutral Diagnostic "
Group 17 - Yaw Rate Sensor							

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
YAW_SENSOR_NOT_ALIVE_ERROR	C0063	This monitor checks if: • electronic fault in sensor	• Yaw Rate Sensor - Not Alive Error • The Yaw Rate signal does not change or is locked at a rail value.	1. Yaw rate is constant AND |Yaw rate| < 857s AND Vehicle Speed > 3 m/s^2 2. |Yawrate|? 1307s	• Emissions Rolls Test Inactive AND 1. Yaw Rate is valid Wheel speed info is valid Vehicle speed > 3 m/s	1. 1 s 2. 100 ms	Type C, No MIL, "Emissions Neutral Diagnostic "
YAW_SENSOR_STEP_ERROR	C0063	This monitor checks if: • defective sensor • mechanical mounting of the sensor • Stone impingement at the floor pan	• Yaw Rate Sensor - Step Error • The Yaw Rate signal has to show a gradient above a certain threshold.	Yaw rate gradient > $8007s^2$	• Yaw Rate is valid • Emissions Rolls Test Inactive	100 ms	Type C, No MIL, "Emissions Neutral Diagnostic "
YAW_SENSOR_RAW_OFFSET_ERROR	C0063	This monitor checks if: • electronic sensor fault	• Yaw Rate Sensor Raw Offset Error • The Yaw Rate signal has to show an implausible high value while standing still.	Low error threshold: If initialization info is valid and below threshold |Yaw rate| > 507s	• Yaw Rate is valid • Wheel speed info is valid • Vehicle is standing still • Emissions Rolls Test Inactive	200 ms	Type C, No MIL, "Emissions Neutral Diagnostic "
YAW_SENSOR_OFFSET_ERROR	C0063	This monitor checks if: • electronic sensor fault	• Yaw Rate Sensor - Offset Error • The Yaw Rate signal shows an offset out of specification.	While Standing Still 1 Continously learned offset > 5 deg/sec while vehicle standing still. (Offset must remain present as vehicle driven away following statndstill condition) Before Initialization while driving: 2 learned offset is > 87s OR 3 Continuously learned offsets are > 57s for 1 s After Initialization while driving: 4 "extended learn" offsets are > 57s during straight driving (Extended learn offsets are determined while vehicle driving straight over accumulated distances on the order of 250m)	• Yaw Rate is valid • Steering angle, Lat Acc and wheel speed informaiton are valid • Vehicle speed > 4.2 m/s • Stable forward driving • Emissions Rolls Test Inactive	1. 100 ms 2. 1.8 s 3. 100 ms	Type C, No MIL, "Emissions Neutral Diagnostic "
YAW_SENSOR_GAIN_ERROR	C0063	This monitor checks if: • electronic fault in sensor	• Yaw Rate Sensor - Gain Error • This monitoring recognizes offset faults as well as amplification faults.	1. The difference between the measured Yaw rate (zeroed) and the estimated Yaw rate is > failure threshold OR 2. The difference between the measured Yaw rate (zeroed) and the estimated Yaw rate is > two times the failure threshold The fault basic threshold is based on the initialization state: Before Initialization: 67s + delta After Initialization: 37s + delta Where delta is based on the driving situation, a function of vehicle speed, Ay, steering angle and steering angle derivative.	• Yaw Rate is valid • Steering angle, Lat Acc and wheel speed information are valid • Vehicle speed > 2.5 m/s driving forward • Emissions Rolls Test Inactive	1. 1 s 2. 500 ms	Type C, No MIL, "Emissions Neutral Diagnostic "
Group 18 - Pedal Travel Sensor							
PTS_TO_SCP_MODEL_TOO_HIGH_ERROR	C05D2	This monitor checks if: • Master cylinder seal leakage to reservoir • Pedal Simulator seal leakage to reservoir • In-range failure of SCP sensor	The BHS function includes a model of expected simulator Pressure based on driver pedal position. MODEL_TOO_HIGH_ERROR detects the situation where the modeled pressure is much higher than the measured pressure. Given certain travel, some amount of minimun pressure is expected in the SC. Otherwise something is wrong.	BHS modeled pressure > SCP Measured Pressure + 20 Bar Look up table (add lookup table to appendices)	PTS > the minimum point on the lookup table	500 ms Goal: 18000 Counts	Type A. MIL Illumination.
PTS_TO_SCP_MODEL_TOO_LOW_ERROR	C05D3	This monitor checks if: • Pedal Simulator Valve is closed or blocked • Pedal Simulator seized/fails to store fluid • In-range failure of SCP sensor	The BHS function includes a model of expected simulator Pressure based on driver pedal position. MODEL_TOO_LOW_ERROR detects the situation where the modeled pressure is much lower than the measured pressure.	BHS modeled pressure < SCP Measured Pressure —20 Bar	The brake event is not a fast apply (which may cause unpredictable high pressure)	500 ms 18000 Counts	Type A. MIL Illumination.
PTS1_OUT_OF_RAN GEE RROR	C05CC	This monitor checks if: • Failure of PTS1 • Failure of travel sensor cursor rod	During normal operation the input piston travel is physically limited to -25 mm, and during NO_BOOST operation it is limited to -36 mm. The sensor is capable of measuring travel up to 43 mm. Reported travel by a single sensor in excess of these limits is indicative of a sensor error.	• PTS1 signal > 38 mm AND • PTS2 signal and SCP signal agree that actual travel is in range Not checking for SCP	Signal is valid	5 s 18000 Counts	Type A. MIL Illumination.
PTS2_OUT_OF_RANGE_ERROR	C05CF	This monitor checks if: • Failure of PTS2 • Failure of travel sensor cursor rod	During normal operation the input piston travel is physically limited to -25 mm, and during NO_BOOST operation it is limited to -36 mm. The sensor is capable of measuring travel up to 43 mm. Reported travel by a single sensor in excess of these limits is indicative of a sensor error.	• PTS2 signal > 38 mm AND • PTS1 signal and SCP signal agree that actual travel is in range Not checking for SCP	Signal is valid	5 s 18000 Counts	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
PTS1_STEP_ERROR	C05CC	This monitor checks if: • Failure of PTS1 signal line	The PTS1 sensor signal changes at a physically implausible rate, resulting in a signal that disagrees with PTS2 signal, and a modeled pressure that disagrees with the SOP (i.e. PTS2 model and SOP signals agree on driver braking level, PTS1 model and SCP disagree)	• PTS1 signal gradient > 700 mm/s • |PTS1 - PTS2| > Errorjhreshold • Model(PTSI) <> SCP and Model(PTS2) == SCP	Signal is valid	50ms Goal: 10 Counts	Type A. MIL Illumination.
PTS2_STEP_ERROR	C05CF	This monitor checks if: • Failure of PTS2 signal line	The PTS2 sensor signal changes at a physically implausible rate, resulting in a signal that disagrees with PTS1 signal, and a modeled pressure that disagrees with the SCP (i.e. PTS1 model and SCP signals agree on driver braking level, PTS2 model and SCP disagree)	• PTS2 signal gradient > 700 mm/s • |PTS1 - PTS2| > Errorjhreshold • Model(PTS2) <> SCP and Model(PTSI) == SCP	Signal is valid	50ms Goal: 10 Counts	Type A. MIL Illumination.
PTS1_SENT_RECEIVE_ERROR	C2A13	This monitor checks if: PTS1 SENT data error	The PTS2 SENT message is comprised of a 12 bit data value (pedal travel), a 12 bit data value (motor position), a 4 bit CRC, and a 4 bit status field.	PTS1 data < Lower_Threshold OR PTS1 data > Upper_Threshold OR PTS1 upper nibbles + PTS1 lower nibbles != 4095	Any of the following conditions: • SENT message Checksum error • SENT status field indicates receive failure • Received pedal travel is out-of-range low (0) • Received pedal travel is out-of-range high (4095)	5ms	Type A. MIL Illumination.
PTS2_SENT_RECEIVE_ERROR	C2A14	This monitor checks if: PTS2 SENT data error	The PTS1 SENT message is comprised of a 12 bit data value, its 12 bit complement, a 4 bit CRC, and a 4 bit status field	PTS2 data < Lower_Threshold OR PTS2 data > Upper_Threshold	Any of the following conditions: • SENT message Checksum error • SENT status field indicates receive failure • Data value and its complement do not combine to OxFFF • Received position is out-of-range low (0) • Received position is out-of-range high (4095)	5ms	Type A. MIL Illumination.
PTS1_SENT_MESSAGE_MISSING	C2A13	This monitor checks if: Signal line is open or shorted to GND. Shorted to supply Wiring	The SW indicates the failure to the driver interface and set the status of the received Pedal and Motor position value to invalid within FTTD_PEDAL_MOTOR POSITION_VALUE.	N/A	N/A	5 msec	Type A. MIL Illumination.
PTS2_MPS2_SENT_MESSAGE_MISSING	C2A14	This monitor checks if: Signal line is open or shorted to GND. Shorted to supply Wiring	the SW indicates the failure to the driver interface and set the status of the received Pedal and Motor position value to invalid within FTTD_PEDAL_MOTOR POSITION_VALUE.	N/A	N/A	5 msec	Type A. MIL Illumination.
PTS1_CORRELATION_ERROR	C05D0	This monitor checks if: PTS1 Signal Failure	The PTS1, PTS2, and BAS sensor signals are used in a 2-out-of-3 correlation scheme to identify a single failed sensor signal	• |PTS1 - PTS2| > 2 mm AND • |PTS1 - BAS| > 2 mm AND • |PTS2 - BAS| <2 mm	Signal is valid	125-500 ms 18000 Counts	Type A. MIL Illumination.
PTS2_CORRELATION_ERROR	C05D0	This monitor checks if: PTS1 Signal Failure	The PTS1, PTS2, and BAS sensor signals are used in a 2-out-of-3 correlation scheme to identify a single failed sensor signal	• |PTS1 - PTS2| > 2 mm AND • |PTS1 - BAS| > 2 mm AND • |PTS2 - BAS) <2 mm	Signal is valid	125-500 ms 18000 Counts	Type A. MIL Illumination.
PTS_MISSING_CALIBRATION_ERROR	C05D4	This monitor checks if: • Missing Calibration • NVRAM error • ECU/ACU mismatch	The PTS calibrations are stored in NVRAM and reused at the start of each drive cycle. This fault sets if the stored calibrations don't match the values reported by the PTS sensor.	None	After system start up and read from NVRAM	30 msec	Type A. MIL Illumination.
PTS1_OFFSET_ERROR	C05CC	This monitor checks if: • defective sensor • mechanical mounting of the sensor	The offset required to zero the PTS sensor is larger than the specification limit.	|PTS1 Offset, > 2.5 mm	The fault itself does not have much enable condition. Whenever an offset is learned, it is checked for result. To allow the learning, vehicle faster than some speed, vehicle accelerating, driver not on brake.	100ms Goal: 18000	Type A. MIL Illumination.
PTS2OFFSETERROR	C05CF	This monitor checks if: • defective sensor • mechanical mounting of the sensor	The offset required to zero the PTS sensor is larger than the specification limit.	|PTS2 Offset, > 2.5 mm	The fault itself does not have much enable condition. Whenever an offset is learned, it is checked for result. To allow the learning, vehicle faster than some speed, vehicle accelerating, driver not on brake.	100ms Goal: 18000	Type A. MIL Illumination.
Group 19 - Motor Position							
MPS2_CORRELATION_ERROR	C058E	This monitor checks if: • MPS2 Failure • Note: MPS1 failure results in BOOSTED_BRAKE_SYSTEM_FAILURE for lack of motor rotation / pressure build	MPS1 is SPI based with a 50 usee update rate. MPS2 is SENT based with a 1 msec update rate. During motor rotation there is an expected difference in MPS1 and MPS2 based on the different time sampling rates (time lag on MPS2). MPS 1 and 2 moving different direction; or MPS 1 and 2 stopped at different relative postion than history	|MPS1 - MPS2| > 2 Degrees + 3 Degrees (motor speed offset) MPS 1 and 2 moving different direction; or MPS 1 and 2 stopped at different relative postion than history	Signal is valid	100 ms Goal: 18000	Type A. MIL Illumination.
MPS2_SENT_RECEIVE_ERROR	C2A1A	This monitor checks if: MPS2 Signal Failure	Monitor MPS2 sent data received from the SentSensor.	This failsafe detects when MPS2 sent data received from the SentSensor is out of the valid range.	MPS signal data is received.	5 msec	Type A. MIL Illumination.
MPS_BIST_FAULT	C058A	This monitor checks if: MPS Built-in-Self-Test failure	Testing of this module should include running BIST at various MPS angles. The ECU performs an independent calculation parallel to internal MPU sensor BIST software. The fault will occur when the parallel calculations don't match.	The value calculated within the MPS does not equal the ECU calculated value.	BIST Inputs are not faulty.	30 msec	Type A. MIL Illumination.
MPS1NOTALIVEFAILURE	C058A	This monitor checks if: MPS1 Signal Failure	Any Condition	MPS == MPS_prev	MPS1 does not change for 5 consecutive readings.	100ms	Type A. MIL Illumination.
Group 22 - Power Supply Failures							
SYS_ASIC_VDBAT_RANGE_FAILURE	U3006	This monitor checks if: • VDBAT Voltage is outside the voltage range	• KL30_1 Supply voltage outside of the specified range • If the ASIC A/D value for VDBat is outside the acceptable range (VDBat < 6V or VDBat >25V) continuously for 100ms then the fault is set.	6V < KL30_1 Supply Voltage > 25V	• ASIC's VDBAT Voltage Result SPI field is outside the range of 6 and 25 volts for 100msec	100ms	TypeC, No MIL, "Emissions Neutral Diagnostic "
SYS_ASIC_PDBAT_RANGE_FAILURE	U3007	This monitor checks if: • PDBAT Voltage is outside the voltage range	• KL30_2 Supply voltage outside of the specified range • If the ASIC A/D value for PDBat is outside the acceptable range (PDBat < 6V or PDBat >23V) continuously for 100ms then the fault is set.	6V < KL30_2 Supply Voltage > 23V	• ASIC's PDBAT Voltage Result SPI field is outside the range of 6 and 23 volts for 100msec	100ms	Type C, No MIL, "Emissions Neutral Diagnostic "
KL30_1_OPEN_OR_SHRTED_TO_GND	U3006	This monitor checks if: • Fuse blown (Open) • Short_to_Ground	A feedback ratio is calculated based on the KL30_1_Fdbk_A and KL30_2_Fdbk_B. • If the feedback ratio is lower than the valid lower threshold ratio, then KL30_1_Open_or_Shrted_to_Gnd fault is set	• Ratio = (KL30_1-KL30_2)/(KL30_1+KL30_2) • If PSSW1 AND PSSW2 are turned OFF OR at least one safety switch is turned ON • Fault is set if ratio is less than -30% • If PSSW1 AND/OR PSSW2 are turned ON and all safety switches are turned OFF, • Fault is set if ratio is less than -10%	• Power ON, Continuous Failsafing	75ms	Type C, No MIL, "Emissions Neutral Diagnostic "
KL30_2_OPEN_OR_SHRTED_TO_GND	U3007	This monitor checks if: • Fuse blown (Open) • Short_to_Ground	A feedback ratio is calculated based on the KL30_1_Fdbk_A and KL30_2_Fdbk_B. • If this feedback ratio exceeds the valid upper threshold ratio, then KL30_2_Open_or_Shrted_to_Gnd fault is set. Note: Although the SW to tries to detect Fuse Blown/Shorted to ground with both switches on, fuse blown fault will not be detected due to the nature of the circuit and shorted to ground also may not be detected due to the damage that may be caused by this condition. Do not test this condition.	• Ratio = (KL30_1-KL30_2)/(KL30_1+KL30_2) • If PSSW1 AND PSSW2 are turned OFF OR at least one safety switch is turned ON, • Fault is set if ratio is greater than 30% • If PSSW1 AND/OR PSSW2 are turned ON and all safety switches are turned OFF, • Fault is set if ratio is greater than 10%	• Power ON, Continuous Failsafing	75ms	Type C, No MIL, "Emissions Neutral Diagnostic "

<table>
<tr><th>Component/ System</th><th>Fault Code</th><th>Monitoring Strategy Description</th><th>Fault Detection Criteria</th><th>Threshold Value</th><th>Secondary Parameter and Enable Condition</th><th>Maturation Time</th><th>MIL Illumination</th></tr>
<tr><td>SYSTEM_VOLTAGE_LOW</td><td>P0562</td><td>This monitor checks if:
• Vehicle Battery Voltage Supply is providing low voltage levels.
• Defective cables.
• Defective printed circuit board.</td><td>System voltage is monitored continuously but the fault is not enabled during Engine crank.
When the system voltage is continuously lower than 8.5V for more than 150 msec then the fault is set.
When the system voltage is continuously greater than 9.0V for more than 100 msec then the fault is cleared.</td><td>Filtered system voltage < 8.5V</td><td>• Engine is not being cranked
• System is not re-initializing or shutting down
• System is not shutting down</td><td>150 ms</td><td>TypeC, No MIL, "Emissions Neutral Diagnostic "</td></tr>
<tr><td>SYSTEM_VOLTAGE_EXCESSIVE_LOW</td><td>P0562</td><td>This monitor checks if:
• Vehicle Battery Voltage Supply is providing excessively low voltage level.
• Defective cable.
• Defected printed circuit board.</td><td>System voltage is monitored continuously but the fault is not enabled during Engine crank.
When the system voltage is continuously lower than 7.0V for more than 150 msec then the fault is set. When the system voltage is continuously greater than 7.5V for more than 150 msec then the fault is allowed to be cleared if not ignition latched.</td><td>Filtered system voltage < 7.5V</td><td>• Engine is not being cranked
• System is not re-initializing or shutting down
• System is not shutting down</td><td>150 ms</td><td>TypeC, No MIL, "Emissions Neutral Diagnostic "</td></tr>
<tr><td>SYSTEM_VOLTAGE_HIGH</td><td>P0563</td><td>This monitor checks if:
• Voltage Supply is providing high voltage levels.
• Defective printed circuit board.</td><td>System voltage is monitored continuously but the fault is not enabled during Engine crank.
When the system voltage is continuously greater than 16.8V for more than 100 msec then the fault is set.
When the system voltage is continuously less than 16.3V for more than 100 msec then the fault is cleared.</td><td>Filtered system voltage > 16.8 V</td><td>• Engine is not being cranked
• System is not re-initializing or shutting down
• System is not shutting down</td><td>100 ms</td><td>Type B. MIL Illumination.</td></tr>
<tr><td>SYSTEM_VOLTAGE_EXCESSIVE_HIGH</td><td>P0563</td><td>This monitor checks if:
• Voltage Supply is providing excessively high voltage levels.
• Defective printed circuit board.</td><td>System voltage is monitored continuously but the fault is not enabled during Engine crank.
When the system voltage is continuously greater than 18.8V for more than 15 msec then the fault is set.
When the system voltage is continuously less than 18.3V for more than 100 msec then the fault is cleared.</td><td>Filtered system voltage > 18.8V</td><td>• Engine is not being cranked
• System is not re-initializing or shutting down
• System is not shutting down</td><td>15 ms</td><td>Type B. MIL Illumination.</td></tr>
<tr><td>SYSTEM_VOLTAGE_ECU_SELF_TEST_HOLD</td><td>P0562</td><td>This monitor checks if:
• Voltage Supply is providing excessively low or high voltage levels.
• Defective printed circuit board.</td><td>System Self Test will not start if either of the following conditions are present:
Polaris is not initialized
Unfiltered System Voltage is outside the Excessive range
(< 7.0V or >18.8V)
If the System Self Test is delayed continuously for more than 100 msec then the fault is set.</td><td>Polaris. Resync_Seq_Error = TRUE or
Unfiltered system voltage < 7.0V or
Unfiltered system voltage > 18.8V</td><td>• Polaris is not initialized yet
• System Voltage is outside the Excessive range (<7.0 V or >18.8V)
Have not finished self-test</td><td>5 ms</td><td>TypeC, No MIL, "Emissions Neutral Diagnostic "</td></tr>
<tr><td>SYSTEM_VOLTAGE_ERRATIC</td><td>P0562</td><td>This monitor checks if:
• Voltage Supply is toggling between non-operational voltages and/or normal operating voltages
• Defective cables.
• Defective printed circuit board.</td><td>If the filtered System Voltage is above Excessive High Voltage threshold or below Low Voltage threshold, this fault counts toward failure and if the voltage is above Low Voltage and below Excessive High Voltage thresholds the fault counts toward passing. This fault is done this way to catch voltages jumping between non-operational voltages and/or normal operating voltages.</td><td>If (Filtered System Voltage > 18.8) || (Filtered System Voltage < 8.5) fail_counter += 15 else fail_counter -= 5
If fail_counter >= 900 set fault</td><td>• Engine is not being cranked
• System is not re-initializing or shutting down
• System is not shutting down</td><td>300 ms minimum</td><td>TypeC, No MIL, "Emissions Neutral Diagnostic "</td></tr>
<tr><td>PRIMARY_WAKEUP_LINE_STUCK_LOW</td><td>P2534</td><td>This monitor checks if:
HW ignition line failure</td><td>The MCU compares the state of the Primary Wakeup Line with the Ignition switch status CAN signal from the ECM.
If the Primary Wakeup Line is read as Low but Ignition switch status signal indicates RUN or CRANK for a continuous 3 sec then the fault is set.
This fault is not enabled if the Missing PPEI Engine General Status 1 CAN message fault is set.</td><td>(State of Primary Wakeup line == Not Wake) && (CAN Signal == (CRANK || RUN))</td><td>• Primary Wakeup COMMS Signal is Valid
(Singal is Valid when MISSING_PPEI_ENGINE_GENERAL_STATUS_1 fault is not latched)</td><td>2s</td><td>Type B. MIL Illumination.</td></tr>
<tr><td>PRIMARY_WAKEUP_LINE_STUCK_HIGH</td><td>P2535</td><td>This monitor checks if:
HW ignition line failure</td><td>The MCU compares the state of the Primary Wakeup Line with theIgnition switch status signal from the ECM.
If the Primary Wakeup Line is read as High but Ignition switch status signal indicates not Crank and not RUN for a continuous 3 sec then the fault is set
This fault is not enabled if the Missing PPEI Engine General Status 1 CAN message fault is set.</td><td>(State of Primary Wakeup line == Wake) && (CAN Signal != (CRANK || RUN))</td><td>• Primary Wakeup COMMS Signal is Valid (Singal is Valid when MISSING_PPEI_ENGINE_GENERAL_STATUS_1 fault is not latched)
•AND
• Primary Wakeup Line is ON</td><td>2s</td><td>Type B. MIL Illumination.</td></tr>
<tr><td>SECONDARY_WAKEUP_LINE_STUCK_LOW</td><td>P2537</td><td>This monitor checks if:
HW ignition line failure</td><td>The MCU compares the state of the Secondary Wakeup Line with the Propulsion System Active CAN signal from the ECM.
If the Secondary Wakeup Line is read as Low but Propulsion System Active signal reads True for a continuous 1 sec then the fault is set
This fault is not enabled if the Missing PPEI Propulsion Gen Stat 1 CAN message fault is set.</td><td>(State of Secondary Wakeup line != Wake) && (CAN Signal Propulsion System Active == TRUE)</td><td>• 5ms after CRANK
• Secondary Wakeup COMMS Signal is Valid
(Singal is Valid when MISSING_PPEI_PROPULSION_GEN_STAT_1_HS fault is not latched)
• Secondary Wakeup Line is ON</td><td>1s</td><td>Type B. MIL Illumination.</td></tr>
<tr><td>INTERNAL_5V_SUPPLY_VOLT_ERRATIC</td><td>P0606</td><td>This monitor checks if:
• Defective internal 5 V supply circuit

• Defective printed circuit board

• Defective microprocessor feedback input port

• Defective Polaris ASIC feedback input port</td><td>If the filtered 5V supply toggles outside the allowed range but does not stay there long enough to mature the INTERNAL_5V_SUPPLY_VOLT_FAILURE then this fault is matured by an up/down counter on the condition</td><td>If the filtered System Voltage toggles as per the below range

Filtered system voltage ? 4.75V
Filtered system voltage ? 5.25 V</td><td>• Internal 5V supply is enabled
•AND
• None of the following are taking place:
• System is initializing
• System is re-initializing
• Engine is being cranked
• When requested by Diagnostic commands
System is shutting down</td><td>800 counts/80ms minimum</td><td>Type A. MIL Illumination.</td></tr>
<tr><td>ECU_SELF_TEST_TIMEOUT</td><td>P0606</td><td>This monitor checks if:
Faulted ECU</td><td>If the ECU self test does not complete in the alloted amount of time, then set this fault. This fault allows to properly inform the driver that the EBCM functionality is not available.

Note: Timeout fault is latched if system self-test doesn't finish within 2 seconds. This time doesn't include the on-hold time if the battery voltage is out of range.</td><td>None</td><td>Runs duting startup</td><td>5 msec</td><td>Type A. MIL Illumination.</td></tr>
<tr><td>PWR_PTS_MPS_SUP1_RANGE_LOW</td><td>C05D1</td><td>This monitor checks if:
• Defective motor position sensor
• Defective pedal travel sensor
• Defective printed circuit board</td><td>The MCU provides two 5V sensor supplies for the Pedal Travel and Motor Position Sensors (each supply powers one circuit of the PTS and one circuit of the MPS).
The MCU monitors the feedbacks on these two voltage supplies. If either supply is continuously < 4.85V for 100ms then the respective supply fault is set.</td><td>if PWR<4.85for 100ms</td><td>• MPS1 sensor is enabled
• PTS1 sensor is enabled
AND
• None of the following are taking place:
• System is initializing
• System is re-initializing
• Engine is being cranked
• When requested by Diagnostic commands
System is shutting down</td><td>100ms</td><td>Type A. MIL Illumination.</td></tr>
<tr><td>PWR_PTS_MPS_SUP1_RANGE_HIGH</td><td>C05D1</td><td>This monitor checks if:
• Defective motor position sensor
• Defective pedal travel sensor
• Defective printed circuit board</td><td>The MCU provides two 5V sensor supplies for the Pedal Travel and Motor Position Sensors (each supply powers one circuit of the PTS and one circuit of the MPS).
The MCU monitors the feedbacks on these two voltage supplies. If either supply is continuously > 5.15V for 100ms then the respective supply fault is set.</td><td>if PWR>5.15Vfor 100ms</td><td>• MPS1 is enabled
• PTS1 is enabled
AND
• None of the following are taking place:
• System is initializing
• System is re-initializing
• Engine is being cranked
• When requested by Diagnostic commands
System is shutting down</td><td>100ms</td><td>Type A. MIL Illumination.</td></tr>
</table>

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
PWR_PTS_MPS_SUP1_ERRATIC	C05D1	This monitor checks if: • Defective motor position sensor • Defective pedal travel sensor • Defective printed circuit board	The MCU provides two 5V sensor supplies for the Pedal Travel and Motor Position Sensors (each supply powers one circuit of the PTS and one circuit of the MPS). The MCU monitors the feedbacks on these two voltage supplies. If a supply feedback is outside the acceptable range (< 4.85V or > 5.15V) then the respective erratic fault is matured at a weight of 50 toward a goal of 800 (fastest maturation = 80 msec). If the feedback voltage returns within the 4.85 - 5.15V range then the erratic fault is dematured at a weight of 1. Once the fault goal is reached then the fault is set and is ignition latched.	if PWR<4.85 or >5. 15V	• MPS1 is enabled • PTS1 is enabled AND • None of the following are taking place: • System is initializing • System is re-initializing • Engine is being cranked • When requested by Diagnostic commands System is shutting down	80ms minimum	Type A. MIL Illumination.
PWR_PTS_MPS_SUP2_RANGE_LOW	C05BB	This monitor checks if: • Defective motor position sensor • Defective pedal travel sensor • Defective printed circuit board	The MCU provides two 5V sensor supplies for the Pedal Travel and Motor Position Sensors (each supply powers one circuit of the PTS and one circuit of the MPS). The MCU monitors the feedbacks on these two voltage supplies. If either supply is continuously < 4.85V for 100ms then the respective supply fault is set.	if PWR<4.85for 100ms	• MPS2 is enabled • PTS2 is enabled AND • None of the following are taking place: • System is initializing • System is re-initializing • Engine is being cranked • When requested by Diagnostic commands System is shutting down	100ms	Type A. MIL Illumination.
PWR_PTS_MPS_SUP2_RANGE_HIGH	C05BB	This monitor checks if: • Defective motor position sensor • Defective pedal travel sensor • Defective printed circuit board	The MCU provides two 5V sensor supplies for the Pedal Travel and Motor Position Sensors (each supply powers one circuit of the PTS and one circuit of the MPS). The MCU monitors the feedbacks on these two voltage supplies. If either supply is continuously > 5.15V for 100ms then the respective supply fault is set.	if PWR>5.15Vfor 100ms	• MPS2 is enabled • PTS2 is enabled AND • None of the following are taking place: • System is initializing • System is re-initializing • Engine is being cranked • When requested by Diagnostic commands System is shutting down	100ms	Type A. MIL Illumination.
PWR_PTS_MPS_SUP2_ERRATIC	C05BB	This monitor checks if: • Defective motor position sensor • Defective pedal travel sensor • Defective printed circuit board	The MCU provides two 5V sensor supplies for the Pedal Travel and Motor Position Sensors (each supply powers one circuit of the PTS and one circuit of the MPS). The MCU monitors the feedbacks on these two voltage supplies. If a supply feedback is outside the acceptable range (< 4.85V or > 5.15V) then the respective erratic fault is matured at a weight of 50 toward a goal of 800 (fastest maturation = 80 msec). If the feedback voltage returns within the 4.85 - 5.15V range then the erratic fault is dematured at a weight of 1. Once the fault goal is reached then the fault is set and is ignition latched.	if PWR<4.85 or >5. 15V	• MPS2 is enabled • PTS2 is enabled AND • None of the following are taking place: • System is initializing • System is re-initializing • Engine is being cranked • When requested by Diagnostic commands System is shutting down	80ms minimum	Type A. MIL Illumination.
PWR_SW_COIL_SUP_OPEN	C053B	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30JNT supplies the ABS Coils, the BB Coils and the Motor Driver. These three circuits are individually switched on/off by separate Safety Relays. When the Safety Relay is on the downstream voltage feedback is expected to be high. The MCU monitors the voltage feedback downstream from the ABS Coil Safety Relay. If the feedback voltage is less than 80% of KL30JNT for a continuous 50 msec then the fault is set.	If Feedback Voltage < 80%of KL30_x	• Power ON, Continuous Failsafing	50ms	Type A. MIL Illumination.
PWR_SW_COIL_SUP_SHORT	C053B	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30JNT supplies the ABS Coils, the BB Coils and the Motor Driver. These three circuits are individually switched on/off by separate Safety Relays. When the Safety Relay is off the downstream voltage feedback is expected to be low. The MCU monitors the voltage feedback downstream from the ABS Coil Safety Relay. If the feedback voltage is not less than 80% of KL30JNT for a continuous 50 msec then the fault is set.	If Feedback Voltage > 80%of KL30_x	• Power ON, Continuous Failsafing	50ms	Type A. MIL Illumination.
PWR_SW_BB_COIL_SUP_OPEN	C053B	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30JNT supplies the ABS Coils, the BB Coils and the Motor Driver. These three circuits are individually switched on/off by separate Safety Relays. When the Safety Relay is on the downstream voltage feedback is expected to be high. The MCU monitors the voltage feedback downstream from the BB Coil Safety Relay. If the feedback voltage is less than 80% of KL30_INT for a continuous 50 msec then the fault is set.	If Feedback Voltage < 80%of KL30_x	• Power ON, Continuous Failsafing	50ms	Type A. MIL Illumination.
PWR_SW_BB_COIL_SUP_SHORT	C053B	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30JNT supplies the ABS Coils, the BB Coils and the Motor Driver. These three circuits are individually switched on/off by separate Safety Relays. When the Safety Relay is off the downstream voltage feedback is expected to be low. The MCU monitors the voltage feedback downstream from the BB Coil Safety Relay. If the feedback voltage is not less than 80% of KL30JNT for a continuous 50 msec then the fault is set.	If Feedback Voltage > 80%of KL30_x	• Power ON, Continuous Failsafing	50ms	Type A. MIL Illumination.
PWR_SW_MOT_SUP_OPEN	C0595	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30JNT supplies the ABS Coils, the BB Coils and the Motor Driver. These three circuits are individually switched on/off by separate Safety Relays. When the Safety Relay is on the downstream voltage feedback is expected to be high. The MCU monitors the voltage feedback downstream from the Motor Safety Relay. If the feedback voltage is less than 80% of KL30 INT for a continuous 50 msec then the fault is set.	If Feedback Voltage < 80%of KL30_x	• Power ON, Continuous Failsafing	50ms	Type A. MIL Illumination.
PWR_SW_MOT_SUP_SHORT	C0595	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30JNT supplies the ABS Coils, the BB Coils and the Motor Driver. These three circuits are individually switched on/off by separate Safety Relays. When the Safety Relay is off the downstream voltage feedback is expected to be low. The MCU monitors the voltage feedback downstream from the Motor Safety Relay. If the feedback voltage is not less than 80% of KL30 _INT for a continuous 50 msec then the fault is set.	If Feedback Voltage > 80%of KL30_x	• Power ON, Continuous Failsafing	50ms	Type A. MIL Illumination.
PWR_SW_PSSW1_SUP_OPEN	U3006	This monitor checks if: • Disconnected Switch • PCB Problem	This fault is not enabled is a Watchdog fault is already set. The KL30_1 and KL30_2 voltage supply inputs are individually switched on/off by separate Power Switch circuits. When either Switch is turned on then its respective Power Switch Feedback is expected to be high. If the feedback voltage is less than 80% of its respective KL30_x supply voltage for a continuous 50 msec then the fault is set	If Feedback Voltage < 80%of KL30_x	• Power ON, Continuous Failsafing	50 msec	Type C, No MIL, "Emissions Neutral Diagnostic "
PWR_SW_PSSW1_SUP_SHORT	P0606	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30_1 and KL30_2 voltage supply inputs are individually switched on/off by separate Power Switch circuits. When both Switches are turned off then both Power Switch Feedbacks are expected to be low. If the feedback voltage is not less than 80% of its respective KL30_x supply voltage for a continuous 50 msec then the fault is set.	If Feedback Voltage > 80%of KL30_x	• Power ON, Continuous Failsafing	50ms	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
PWR_SW_PSSW2_SUP_OPEN	U3007	This monitor checks if: • Disconnected Switch • PCB Problem	This fault is not enabled is a Watchdog fault is already set. The KL30_1 and KL30_2 voltage supply inputs are individually switched on/off by separate Power Switch circuits. When either Switch is turned on then it's respective Power Switch Feedback is expected to be high. If the feedback voltage is less than 80% of it's respective KL30_x supply voltage for a continuous 50 msec then the fault is set.	If Feedback Voltage < 80%of KL30_x	• Power ON, Continuous Failsafing	50ms	Type C, No MIL, "Emissions Neutral Diagnostic "
PWR_SW_PSSW2_SUP_SHORT	P0606	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30_1 and KL30_2 voltage supply inputs are individually switched on/off by separate Power Switch circuits. When both Switches are turned off then both Power Switch Feedbacks are expected to be low. If the feedback voltage is not less than 80% of it's respective KL30_x supply voltage for a continuous 50 msec then the fault is set.	If Feedback Voltage > 80%of KL30_x	• Power ON, Continuous Failsafing	50ms	Type A. MIL Illumination.
SYS_ASIC_VCP12_U12_VOLTAGE_LOW	P0606	This monitor checks if: Defective vehicle battery or Charging system Otherwise: -Defective system ASIC -Defective printed circuit board. • Defective system ASIC	The Polaris ASIC provides an internal VCP12 voltage regulator which is required to operate the I_SSR amplifier and to maintain regulation of the VA5pO regulators and the U3 and U1 linear regulators. If the VCP12 voltage is less that 7.25 V for 44 ?sec then the Polaris sets the VPC12 Low Voltage Warning SPI bit to True. Software monitors this SPI bit. If it is continuously True for more than 100 msec then the fault is set.	VCP 12 voltage is less that 7.25 V for 44 ?sec	• Polaris is initialized	100 msec	Type A. MIL Illumination.
SYS_ASIC_CHARGE_PUMP_OVER_VOLT	P0606	This monitor checks if: • Defective system ASIC	The Polaris ASIC provides a two-stage charge pump to produce a voltage greater than the VCP12 voltage. If the charge pump voltage exceeds VCP12 voltage by more than 13V for 53 msec then the Polaris sets the Charge Pump Overvoltage Limit SPI bit to True. Software monitors this SPI bit. If it is continuously True for more than 100 msec then the fault is set.	charge pump voltage exceeds VCP12 voltage by more than 13V for 53 msec	• Polaris is initialized	100 msec (145.2 ms)	Type A. MIL Illumination.
SYS_ASIC_VDG_RANGE_FAULT	P0606	This monitor checks if: • Defective system ASIC	Verify that the KL30_1 Power Switch command is not stuck On. The ASIC VDG pin controls the KL30_1 Power Switch. While the Power Switch is commanded off, the SW reads the ASIC's VDG voltage feedback. When the VDG voltage is continuously >= 1.0V for more than 100 msec then the fault is set.	SSRON: VDBat+3V <= VDG <= VDBat+12V SSROFF: VDG <= 1.0V	• Polaris is initialized	100 msec	Type A. MIL Illumination.
SYS_ASIC_VBAT_SW_OVERCURRENT	P0606	This monitor checks if: • Defective system ASIC	The Polaris ASIC provides an overcurrent protected VBAT_SW output used for powering sensors and external circuits. If the VBAT_SW current draw exceeds 150 mA for 800 ?sec then the Polaris sets the VBAT_SW Overcurrent SPI bit to True. Software monitors this SPI bit. If it is continuously True for more than 25 msec then the fault is set.	VBAT_SW Enable and VBAT_SW Over-Current SPI bits are both TRUE	• Polaris is initialized	25 msec	Type A. MIL Illumination.
SYS_ASIC_VBAT_SW_CORR	P0606	This monitor checks if: • Defective system ASIC	The MCU shall read the ASIC's VBAT_SW Voltage Result SPI field and perform a plausibility check against the measured VBAT voltage pin on the MCU. When the difference between the two voltage values is continuously > 1.75V for more than 25 msec then the fault is set.	voltage difference > 1.75 volts	• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYS_ASIC_VBAT_SW_DISABLE_CORR	P0606	This monitor checks if: • Defective wiring harness • Defective ASCI • Defective CPU • Defective circuit board	Check that the ASIC VBAT_SW output is not leaking or stuck On. The MCU shall read the ASIC's VBAT_SW Voltage Result SPI field when the commanded VBAT_SW state is Off. If the voltage is continuously > 1,5V for more than 25 msec then the fault is set.	voltage difference > 1.5 volts	-Polaris is initialized -Power Switch is OFF	25 msec	Type A. MIL Illumination.
SYS_ASIC_U5_FAILURE	P0606	This monitor checks if: • Defective system ASIC	The U5 power supply regulates battery voltage down to 5V to supply such circuits as network communication transceivers, internal sensors and ADC references. If U5 is outside the acceptable range (<4.75V or >5.1 V) continuously for 105 ?sec then the ASIC shall continue to attempt to regulate U5 and set the U5 Out of Range Warning SPI bit to True. Software monitors this SPI bit. If it becomes True then the fault is set immediately.	The MCU shall monitor the ASIC's U5 Out of Range Warning SPI bit. (<4.75V or >5.1V)	• Polaris is initialized	5 msec	Type A. MIL Illumination.
SYS_ASIC_CHARGE_PUMP_UNDER_VOLT	P0606	This monitor checks if: • Defective system ASIC	The Polaris ASIC provides a two-stage charge pump to produce a voltage greater than the VCP12 voltage. If the charge pump voltage exceeds VCP12 voltage by less than 9.5V for 5.5 msec then the Polaris sets the Charge Pump Undervoltage Limit SPI bit to True. Software monitors this SPI bit. If it is continuously True for more than 100 msec then the fault is set.	If the charge pump voltage exceeds VCP12 voltage by less than 9.5V for 5.5 msec	• Polaris is initialized	100 msec (105.5 ms)	Type A. MIL Illumination.
U5_ASIC_ADC_REF_FAULT	P0606	This monitor checks if: • Defective system ASIC or circuit board	The 5V regulated supply is read at the ASIC. If it is not within the range, then the fault is set.	Asic U5 is not within the 4.75V and 5.25V	Polaris is initialized	80 msec	Type A. MIL Illumination.
SYS_ASIC_U3_UV_RESET_FAULT	P0606	This monitor checks if: • ASIC power supply block problem • Defective ASIC • PCB problem	• When the U5, U3, or U1 Undervoltage Diagnostic SPI bit is set, the ASIC shall raise the effective U5 out of range lower warning level, or the U3 or U1 undervoltage fault threshold above the maximum U5, U3, or U1 regulation voltage, thus forcing a U5 out of range warning or U3 or U1 undervoltage fault. • Periodically, the MCU shall store a flag in NVM indicating that it will perform a U5, U3 or U1 undervoltage diagnostic. The MCU shall then force one of the three test modes and start a timer.	The MCU shall detect a fault if it does not receive a reset within the expected time. If a reset occurs, the MCU shall check NVM and the ASIC's Reset Source SPI Register, and verify that the reset was due to a planned test.	• Runs during initialization	10 msec	Type A. MIL Illumination.
SYS_ASIC_U3_OV_RESET_FAULT	P0606	This monitor checks if: • ASIC power supply block problem • Defective ASIC • PCB problem	• When the U5, U3, U1 Overvoltage Diagnostic SPI bit is set, the ASIC shall lower the effective overvoltage fault threshold below the minimum U5, U3, or U1 regulation voltage, thus forcing a U5, U3, or U1 overvoltage fault. • Periodically (e.g. once per ignition cycle at shutdown), the MCU shall store a flag in NVM indicating that it will perform a U5, U3 or U1 overvoltage diagnostic. The MCU shall then force one of the three test modes and start a timer.	The MCU shall detect a fault if it does not receive a reset within the expected time. If a reset occurs, the MCU shall check NVM and the ASIC's Reset Source SPI Register, and verify that the reset was due to a planned test.	• Runs during initialization	10 msec	Type A. MIL Illumination.
SYS_ASIC_U5_OV_RESET_FAULT	P0606	This monitor checks if: • ASIC power supply block problem • Defective ASIC • PCB problem	• When the U5, U3, U1 Overvoltage Diagnostic SPI bit is set, the ASIC shall lower the effective overvoltage fault threshold below the minimum U5, U3, or U1 regulation voltage, thus forcing a U5, U3, or U1 overvoltage fault. • Periodically (e.g. once per ignition cycle at shutdown), the MCU shall store a flag in NVM indicating that it will perform a U5, U3 or U1 overvoltage diagnostic. The MCU shall then force one of the three test modes and start a timer.	The MCU shall detect a fault if it does not receive a reset within the expected time. If a reset occurs, the MCU shall check NVM and the ASIC's Reset Source SPI Register, and verify that the reset was due to a planned test.	• Runs during initialization	10 msec	Type A. MIL Illumination.
Group 20 - BOOST SYSTEM							
BOOSTED_BRAKE_SYSTEM_FAILED_WARNING	C0021	This monitor checks if: N/A	N/A	N/A	N/A	N/A	Type B. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
BOOSTED_BRAKE_SYSTEM_FAILED	C0021	This monitor checks if: Internal eBoost failure	Error Threshold (Y value) is a linear lookup table value which is a function of the Boost Pressure Target (X value). XO : 0 BAR , YO : 0 BAR X1 : 6 BAR , Y1 : 3 BAR X2 : 20 BAR , Y2 : 4 BAR X3 : 200 BAR , YO : 40 BAR When ABS is active the Y values are increased by 30% When the boost error exceeds this threshold the "error" signal is integrated each loop and when it exceeds 2000 Bar-msec the fault will set.	Derivative of the Boost pressure target > (-150 Bar/s) AND Derivative of Boost pressure < 200 Bar/s	The Measured Boost Pressure is compared against an "error" threshold and sets a fault when the difference is large enough to cause possible under braking of the vehicle. The difference or "error" threshold itself is a function of the Boost Pressure Target such that larger errors are accepted as the requested pressure increases (i.e. a request of 30 bar that results in a 10 bar pressure is considered more consequential than a 20 bar error at a pressure request of 180 bar). This error threshold gets desensitized when slip control is active to account for the more dynamic boost pressure response when individual wheel control is active. Right now this is a percentage of the base error threshold, but will need to be enhanced. When the measured pressure is less than the error target the fault maturity counter accumulates at a rate proportional to the error. When the counter reaches a maturation threshold the fault will get set and the system will enter Push Through mode.	5 ms	Type B. MIL Illumination.
BOOSTED_BRAKE_SYSTEM_DYNAMIC_LEAK	C05B0	This monitor checks if: Monitors for leaks in the braking system at the circuit level during braking events. This is different from the Static Leak check which looks for leaks at the channel level at shutdown.	The leak detection logic compares pressure gradient threshold against the measured pressure gradient. Once the error last longer than a time threshold, and the pressure error integral passes its threshold, leak is detected. The pressure gradient can be estimated from Dap flow rate and PV information; Similarly, pressure can be estimated from Dap volume and PV information. Here the worst case PV is taken	There are 12 calibrations associated with this failsafe so it is impossible to describe the interation of all of them in this document. Ultimately when the pressure error integral exceeds 20 bar AND the pressure gradient error integral exceeds 3000 Bar/s the fault is set.	Boost control active Boost pressure > 2 Bar Advancing DAP (no replenishment mode) No slip control active Faded brakes have not been detected	5 msec	Type A. MIL Illumination.
BOOSTED_BRAKE_SYSTEM_DYNAMIC_LEAK_SLOW	C05B0	This monitor checks if: Monitors for slow leaks in the braking system at the circuit level during braking events. This is different from the Static Leak check which looks for leaks at the channel level at shutdown.	DAP travel is used to determine the volume of fluid used in the brake apply at the worst case PV curve. Given that volume and PV data we can obtain an estimated pressure that should be in the boost system. If that can get above 200 bar in 20 sec there is a leak. Note: The fast dynamic leak fault will only be used to catch big leaks which impact the ability to maintain boost pressure across multiple braking events.	Estimated brake pressure is above 200 bar in less than 20 seconds	Boost control active Boost pressure > 2 Bar Advancing DAP (no replenishment mode) No slip control active Faded brakes have not been detected	1 count	Type A. MIL Illumination.
BOOSTED_BRAKE_SYSTEM_LEAK_ISO_FAILED	C05B0	This monitor checks if: Set if the leakage circuit cannot be isolated successfully	Brake fluid leak on a channel or circuit without the ability to identify the location of the leak	BOOSTED_BRAKE_SYSTEM_DYNAMIC_LEAK AND Circuit cannot be isolated	BOOSTED_BRAKE_SYSTEM_DYNAMIC_LEAK already present.	230 msec	Type A. MIL Illumination.
BOOST_POWER_MANAGEMENT_ENABLED_WARNING	P0562	This monitor checks if: Low input voltage to the module	This fault sets due low voltage in order to disable features before affect boosted brakes operation.	Motor Voltage < 9.3 V	Propulsion System Active = TRUE or (System Power Mode = Run and vehicle speed > then 3 kph)	5 occurrences of dipping below 9.3 V within 2 minutes without stable voltage above 11.3V	Type C, No MIL, "Emissions Neutral Diagnostic "
BOOST_POWER_MANAGEMENT_ACTIVE_FAILURE	P0562	This monitor checks if: Low input voltage to the module	• Did not detect BOOST_POWER_MANAGEMENT_ENABLED_WARNING • Motor Voltage < 7 V (Need for quickly detecting to protect the DAP if for some reason the BOOST_POWER_MANAGEMENT_ENABLED_WARNING is not detected.)	Motor Voltage < 7V	Propulsion System Active = TRUE or (System Power Mode = Run and vehicle speed > 3 kph)	17.5 msec	Type C, No MIL, "Emissions Neutral Diagnostic "
BOOST_SYSTEM_FADED_BRAKES_DETECTED	C0072	This monitor checks if: Monitor the estimated brake rotor temperatures, the system compliance, the boost pressure, and the measured deceleration during braking events. Based on a model calculate a Brake Fade Factor that will detect brake fade.	If the fade factor is greater than TBD for TBD msec, this fault is set.	Average brake rotor temperature > 400C Brake Fade Factor > 50% 2 conditions above exists for 800 msec	Boost control active No slip control active Vehicle speed > 4 m/s	800 msec	Type A. MIL Illumination.
PTU_ESTABLISH_HOME_POSITION	C0021	This monitor checks if: Set if motor could not find home position during startup	Motor could not find home position in 4sec. Motor gets stuck somewhere	Motor still moving to find home position for 4 sec	Cycle IGN or Clear Code	1 msec	TypeB. MIL Illumination.
ACU_NOT_CONFIGURED	P0602	This monitor checks if: Set if EOL sensor Learn or Comp Port Learn has not done or failed	Read DID 46, if DID 46 == OF00, clear the fault, otherwise, set the fault	Read DID 46, if DID 46 == OF00, clear the fault, otherwise, set the fault	Learn all EOL sensor, and comp port learn again and clear code	5 msec	Type A. MIL Illumination.
STATIC_CIRCUITO_LEAK_DETECTED	C05B0	This monitor checks if: System Leak	Leak fault, commands each circuit to build 30 bar pressure and checks for a leak by holding for 1sec. If the pressure drops to 24 bar, this fault is set.	Checks every wheel if there is a leak during shutdown.	Runs During Shutdown	5 msec	Type A. MIL Illumination.
STATIC_CIRCUIT1_LEAK_DETECTED	C05B0	This monitor checks if: System Leak	Leak fault, commands each circuit to build 30 bar pressure and checks for a leak by holding for 1sec. If the pressure drops to 24 bar, this fault is set.	Checks every wheel if there is a leak during shutdown.	Runs During Shutdown	5 msec	Type A. MIL Illumination.
BRAKE_BY_WIRE_HIGH_LEVEL_MONITOR_FAILURE	C0021	This monitor checks if: Base brake values are energized in a boosted brake mode, while there are any parts of the boost logic which indicate that boosted brakes should not be enabled.	The goal of this fault monitor is to look for conditions where the base brake values are energized in a boosted brake mode, while there are any parts of the boost logic which indicate that boosted brakes should not be enabled. The validity of the driver inputs, base brake mode, Actuator control mode, Boost/Brake Arbitrator states, and the Electric drive states must all agree that boosted brakes are allowed for the base brake valves to be in a boosted condition. Otherwise the fault will be matured.	• (Pedal Travel signal is not valid AND SCP is invalid) OR • Boost Arb targeted pressure is not available OR • BOOST System in INHIBITED OR • Electric Drive state is not active or not running OR • Actuator Control is not allowed	• Pedal travel sensor signal • SCP value • Boost Arb state • Electric drive status	200 msec	TypeB. MIL Illumination.
BRAKE_BLEED_NOT_COMPLETED	C15C7	This monitor checks if: DID NOT write DID B2	DID B2 == 0	DID B2 == 0	Runs Continuous	5 msec	Type A. MIL Illumination.
BOOST_STARTUP_FAILURE	C0021	This monitor checks if: Boost not initialized during system self test	After mode manger completes system self test the boost system looks to intialize the boost controller. If during this phase the conditions are not correct we will set a fault.	When boost control state is in initialze state a timer is incremented allowing a set time to initialize before a fault should be set.	Run during the power up initializtion of boost arbitration	4 seconds	Type B. MIL Illumination.
Group 21 - Regen							
Group 25 - Special Mode							

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
Group 27 - CAN Device							
CAN_0_BUS_OFF_COMMS_FAULT	U0073	This monitor checks if: • HS bus Shorted • CAN transceiver faulty	Can peripheral locks for the bit errors in transmitted messages and increments txerror counter if any error is detected	if txerror counter reaches 256 and doesn't transmit any message for the fault maturation time.	• When wake lines are enabled. • Node supervisor is in enabled state	115 msec	Type B. MIL Illumination.
CAN_0_LIST_INIT_TIMEOUT_COMMS_FAULT	P0606	This monitor checks if: • CAN hardware initialization failure	When time taken to initialize the message object exceeds the configured time out	Message object initilization timeout has occurred.	None	1 count	Type A. MIL Illumination.
CAN_1_BUS_OFF_COMMS_FAULT	U0077	This monitor checks if: • CE bus Shorted • CAN transceiver faulty	CAN peripheral locks for the bit errors in transmitted messages and increments Tx error counter if any error is detected. if Tx error counter reaches 256 the fault get set.	if txerror counter reaches 256 and doesn't transmit any message for the fault maturation time.	• When wake lines are enabled. • Node supervisor is in enabled state	115 msec	TypeC, No MIL, "Emissions Neutral Diagnostic "
Group 28 ■CAN Communication							
MISSING_PPEI_POWERTRAIN_CONFIG_DATA	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 2.5 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	2.5 sec	Type B. MIL Illumination.
MISSING_PPEI_ENGINE_GENERAL_STATUS_4	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 1.25 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1.25 sec	Type B. MIL Illumination.
MISSING_PPEI_PLATFORM_ENG_CNTRL_REQUESTS	U0140	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for .625 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	0.625 sec	TypeC, No MIL, "Emissions Neutral Diagnostic "
MISSING_PPEI_ENGINE_TORQUE_STATUS_3	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.
MISSING_PPEI_TRANS_GENERAL_STATUS_2	U0101	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.
MISSING_PPEI_PLATFORM_GENERAL_STATUS	U0140	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for .25 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	TypeC, No MIL, "Emissions Neutral Diagnostic "
MISSING_PPEI_TORQUE_REQUEST_STATUS	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.
GMLAN_ABA_ACT_POS_PROT_FAULT	U0401	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	ARC + Protection_Value != 0	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	TypeC, No MIL, "Emissions Neutral Diagnostic "
GMLAN_ABA_ACT_POS_ARC_FAULT	U0401	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. •The receiver shall check the ARC value with every new received frame. •Any alive rolling count value that matches the previously received value will activate the fault counter. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	New_ARC - Prev_ARC >= 2	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	TypeC, No MIL, "Emissions Neutral Diagnostic "
MISSING_PPEI_ENGINE_TORQUE_STATUS_2	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.
GMLAN_ENGTRQ_FSTAT_TRQ_FAIL	C2A07	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked.	EngTrqRdFlrSt == 0x1 OR EngTrqRdFlrSt == 0x2 OR EngTrqRdFlrSt ==0x4	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	TypeC, No MIL, "Emissions Neutral Diagnostic "
GMLAN_ENGTRQ_FSTAT_ABOVE_RANGE	U0401	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• COMMS Message must be received. When correct message is received by EBCM, it is unpacked and pertinent signals are checked for a range error.	EngTrqRdFlrSt >= 5	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 Count	TypeC, No MIL, "Emissions Neutral Diagnostic "
MISSING_PPEI_TRANS_GENERAL_STATUS_1	U0101	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MISSING_ETEI_TRANSMISSION_GENERAL_STATUS	U0101	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.
MISSING_PPEI_ENGINE_GENERAL_STATUS_1	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.
GMLAN_ENG_SPEED_STAT_ABOVE_RANGE	U0401	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• COMMS Message must be received. When correct message is received by EBCM, it is unpacked and pertinent signals are checked for a range error.	EngSpdStat_O == 0x02	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 Count	TypeC, No MIL, "Emissions Neutral Diagnostic "
MISSING_ACTIVE_REAR_STEER_STATUS_CE	U0134	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	The EBCM is monitoring the CAN bus for message Active_Rear_Steer_Status_CE(0x176) and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	TypeC, No MIL, "Emissions Neutral Diagnostic "
ARS_ALIGN_COMP_FAULT	U0435	This monitor checks if: ARS module detects that its alignment calibration has not been completed.	If the signal ARSAlgmtCmplt (Active Rear Steer Alignment Complete) of message Active_Rear_Steer_Status_CE (0x176) is received with "FALSE" Value (0x0) for 10 messages in a row then this fault is set.	"FALSE" Value (0x0) is received.	• Fault will not be set during the following conditions: • within the first 5 seconds after System Power Mode has transitioned to RUN • Within the first 5 seconds of recovery from an under or over voltage condition CAN Bus Off Failure is latched	100 msec / 10 msgs	TypeC, No MIL, "Emissions Neutral Diagnostic "
ARS_OPER_STAT_FAULT	U0435	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	If the signal ARSOpStat (Active Rear Steer Operational Status) of message Active_Rear_Steer_Status_CE(0x176) is received with "TemporarilyUnavailable" (0x1) or "PermanentlyFailed" (0x3) or any other unknown Value for 50 messages in a row then this fault is set.	Received value is not "NORMAL" (0x0)	• Fault will not be set during the following conditions: • within the first 5 seconds after System Power Mode has transitioned to RUN • Supply Voltage is not in the range 9V <= V <= 16V • Within the first 5 seconds of recovery from an under or over voltage condition CAN Bus Off Failure is latched	500 msec / 50 msgs	TypeC, No MIL, "Emissions Neutral Diagnostic "
MISSING_PPEI_CGM_GENERAL_STATUS_HS	U0146	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.
MISSING_PPEI_HYBRID_GENERAL_STATUS_3_HS	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.
MISSING_PRFRMNC_TRCTN_CNTRL_ENG_STAT_HS	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 250 msec OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250 msec	Type B. MIL Illumination.
MISSING_PPEI_STEERING_WHEEL_ANGLE_CE	U0131	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for .025 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	30 msec	TypeC, No MIL, "Emissions Neutral Diagnostic "
SWA_CHECKSUM_FAULT	U0420	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	ARC + CHKSUM != 0	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	TypeC, No MIL, "Emissions Neutral Diagnostic "
SWA_ARC_FAULT	U0420	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. •The receiver shall check the ARC value with every new received frame. •Any alive rolling count value that matches the previously received value will activate the fault counter. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	New_ARC - Prev_ARC >= 2	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	TypeC, No MIL, "Emissions Neutral Diagnostic "
MISSING_IMU_YAW_LONG_ACC_CE	U0151	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for .025 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	.25 sec	TypeC, No MIL, "Emissions Neutral Diagnostic "
INERTIAL_DATA_RED_CHECKSUM_FAULT	U0452	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	ARC + CHKSUM != 0	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	TypeC, No MIL, "Emissions Neutral Diagnostic "
INERTIAL_DATA_RED_ARC_FAULT	U0452	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. •The receiver shall check the ARC value with every new received frame. •Any alive rolling count value that matches the previously received value will activate the fault counter. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	New_ARC - Prev_ARC >= 2	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	TypeC, NoMIL, "Emissions Neutral Diagnostic "

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
LONG_ACCEL_NOT_A VAILABLE	U0452	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• When the incoming message is unpacked, the signal will be checked immediately.	IMULonAccPriAval == 0x0	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 Count	TypeC, No MIL, "Emissions Neutral Diagnostic "
MISSING_IMU_YAW_LATITUD_ACC_CE	U0151	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for .025 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	.25 sec	TypeC, NoMIL, "Emissions Neutral Diagnostic "
INERTIAL_DATA_CHECKSUM_FAULT	U0452	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	ARC + CHKSUM != 0	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	TypeC, No MIL, "Emissions Neutral Diagnostic "
INERTIAL_DATA_ARC_FAULT	U0452	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. •The receiver shall check the ARC value with every new received frame. •Any alive rolling count value that matches the previously received value will activate the fault counter. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	New_ARC - Prev_ARC >= 2	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	TypeC, No MIL, "Emissions Neutral Diagnostic "
BODY_INFORMATION_HS_ARC_FAULT	U0422	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. •The receiver shall check the ARC value with every new received frame. •Any alive rolling count value that matches the previously received value will activate the fault counter. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	New_ARC - Prev_ARC >= 2	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	N/A	Type C, No MIL, "Emissions Neutral Diagnostic "
MISSING_PPEI_DRV_PREF_MODE_SWITCH_STATUS	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for .25 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	.25 sec	Type B. MIL Illumination.
MISSING_PPEI_ENGINE_GENERAL_STATUS_6	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for .25 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	.25 sec	Type B. MIL Illumination.
MISSING_ETRS_GENERAL_REQUEST_2_HS	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for .25 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	.25 sec	Type B. MIL Illumination.
MISSING_PPEI_PROPULSION_GEN_STAT_1_HS	U0100	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for .25 seconds OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	.25 sec	Type B. MIL Illumination.
MISSING_CONTROL_REGENERATIVE_BRAKE_TRQ_2	U0101	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The EBCM is monitoring the CAN bus for this message and checks if the message was received in the detection time.	Message missing for 2.5 counts OR Message length is less than defined by DBC	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	250ms	Type B. MIL Illumination.
CHS_SYS_BRK_BLNDG_AXL_TRQ_PROT_FAULT	U0402	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	ARC + Protection_Value != 0	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	Type B. MIL Illumination.
CHS_SYS_BRK_BLNDG_AXL_TRQ_ARC_FAULT	U0402	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. •The receiver shall check the ARC value with every new received frame. •Any alive rolling count value that matches the previously received value will activate the fault counter. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	New_ARC - Prev_ARC >= 2	• Fault will not be set during the following conditions: • within the first 2 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • CAN Bus Off Failure is detecting or latched • System Power Mode is in crank mode.	1 count	Type B. MIL Illumination.
ARS_STATUS_CE_CHKSUM_FAULT	U0435	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	ARC + CHKSUM != 0	• Fault will not be set during the following conditions: • within the first 5 seconds after System Power Mode has transitioned to RUN • Supply Voltage is not in the range 9V <= V <= 16V • Within the first 5 seconds of recovery from an under or over voltage condition CAN Bus Off Failure is latched	fastest maturation is 3 consecutive bad checksums (30 msec). Sliding Window Fail Threshold is 3 out 16	Type C, No MIL, "Emissions Neutral Diagnostic "
ARS_ACTUAL_ANGLE_SIGNAL_INVALID	U0435	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	If the signal ARSActAnglV (Active Rear Steer Actual Angle Validity) of message Active_Rear_Steer_Status_CE(0x176) is received with Invalid Value (0x1) then this fault is set immediately.	Validity Bit = 1 (Valid = 0, Invalid = 1)	• Fault will not be set during the following conditions: • within the first 5 seconds after System Power Mode has transitioned to RUN • Supply Voltage is not in the range 9V <= V <= 16V • Within the first 5 seconds of recovery from an under or over voltage condition CAN Bus Off Failure is latched	1 msg (10 msec)	TypeC, NoMIL, "Emissions Neutral Diagnostic "

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
ARS_STATUS_CE_ARC_FAULT	U0435	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	• The EBCM is monitoring all relevant signals of the messages that are received and unpacked. •The receiver shall check the ARC value with every new received frame. •Any alive rolling count value that matches the previously received value will activate the fault counter. • Alive Rolling Count and Protection Value Errors will be detected according to GMW8772.	New_ARC - Prev_ARC >= 2	• Fault will not be set during the following conditions: • within the first 5 seconds after System Power Mode has transitioned to RUN • Supply Voltage is not in the range 9V <= V <= 16V • Within the first 5 seconds of recovery from an under or over voltage condition CAN Bus Off Failure is latched	fastest maturation is 3 consecutive count sequence errors (30 msec). Sliding Window Fail Threshold is 3 out 16	Type C, No MIL, "Emissions Neutral Diagnostic "
ARSSIGSUPERRFAULT	U0435	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring Problem at message receiving module	If the signal ARSActAngIV (Active Rear Steer Actual Angle Validity) of message Active_Rear_Steer_Status_CE(0x176) is received with Invalid Value (0x1) then this fault is set immediately.	Validity Bit = 1 (Valid = 0, Invalid = 1)	• Fault will not be set during the following conditions: • within the first 5 seconds after System Power Mode has transitioned to RUN • Supply Voltage is not in the range 9V <= V <= 16V • Within the first 5 seconds of recovery from an under or over voltage condition CAN Bus Off Failure is latched	1 msg (10 msec)	Type C, No MIL, "Emissions Neutral Diagnostic "
Group 30 - Configuration							
Group 32 - Miscellaneous							
Group 33 - Electronic Park Brake							
PB_WAKE_UP_LINE_VOLTAGE_FAULT	C0616	This monitor checks if: • Transceiver faulty • PCB probelm	The Sw monitors the A2D feedback received from INH pin of LIN transceiver if this voltage drops below the threshold voltage for 60msec we set this fault indicating EPB wake up is not possible .	If the transceiver feedback drops below voltage 6v	• Power ON, Continuous Failsafing	30 msec	Type A. MIL Illumination.
PB_MICRO_ROM_FAULT	C0616	This monitor checks if: S12 micro ROM failure, S12 micro ALU/instruction set fault	S12 micro calculates a CCITT CRC16 checksum over the complete FLASH memory. If that does not match with the stored checksum, the fault is set The complete ROM is checked during startup, it is consecutively checked during normal operation (complete check takes 1.28 s) and in sleep mode (complete check takes approx. 60 seconds)	Each ROM section is checksummed byte by byte. Each byte will be added to the current checksum for a section. If the byte being checked is the last byte of a section, then the setion is verified for a correct checksum stored at the end of the section.	Continuous	10 msec	Type A. MIL Illumination.
PB_MOTOR_SUPPLY_OC	C0616	This monitor checks if: • open supply	Precondition: no FC_A2D_REFERENCE_FAULT detected! When the measured Motor Supply Voltage is less than 2V the Fault is set.	Motor Supply Voltage < 2v	• No Actuation	160 ms	Type A. MIL Illumination.
PB_MOTOR_SUPPLY_OC_RR	C0616	This monitor checks if: • open supply	Precondition: no FC_A2D_REFERENCE_FAULT detected! When the measured Motor Supply Voltage is less than 2V the Fault is set.	Motor Supply Voltage < 2v	• No Actuation	160 ms	Type A. MIL Illumination.
PB_MICRO_ADC_REFERENCE_FAULT	C0616	This monitor checks if: ECU internal defect. Incorrect 5V supply from ASIC.	The conversion of all input voltages on the S12 micro is based on an ADC reference voltage. This fault indicates this voltage is outside of expected tolerance so none of the voltage readings can be considered accurate.	The EPB Micro fault flag PB_MICRO_ADC_REFERENCE_FAULT = True	Filtered system voltage >= 7.5V AND SYSTEM_VOLTAGE_EXCESSIVE_LOW fault not set.	50 msec	Type A. MIL Illumination.
PB_MICRO_ADC_CAL_DATA_IMPLAUSIBLE	C0616	This monitor checks if: Wrong calibration, ECU defect	Each S12 micro ADC input has calibration data saved in the EEPROM in Main micro, which is sent from the Main micro to the S12 micro at Initialization multiple times. If all "versions" of these calibrations do not match, the ADC calibration data is considered implausible.	Gain values and offset values are compared between the main micro and the EPB micro. If values disagree, fault is set.	• Periodic	10 msec	Type A. MIL Illumination.
PB_MICRO_ADC_CAL_FAULT	C0616	This monitor checks if: Wrong calibration, ECU defect	This fault is set if valid ADC calibration data is never received by the S12 micro.	Periodic ADC calibration indicates that calibration data is invalid	• Periodic	1000 msec	Type A. MIL Illumination.
PB_MOTOR_MISSING_INITIALIZATION_ERROR	C0616	This monitor checks if: • Calibration values for EPB are missing or out of range	• During initialization, the Park Brake motor offset and gain values are read from NVRAM. If the values are not within an acceptable range, the SW will use default values from ROM.	Calibration values in NVRAM are missing or out of range	• Runs during initialization	10 msec	Type A. MIL Illumination.
PB_APPLY_ENABLE_WRONG_STATE	C0616	This monitor checks if: S12 micro/Zenon hardware fault. FET SC/OC.	Monitor routine calculates the expected apply enable state using the same algorithms and input parameters as S12 micro and compares the expected state to the real state of the related FET's enable line.	No successful FET activation	Continuous failsafing	40 s	Type A. MIL Illumination.
PB_APPLY_ENABLE_NO_CONTROL	C0616	This monitor checks if: S12 micro/Zenon hardware fault. FET SC/OC.	FET is requested to be activated, but the monitoring shows the FET as unactivated.	No successful FET activation	Continuous failsafing	10 ms	Type A. MIL Illumination.
PB_RELEASE_ENABLE_WRONG_STATE	C0616	This monitor checks if: S12 micro/Zenon hardware fault. FET SC/OC.	Monitor routine calculates the expected apply enable state using the same algorithms and input parameters as S12 micro and compares the expected state to the real state of the related FET's line.	No successful FET activation	Continuous failsafing	40 s	Type A. MIL Illumination.
PB_RELEASE_ENABLE_NO_CONTROL	C0616	This monitor checks if: S12 micro/Zenon hardware fault. FET SC/OC.	FET is requested to be activated, but the monitoring shows the FET as unactivated.	No successful FET activation	Continuous failsafing	10 ms	Type A. MIL Illumination.
EPB_COMMAND_RANGE_ERROR	C0616	This monitor checks if: • EPB decel request out of range	• This failsafe monitors the decel request received from the EPB and checks to see if it is out of range	Decel Request from EPB is greater than 9.83 m/s	• Continuous failsafing	250 msec	Type A. MIL Illumination.
PBHSBINITFAULT	C0616	This monitor checks if: • Failure of the Host Safety Barrier to complete its normal initialization.	• The HSB self test is included in the system self test, and it is run to ensure that the HSB still has control over the apply/release enable lines. This fault also sets if indeterminate states of the enable lines are detected.	HSB Initialization Failed	Runs during system self test	10 ms	Type A. MIL Illumination.
Group 35 - Vacuum Pump Control							
Group 36 - Brake Pad Life Monitoring							
Group 38 - Systematic Errors							
TASKOVERRUNCOREO	P0606	This monitor checks if: Software Error ECU Hardware Failure Input Signals To ECU causing high interrupt load	A timer alarm used to activate a periodic task expires and the prior activation/execution of this task has not run to completion. If the number of multiple activations allowed (2) for the task has already been reached a fault is set.	multiple activation counter >= max number of activations Task_Overrun_Cnt>0	Always Enabled	9 counts Time: 10 ms Note: Although weight and goal implies setting after 2 occurrences, faults sets 10 ms later after the 1st occurence of 2 overruns in a row due to latching of the fault bit.	Type A. MIL Illumination.
TASK_OVERRUN_CORE1	P0606	This monitor checks if: Software Error ECU Hardware Failure Input Signals To ECU causing high interrupt load	A timer alarm used to activate a periodic task expires and the prior activation/execution of this task has not run to completion. If the number of multiple activations allowed (2) for the task has already been reached a fault is set.	multiple activation counter >= max number of activations Task_Overrun_Cnt>0	Always Enabled	9 counts Time: 10 ms Note: Although weight and goal implies setting after 2 occurrences, faults sets 10 ms later after the 1st occurence of 2 overruns in a row due to latching of the fault bit.	Type A. MIL Illumination.
TASKOVERRUNCORE2	P0606	This monitor checks if: Software Error ECU Hardware Failure Input Signals To ECU causing high interrupt load	A timer alarm used to activate a periodic task expires and the prior activation/execution of this task has not run to completion. If the number of multiple activations allowed (2) for the task has already been reached a fault is set.	multiple activation counter >= max number of activations Task_Overrun_Cnt>0	Always Enabled	9 counts Time: 10 ms Note: Although weight and goal implies setting after 2 occurrences, faults sets 10 ms later after the 1st occurence of 2 overruns in a row due to latching of the fault bit.	Type A. MIL Illumination.

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
RUNNING_RESET_FAILURE	P0562	This monitor checks if: • Keep Alive Voltage Regulator not functional. • Processor looses complete power (system voltage). • Processor is incorrectly reset.	• Two blocks in NVRAM are used to failsafe the systems mode manager's ability to control the system shutdown process. During system initialization (each new ignition cycle), the contents of these two blocks are compared. If a mismatch is found, it indicates that mode manager was unable to control the system shutdown process on the previous ignition cycle. • Counter: Count 1-up • Monitor Rate: 10ms Note- This fault also sets when there is a startup after an improper shutdown with the vehicle not in park AND with the drivers foot on the brake pedal.	System failed to finish NVRAM update on the last module shut-down (ex. Disconnect battery from module before shutdown)	• System is not re-initializing AND • System is not shutting down	5ms	Type C, No MIL, "Emissions Neutral Diagnostic "
MPU_FAULT_TRW_SCS_COREO	P0606	This monitor checks if: Software Error Partial Microcontroller Failure	Memory Protection Unit (MPU) detects an attempted memory access where there is no defined address range providing the needed permission.	None	Always Enabled	10 ms	Type A. MIL Illumination.
MPU_FAULT_TRW_SCS_CORE1	P0606	This monitor checks if: Software Error Partial Microcontroller Failure	Memory Protection Unit (MPU) detects an attempted memory access where there is no defined address range providing the needed permission.	None	Always Enabled	10 ms	Type A. MIL Illumination.
MPU_FAULT_TRW_SCS_CORE2	P0606	This monitor checks if: Software Error Partial Microcontroller Failure	Memory Protection Unit (MPU) detects an attempted memory access where there is no defined address range providing the needed permission.	None	Always Enabled	10 ms	Type A. MIL Illumination.
ITBC_LSM_FAULT	P0606	This monitor checks if: If the ITBC tasks execute out of order, or if a task is skipped or if the tasks do not complete, then this fault is set.	Set this fault , if the order of execution of ITBC tasks is not correct. If the tasks skip or if some tasks are left incomplete	None	• LIN communication	10 msec	Type A. MIL Illumination.
ICC_FAILURE_COREO	P0606	This monitor checks if: ICC send or receive have been skipped.	ICC failsafe mechanism determines if any ICC receives or sends were skipped. At the beginning of every 10ms slot, every core in the scheduler runs the failsafe that checks if any of the ICC sends or receives were skipped in the previous 10ms slot. In case it was skipped the failsafe matures the ICC fault. The failsafe also tries to get back the ICC receives and sends to work normally from the next 10ms Slot.	At the beginning of every 10ms slot, every core in the scheduler runs the failsafe that checks if any of the ICC sends or receives were skipped in the previous 10ms slot.	Always Enabled	60 msec	Type A. MIL Illumination.
ICC_FAILURE_CORE1	P0606	This monitor checks if: ICC send or receive have been skipped.	ICC failsafe mechanism determines if any ICC receives or sends were skipped. At the beginning of every 10ms slot, every core in the scheduler runs the failsafe that checks if any of the ICC sends or receives were skipped in the previous 10ms slot. In case it was skipped the failsafe matures the ICC fault. The failsafe also tries to get back the ICC receives and sends to work normally from the next 10ms Slot.	At the beginning of every 10ms slot, every core in the scheduler runs the failsafe that checks if any of the ICC sends or receives were skipped in the previous 10ms slot.	Always Enabled	60 msec	Type A. MIL Illumination.
ICC_FAILURE_CORE2	P0606	This monitor checks if: ICC send or receive have been skipped.	ICC failsafe mechanism determines if any ICC receives or sends were skipped. At the beginning of every 10ms slot, every core in the scheduler runs the failsafe that checks if any of the ICC sends or receives were skipped in the previous 10ms slot. In case it was skipped the failsafe matures the ICC fault. The failsafe also tries to get back the ICC receives and sends to work normally from the next 10ms Slot.	At the beginning of every 10ms slot, every core in the scheduler runs the failsafe that checks if any of the ICC sends or receives were skipped in the previous 10ms slot.	Always Enabled	60 msec	Type A. MIL Illumination.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Blower Motor Speed Return Circuit High	B2B02	This DTC monitors for a continuous or intermittent short on the blower motor feedback circuit. The instantaneous fail determination is evaluated in the BCM (OBD Smart Device) and communicated to the ECM for fault maturation. Refer to Section N for Emissions Neutral Default Action.	Blower motor feedback circuit high failure status (as determined by OBD Smart Device)	= Fail Criteria Met	Diagnostic is Enabled Blower motor feedback circuit low failure status is not No active DTC's:	 = Indeterminate U0140, B2B38	8 seconds out of a 10 seconds window	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 Ilium.
Blower Motor Speed Return Circuit Low	B2B03	This DTC monitors for a continuous or intermittent short on the blower motor feedback circuit. The instantaneous fail determination is evaluated in the BCM (OBD Smart Device) and communicated to the ECM for fault maturation. Refer to Section N for Emissions Neutral Default Action.	Blower motor feedback circuit low failure status (as determined by OBD Smart Device)	= Fail Criteria Met	Diagnostic is Enabled Blower motor feedback circuit low failure status is not No active DTC's:	 = Indeterminate U0140, B2B38	8 seconds out of a 10 seconds window	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 Ilium.
Blower Motor Speed Return Feedback Circuit Out of Range High	B2B0B	This DTC monitors for an implausibly high blower motor speed feedback frequency. Refer to Section N for Emissions Neutral Default Action.	Blower motor speed feedback frequency	> 200 Hertz	Diagnostic is Enabled Blower motor feedback circuit high failure status is not No active DTC's:	 = Indeterminate U0140, B2B38, B2B02, B2B03	8 seconds out of a 10 seconds window	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 Ilium.
Blower Motor Speed Return Feedback Circuit Out of Range Low	B2B0C	This DTC monitors for an implausibly low blower motor speed feedback frequency. Refer to Section N for Emissions Neutral Default Action.	Blower motor speed feedback frequency	< 45 Hertz	Diagnostic is Enabled Blower motor feedback circuit low failure status is not No active DTC's:	 = Indeterminate U0140, B2B38, B2B02, B2B03	8 seconds out of a 10 seconds window	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 Ilium.
CGM Ignition Switch Run/ Start Position Circuit Low	B2B0D	This DTC monitors for a CGM Ignition Switch Run/Start Position Circuit Low error as determined by the CGM	A corresponding index within the CGM Diagnostic Status Message Signal indicates that the CGM Ignition Switch Run/Start Position Circuit Low DTC has set in the CGM. See CGM summary pages for more information.		General Enable Criteria: The corresponding index within the CGM Diagnostic Status Message Signal Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
CGM Ignition Switch Run/ Start Position Circuit High	B2B0E	This DTC monitors for a CGM Ignition Switch Run/Start Position Circuit High error as determined by the CGM	A corresponding index within the CGM Diagnostic Status Message Signal indicates that the CGM Ignition Switch Run/Start Position Circuit High DTC has set in the CGM. See CGM summary pages for more information.		General Enable Criteria: The corresponding index within the CGM Diagnostic Status Message Signal Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
CGM Control Module Memory Failure	B2B12	This DTC monitors for a CGM Control Module Memory Failure error as determined by the CGM	A corresponding index within the CGM Diagnostic Status Message Signal indicates that the CGM Control Module Memory Failure DTC has set in the CGM. See CGM summary pages for more information.		General Enable Criteria: The corresponding index within the CGM Diagnostic Status Message Signal Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
CGM Control Module Internal Performance Failure	B2B13	This DTC monitors for a CGM Control Module Internal Performance Failure error as determined by the CGM	A corresponding index within the CGM Diagnostic Status Message Signal indicates that the CGM Control Module Internal Performance Failure DTC has set in the CGM. See CGM summary pages for more information.		General Enable Criteria: The corresponding index within the CGM Diagnostic Status Message Signal Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Front Blower Fan Feedback Message Counter Incorrect	B2B38	The DTC monitors for an error in communication with the HVAC Blower Speed Feedback Signals received from the Body Control Module (BCM). Refer to Section N for Emissions Neutral Default Action.	Communication of the Alive Rolling Count from the Body Control Module (BCM) over CAN bus is incorrect for out of total samples	>=3 counts >=10 counts	Diagnostic is Enabled Message frame No active DTC's:	= Is available U0140	3 seconds out of a 10 seconds window	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 Ilium.
Steering Wheel Angle Sensor Signal Message Counter Incorrect	C1211	This DTC monitors for an error in the Steering Wheel Angle Sensor Signal Message Counter.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Steering Wheel Angle ARC Steering Angle Sensor CSUM	 >= 8.00 counts out of >= 18.00 counts >=8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >=11.00 volts <= 18.00 volts	Steering Wheel Angle ARC samples every 15.00 milliseconds. Steering Angle Sensor CSUM samples every 15.00 milliseconds.	Type C, No SVS "Safety Emissions Neutral Diagnostic"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lateral Acceleration Sensor Circuit Low	C124F	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	< -3.8500 g > -3.8500 g (< 0.5 Q impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Type C, No SVS "Emissions Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lateral Acceleration Sensor Circuit High	C1250	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	> 3.8500 g < 3.8500 g (< 0.5 Q impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional LI0073 fault active U0073 test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Type C, No SVS "Emissions Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lateral Acceleration Sensor Performance	C1251	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a signal value that is stuck in a valid range by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	ABS(raw lateral acceleration signal) AND ABS(raw lateral acceleration signal) update raw lateral acceleration signal fail, 50 millisecond update rate	> 0.5300 g < 3.8500 g	battery voltage run crank voltage diagnostic monitor enable update raw lateral acceleration signal stablity time: TOSS vehicle speed automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw lateral acceleration signal) update sample time LI0073 fault active U0073 test fail this key on DTCs not fault active	> 11.00 volts > 11.00 volts = 1 Boolean > 15.0 KPH = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA	raw lateral acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Type C, No SVS "Emissions Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Longitudinal Acceleration Sensor Circuit Low	C1252	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	< -3.8500 g > -3.8500 g (< 0.5 Q impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Type C, No SVS "Emissions Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Longitudinal Acceleration Sensor Circuit High	C1253	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	> 3.8500 g < 3.8500 g (< 0.5 Q impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional LI0073 fault active U0073 test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Type C, No SVS "Emissions Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Longitudinal Acceleration Sensor Performance	C1254	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal rationalized against the TOSS vehicle speed acceleration. The diagnostic monitor can be designed to detect an invalid longitudinal acceleration signal based on the TOSS vehicle speed windows and TOSS vehicle speed acceleration, 4 windows can be enabled. The delta between the TOSS vehicle speed acceleration and longitudinal acceleration signal is taken within each window to verify the delta is small, no failure indicated, or the delta is large indicating the longitudinal acceleration signal is in error. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 1 fail time, 50 millisecond update rate	> 0.5300 g	battery voltage run crank voltage diagnostic monitor enable region 1 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 1 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed	> 11.00 volts > 11.00 volts = 1 Boolean = 0 Boolean > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th > 0.5300 g < 3.8500 g < 0.70 % > 80.0 Nm > 0.1500 g > 15.0 KPH < 200.0 KPH	raw longitudinal acceleration signal stability time > 10.0 seconds raw longitudinal acceleration signal fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate region 1 fail time > 75.0 seconds out of region 1 sample time > 120.0 seconds, 50 millisecond update rate	Type C, No SVS "Emissions Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					ABS(raw longitudinal acceleration signal) update sample time U0073 fault active 110073 test fail this key on DTCs not fault active	< 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 2 fail time, 50 millisecond update rate	> 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 2 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal)	> 11.00 volts > 11.00 volts = 1 Boolean = 0 Boolean > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th > 0.5300 g < 3.8500 g	raw lateral longitudinal acceleration signal stability time > 10.0 seconds raw longitudinal acceleration signal fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate region 2 fail time > 75.0 seconds out of region 2 sample time > 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					update region 2 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time 110073 fault active U0073 test fail this key on DTCs not fault active	 < 0.70 % > 80.0 Nm > 0.1500 g > 0.0 KPH < 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensorFA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 3 fail time, 50 millisecond update rate	> 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = 0 Boolean > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE	raw lateral longitudinal acceleration signal stability time > 10.0 seconds raw longitudinal acceleration signal fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate region 3 fail time > 75.0 seconds out of region 3 sample time > 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 3 sample time: brake pedal position engine torque ABS(TOSS vehicle speed acceleration) TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time 110073 fault active U0073 test fail this key on DTCs not fault active	= FALSE = FALSE = 1st thru 10th > 0.5300 g < 3.8500 g < 0.70 % > 80.0 Nm < 0.1000 g > 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 4 fail time, 50 millisecond update rate	> 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable	> 11.00 volts > 11.00 volts = 1 Boolean = 0 Boolean > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE	raw lateral longitudinal acceleration signal stability time > 10.0 seconds raw longitudinal acceleration signal fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					diagnsotic fault sequence gear active	= FALSE	region 4 fail time > 75.0 seconds out of region 4 sample time > 120.0 seconds, 50 millisecond update rate	
					P0716 fault active	= FALSE		
					P0716 test fail this key on	= FALSE		
					P0717 fault active	= FALSE		
					P0717 test fail this key on	= FALSE		
					P07BF fault active	= FALSE		
					P07BF test fail this key on	= FALSE		
					P07C0 fault active	= FALSE		
					P07C0test fail this key on	= FALSE		
					attained gear	= 1st thru 10th		
					ABS(raw longitudinal acceleration signal) AND	> 0.5300 g		
					ABS(raw longitudinal acceleration signal)	< 3.8500 g		
					update region 4 sample time:			
					brake pedal position	< 0.70 %		
					engine torque	< 80.0 Nm		
					TOSS vehicle speed acceleration	< 0.1500 g		
					TOSS vehicle speed	> 0.0 KPH		
					TOSS vehicle speed	< 0.0 KPH		
					ABS(raw longitudinal acceleration signal)	< 0.5300 g		
					update sample time			
					U0073 fault active	= FALSE		
					U0073 test fail this key on	= FALSE		
					DTCs not fault active	VehicleSpeedSensor_FA VehicleSpeedSensorError		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft System Performance - Bank 1	P0011	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive.	(Intake cam Bank 1) Cam Position Error > (**P0011_CamPosErrorLimId**) deg	**Intake Cam Phsr Enable**	= TRUE	135.00 failures out of 150.00 samples 100 ms /sample	Type A, 1 Trips
					System Voltage	> 11.00 Volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> (**P0011_CamPosErrorLimIc1**) deg AND < **(CalculatedPerfMaxId)** deg		
					Desired cam position variation	< 3.00 deg for (**P0011_P05CC_StablePositionTimeId**) seconds		
					No Active DTCs	P0010 P2088 P2089		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Actuator Solenoid Circuit Open - Bank 1	P0013	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	P0013 is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft System Performance - Bank 1	P0014	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive.	(Exhaust cam Bank 1) Cam Position Error > (**P0014_CamPosErrorLimEd**)deg	**Exhaust Cam Phsr Enable** System Voltage Engine Running Power Take Off (PTO) active Desired cam position Desired AND Measured cam position Desired cam position variation No Active DTCs	= TRUE > 11.00 Volts = TRUE = FALSE > 0 deg > (**P0014_CamPosErrorLimEd**)deg AND < **(CalculatedPerfMaxEcl)** deg <3.00 deg for (**P0014_P05CE_StablePositionTimeEd**) seconds P0013 P2090 P2091	135.00 failures out of 150.00 samples 100 ms /sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor A	P0016	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	Out of range cam edge measurements in one engine cycle Out of range values are: cam edge measurement OR cam edge measurement from the expeced nominal cam position	>= 4 cam edges < -8.5 Crank Degrees > 12.4 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser control indcates the phaser is 'parked' No Active DTCs: Time since last execution of a test IntCamECCjDilPresLow	Test is Enabled CrankSensor_FA P0340, P0341 >1.0 sec = FALSE	4 cam edge measurements and 1 test sample per engine cycle Test failure is 4 fails in 5 samples Diagnostic failure is 2 failed tests out of 3 If the first test fails, the next test is delayed to confirm the phaser 'parked' This delay time is defined by **P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold** For mid-park phasers, an additional delay **P0016-0019 Mid-Park Phaser Delay** is applied	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor B	P0017	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 1 sensor B occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	Out of range cam edge measurements in one engine cycle Out of range values are: cam edge measurement OR cam edge measurement from the expeced nominal cam position	>= 4 cam edges < -8.5 Crank Degrees > 12.4 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser control indcates the phaser is 'parked' No Active DTCs: Time since last execution of a test ExhCamECC_OilPresLow	Test is Enabled CrankSensor_FA P0365, P0366 >1.0 sec = FALSE	4 cam edge measurements and 1 test sample per engine cycle Test failure is 4 fails in 5 samples Diagnostic failure is 2 failed tests out of 3 If the first test fails, the next test is delayed to confirm the phaser 'parked' This delay time is defined by **P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold** For mid-park phasers, an additional delay **P0016-0019 Mid-Park Phaser Delay** is applied	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 1 Control Circuit Open	P001A	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 1 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 1 Control Circuit Low Voltage	P001B	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 1 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	>11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 1 Control Circuit High Voltage	P001C	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 1 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnositc is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 1 Circuit Open	P002A	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 1 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 1 Circuit Low Voltage	P002B	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 1 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 1 Circuit High Voltage	P002C	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 1 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Turbo/Super Charger Bypass Valve A Control Circuit	P0033	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'A' actuator' low sided driver for an open circuit failure, when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between output and controller ground	Diagnostic enabled Powertrain relay voltage Engine does not crank Diagnostic system not disabled	True >= 11.0 Volts	10 failures out of 12 samples PWM CRV: 100ms / sample eCRV: 12.5ms / sample	Type A, 1 Trips Note: In certain controllers P0034 may also set turbo/ super charger bypass valve control circuit low

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Turbo/Super Charger Bypass Valve A Control Circuit Low	P0034	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'A' actuator' low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. In series application, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	< 0.5 Q impedance between output and controller ground	Diagnostic Enabled Powertrain relay voltage Engine does not crank Diagnostic system not disabled	True >= 11.0 Volts	10 failures out of 12 samples PWM CRV: 100ms / sample eCRV: 12.5ms / sample	Type A, 1 Trips Note: In certain controllers P0033 may also set turbo/ super charger bypass balve control circuit

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Turbo/Super Charger Bypass Valve A Control Circuit High	P0035	Controller specific output driver circuit diagnostic, diagnosing the 'compressor recirculation valve 'A' actuator' low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds. In series application, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	< 0.5 Ω impedance between output and controller power.	Diagnostic enabled ***************************** Powertrain relay voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts *****************************	10 failures out of 12 samples PWM CRV: 100ms / sample eCRV: 12.5ms / sample	Type A, 1 Trips

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 1 Performance	P003C	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 1	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 1 Pin Stuck	P003D	Monitors Sliding Cam Actuator Hall Sensor Feedback looking for an extended pin when it should have been returned and be reporting above the "RETRACTED" threshold. Monitors Intake Camshaft Profile Actuator 1 for a pin stuck out condition.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00) If EXTENDING and or EXTENDED have been obtained but RETRACTED is not obtained before the end of the engine cycle, Pin Stuck out is reported.	Feed back has reported below EXTENDING 55.00 and or below EXTENDED 45.00 , but has not reported above RETRACTED by the end of the engine cycle the fault is reported 68.00 ,	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	1.00 failure report out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
HO2S Heater Resistance Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0054	Detects an oxygen sensor heater having an incorrect or out of range resistance value. This test calculates the heater's resistance (using voltage and current) at engine start after a soak condition and compares it to the expected values for the released sensor. This fault is set if the heater resistance is outside the expected range.	Heater Resistance outside of the expected range of	4.2 < ohms <8.2	Diagnostic is Enabled No Active DTC's Coolant - IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	 ECT_Sensor_FA P262B IAT_SensorFA < 8.0 °C >28,800 seconds > -30.0 °C < 32.0 volts < 0.09 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 1 Performance	P005A	An unintended pin firing without controller command. Exhaust Camshaft Profile Actuator 1	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnositc is Enabled system voltage engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
MAP / MAF / Throttle Position Correlation	P0068	Detect when MAP and MAF do not match estimated engine airflow as established by the TPS	Difference between MAP and estimated MAP exceeds threshold (kPa), or P0651 (5 Volt Ref), or P0107 (MAP circuit low), orP0108 (MAP circuit high) have failed this key cycle, then MAP portion of diagnostic fails Absolute difference between MAF and estimated MAF exceed threshold (grams/sec), or P0102 (MAF circuit low), or P0103 (MAF circuit hi) have failed this key cycle, or maximum MAF versus RPM (Table) is greater than or equal to maximum MAF versus battery voltage, then MAF portion of diagnostic fails	Table, f(TPS). See supporting tables: **P0068_Delta MAP Threshold f(TPS)** Table, f(TPS). See supporting tables: **P0068_Delta MAF Threshold f(TPS)** Table, f(RPM). See supporting tables: **P0068_Maximum MAF f(RPM)** Table, f(Volts). See supporting tables: **P0068_Maximum MAF f(Volts)**	Engine Speed Run/Crank voltage	> 800 RPM >6.41 Volts	Continuously fail MAP and MAF portions of diagnostic for 0.1875 s Continuous in MAIN processor	Type A, 1 Trips

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Outside Air Temperature (OAT) Sensor Circuit Low	P0072	Detects a continuous short to ground in the Outside Air Temperature (OAT) signal circuit by monitoring the OAT sensor output resistance and failing the diagnostic when the OAT resistance is too low. The OAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A lower resistance is equivalent to a higher temperature.	Raw OAT Input	<= 46 Ohms (-150 deg C)	Diagnostic is Enabled		40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Outside Air Temperature (OAT) Sensor Circuit High	P0073	Detects a continuous open circuit in the Outside Air Temperature (OAT) signal circuit by monitoring the OAT sensor output resistance and failing the diagnostic when the OAT resistance is too high. The OAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A higher resistance is equivalent to a lower temperature.	Raw OAT Input	>= 427,757 Ohms (~-60 deg C)	Diagnostic is Enabled		40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Outside Air Temperature (OAT) Sensor Intermittent In-Range	P0074	Detects a noisy or erratic signal in the OAT circuit by monitoring the OAT sensor and failing the diagnostic when the OAT signal has a noisier output than is expected. When the value of the OAT signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of OAT readings. The result of this summation is called a “string length”. Since the OAT signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic OAT signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current OAT reading - OAT reading from 100 milliseconds previous)	> 100 deg C 10 consecutive OAT readings	Diagnostic is Enabled		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module SIDI High Pressure Pump min/ max authority	P0089	This DTC determines when the high pressure pump control has reached to its max or min authority	High Pressure Fuel Pump Delivery Angle OR High Pressure Fuel Pump Delivery Angle	>= 92° <= 0°	High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Barometric Pressure Inlet Air Temp Fuel Temp Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP orTFTKO)and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In	True >= 11 Volts > 0.275 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking >= 70.0 KPA >= -20.0 degC -12 <= Temp degC <= 132	Windup High/ Low 10.00 seconds failures out of 12.50 Seconds samples	Type B, 2 Trips

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor 2 Circuit Performance (applications with humidity sensor and manifold temperature sensor)	P0096	Detects an Intake Air Temperature 2 (IAT2) sensor value that is stuck in range by comparing the IAT2 sensor value against the IAT and IAT3 sensor values and failing the diagnostic if the IAT2 value is more different than the IAT and IAT3 values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled. The diagnostic will fail if the IAT and IAT3 values are similar, and the IAT2 value is not similar to the IAT and IAT3 values. The diagnostic will also fail if none of the three sensor values are similar to each other, and the IAT2 value is furthest from the sensor value that is in the middle of the three sensor values. This diagnostic is executed once per	**<u>Good Correlation Between IAT and IAT3:</u>** ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3)	> 30 deg C <= 25 deg C > 25 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs: LIN communications established with MAF	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
			<u>Not Good Correlation, IAT in middle:</u> Power Up IAT is between Power Up IAT2 and Power Up IAT3 AND ABS(Power Up IAT2 - Power Up IAT3) AND ABS(Power Up IAT - Power Up IAT2) > ABS(Power Up IAT - Power Up IAT3)	> 25 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs: LIN communications established with MAF	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		ignition cycle if the enable conditions are met.	**<u>Not Good Correlation, IAT3 in middle:</u>** Power Up IAT3 is between Power Up IAT and Power Up IAT2 AND ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT3 - Power Up IAT2) > ABS(Power Up IAT3 - Power Up IAT)	> 30 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs: LIN communications established with MAF	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Se nsor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Radiator Coolant Temp Sensor Circuit Low Voltage	P00B3	Circuit Continuity This DTC detects a short to ground in the RCT (Radiator Coolant temperature) signal circuit or the RCT sensor. This is accomplished by monitoring the resitance of the circuit. If the resistance goes out of the expected range the DTC is set.	RCT Resistance (@ 150°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 55.0 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 55.0 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 55.0 Ohms Temp Sensor 7: 55.0 Ohms	Diagnostic is Enabled		5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Radiator Coolant Temp Sensor Circuit High Voltage	P00B4	Circuit Continuity This DTC detects a short to high or open in the RCT (Radiator Coolant temperature) signal circuit or the RCT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	> X Ohms X is equal to: Temp Sensor 1: 174,069 Ohms Temp Sensor 2: 174,069 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 174,069 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 174,069 Ohms Temp Sensor 7: 174,069 Ohms	Diagnostic is Enabled Engine run time OR IAT min	 > 10.0 seconds > -20.0 °C	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Radiator Coolant Temperature Sensor Circuit Intermittent/ Erratic	P00B5	Circuit Erratic This DTC detects large step changes in the RCT (Radiator Coolant temperature) signal circuit or the RCT 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.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolantTempSnsr4		Diagnostic is Enabled No Active DTC's	 EECR_RCT_Erratic_TFTKO EECR_RCT_CktHiLo_FA	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6 The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 10.0 seconds -60.0 °C 150.0 °C 10.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 7.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the calculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. *****************************	 5.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
High Pressure Start Diagnostic	P00C6	The DTC Diagnoses the high side fuel pressure during engine cranking.	The ECM detects that the fuel pressure is not rising or has fallen beyond acceptable limits during engine cranking Pressure Rise Test: Sensed High Pressure Fuel Rail Pressure value Pressure Fall Test: Sensed High Pressure Fuel Rail Pressure value	< **P00C6 - Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery** (see Supporting Table) <= **P00C6 - Minimum acceptable value of fuel rail pressure after High Pressure Start** (see Supporting Table)	High Pressure Rise Diagnostic During Start High Pressure Fall Diagnostic During Start Low side feed fuel pressure Engine Run Time Run/Crank Voltage Engine Coolant For each engine start, only 1 diagnostic is performed. The pressure rise test will run if High side fuel pressure is less than KtFHPC_p_HighPressStart, otherwise, the pressure fall diagnostic will run The pressure fall runs when the engine is cranking.	Enabled Disabled >= 0 KPA < = 0 sec > 8 Volts -100 <= °C <= 132 All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP orTFTKO)and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT, IAT2 and ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control	Pressure Rise Test: Crank Time >= **P00C6 - High Pressure Pump Control Mode timeout** (see Supporting Table) 6.25 ms per sample Pressure Fall Test: Injected cylinder events >= **P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start** (see Supporting Table) 4 samples per engine rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Barometric Pressure Inlet Air Temp	commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active >= 70.0 KPA >= -20.0 DegC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Pressure Measurement System - Multiple Sensor Correlation (single turbo)	P00C7	Detects an inconsistency between pressure sensors in the induction system in which a particular sensor cannot be identified as the failed sensor. If the engine has been off for a sufficient amount of time, the pressure values in the induction system will have equalized. The Manifold Pressure (MAP), Turbocharger Boost Pressure and Barometric Pressure (BARO) sensors values are checked to see if they are within the normal expected atmospheric pressure range. If one of the sensors is outside the normal expected atmospheric pressure range, this monitor will fail. Otherwise, MAP, Turbocharger Boost Pressure and BARO are compared to see if their values are similar. If two of these three sensors have similar values, but the third does not, then this monitor will fail. This monitor will also fail if there is no combination	ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure)	> 10.0 kPa <= 10.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa <= 10.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa > 10.0 kPa > 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating Manifold Pressure Manifold Pressure Baro Pressure Baro Pressure Turbocharger Boost Pressure Turbocharger Boost Pressure No Active DTCs: No Pending DTCs: Diagnostic is Enabled LIN communications established with MAF	> 5.0 seconds >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa EngineModeNotRunTimer Error MAP_SensorFA AAP_SnsrFA AAP2_SnsrFA AAP_LIN1_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP_LIN1_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec for applications without LIN MAF 1 sample every 25 msec for applications with LIN MAF	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		of two of these three sensors reporting similar values and the failed sensor cannot be uniquely identified.	AND ABS(Turbocharger Boost Pressure - Baro Pressure)	> 10.0 kPa				
			Manifold Pressure OR Manifold Pressure OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure)	< 50.0 kPa > 115.0 kPa > 10.0 kPa > 10.0 kPa <= 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs: Diagnostic is Enabled LIN communications established with MAF	> 5.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA AAP_LIN1_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP_LIN1_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec for applications without LIN MAF 1 sample every 25 msec for applications with LIN MAF	
			Turbocharger Boost Pressure OR Turbocharger Boost Pressure OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND	< 50.0 kPa > 115.0 kPa <= 10.0 kPa > 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs:	> 5.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA AAP_LIN1_SnsrCktFA	4 failures out of 5 samples 1 sample every 12.5 msec for applications without LIN MAF 1 sample every 25 msec for applications with LIN MAF	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			ABS(Turbocharger Boost Pressure - Baro Pressure)	> 10.0 kPa	No Pending DTCs: Diagnostic is Enabled LIN communications established with MAF	MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP_LIN1_SnsrCktFP		
			Barometric Pressure OR Barometric Pressure OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure)	< 50.0 kPa > 115.0 kPa > 10.0 kPa <= 10.0 kPa > 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs: Diagnostic is Enabled LIN communications established with MAF	> 5.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA AAP_LIN1_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP_LIN1_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec for applications without LIN MAF 1 sample every 25 msec for applications with LIN MAF	

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor 3 Circuit Performance (applications with humidity sensor and manifold temperature sensor)	P00E9	Detects an Intake Air Temperature 3 (IAT3) sensor value that is stuck in range by comparing the IAT3 sensor value against the IAT and IAT2 sensor values and failing the diagnostic if the IAT3 value is more different than the IAT and IAT2 values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled.	**<u>Good Correlation Between IAT and IAT2:</u>** ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3)	<= 30 deg C > 25 deg C > 25 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time (Engine Coolant Temp - Outside Ambient Temp) No Active DTCs: LIN communications established with MAF	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds <= 99.0 deg C PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
		The diagnostic will fail if the IAT and IAT2 values are similar, and the IAT3 value is not similar to the IAT and IAT2 values. The diagnostic will also fail if none of the three sensor values are similar to each other, and the IAT3 value is furthest from the sensor value that is in the middle of the three sensor values. This diagnostic is executed once per ignition cycle if the	**<u>Not Good Correlation, IAT in Middle:</u>** Power Up IAT is between Power Up IAT2 and Power Up IAT3 AND ABS(Power Up IAT2 - Power Up IAT3) AND ABS(Power Up IAT - Power Up IAT3) > ABS(Power Up IAT - Power Up IAT2)	> 25 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		enable conditions are met.			LIN communications established with MAF			
			Not Good Correlation, IAT2 in Middle: Power Up IAT2 is between Power Up IAT and Power Up IAT3 AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3) > ABS(Power Up IAT2 - Power Up IAT)	> 25 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs: LIN communications established with MAF	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor Circuit 3 Low (applications with manifold temperature and humidity)	POOEA	Detects a continuous short to ground in the Intake Air Temperature 3 (IAT3) signal circuit by monitoring the IAT3 sensor output resistance and failing the diagnostic when the IAT3 resistance is too low. The IAT3 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A lower resistance is equivalent to a higher temperature.	Raw IAT 3 Input	< 57.94 Ohms (-150 deg C)	Diagnostic is Enabled		40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor Circuit 3 High (applications with manifold temperature and humidity)	POOEB	Detects a continuous open circuit in the Intake Air Temperature 3 (IAT3) signal circuit by monitoring the IAT3 sensor output resistance and failing the diagnostic when the IAT3 resistance is too high. The IAT3 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A higher resistance is equivalent to a lower temperature.	Raw IAT 3 Input	> 153,665 Ohms (~-60 deg C)	Diagnostic is Enabled		40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor 3 Intermittent In-Range	POOEC	Detects a noisy or erratic signal in the Intake Air Temperature 3 (IAT3) circuit by monitoring the IAT3 sensor and failing the diagnostic when the IAT3 signal has a noisier output than is expected. When the value of the IAT3 signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of IAT3 readings. The result of this summation is called a “string length”. Since the IAT3 signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT3 signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT 3 reading - IAT 3 reading from 100 milliseconds previous)	> 80.00 deg C 10 consecutive IAT 3 readings	Diagnostic is Enabled		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Mass Air Flow System Performance (single turbo)	P0101	Detects a performance failure in the Mass Air Flow (MAF) sensor, such as when a MAF value is stuck in range. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Manifold Pressure (MAP) sensor, Turbocharger Boost Pressure sensor and Throttle Position sensor (TPS). These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the MAF sensor. In this case, the MAF Performance diagnostic	See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered MAPI model fails when ABS(Measured MAP - MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND	> 20.0 grams/sec > 25.0 kPa > 30.0 kPa > 30.0 kPa > 30.0 kPa > 250 kPa*(g/s)	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -9 Deg C = TRUE) <= 130 Deg C = FALSE) >= -20 Deg C <= 100 Deg C >= 0.50 Modeled Air Flow Error multiplied by **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM** and **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAPI Residual Weight Factor based on RPM**	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		will fail.	Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow -	> 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm/sec as a function of engine speed. See table	No Active DTCs: No Pending DTCs:	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			AND Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure AND Mass Air Flow - Filtered Mass Air Flow	**P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow** > a threshold in kPa as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 3.0 gm/sec < a threshold in gm/sec as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed. See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 3.0 gm/sec	Diagnostic is Enabled	MnfdTempSensorCktFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Mass Air Flow Sensor Circuit Low Frequency (all MAF suppliers except for Continental)	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 low engine air flow. The MAF sensor monitors the temperature of a circuit in the airflow of the engine. The temperature of this circuit is related to the mass airflow across the sensor. The mass airflow value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a mass air flow value in grams/second through a transfer function.	MAF Output	<= 750 Hertz (<= 0.01 gm/sec)	Engine Run Time Engine Speed Powertrain Relay Voltage Above criteria present for a period of time Diagnostic is Enabled	> 0.0 seconds >= 300 RPM >= 9.1 Volts >= 0.5 seconds	200 failures out of 250 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Mass Air Flow Sensor Circuit High Frequency (all MAF suppliers except for Continental)	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 high engine air flow. The MAF sensor monitors the temperature of a circuit in the airflow of the engine. The temperature of this circuit is related to the mass airflow across the sensor. The mass airflow value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a mass air flow value in grams/second through a transfer function.	MAF Output	>= 13,350 Hertz (>= 375.0 gm/sec)	Engine Run Time Engine Speed Powertrain Relay Voltage Above criteria present for a period of time Diagnostic is Enabled	> 0.0 seconds >= 300 RPM >= 9.1 Volts >= 0.5 seconds	200 failures out of 250 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Manifold Absolute Pressure Sensor Performance (single turbo)	P0106	Detects a performance failure in the Manifold Pressure (MAP) sensor, such as when a MAP value is stuck in range. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Mass Air Flow (MAF) sensor, Turbocharger Boost Pressure sensor and Throttle Position sensor (TPS). These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the MAP sensor. In this case, the MAP Performance diagnostic	**Engine Running:** See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered MAPI model fails when ABS(Measured MAP - MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is	> 20.0 grams/sec > 25.0 kPa > 30.0 kPa > 30.0 kPa > 30.0 kPa > 250 kPa*(g/s)	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -9 Deg C = TRUE) <= 130 Deg C = FALSE) >= -20 Deg C <= 100 Deg C >= 0.50 Modeled Air Flow Error multiplied by **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM** and **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAPI Residual Weight Factor based on RPM**	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		will fail.	TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow	> 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm/sec as a function of engine speed See table	No Active DTCs: No Pending DTCs:	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			-	**P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow**	Diagnostic is Enabled	IAT_SensorCircuitFP MnfdTempSensorCktFP		
			AND Manifold Pressure	> a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP**				
			AND Filtered Mass Air Flow - Mass Air Flow	< 3.0 gm/sec				
			Low Engine Air Flow is TRUE when Mass Air Flow	< a threshold in gm/sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow**				
			AND Manifold Pressure	< a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP**				
			AND Mass Air Flow - Filtered Mass Air Flow	< 3.0 gm/sec				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Manifold Absolute Pressure Sensor Circuit Low	P0107	Detects a continuous short to ground in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too low. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	< 3.0 % of 5 Volt Range (This is equal to 7.5 kPa)	Diagnostic is Enabled		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Manifold Absolute Pressure Sensor Circuit High	P0108	Detects a continuous short to power or open circuit in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too high. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	>85.8% of 5 Volt Range (This is equal to 371.0 kPa)	Diagnostic is Enabled		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Air Temperature Sensor Circuit Performance (applications with humidity sensor and manifold temperature sensor)	P0111	Detects an Intake Air Temperature (IAT) sensor value that is stuck in range by comparing the IAT sensor value against the IAT2 and IAT3 sensor values and failing the diagnostic if the IAT value is more different than the IAT2 and IAT3 values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled. The diagnostic will fail if the IAT2 and IAT3 values are similar, and the IAT value is not similar to the IAT2 and IAT3 values. The diagnostic will also fail if none of the three sensor values are similar to each other, and the IAT value is furthest from the sensor value that is in the middle of the three sensor values. This diagnostic is executed once per	**<u>Good Correlation Between IAT2 and IAT3</u>** ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3)	> 30 deg C > 25 deg C <= 25 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs: LIN communications established with MAF	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
			<u>Not Good Correlation, IAT2 in Middle:</u> Power Up IAT2 is between Power Up IAT and Power Up IAT3 AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT) > ABS(Power Up IAT2 - Power Up IAT3)	> 25 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs: LIN communications established with MAF	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		ignition cycle if the enable conditions are met.	**Not Good Correlation, IAT3 in Middle:** Power Up IAT3 is between Power Up IAT and Power Up IAT2 AND ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT3 - Power Up IAT) > ABS(Power Up IAT3 - Power Up IAT2)	> 30 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs: LIN communications established with MAF	> 28,800 seconds >=11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Se nso r_C kt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temp Sensor Circuit Low	P0117	Circuit Continuity This DTC detects a short to ground in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsrl Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 55.0 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 55.0 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 55.0 Ohms Temp Sensor 7: 55.0 Ohms	Diagnostic is Enabled		5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temp Sensor Circuit High	P0118	Circuit Continuity This DTC detects a short to high or open in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsrl Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	> X Ohms X is equal to: Temp Sensor 1: 174,069 Ohms Temp Sensor 2: 174,069 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 174,069 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 174,069 Ohms Temp Sensor 7: 174,069 Ohms	Diagnostic is Enabled Engine run time OR IAT min	 > 10.0 seconds > -20.0 °C	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	P0119	Circuit Erratic This DTC detects large step changes in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsrl Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7:		Diagnostic is Enabled No Active DTC's	 ECT_Sensor_Ckt_FA EECR_EngineOut_Erratic_TFTKO	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CeEECR_e_EngCoolant TempSnsr6 The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 6: 1) Sensor time constant	 10.0 seconds -60.0 °C 150.0 °C 10.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 7.0 seconds				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			2) Sensor low limit 3) Sensor high limit Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the calculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. *****************************	-60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Throttle Position Sensor Performance (single turbo)	P0121	Detects a performance failure in the Throttle Position sensor (TPS) sensor, such as when a TPS value is stuck in range. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Manifold Pressure (MAP) sensor, Turbocharger Boost Pressure sensor and Mass Air Flow (MAF) sensor. These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the TPS sensor. In this case, the TPS	See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered MAPI model fails when ABS(Measured MAP - MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP -	>20.0 grams/sec > 25.0 kPa > 30.0 kPa > 30.0 kPa > 30.0 kPa > 250 kPa*(g/s)	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -9 Deg C = TRUE) <= 130 Deg C = FALSE) >= -20 Deg C <= 100 Deg C >= 0.50 Modeled Air Flow Error multiplied by **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM** and **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAPI Residual Weight Factor based on RPM**	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		Performance diagnostic will fail.	measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow AND	> 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow**	No Active DTCs: No Pending DTCs:	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Manifold Pressure AND Filtered Mass Air Flow - Mass Air Flow Low Engine Air Flow is TRUE when Mass Air Flow AND Manifold Pressure AND Mass Air Flow - Filtered Mass Air Flow	> a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP** < 3.0 gm/sec < a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow** < a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP** < 3.0 gm/sec	Diagnostic is	MnfdTempSensorCktFP Enabled		

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Below Stat Regulating Temperature	P0128	This DTC detects if the ECT (EngineCoolant temperature) does not achieve the required target temperature after an allowed energy accumulation by the engine. This can be caused by an ECT sensor biased low or a cooling system that is not warming up correctly because of a stuck open thermostat or other fault.	Energy is accumulated after the first conbustion event using Range 1, 2 or 3: If the maxium energy is greater than as shown in the supporting tables prior to the Engine outlet coolant achieving the target a fault will be indicated. **Range 1 (Primary):** Ambient air temperature is between 10.0 and 52.0 °C Engine Outlet Coolant reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 20.0 °C. The target temperature for this range will not drop below 71.0° C **Range 2 (Secondary):** Ambient air temperature is between -9.0 and 10.0 ° C Engine Outlet Coolant reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 36.0 °C. The target temperature for this range will not drop below 36.0 °	**P0128 Maximum Acculated Energy - Primary** **P0128 Maximum Acculated Energy - Secondary**	Diagnostic is Enabled No DTCs Engine soak time Engine run time Engine Outlet Coolant Temperature - Range 1: - Range 2: - Range 3: Devices in main cooling circuit are not in in device control If Engine RPM is continuously greater than for this time period Distance traveled	THMR_AWP_AuxPumpFA THMR_AHV_FA THMR S WP_Control_FA THMR_SWP_FlowStuckOn_FA THMR_SWP_NoFlow_FA OAT_PtEstFiltFA VehicleSpeedSensor_FA EngineTorqueEstInaccurate MAF_SensorFA ETHR_CoolantEnergyModel ETHR_RemedialActionLeveil ETHR_RemedialActionLevel2 ETHR_RemedialActionLevel3 EECR_EngineOutlet_FA > 1,800.0 seconds 10.0 - 1,800.0 seconds <51.6 °C <35.6 °C <35.6 °C 9,999 rpm 5.0 seconds >1.0 km	1 failure to set DTC 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			C **Range 3 (Tertiary):** Ambient air temperature is between -9.0 and -9.0 ⁰ C Engine Outlet Coolant reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 36.0 °C. The target temperature for this range will not drop below 36.0 ° C	**P0128 Maximum Acculated Energy - Tertiary** This diagnostic models the net energy into and out of the cooling system during the warm-up process. The ten energy terms are: heat from combustion (with AFM correction), heat from after-run, heat loss to transmission oil, heat loss to enviroment, heat loss to cabin, heat loss to DFCO, heat loss to engine oil, heat loss to exhaust, and eat loss to autostop.	The diagnostic will abort if the temperature has dropped by after the customer has commanded the engine off	>5.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit Low Voltage Bank 1 Sensor 1 (For use with WRAF - Gen4 ECM	P0131	This DTC determines if the WRAF 02 sensor signal circuit is shorted low. This DTC will detect a short to ground fault to the Pump Current, Reference Cell Voltage, Reference Ground and Trim circuits. When enabled, the diagnostic monitors the three different failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the three individual fail and sample counters.	B1S1 WRAF ASIC indicates a ground short to any of the following WRAF signals: A) Pump Current - short to ground fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to ground fail counts are accumulated to determine fault status. C) Reference Ground - short to ground fail counts are accumulated to determine fault status. D) Trim circuit - short to ground fail counts are accumulated to determine fault status. Note: This ASIC is referred to asATIC142 (Continental). Note: Aground short on the Pump Current or Reference Voltage signal may also set a P223C DTC.	The ASIC provides a fault indication when the pump current, reference cell or reference ground pin is < 150mV. Note: the faults must exist for previous 100 milli - seconds to qualify for a fail flag. The four fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	Diagnostic is Enabled B1S1 DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop *kickic'kicicic'k'kicicicic'icicic'kicicicickic'kic Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) **************************	 P0135, P0030, P0031 or P0032 = Valid = Ready = True = Complete > 20.0 seconds	Signal A: 20 failures out of 24 samples OR Signal B: 20 failures out of 24 samples OR Signal C: 20 failures out of 24 samples OR Signal D: 20 failures out of 24 samples Continuous in 25 milli - second loop	Type B, 2 Trips
			B1S1 WRAF ASIC indicates a ground short to any of the following WRAF signals:	The ASIC provides a fault indication when the pump current, reference cell, reference ground or	Diagnostic is Enabled B1S1 DTC's Not active this key cycle	 P0135, P0030, P0031 or P0032	Signal A: 20 failures out of 24 samples OR	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			A) Pump Current - short to ground fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to ground fail counts are accumulated to determine fault status. C) Reference Ground - short to ground fail counts are accumulated to determine fault status. D) Trim circuit - short to ground fail counts are accumulated to determine fault status. Note: This ASIC is referred to as CJ136 (next Gen version of CJ135 from Bosch).	trim circuit fails the following criteria; |Nernst signal - 0.45| >1.0 volts OR |Voltage drop over Rgnd - (internal current source *Rgnd)| >0.5 volts OR CJ136 H/W detection Note: the faults must exist for previous 10 milli - seconds to qualify for a fail flag. The four fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ***** kick kkk kkk kkk kkk kkk kkk Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) ***************************	= Valid = Ready = True = Complete > 20.0 seconds	Signal B: 20 failures out of 24 samples OR Signal C: 20 failures out of 24 samples OR Signal D: 20 failures out of 24 samples Continuous in 25 milli - second loop	

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

Component/ System	**Fault Code**	**Monitor Strategy Description**	**Malfunction Criteria**	**Threshold Value**	**Secondary Parameters**	**Enable Conditions**	**Time Required**	**MIL Ilium.**
O2S Circuit High Voltage Bank 1 Sensor 1 (For use with WRAF - Gen4 ECM	P0132	This DTC determines if the WRAF 02 sensor signal circuit is shorted high. This DTC will detect a short to power fault to the Pump Current, Reference Cell Voltage, Reference Ground and Trim circuit. When enabled, the diagnostic monitors the three different failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the three individual fail and sample counters.	B1S1 WRAF ASIC indicates a short to power on any of the following WRAF signals: A) Pump Current - short to power fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to power fail counts are accumulated to determine fault status. C) Reference Ground - short to power fail counts are accumulated to determine fault status. D) Trim Circuit - short to power fail counts are accumulated to determine fault status Note: This ASIC is referred to asATIC142 (Continental)..	The ASIC provides a fault indication when the pump current, reference cell, reference ground or trim circuit pin is > 5.2V. Note: the faults must exist for more than 100 msec to qualify for a fail flag. The four fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	Diagnostic is Enabled B1S1 DTC's Not active this key cycle Measure Valid Status (ASIC) Controller status (ASIC) Engine Run or Auto stop *kickic'kicicic'k'kicicicic'icicic'kicicicickic'kic Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) *************************	 P0135, P0030, P0031 or P0032 = Valid = Ready = True = Complete > 20.0 seconds	Signal A: 20 failures out of 24 samples OR Signal B: 20 failures out of 24 samples OR Signal C: 20 failures out of 24 samples OR Signal D: 20 failures out of 24 samples Frequency: Continuous in 25 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			B1S1 WRAF ASIC indicates a short to power on any of the following WRAF signals: A) Pump Current - short to power fail counts are accumulated to determine fault status. B) Reference Cell Voltage - short to power fail counts are accumulated to determine fault status. C) Reference Ground - short to power fail counts are accumulated to determine fault status. D) Trim Circuit - short to power fail counts are accumulated to determine fault status Note: This ASIC is referred to as CJ136 (next Gen of CJ135 from Bosch).	The ASIC provides a fault indication when the pump current, reference cell, reference ground or trim circuit pin fail the following criteria; CJ136 H/W detection Note: the faults must exist for more than 10 msec to qualify for a fail flag. The four fault signals have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	Diagnostic is Enabled B1S1 DTC's Not active this key cycle Measure Valid Status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete). **************************	 P0135, P0030, P0031 or P0032 = Valid = Ready = True = Complete > 20.0 seconds	Signal A: 20 failures out of 24 samples OR Signal B: 20 failures out of 24 samples OR Signal C: 20 failures out of 24 samples OR Signal D: 20 failures out of 24 samples Frequency: Continuous in 25 milli - second loop	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the 02 sensor heater is functioning properly by monitoring the current through the heater circuit. This test compares the measured heater current (monitored thru the low side driver) and compares it to the expected values (over the voltage range provided) for the released sensor. The diagnostic failure counter is incremented if the heater current is outside the expected range. This DTC is set based on the fail and sample counters.	Heater Current outside of the expected range of	0.3 < Amps < 4.3	Diagnostic is Enabled No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	 ECT_Sensor_FA >11.0 Volts = Complete = Not active > zero > 120 seconds	/failures out of 9 samples Frequency: 2 tests per trip 10 seconds delay between tests and 1 second execution rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit Low Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0137	This DTC determines if the 02 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is below the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	< 40 mvolts	Diagnostic is Enabled No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault Commanded Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active	 TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 11.0 < Volts = Not active = Not active = Not active = Not active = False = False 0.991 < ratio <1.040 60 < mgrams < 500 = Closed Loop = TRUE (Please see **"Closed Loop Enable**	320 failures out of 400 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Circuit High Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0138	This DTC determines if the 02 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the 02S signal and compares it to the threshold. The diagnostic failure counter is incremented if the 02S signal is above the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	> 1,050 mvolts	Diagnostic is Enabled No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Low Fuel Condition Only when FuelLevelDataFault *********************** Secondary delay after above conditions are complete (cold start condition) Secondary delay after above conditions are complete (not cold start condition) Commanded Equivalence Ratio *********************** All of the above met for	 TPS_ThrottleAuthorityDefaulted MAF_SensorFA MAP_SensorFA EvapExcessPurgePsbl_FA FuelInjectorCircuit_FA Ethanol Composition Sensor FA AIR System FA 11.0 < Volts = All Cylinders active = Complete > 5.0 seconds > 30.0 seconds = False = False *********************** > 150.0 seconds when engine soak time > 28,800 seconds > 150.0 seconds when engine soak time < 28,800 seconds <1.040 EQR *********************** > 3.0 seconds	100 failures out of 125 samples Frequency: Continuous in 100 milli-second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	P013A	The P013A diagnostic is the third in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor has an slow response to an A/F change from Rich to Lean and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. Note: The Primary method is used when the secondary 02 sensor signal transitions from above the upper threshold to below the lower threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P013A diagnostic measures the secondary 02 sensor voltage response rate	Primary Method: The EWMA of the Post 02 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient. OR Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units < 7.2 units > 60.0 grams (upper voltage threshold is 450 mvolts and lower voltage threshold is 150 mvolts)	Diagnostic is Enabled No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2TFTKO P013B, P013E, P013F, P2270 or P2271 >11.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		between an upper and lower voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized intregral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTCP013Ais set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. Secondary method:			Low Fuel Condition Only when FuelLevelDataFault Post fuel cell Crankshaft Torque DTC's Passed =================== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	only enabled when airflow is above 22.0 grams/sec. = False = False = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. <75.0Nm P2270 (and P2272 if applicable) P013E (and P014Aif applicable) ==================		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Slow Response Lean to Rich Bank 1 Sensor 2	P013B	The P013B diagnostic is the sixth in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor has an slow response to an A/F change from Lean to Rich and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. Note: The Primary method is used when the secondary 02 sensor signal transitions from below the lower threshold to above the upper threshold, otherwise the Secondary method is used. Primary method: The P013B diagnostic measures the secondary 02 sensor voltage response rate	Primary Method: The EWMA of the Post 02 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient. OR Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units < 7.2 units >200 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 600 mvolts)	Diagnostic is Enabled No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2TFTKO P013A, P013E, P013F, P2270 or P2271 >11.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		between an lower and upper voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized intregral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTCP013Bis set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value.				Airflow accumulation is only enabled when airflow 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 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 22.0 grams/ sec. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					DTC's Passed	P2270 P013E P013A P2271 P013F		
					===================	=================		
		Secondary method:			After above conditions are met: Fuel Enrich mode continued.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		This fault is set if the secondary 02 sensor does not achieve the required upper voltage threshold before the accumulated mass air flow threshold is reached.			================= During this test the following must stay TRUE or the test will abort: 0.950 < Base Commanded EQR < 1.100 ================ During this test: Engine Airflow must stay below: and the delta Engine Airflow over 12.5msec must be :	================== ================== 80 gps < 15.0 gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	The P013E diagnostic is the second in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor has an initial delayed response to an A/F change from Rich to Lean and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required voltage before the accumulated mass airflow threshold is reached.	Post 02 sensor voltage AND The Accumulated mass airflow monitored during the Delayed Response Test under DFCO DFCO begins after: 1) Catalyst has been rich for a minimum of AND 2) Catalyst Rich Accumulation Air Flow is	> 450 mvolts > 70 grams > 1 secs > 7.0 grams	Diagnostic is Enabled No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTKO 02S_Bank_ 2TFTKO P013A, P013B, P013F, P2270 or P2271 >11.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.		
					Low Fuel Condition Only when FuelLevelDataFault	= False = False		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					Crankshaft Torque	<75.0Nm		
					DTC's Passed	P2270		
					Number of fueled cylinders	< 3 cylinders		
					After above conditions are met: DFCO mode entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2	P013F	The P013F diagnostic is the fifth in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor has an initial delayed response to an A/F change from Lean to Rich and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required voltage before the accumulated mass airflow threshold is reached.	Post 02 sensor voltage AND The Accumulated mass airflow monitored during the Delayed Response Test	< 350 mvolts >200 grams	Diagnostic is Enabled No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green 02S Condition	 TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTKO 02S_Bank_ 2TFTKO P013A, P013B, P013E, P2270 or P2271 >11.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						Airflow accumulation is only enabled when airflow 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 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 22.0 grams/ sec. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					DTC's Passed	P2270 P013E P013A P2271		
					Number of fueled cylinders	> 1 cylinders		
					==================	==================		
					After above conditions are met: Fuel Enrich mode			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					entered. ================= During this test the following must stay TRUE or the test will abort: 0.950 < Base Commanded EQR < 1.100 ================= During this test: Engine Airflow must stay below: and the delta Engine Airflow over 12.5msec must be :	================== ================ 80 gps < 15.0 gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
O2S Heater Performance Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0141	This DTC determines if the 02 sensor heater is functioning properly by monitoring the current through the heater circuit. This test compares the measured heater current (monitored thru the low side driver) and compares it to the expected values (over the voltage range provided) for the released sensor. The diagnostic failure counter is incremented if the heater current is outside the expected range. This DTC is set based on the fail and sample counters.	Heater Current outside of the expected range of	0.3 > amps > 2.5	Diagnostic is Enabled No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA >11.0 Volts = Complete = Not active > zero > 120 seconds	/failures out of 9 samples Frequency: 2 tests per trip 10 seconds delay between tests and 1 second execution rate.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Rich to Lean Bank 1 Sensor 1) (For use with WRAF	P015A	DTC P015A detects that the primary WRAF oxygen sensor for Bank 1 has delayed response when the air fuel ratio transitions from rich to lean condition. This diagnostic runs simultaneously with the intrusive secondary 02 monitor rich to lean tests (P013E / P013A/ P2271), which commands fuel cut off. Note: The Primary method is used when the primary WRAF 02 sensor signal transitions from above to below the 02 measured EQR threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P015A diagnostic measures the primary WRAF 02 sensor response time between a rich condition above a starting measured EQR threshold and a lower measured EQR threshold. The response time is then scaled and normalized to mass airflow rate, engine speed, Baro,	Primary method: The EWMA of the Pre 02 sensor normalized R2L time delay value. The EWMA repass limit is The EWMA calculation uses a 0.25 coefficient. This method calculates the result when the WRAF 02 sensor measured EQR is OR Secondary Method: The Accumulated time monitored during the R2L Delayed Response Test. AND Pre WRAF 02 sensor measured EQR is	> 0.57 EWMA (sec) < 0.50 EWMA (sec) < 0.800 EQR > 2.5 Seconds > 0.300 EQR	Diagnostic is Enabled No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA WRAF_Bank_1_FA P0131, P0132, P013A, P013B, P013E, P013F, P2270, P2271 >11.0 Volts = Not active = Not active = Not active = Not active = False = False	Frequency: Once per trip Note: if NaESPD_b_FastInitResplsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		and intake air temperature resulting in a normalized delay value. The normalized delay is fed into a 1st order lag filter to update the final EWMA result. DTC P015A is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. <ins>Secondary method:</ins> This fault is set if the primary WRAF 02 sensor does not achieve the required lower measured EQR			Green 02S Condition 02 Heater (pre sensor) on for Engine Coolant (Or OBD Coolant Enable Criteria IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) Closed loop integral Closed Loop Active	= Not Valid, Green 02S condition is considered valid until the accumulated airflow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. > 30 seconds > 50 °C = TRUE) > -40 °C > 30 seconds 1,100 < RPM < 3,000 1,000 < RPM < 3,100 2.0 < gps < 20.0 34.2 < MPH < 80.8 31.1 < MPH < 87.0 0.80 < C/LInt < 1.08 = TRUE (Please see **"Closed Loon Enable**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		threshold before a delay time threshold is reached.			Evap Ethanol Estimation in Progress Baro Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State	**Clarification”** in Supporting Tables), not in control of purge = Not Active (Please see **“Ethanol Estimation in Progress”** in Supporting Tables). > 70kpa = enabled = not active = not active > 60.0 sec 500 < °C < 800 = DFCO possible		
					All of the above met for at least 1.0 seconds, and then the Force Cat Rich intrusive stage is requested.			
					Pre O2S EQRB1S1 at end of Cat Rich stage Fuel State Number of fueled cylinders	> 1.120EQR = DFCO active < 3 cylinders		
					After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1) (For use with WRAF	P015B	DTC P015B detects that the primary WRAF oxygen sensor for Bank 1 has delayed response when the air fuel ratio transitions from lean to rich condition. This diagnostic runs simultaneously with the intrusive secondary 02 monitor lean to rich tests (P013F / P013B), which commands fuel enrichment. Note: The Primary method is used when the primary WRAF 02 sensor signal transitions from lean condition to above the 02 measured EQR threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P015B diagnostic measures the primary WRAF 02 sensor response time between a lean condition and a higher measured EQR threshold. The response time is then scaled and normalized to mass airflow rate, engine speed, Baro, and intake air temperature resulting in	Primary method: The EWMA of the Pre 02 sensor normalized L2R time delay value. The EWMA repass limit is The EWMA calculation uses a 0.25 coefficient. OR Secondary method: The Accumulated time monitored during the L2R Delayed Response Test. AND Pre WRAF 02 sensor measured EQR is OR At end of Cat Rich stage the Pre WRAF 02 sensor measured EQR is	> 0.68 EWMA (sec) < 0.60 EWMA (sec) > 2.0 Seconds < 0.800 EQR < 1.120EQR	Diagnostic is Enabled No Active DTC's P015Atest is complete and System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA WRAF_Bank_1_FA P0131, P0132, P013A, P013B, P013E, P013F, P015A, P2270, P2271 = Passed >11.0 Volts = Not active = Not active = Not active = Not active = False	Frequency: Once per trip Note: if NaESPD_b_FastInitResplsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		a normalized delay value. The normalized delay is fed into a 1st order lag filter to update the final EWMA result. DTC P015B is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. <u>Secondary method:</u> This fault is set if the primary WRAF 02 sensor does not achieve the required higher measured EQR threshold before a delav time threshold is			Only when FuelLevelDataFault Green 02S Condition 02 Heater (pre sensor) on for Engine Coolant (Or OBD Coolant Enable Criteria IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled)	 = False = Not Valid, Green 02S condition is considered valid until the accumulated airflow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec. > 30 seconds > 50 °C = TRUE) > -40 °C > 30 seconds 1,100 < RPM < 3,000 1,000 < RPM < 3,100 2.0 < gps < 20.0 34.2 < MPH < 80.8 31.1 < MPH < 87.0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		reached.			Closed loop integral Closed Loop Active Evap Ethanol Estimation in Progress Baro Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on time Predicted Catalyst temp Fuel State Number of fueled cylinders	0.80 < C/L Int < 1.08 = TRUE (Please see **“Closed Loop Enable Clarification”** in Supporting Tables). not in control of purge = Not Active (Please see **“Ethanol Estimation in Progress”** in Supporting Tables). > 70kpa = enabled = not active = not active > 60.0 sec 500 < °C < 800 = DFCO inhibit > 1 cylinders		
					When above conditions are met: Fuel Enrich mode is entered. _______________			
					During this test: Engine Airflow must stay between: and the delta Engine Airflow over 12.5msec must be :	0 < gps < 30 < 30.0 gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel System Too Lean Bank 1	P0171	Determines if the primary fuel control system for Bank 1 is in a lean condition, based on the filtered long-term and short-term fuel trim. A normally operating system operates centered around long-term fuel trim metric of 1.0. For lean conditions extra fuel trim is required therefor values >1.0 indicate a Lean condition.	The filtered long-term fuel trim metric	>= 1.300	The primary fuel trim diagnostic is enabled		Frequency: 100 ms Continuous Loop	Type B, 2 Trips
			AND		Engine speed	400 <rpm< 6,500		
					BARO	> 70 kPa		
			The filtered short-term fuel trim metric (Note: any value below 0.95 effectively nullifies the short-term fuel trim criteria)	>= 0.100	Coolant Temp	>-20 °C (or OBD Coolant Enable Criteria = TRUE)		
				If a fault has been detected the long-term fuel trim metric must be < 1.250 and the short-term fuel trim metric must be < 2.000 to repass the diagnostic.	Coolant Temp	< 135 °C		
					MAP	18 <kPa< 255		
					Inlet Air Temp	-20 <°C< 150		
					MAF	1 <g/s< 1,000		
					Fuel Level	> 10 % or if fuel sender is faulty the diagnostic will bypass the fuel level criteria.		
		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.			Long Term Fuel Trim data accumulation:	> 30.00 seconds of data must accumulate on each trip, with at least 15.00 seconds of data in the current fuel trim cell before a pass or fail decision can be made. Additional time can be required for cold ambient starts to accommodate larger minimum LTM's for startability reasons. See **Startup Engine Coolant adjusmentto Minimum accumulation time** .		
					Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis	(Please see **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage** in Supporting Tables for a list of cells utilized for diagnosis)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Closed Loop Long Term FT	Enabled Enabled (Please see **"Closed Loop Enable Clarification"** and **"Long Term FT Enable Criteria"** in Supporting Tables.)		
					EGR Diag. Catalyst Diag. Post 02 Diag. Device Control EVAP Diag.	Intrusive Test Not Active Intrusive Test Not Active Intrusive Test Not Active Not Active Large Leak Diagnostic (P0455) Not Active		
					Delay during GPF Regeneration Standard startup delays are re-initialized following completion of GPF Regen to allow system stabilization. (See "Long Term Fuel Trim data accumulation" above.)	No Delay		
					No active DTC:	IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPurgePsbl_F A Ethanol Composition Sensor FA FuelInjectorCircuit_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbPresDfltdStatus TC_BoostPresSnsrFA O2S_Bank_1_Sensor_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel System Too Rich Bank 1	P0172	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric.A normally operating system operates centered around long-term fuel trim metric of 1.0. For rich conditions less fuel trim is required therefor values < 1.0 indicate a rich condition. There are two methods to determine a Rich fault. They are Passive and Intrusive. A Passive Test decision can be made up until the time that purge is first enabled. From that point forward, rich faults can only be detected by turning purge off intrusively. If during this period of time the filtered long-term fuel trim metric exceeds the threshold a fault will be set. In addition to the long-term fuel trim limit, the short-term fuel trim metric can be monitored and the fault sets once both threshold values are exceeded. The short-	**Passive Test:** The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria) **************************** **Intrusive Test:** For 2 out of 3 intrusive segments The filtered Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria)	<= 0.710 <= 2.000 ************************* <= 0.715 <= 0.710 <= 2.000 If a fault has been detected (by the passive or intrusive test) the long-term fuel trim metric must be > 0.710 and the short-	***************************** Purge Vapor Fuel	Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered. ***************************** <= 22.00 % Intrusive Test is inhibited when Purge Vapor percentage is greater than this threshold. (Note: values greater than 50% indicate the Purge Vapor Fuel requirement is not being used) A minimum number of accumlated Fuel Trim Data samples are required to adequately learn a correct Purge Vapor Fuel value. See the table **Minimum Non-Purge Samples for Purge (Vapor Fuel)** for the Purge Off cells used to validate the Purge Vapor Fuel parameter.	Frequency: 100 ms Continuous Loop ****************** **Segment Definition:** Segments can last up to 60 seconds and are separated by the lesser of 20.00 seconds of purge-on time or enough time to purge 36 grams of vapor. A maximum of 3 completed segments or 20 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		term fuel trim metric is only monitored on programs that have acceptable emissions when the long-term fuel metric reaches its full authority. Once purge is enabled if the filtered Purge Long Term Fuel Trim metric > 0.715 , 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 <= 0.715 , 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 2 out of 3 intrusive segments, the filtered Purge Long Term Fuel Trim metric <= 0.710 the fault will set. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics. This is why the intrusive test is operated over several		term fuel trim metric must be > 0.000 to repass the diagnostic. The intrusive test will be enabled at long-term fuel metric values < 0.71 until the diagnostic repasses after a failure.		If the accumulated purge volume is > 1,400.0 grams, the intrusive test will not be inhibited even if Purge Vapor Fuel is > 22.0 %.	time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge Long Term Fuel Trim metric > 0.715 for at least 150.00 seconds, indicating that the canister has been purged.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		segments allowing Purge to renable between segments. Likewise, for these reasons, if after the 3 intrusive segments the diagnostic continues to pass, there is a delay period of 300 seconds to allow sufficient time to purge excess vapors from the canister, before re-evaluating a Rich condition if it still exists.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Temperature Sensor 1 Circuit Low Fault	P0182	This DTC diagnose SENT fuel rail temperature sensor 1 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	< 145	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (U0625, U101B, U0670, U0671) SENT Intenal Error Fault Active (P126E) Fuel Temperature Sensor SENT Message Error Fault Active (P128C)		
					No Fault Pending on	SENT Intenal Error Fault Pending (P126E) Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Temperature Sensor 1 Circuit High Fault	P0183	This DTC diagnose SENT fuel rail temperature sensor 1 that is too high out of range. If the sensor digital value (represnting the refernce voltage) is above the upper digital threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the high sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	> 1,865	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (U0625, U101B, U0670, U0671) SENT Intenal Error Fault Active (P126E) Fuel Temperature Sensor SENT Message Error Fault Active (P128C)		
					No Fault Pending	SENT Intenal Error Fault Pending (P126E) Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Temperature Sensor 2 Circuit Low Fault	P0187	This DTC diagnose SENT fuel rail temperature sensor 2 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital read threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	< 145.00	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (U0625, U101B, U0670, U0671)		
						SENT Intenal Error Fault Active (P126F)		
						Fuel Temperature Sensor SENT Message Error Fault Active (P128D)		
					No Fault Pending	SENT Intenal Error Fault Pending (P126F)		
						Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Temperature Sensor 2 Circuit High Fault	P0188	This DTC diagnose SENT fuel rail temperature sensor 2 that is too high out of range. If the sensor digital value (represnting the refernce voltage) is above the upper digital read threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the high sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	> 1,865.00	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (U0625, U101B, U0670, U0671) SENT Intenal Error Fault Active (P126F) Fuel Temperature Sensor SENT Message Error Fault Active (P128D)		
					No Fault Pending	SENT Intenal Error Fault Pending (P126F) Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pressure Sensor "B" Circuit Range/ Performance	P018B	This DTC detects a fuel pressure sensor response stuck within the normal operating range using an intrusive test (as follows) a] Intrusive Test Trigger: 1] Fuel Pump Duty Cycle Clamped Time (min or max duty cycle) >= 5 sec Or 2] Fuel Pres Err Variance <= calibration value KeFDBR_cmp_FPSS_MinPres Variance ; Otherwise, Report status as Pass b] Intrusive test freq limit: 60 sec between intrusive tests that pass, c] Intrusive test Fuel Flow limit: Fuel Flow Actual < Max allowed Fuel Flow rate						Type B, 2 Trips

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure Sensor 1 Out of Range	P0192	This DTC diagnose SENT high pressure sensor 1 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	High Pressure Rail Sensor 1 SENT digital read value	=< 66			Time Based: 400 Failuerout of 500 Samples 6.25 ms per Sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Temperature (EOT) Circuit Low	P0197	Controller specific output driver circuit diagnoses the Engine Oil Temperature (EOT) Sensor low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor (EOT) Circuit Resistance	< 25 ohms	Diagnostic Status	Enabled	4 failures out of 5 samples Sampled every 1 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Temperature (EOT) Circuit High	P0198	Controller specific output driver circuit diagnoses the Engine Oil Temperature (EOT) Sensor low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor (EOT) Circuit Resistance	> 450,000 ohms	Diagnostic Status Engine Run Time OR ECT	Enabled > 20.0 seconds >= -20 Deg C	4 failures out of 5 samples Sampled every 1 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Temperature Sensor (EOT) Circuit Intermittent	P0199	Determines if an intermittent fault exists on the engine oil temperature sensor circuit. This diagnostic compares each temperature sample to the previous sample and measures cumulative error over a sample period.	**Continuous Test** Pass/Fail Condition: Temperature signal string length, cumulative sum of absolute value of (Oil Temperature - Previous Oil Temperature)	String Length >= 10.00 °C	None	Enabled	4 failures out of 5 samples, sampled every 2 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Temperature Sensor B Circuit Low	P01BB	Controller specific output driver circuit diagnoses the Engine Oil Temperature Sensor B low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor B Circuit Resistance	< 25 ohms	Diagnostic Status	Enabled	4 failures out of 5 samples Sampled every 1 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Temperature Sensor B Circuit High	P01BC	Controller specific output driver circuit diagnoses the Engine Oil Temperature Sensor B low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor B Circuit Resistance	> 450,000 ohms	Diagnostic Status Engine Run Time OR ECT	Enabled > 20.0 seconds >= -20 Deg C	4 failures out of 5 samples Sampled every 1 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Temperature Sensor B Circuit Intermittent	P01BD	Determines if an intermittent fault exists on the engine oil temperature sensor B circuit. This diagnostic compares each temperature sample to the previous sample and measures cumulative error over a sample period.	**Continuous Test** Pass/Fail Condition: Temperature signal string length, cumulative sum of absolute value of (Oil Temperature - Previous Oil Temperature)	String Length >= 10.00 °C	None	Enabled AND EngOilTempFA = FALSE	4 failures out of 5 samples, sampled every 2 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 3 Circuit Low	P01E5	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr3 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 55.0 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 55.0 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 55.0 Ohms Temp Sensor 7: 55.0 Ohms	Diagnostic is Enabled		5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 3 Circuit High	P01E6	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	> X Ohms X is equal to: Temp Sensor 1: 174,069 Ohms Temp Sensor 2: 174,069 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 174,069 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 174,069 Ohms Temp Sensor 7: 174,069 Ohms	Diagnostic is Enabled Engine run time OR IAT min	 > 10.0 seconds > -20.0 °C	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 3 Circuit Intermittent/ Erratic	P01E7	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature 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.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr3 Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolantTempSnsr4		Diagnostic is Enabled No Active DTC's	 EECR_TS3_Erratic_TFTK0 EECR_TS3_CktHiLo_FA	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6 The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 10.0 seconds -60.0 °C 150.0 °C 10.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 7.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the calculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. *****************************	 5.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Coolant Temperature Dropped Below Diagnostic Monitoring Temperature -ATM	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.	Engine outlet coolant temperature drops below for an unexpected reason	60.0 °C	Diagnostic is Enabled No Active DTC's Engine Runtime Distance traveled this key cycle Ambient air pressure Ambient air temperature ************************** Engine coolant temperature At least once during the key cycle Type 0 (non-heated t-stat) ************************** Heat to coolant DFCO time Thermostat duty cycle RPM Active Fuel Management is not in	 ECT_Sensor_Ckt_FA VehicleSpeedSensor_FA OAT_PtEstFiltFA THMR_AWP_AuxPumpFA THMR_AHV_FA THMR S WP_Control_FA EngineTorqueEstInaccurate ECT_Sensor_Perf_FA THMR-SWP NoFlow FA THMR_SWP_FlowStuckOn_FA >30.0 seconds >1.0 km > 55.0 kPa >-9.0 °C > 71.0 °C ≥ **P01F0 - Heat To Coolant Min 2D** < 12.0 seconds < 101.0% < 9,999 Half Cylinder Mode	48 seconds out of a 60 seconds window	Type B, 2 Trips

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Secondary Circuit Low [FTZM Brushed Motor Fuel Pump applications only]	P0231	This DTC detects if the fuel pump control circuit is shorted to low. Fuel Pump Power Driver device reports a Faulted state enumeration if current >= 18A [25A for high performance variants. FPDCM reports Not Faulted enumeration if current < 18A FPDCM reports Indeterminate state enumeration if the circuit is not being evaluated during current decision loop due to other conditions.	Power driver output current (Fuel Pump Power Module Driver Circuit Ground Short enumeration)	Current >= 18.0 A	a) Chassis Fuel Pres Sys Type configuration selection [FCBR] b) Arbitrated Fuel Pump Duty Cycle (%) c) Diagnostic Enabled d) Control serial data available [$3EC] e) Sensor Bus Relay On state f) FPDCM Driver Status Alive Rolling Count Sample Faulted g) Fuel Pump Control Enable time [FABR GshtCktDiagInvFail]	a)== FCBR Gas ECM FTZM BDC Sys b1) >10.00 % AND b2)< 100.00 % c) ==TRUE d) ==TRUE e) ==TRUE f) <>True g) >= 31,536,000.00 seconds	40 failures / 80 samples 1 sample/12.5 millisec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Secondary Circuit High [FTZM Brushed Motor Fuel Pump applications only]	P0232	This DTC detects if the fuel pump control circuit is shorted to high voltage by measuring voltage offset relative to low state level of duty cycle pulse. Fuel Pump Power device reports a Faulted state enumeration if circuit voltage >= 4V. FPPM reports Not Faulted enumeration if circuit voltage < 4V. FPPM reports Indeterminate state enumeration if the circuit is not being evaluated during current decision loop due to other conditions.	Voltage offset relative to low state level of duty cycle pulse measured at fuel pump circuit	>4.0 V	a) Chassis Fuel Pres Sys Type configuration selection [FCBR] b) Arbitrated Fuel Pump Duty Cycle (%) c) Diagnostic Enabled d) Diagnostic serial data available [$3EC] e) Sensor Bus Relay On f) FPPM Driver Status Alive Rolling Count Sample Faulted	a) == FCBR Gas ECM FTZM BDC Sys b1) > 5.00 % AND b2)< 95.00 % c) ==TRUE d) == TRUE e) == TRUE f) <> True	40 failures / 80 samples 1 sample / 12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Turbocharger Boost Pressure (TIAP) Sensor Performance (single turbo)	P0236	Detects a performance failure in the Turbocharger Boost Pressure sensor, such as when a Turbocharger Boost Pressure value is stuck in range. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Mass Air Flow (MAF) sensor, Manifold Pressure (MAP) sensor and Throttle Position sensor (TPS). These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the Turbocharger Boost	<u>**Engine Running:**</u> See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered MAPI model fails when ABS(Measured MAP - MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND	> 20.0 grams/sec > 25.0 kPa > 30.0 kPa > 30.0 kPa > 30.0 kPa > 250 kPa*(g/s)	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -9 Deg C = TRUE) <= 130 Deg C = FALSE) >= -20 Deg C <= 100 Deg C >= 0.50 Modeled Air Flow Error multiplied by **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM** and **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAPI Residual Weight Factor based on RPM**	Continuous Calculation are performed every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		Pressure sensor. In this case, the Turbocharger Boost Pressure Performance diagnostic will fail.	Measured TIAP - measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow	> 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm/sec as a function of engine speed See table	No Active DTCs: No Pending DTCs:	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
				P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow	Diagnostic is Enabled	MnfdTempSensorCktFP		
			AND Manifold Pressure	> a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP**				
			AND Filtered Mass Air Flow - Mass Air Flow	< 3.0 gm/sec				
			Low Engine Air Flow is TRUE when Mass Air Flow	< a threshold in gm/sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow**				
			AND Manifold Pressure	< a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP**				
			AND Mass Air Flow - Filtered Mass Air Flow	< 3.0 gm/sec				

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Turbocharger Boost Pressure Sensor Circuit High	P0238	Detects a continuous short to power or open circuit in the Turbocharger Boost Pressure signal circuit by monitoring the Turbocharger Boost Pressure sensor output voltage and failing the diagnostic when the Turbocharger Boost Pressure voltage is too high. The Turbocharger Boost Pressure sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	Turbocharger Boost Pressure Voltage	> 85.8 % of 5 Volt Range (This is equal to 371.0 kPa)	Diagnostic is Enabled		320 failures out of 400 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Secondary Circuit Open [FTZM Brushed Motor Fuel Pump applications only]	P023F	This DTC detects if the fuel pump control circuit is open Fuel Pump Power device reports a Faulted state enumeration if current <= 1 A. FPPM reports Not Faulted enumeration if current > 1A. FPPM reports Indeterminate state enumeration if the circuit is not being evaluated during current decision loop due to other conditions.	Output driver current [Fuel Pump Power Driver Circuit Open enumeration]	Current <= 1.0 A	a) Chassis Fuel Pres Sys Type configuration selection [FCBR] b) Diagnostic Enabled c) Arbitrated Fuel Pump Duty Cycle (%) d) FPDCM Driver Status Alive Rolling Count Sample Faulted	a) == FCBR Gas ECM FTZM BDC Sys b) ==TRUE c1) > 20.00 % AND c2)< 100.00 % d] oTRUE	40 failures / 80 samples; 1 sample/12.5ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit Low	P0245	Controller specific output driver circuit diagnostic, diagnosing the 'turbocharger boost solenoid 'A' actuator' low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In a parallel application, turbocharger 'A'is associated with engine bank 1.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	< 0.5 Q impedance between output and controller ground	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts >5.00 Volts *****************************	10 failures out of 12 samples 100ms / sample	Type A, 1 Trips Note: In certain controllers P0243 may also set turbocharger wastegate / supercharger boost solenoid A control circuit

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit High	P0246	Controller specific output driver circuit diagnostic, diagnosing the 'turbocharger boost solenoid 'A' actuator' low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In a parallel application, turbocharger 'A'is associated with engine bank 1.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power. In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.	< 0.5 Q impedance between output and controller power	Diagnostic enabled ***************************** Powertrain relay voltage Ignition run crank voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts >5.00 Volts *****************************	10 failures out of 12 samples 100ms / sample	Type A, 1 Trips

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

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

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Turbo/Super Charger Engine Underboost Wastegate Position Deviation; Turbocharger with electronic wastegate.	P0299	This DTC indicates a wastegate position deviation which will lead into an underboost situation.	Wastegate Position deviation Error = (Expected Wastegate Position - Actual Wastegate Position)	< refer to **P0299: WG negative deviation fail threshold over engine speed and desired torque.** + **P0299: Additive offset on WG negative deviation ambient correction,** in Supporting tables.	Dev. Diagnostic enable *****************************	True *****************************	25 failures out of 30 samples 100ms / sample	Type A, 1 Trips
					Coolant temperature or OBD Coolant Enable Criteria and Coolant temperature and not OBD Max Coolant Achived *****************************	> -40.0 °C < 150.0 °C *****************************		
					Engine speed *****************************	> refer to **P0234 P0299: Engine speed minimum limit over Ambient pressure to enable the WG deviation diagnosis,** in Supporting tables. *****************************		
					Desired Torque *****************************	> refer to **P0234 P0299: Desired torque minimum limit overAmbient pressure to enable the WG deviation diagnosis,** in Supporting tables *****************************		
					Desired Torque derivative in range	> -30.00 Nm/sec < 30.00 Nm/sec		
					Actual wastegate position in range	> 40.00 % < 100.00 %		
					Actual wastegate position derivative in range *****************************	> -15.00 %/sec < 15.00 %/sec *****************************		
					All conditions haveto be fulfilled for:	> refer to		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					**************************** No active DTCs: **************************** No device control active for compresseor recirculation valve.	**P0234 P0299: Wastegate position deviation diagnostic enable delay as a function of engine speed and ambient pressure** in Supporting table **************************** WGAR_b_WG_CktFA NaWGAR_b_PstnCntrlFA CRAR_b_CRV_CktFA ECT_Sensor_FA IAT_SensorFA BSTR_b_BoostSnsrFA AmbientAirDefault ****************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 1 Injector Circuit Range/ Performance	P02EE	Diagnostic to determine if Cylinder 1 injector voltage feedback measured from the analog to digital converter is rational. The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltage	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 2 Injector Circuit Range/ Performance	P02EF	Diagnostic to determine if Cylinder 2 injector voltage feedback measured from the analog to digital converter is rational. The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltage	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 3 Injector Circuit Range/ Performance	P02F0	Diagnostic to determine if Cylinder 3 injector voltage feedback measured from the analog to digital converter is rational. The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltage	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 4 Injector Circuit Range/ Performance	P02F1	Diagnostic to determine if Cylinder 4 injector voltage feedback measured from the analog to digital converter is rational. The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltage	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected	P0300 P0301 P0302 P0303 P0304	These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring various terms derived from crankshaft velocity. The rate of misfire over an interval is compared to both emissions and catalyst damaging thresholds. The pattern of crankshaft acceleration after the misfire is checked to differentiate between real misfire and other sources of crank shaft noise. Emissions Neutral Default Action: If consumed Emissions Neutral Default DTCs from other subsystems are set: Ignore Rough Road, Traction, Stability, and Antilock brake signals. If default action not activated, Misfire Monitor could complete less frequently or inaccurately. Default Action Latched for duration of Trip Default Action: If Misfire P030x sets on some hybrid applications, the isolation damper	Crankshaft Deceleration Value(s) vs. Engine Speed and Engine load The equation used to calculate deceleration value is tailored to specific vehicle operating conditions. The selection of the equation used is based on the 1st single cylinder continuous misfire threshold tables encountered that are not max of range. If all tables are max of range at a given speed/load, that speed load region is an ***Undetectable region*** see Algorithm Description Document for additional details. SINGLE CYLINDER CONTINUOUS MISFIRE((Medres_Decel Medres_Jerk OR (Medres_Decel Medres_Jerk OR (Lores_Decel Lores_Jerk OR (LoresJDecel Lores_Jerk OR RevBalanceTime)	- see details of thresholds on Supporting Tables Tab **> RufSCD_Decel** AND **> RufSCD_Jerk)** **>SCD_Decel** AND **> SCD_Jerk)** **> RufCyl_Decel** AND **> RufCyl_Jerk)** **> CylModeDecel** AND **> CylModeJerk)** **>RevMode_Decel**	Engine Run Time Engine Coolant Temp Or If ECT at startup Then System Voltage + Throttle delta - Throttle delta Early Termination option: (used on plug ins that may not have enough engine run time at end of trip for normal interval to complete.)	> 2 crankshaft revolution "ECT" If OBD Max Coolant Achieved = FALSE -12 °C < ECT Or if OBD Max Coolant Achieved = TRUE -12°C < ECT < 130 °C < -12°C If OBD Max Coolant Achieved = FALSE 21 °C < ECT If OBD Max Coolant Achieved = TRUE 21°C < ECT < 130°C 9.00 < volts < 32.00 < 20.50 % per 25 ms < 20.50 % per 25 ms Not Enabled	Emission Exceedence = any (5) failed 200 rev blocks out of (16) 200 rev block tests Failure reported for (1) Exceedence in 1st (16) 200 rev block tests, or (4) Exceedences thereafter. OR when Early Termination Reporting = Enabled and engine rev > 1,000 revs and < 3,200 revs at end of trip	Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire)

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			OR (Revmode Active AND (within one engine cycle: 2nd largest Lores_Decel)	**> CylModeDecel * PairCylModeDecel**				
			BANK MISFIRE Cylinders above Bank Thresholds	>= 4 cylinders				
			(MedresDecel	**> 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 (LoresJDecel	**> CylModeDecel * BankCylModeDecel**				
			AND Lores_Jerk)	**> CylModeJerk * BankCylModeJerk**				

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CYLINDER DEACTIVATION MODE (Active Fuel Managment)					
			AFM: SINGLE CYLINDER CONTINUOUS MISFIRE					
			(CylAfterDeacCylJDecel	> 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				
			(CylAfterDeacCylJDecel	> CylModeDecel * ClyAfterAFM_Decel * RandomAFMJDecl				
			AND CylAfterDeacCyl_Jerk)	> CylModeJerk * CylAfterAFM_Jerk * RandomAFM_Jerk				
			(CylBeforeDeacCylDecel	> CylModeDecel * CylBeforeAFM_Decel * RandomAFMJDecl				
			AND					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CylBeforeDeacCyl_Jerk)	**> CylModeJerk * ClyBeforeAFM_Jerk * RandomAFM_Jerk**				
			OR IF option Crank based IMEP estimate is Enabled and CrankBasedJMEP is	IMEP Enabled < **Misfire_IMEP_Thresh_vs_BinID** (Note: Thresholds uses following tables to pick threshold vs BinID. See supporting tables for more information on how BinID works to select appropriate calibration threshold) **Misfire_IMEP_BinID_vs_RPM_Load** **Misfire_IMEP_BinID_RPM_Axis** **Misfire_IMEP_BinID_Load_Axis** - see details on Supporting Tables Tab				
			Misfire Percent Emission Failure Threshold	>2.63 % P0300				
			Misfire Percent Catalvst	>				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Damage	**Catalyst_Damage_Misfire_Percentage** in Supporting Tables whenever secondary conditions are met.	(at low speed/loads, one cylinder may not cause cat damage)			
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	< 0 FTP rpm AND < 0 FTP % load	Engine Speed Engine Load Misfire counts	> 1,800 rpm AND > 12 % load AND <180 counts on one cylinder		
					Engine Speed	600 < rpm < ((Engine Over Speed Limit) - 400) OR 8,191) Engine speed limit is a function of inputs like Gear and temperature see **EngineOverSpeedLimit** in supporting tables	4 cycle delay	
					No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensor_TFTKO CrankSensor_FA CamLctnIntFA	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						CamLctnExhFA CamSensorAnyLctnTFTK 0 AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus		
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnos tic	500 cycle delay	
					Cam and Crank Sensors	in sync with each other	4 cycle delay	
					Misfire requests TCC unlock	Not honored because Transmission in hot mode or POPD intrusive diagnostic running	4 cycle delay	
					Fuel System Status	# Fuel Cut	4 cycle delay	
					Active FuelManagement	Transition in progress	7 cycle delay	
					Undetectable engine speed and engine load region	***Undetectable region*** from Malfunction Criteria	4 cycle delay	
					Abusive Engine Over Speed	> 7,200 rpm	0 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	**< ZeroTorqueEngLoad** or **<ZeroTorqueAFM** if AFM is active in Supporting Tables	4 cycle delay	
					Below zero torque: TPS Vehicle Speed	< 1.3% (< 1.3% in AFM) >22mph (>22mph AFM)	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					NEGATIVE TORQAFM If deactivated cylinders appear to make power, torque is negative:			
					DeactivatedCyl_Decel AND	**<DeacCylInversionDecel**	0 cycle delay	
					DeactivatedCyl_Jerk AND	**<DeacCylInversionJerk**		
					# of Deact Cyls Inverted	> 2 cylinders		
					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			
					Combustion Mode	**= InfrequentRegen** value in Supporting Tables	0 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Driver cranks before Wait to Start lamp extinguishes	IF TRUE	**WaitToStart** cycle delay	
					Brake Torque ******************************	> 199.99 % Max Torque ******************************	0 cycle delay ******************	
					DRIVELINE RING FILTER After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.			
					Filter Driveline ring:	**> "Ring Filter"** # of engine cycles after misfire in Supporting Tables		
					Stop filter early:	**> "Number of Normals"** # of engine cycles after misfire in Supporting Tables tab		
					ABNORMAL ENGINE SPEED OSCILLATION: (checks each "misfire" candidate in 100 engine Cycle test to see if it looks like some disturbance like rough road (abnormal).)			
					Used Off Idle, and while not shifting,			
					TPS	> 0 %		
					Engine Speed	> 900 rpm		
					Veh Speed	> 3 mph		
					Auto Transmission	not shifting		
					indivdual candidate deemed abnormal if number of			

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					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	Disabled		
					Engine Speed Veh Speed	1,100 < rpm < 6,100 > 3.1 mph		
					The 1st check for "recognized" is the 1st fired cylinder after the misfire candidate should both accelerate and jerk an amount based acceleration and jerk of Single Cylinder Misfire thresholds in effect at that speed and load. (CylAfter_Accel AND	> Misfire_decel * **1st_FireAftrMisfr_Acel**		
					CylAfter_Jerk)	> Misfire_Jerk * **1st_FireAftrMisfr_Jerk** Or if AFM mode is active: > Misfire_decel * **1stFireAftrMisAcelAFM** > Misfire_Jerk * **1stFireAfterMisJerkAFM**		
					Addtionally, the crankhaft			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					is checked again a small calibratible number of cylinders later to see if the distrubance is still large like rough road, or has calmed down like real misfire. The size of disturbance is compared to a multiplier times the ddtjerk value used to detect misfire at that speed and load. If there is repetitive misfire on consecutive engine cycles, the expected snap is adjusted due to the higher expected disturbance.			
					Num of Cylinders after misfire to start check of crankshaft snap	2 Cylinders		
					"misfire" recognized if: Crankshaft snap after: isolated "misfire"	< Misfire_Jerk * **SnapDecayAfterMisfire**		
					repetative "misfire"	< Misfire_Jerk * **SnapDecayAfterMisfire * RepetSnapDecayAdjst** in Supporting Tables		
					At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present.			
					Ratio of Unrecog/Recog	>1.00	discard 100 engine cycle test	

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Performance Per Cylinder	P0324	This diagnostic checks for knock sensor performance out of the normal expected range on a per cylinder basis due to Excessive Knock (either real or false knock). In the knock detection algorithm, the term “Knock Intensity” (KI) is used to define the relative size of a knock event, and is calculated as (KI = current knock event - knock threshold). This results in a KI amplitude that is proportional to the size of the knock event (as seen by the knock sensor). In addition, Knock Intensity cannot be less than zero as it is forced/limited to be = 0 with no knock detected (i.e. whenever the current knock event < knock threshold, KI = 0). This diagnostic calculates a first-order lag filter version of the Knock Intensity and sets a fault when: (Filtered KI) > (Excessive Knock Diagnostic Threshold)	Filtered Knock Intensity (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	**> P0324_PerCyl_ExcessiveKnock_Threshold** (no units)	Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes > 0.0 seconds > 650 RPM AND < 8,500 RPM >0 mg/cylinder AND < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C > 110 revs	First Order Lag Filters with Weight Coefficient = 0.0260 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit Sensor 1/Bank 1. There are two possible methods used: 1. **20 kHz Method:** This method injects a 20 kHz signal (internal to the ECU) onto one of the Knock Sensor inputs. For a normal/ good circuit the 20 kHz signal will propogate through the Knock sensor and back to the ECU through the sensor return circuit. The 20 kHz signal is processed through the Fast Fourier Transform (FFT) and then filtered with a first-order lag filter. Since the Knock Detection algorithm uses a Differential Op-Amp to compare the input from the two knock sensor wires, the FFT 20 kHz diagnostic signal will have either: A. Low output with a good circuit (because the 20 kHz injected signal is detected on both of the sensor inputs) or B, High output for an Open Circuit (because	Open Circuit Method chosen (2 possible methods: 20 kHz or Normal Noise): Filtered FFT Output Filtered FFT Output	= **P0325_P0330_OpenMethod_2** **<u>Case 1 (20 kHz Method):</u>** **> P0325_P0330_OpenCktThrshMin (20 kHz) AND < P0325_P0330_OpenCktThrshMax (20 kHz)** **<u>Case 2 (Normal Noise Method):</u>** **> P0325_P0330_OpenCktThrshMin (Normal Noise) AND < P0325_P0330_OpenCktThrshMax (Normal Noise)**	Diagnostic Enabled? Engine Run Time Engine Speed Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature	Yes > 0.0 seconds > 650 RPM and < 8,500 RPM > 300 revs > 70 mg/cylinder and < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0065 Updated each engine event	Type B, 2 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Performance Bank 1	P0326	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis. This diagnostic is specifically designed to identify the fault condition where the knock sensor is properly attached electrically, but produces an abnormally low output due to being unattached (or loosely attached) with the mounting bolt (and thus unable to properly transfer the engine vibration energy from the engine block to the knock sensor). The term "Abnormal (engine) Noise" is used to define this diagnostic method. A fault condition is identified when a first-order lag filtered version of the Abnormal Noise signal falls below the diagnostic threshold.	Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background engine noise for a selected frequency) Filtered FFT Intensity	**Case 1: Engine not in AFM mode** < **P0326_P0331_AbnormalNoise_Threshold** (Supporting Table) OR **Case 2: Engine is in AFM mode** < **P0326_P0331_AbnormalNoise_Thresh_AFM** (Supporting Table; Engine js in AFM mode)	Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature Individual Cylinders enabled for Abnormal Noise Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes > 0.0 seconds > 2,500 RPM (not in AFM mode) OR > 2,000 (in AFM mode) AND < 8,500 RPM > 70 mg/cylinder AND < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C **P0326_P0331_AbnormalNoiseCylsEnabled** (Supporting Table) > 600 Revs	First Order Lag Filters with Weight Coefficient = 0.0200 Updated each engine event	Type B, 2 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Circuit Bank 2	P0330	This diagnostic checks for an open in the knock sensor circuit Sensor 2/Bank 2 There are two possible methods used: 1. **20 kHz Method:** This method injects a 20 kHz signal (internal to the ECU) onto one of the Knock Sensor inputs. For a normal/ good circuit the 20 kHz signal will propogate through the Knock sensor and back to the ECU through the sensor return circuit. The 20 kHz signal is processed through the Fast Fourier Transform (FFT) and then filtered with a first-order lag filter. Since the Knock Detection algorithm uses a Differential Op-Amp to compare the input from the two knock sensor wires, the FFT 20 kHz diagnostic signal will have either: A. Low output with a good circuit (because the 20 kHz injected signal is detected on both of the sensor inputs) or B, High output for an	**Individual Sensor Thresholds Enabled?** **Open Circuit Method chosen** (2 possible methods: 20 kHz or Normal Noise): Filtered FFT Output Filtered FFT Output	= 1, Use Case 3 and 4 = **P0325_P0330_OpenMethod_2** (supporting table) **<u>Case 1 (20 kHz Method):</u>** > **P0325_P0330_OpenCktThrshMin (20 kHz)** **AND** **<** **P0325_P0330_OpenCktThrshMax (20 kHz)** **<u>Case 2 (Normal Noise Method):</u>** **>** **P0325_P0330_OpenCktThrshMin (Normal Noise)** **AND** **<** **P0325_P0330_OpenCktThrshMax (Normal Noise)** **Case 3 (20 kHz Method):**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature	Yes > 0.0 seconds > 650 RPM and < 8,500 RPM ≥ 300 revs > 70 mg/cylinder and < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C	First Order Lag Filter with Weight Coefficient **Case 1 & 2:** Weight Coefficient = 0.0065 Updated each engine event	Type B, 2 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Knock Sensor (KS) Performance Bank 2	P0331	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis. This diagnostic is specifically designed to identify the fault condition where the knock sensor is properly attached electrically, but produces an Abnormally low output due to being unattached (or loosely attached) with the the mounting bolt (and thus unable to properly transfer the engine vibration energy from the engine block to the knock sensor). The term "Abnormal (engine) Noise" is used to define this diagnostic method. A fault condition is identified when a first-order lag filtered version of the Abnormal Noise signal falls below the diagnostic threshold. The failure thresholds can be the same for both sensors (in a 2 sensor application), or the failure thresholds can be unique to each sensor.	Individual Sensor Thresholds Enabled? Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background engine noise) Filtered FFT Intensity	= 1, Use Case 3 and 4 **Case** 1: **Engine <u>not</u> in AFM mode** < **P0326_P0331_AbnormalNoise_Threshold** (Supporting Table) OR **Case 2: Engine <u>is</u> in AFM mode** < **P0326_P0331_AbnormalNoise_Thresh_AFM** (Supporting Table) **Case 3: Engine not in AFM mode** < **P0331_Abnormall_o2** (Supporting Table) OR **Case 4: Engine is in AFM mode** < **P0331_Abnormall_oAFM_2** (Supporting Table)	Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature Individual Cylinders enabled for Abnormal Noise Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes > 0.0 seconds > 2,500 RPM (not in AFM mode) OR > 2,000 (in AFM mode) AND < 8,500 RPM > 70 mg/cylinder AND < 2,000 mg/cylinder > -40 deg's C = TRUE > -40 deg's C **P0326_P0331_AbnormalNoiseCylsEnabled** (Supporting Table) > 600 Revs	First Order Lag Filter with Weight Coefficient **Case 1 & 2:** Weight Coefficient = 0.0065 Updated each engine event **Case 3 & 4:** Weight Coefficient = 0.01 Updated each engine eventFirst	Type B, 2 Trips

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position (CKP) Sensor A Circuit	P0335	Diagnostic will fail if a crank sensor pulse was not received during a period of time; if crank sensor pulses are received the diagnostic will pass.	Time since last crankshaft position sensor pulse received	>= 4.0 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 0.3 grams/second))	Continuous every 100 msec	Type A, 1 Trips
			No crankshaft pulses received	>= 0.1 seconds	Engine is Running Starter is not engaged	Test is Enabled	Continuous every 12.5 msec	
			No crankshaft pulses received		Engine is Running OR Starter is engaged No DTC Active:	Test is Enabled P0365 P0366	2 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position (CKP) Sensor A Performance	P0336	1. Fail counts will occur if the engine goes out of synchronization repeatedly over a period of time and will pass if the engine stays in synchronization. 2. Diagnostic will fail if synchronization gap is not found in a specified period of time and will pass if the synchronization gap is found. 3. Diagnostic will fail if the incorrect number of crank sensor teeth are detected in-between detecting the synchronization gap and will pass if the correct number of teeth are seen.	Time in which 10 or more crank re-synchronizations occur	< 10.0 seconds	Engine Air Flow Cam-based engine speed No DTC Active:	Test is Enabled >= 0.3 grams/second > 450 RPM P0335	Continuous every 250 msec	Type A, 1 Trips
			No crankshaft synchronization gap found	>= 0.4 seconds	Engine is Running Starter is not engaged	Test is Enabled	Continuous every 12.5 msec	
			Time since starter engaged without detecting crankshaft synchronization gap	>= 1.5 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 0.3 grams/second))	Continuous every 100 msec	
			Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution	< 1 pulses > 65,535 pulses	Engine is Running OR Starter is engaged No DTC Active:	Test is Enabled P0365 P0366	8 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A	P0340	Diagnostic will fail if a cam sensor pulse was not received during a period of time; if cam sensor pulses are received the diagnostic will pass.	Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse	>= 5.5 seconds >= 4.0 seconds	Starter engaged AND (crank pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 0.3 grams/second))	Continuous every 100 msec	Type A, 1 Trips
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged	Test is Enabled	Continuous every 100 msec	
			No camshaft pulses received during 12 MEDRES events (There are 12 MEDRES events per engine cycle) Test begins when MEDRES region AND accumulated number of MEDRES events	= region 3 >= 0 counts	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	Test is Enabled CrankSensor_FA	Continuous, every MEDRES event unitl test completes, one test at every start attempt	
			The number of camshaft pulses received during 100 engine cycles	= 0 pulses	Crankshaft is synchronized No DTC Active:	Test is Enabled CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Diagnostic will fail if an incorrect number of cam sensor pulses are detected over a number of engine cycles and will pass if the number of cam pulses is correct.	The number of camshaft pulses received during 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle) Test begins when MEDRES region AND accumulated number of MEDRES events	< 4 pulses > 6 pulses = region 3 >= 0 counts	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	Test is Enabled CrankSensor_FA	Continuous, every MEDRES event unitl test completes, one test at every start attempt	Type A, 1 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 pulses > 402 pulses	Crankshaft is synchronized No DTC Active:	Test is Enabled CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position Sensor - Crankshaft Start Position Incorrect	P034A	Monitors the position of the crankshaft during auto-start's to verify that the crankshaft is in the expected position-diagnostic will fail if the crankshaft is not in the expected range otherwise the diagnostic will pass	Crankshaft position is in error by a number of crankshaft wheel teeth	> 2 crankshaft teeth	Engine has started rotating during a hybrid auto-start Crankshaft position is being verified No Active DTCs:	Test is Enabled CrankSensor_FA	2 failures out of 3 samples a sample occurs at each hybrid auto-start	Type B, 2 Trips
			Crankshaft position is in error by at least one crankshaft wheel tooth		Engine has started rotating during a hybrid auto-start Crankshaft position is being verified No Active DTCs:	Test is Enabled CrankSensor_FA	4 failures out of 5 samples a sample occurs each hybrid auto-start	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankshaft Position Sensor - Crankshaft Direction Incorrect	P034B	Detects if the crankshaft is not rotating in the correct direction- will fail if the engine is reported to be spinning backwards while the engine is running otherwise the diagnostic will pass.	Number of crankshaft sensor reversals within a period of time	>= 3 pulses <= 10.0 seconds	Engine Speed Engine Speed Engine Air Flow Engine Movement Detected No Active DTCs:	Test is Enabled > 400 RPM < 2,000 RPM >= 0.3 grams/second CrankSensor_FA	Continuous Every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #1 CIRCUIT	P0351	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kO impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #2 CIRCUIT	P0352	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kO impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #3 CIRCUIT	P0353	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kO impedance between signal and controller ground	Engine running Ignition Voltage	>11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #4 CIRCUIT	P0354	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kO impedance between signal and controller ground	Engine running Ignition Voltage	>11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B	P0365	Diagnostic will fail if a cam sensor pulse was not received during a period of time; if cam sensor pulses are received the diagnostic will pass.	Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse	>= 5.5 seconds >= 4.0 seconds	Starter engaged AND (crank pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 0.3 grams/second))	Continuous every 100 msec	Type A, 1 Trips
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged	Test is Enabled	Continuous every 100 msec	
			No camshaft pulses received during 12 MEDRES events (There are 12 MEDRES events per engine cycle) Test begins when MEDRES region AND accumulated number of MEDRES events	= region 3 >= 0 counts	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	Test is Enabled CrankSensor_FA	Continuous, every MEDRES event unitl test completes, one test at every start attempt	
			The number of camshaft pulses received during 100 engine cycles	= 0 pulses	Crankshaft is synchronized No DTC Active:	Test is Enabled CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B	P0366	Diagnostic will fail if an incorrect number of cam sensor pulses are detected over a number of engine cycles and will pass if the number of cam pulses is correct.	The number of camshaft pulses received during 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle) Test begins when MEDRES region AND accumulated number of MEDRES events	< 4 pulses > 6 pulses = region 3 >= 0 counts	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	Test is Enabled CrankSensor_FA	Continuous, every MEDRES event unitl test completes, one test at every start attempt	Type A, 1 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 pulses > 402 pulses	Crankshaft is synchronized No DTC Active:	Test is Enabled CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cold Start Camshaft Profile System Performance	P037C	3 Step Sliding Cam Cold Start Performance. When Cold Start Emissons Reduction is active, verifies that commanded 3 Step Sliding Cam desired state has been obtained	When Cold Start Emissons Reduction is active, the current commanded 3 Step Sliding Cam desired state is compared to the desired coldstart emissions reduction sliding cam state to determine if desired position has been obtained	Measured system state (High Lift or Low Lift)	Diagnostic is Enabled Catalyst Warmup Enabled Fuel delivery mode CLO Lift Position Desired System Voltage Engine Running	 = TRUE = Multi Pulse = TRUE > 11.00 Volts = TRUE	200.00 cylinder events out of 500.00 with incorrect system lift state	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 3 Control Circuit Open	P03EC	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 3 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 3 Control Circuit Low Voltage	P03ED	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 3 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 3 Control Circuit High Voltage	P03EE	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 3 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnositc is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 3 Performance	P03EF	An unintended pin firing without controller command. Intake Camshaft Profile 3	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 3 Pin Stuck	P03F0	Monitors Sliding Cam Actuator Hall Sensor Feedback looking for an extended pin when it should have been returned and be reporting above the "RETRACTED" threshold. Monitors Intake Camshaft Profile Actuator 3 for a pin stuck out condition.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00) If EXTENDING and or EXTENDED have been obtained but RETRACTED is not obtained before the end of the engine cycle, Pin Stuck out is reported.	Feed back has reported below EXTENDING 55.00 and or below EXTENDED 45.00 , but has not reported above RETRACTED by the end of the engine cycle the fault is reported 68.00 ,	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	1.00 failure report out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 3 Circuit Open	P03F1	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 3 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 3 Circuit Low Voltage	P03F2	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 3 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 3 Circuit High Voltage	P03F3	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 3 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 3 Performance	P03F4	An unintended pin firing without controller command. Exhaust Camshaft Profile Actuator 3	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled system voltage engine running	> 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Catalyst System Low Efficiency Bank 1	P0420	NOTE: The information below applies to applications that use the Decel Catalyst Monitor Algorithm Oxygen Storage. The catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and 02 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Rich (intrusive rich) and Lean (decel fuel cutoff) A/F excursions Normalized Ratio OSC Value Calculation Information and Definitions = 1. Raw OSC Calculation = (post cat 02 Resp time - pre cat 02 Resp time) 2. BestFailing OSC value from a calibration	Normalized Ratio OSC Value The EWMA calculation uses a 0.11 coefficient.	< 0.35	Diagnostic is Enabled All enable criteria associated with P0420 can be found under P2270 - (02 Sensor Signal Stuck Lean Bank 1 Sensor 2) Rapid Step Response (RSR) feature will initiate multiple tests: If the difference between current EWMA value and the current OSC Normalized Ratio value is and the current OSC Normalized Ratio value is Maximum number of RSR tests to detect failure when RSR is enabled. MAF Predicted catalyst temperature Front 02 Sensor or Front WRAF Rear 02 Sensor General Enable Criteria In addition to the p-codes	>0.70 <0.10 12 > 2.00 g/s < 20.00 g/s <800 °C >825.00 mV or >1.11 EQR >825.00 mV	1 test attempted per valid decel period Minimum of 1 test per trip Maximum of 3 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 12.5ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow) Normalized Ratio Calculation = (1-2) / (3-2) A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part. Refer to the **P0420_WorstPassingOSCTableBI** and **P0420_BestFailingOSCTableBI** in Supporting Tables tab for details The Catalyst Monitoring Test is completed during a decel fuel cutoff event. This fuel cutoff event occurs following a rich instrusive fueling event initiated by the O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 test (P2270). Several conditions must be met in order to execute this test. Additional conditions and their related values			listed under P2270, the following DTC's shall also not be set: For switching O2 sensors: For WRAF O2 sensors:	 O2S_Bank_1_Sensor_1_FA 02S _Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA WRAF_Bank_1_FA WRAF_Bank_2_FA **P0420_WorstPassingOSCTableBI** **P0420_BestFailingOSCTableBI**		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) System Small Leak Detected (No ELCP - Conventional EVAP Diagnostic - with EAT using OAT Sensor - with Fuel Tank Zome 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. EONVisan evaporative system leak detection diagnostic that runs when the vehicle is shut off when enable conditions are met. Prior to sealing the system and performing the diagnostic, the fuel volatility is analyzed. In an open system (Canister Vent Solenoid [CVS] open) high volatility fuel creates enough flow to generate a measurable pressure differential relative to atmospheric.After the volatility check, the vent solenoid will close. After the vent is closed, typically a build up of pressure from the hot soak begins (phase-1). The pressure typically will peak and then begin to decrease as the fuel cools. When	The total delta from peak pressure to peak vacuum during the test is normalized against a calibration pressure threshold table that is based upon fuel level and ambient temperature. (Please see **P0442 EONV Pressure Threshold (Pascals)** in Supporting Tables). The normalized value is calculated by the following equation: 1 - (peak pressure - peak vacuum) / pressure threshold. The normalized value is entered into EWMA(with 0= perfect pass and 1= perfect fail). When EWMA is the DTC light is illuminated. The EWMA calculation uses a 0.14 weighting coefficient. The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 3 additional consecutive trips.	> 0.59 (EWMA Fail Threshold), < 0.35 (EWMA Re-Pass Threshold)	Diagnostic is Enabled Fuel Level Drive Time Drive length (ECT OR OBD Coolant Enable Criteria Baro Distance since assembly plant Engine not run time before key off must be Time since last complete test if normalized result and EWMA is passing OR Time since last complete test if normalized result or EWMA is failing Estimated Ambient Temperature (EAT) using OAT sensor at end of drive Conditions for Estimated	10 % < Percent < 90 % > 600 seconds > 5.0 miles > 63 °C = TRUE) > 70 kPa > 10.0 miles < refer to **P0442 Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature** in Supporting Tables. > 8 hours > 8 hours 0 °C<Temperature<35 °C	Once per trip, during hot soak (up to 2,400 sec.). No more than 2 unsuccessful attempts between completed tests.	Type A, 1 Trips EWMA Average run length is 8 to 12 trips under normal conditions Run length is 3 to 6 trips after code clear or non-volatile reset

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		the pressure drops (-62) Pa from peak pressure, the vent is then opened for 60 seconds to normalize the system pressure. The vent is again closed to begin the vacuum portion of the test (phase-2). As the fuel temperature continues to fall, a vacuum will begin forming. The vacuum will continue until it reaches a vacuum peak. When the pressure rises 62 Pa from vacuum peak, the test then completes. If the key is turned on while the diagnostic test is in progress, the test will abort.			Ambient Temperature Using OAT Sensor to be Valid			
					*****************************	*****************************		
					1. Startup OAT is less than previous trip EAT			
					OR 2. Startup ECT - previous trip EAT	<0°c		
					OR 3. Engine off time	> 7,200 seconds		
					OR 4. At startup, time since previous EAT valid and able to learn	< 3,600 seconds		
					OR 5. EAT - current OAT	0 °C < difference < 2 °C		
					OR 6. EAT < current OAT and speed timer	> 240 seconds		
					and current OAT - EAT	< 2 °C		
					Speed timer increments at 100 msec rate and increments vary based on vehicle speed as follows:			
					vehicle speed < 10 mph	-0.2 seconds		
					10 mph<speed< 35 mph	0.10 seconds		
					35 mph<speed< 124	0.20 seconds		
					124 mph<speed< 124	0.20 seconds		
					Speed timer can never be less than 0 seconds			
					*****************************	*****************************		
					1. High Fuel Volatility			

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P0458 P0459 P0498 P0499 P0496 P1001 P1005 P11FF P130F U18A2		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) Vent System Performance (No ELCP - Conventional EVAP Diagnostic - with purge pump - with Fuel Tank Zone Module (FTZM))	P0446	This DTC will determine if a restriction is present in the vent solenoid, vent filler, vent hose or EVAP canister. This diagnostic runs with normal purge control and canister vent solenoid commanded open. The diagnostic fails when the FTP sensor vacuum measurement is above a vacuum threshold before it accumulates purge volume above a threshold. The diagnostic passes when it accumulates purge volume above a threshold before the FTP sensor vacuum measurement is above a vacuum threshold.	Vent Restriction Prep Test: Vented Vacuum for OR Vented Vacuum for Vent Restriction Test: Tank Vacuum for before Purge Volume After setting the DTC for the first time, 0 liters of fuel must be consumed before setting the DTC for the second time.	< -623 Pa 60 seconds > 1,245 Pa 60 seconds > refer to **P0446 canister vent restriction test tank vacuum threshold** in Supporting Tables. Calibration threshold (Pa) for canister vent restriction as function (baro) 5 seconds > refer to **P0446 canister vent restriction test displaced purge volume limit** in Supporting Tables. Calibration threshold (liters) for canister vent restriction as function (baro)	Diagnostic is Enabled Fuel Level System Voltage Startup IAT Startup ECT Barometric Pressure P146C EVAP Purge Pump System Misassembled diagnostic is not running No active DTCs: No Active DTCs TFTKO	10 % < Percent < 90 % > 10.0 volts 4 °C<Temperature<35 °C <35 °C >70 kPa MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited FuelLevelDataFault EvapPurgeSolenoidCircuit_FA EvapVentSolenoidCircuit_FA FTP_SensorCircuit_FA PurgePumpDiag_FA Purge Pump LIN Communication Fault Active P0443 P0449 P0452 P0453 P0454 P0458 P0459 P0498 P0499 P1001	Once per Cold Start Time is dependent on driving conditions Maximum time before test abort is 1,400 seconds	Type B, 2 Trips

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Tank Pressure (FTP) Sensor Circuit Intermittent (No ELCP - Conventional EVAP Diagnostic)	P0454	This DTC will detect intermittent tank vacuum sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event. During the EONV test, an abrupt change in fuel tank vacuum is identified as a possible refueling event. If the abrupt change occurs while the vent valve is closed, the EONV small-leak test aborts and the refueling rationality test starts. If the refueling rationality test detects a refueling event, then the vacuum change is considered “rational.” If the refueling rationality test does not detect a refueling event, then the vacuum change is considered “irrational.” The vacuum change rationality diagnostic is an “X out of Y” test. 1) Each time the EONV test completes, the (Y) sample counter is incremented. 2) Each time the	If an abrupt change in tank vacuum is detected the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that a refueling event occurred. If a refueling is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem. An abrupt change is defined as a change in vacuum in the span of 1.0 seconds. But in 12.5 msec. A refueling event is confirmed if the fuel level has a persistent change of for 30 seconds during a 600 second refueling rationality test.	> 112 Pa < 249 Pa >15 %	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes and the canister vent solenoid is closed		This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period.The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.The test will report a failure if 2 out of 3 samples are failures. 12.5 ms / sample	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) System Large Leak Detected (No ELCP - Conventional EVAP Diagnostic - with Purge Pump - with Fuel Tank Zone Module (FTZM))	P0455	This DTC will detect a weak vacuum condition (large leak or purge blockage) in the EVAP system. This mode checks for large leaks and blockages when proper driving conditions are met. If these conditions are met, the diagnostic commands the vent valve closed and controls the purge duty cycle to allow purge flow to purge the fuel tank and canister system while monitoring the fuel tank vacuum level. The algorithm accumulates purge flow during the test to determine a displaced purge volume as the test proceeds. If the displaced purge volume reaches a threshold before the fuel tank vacuum level reaches its passing threshold, then a large leak failure is detected. On fuel systems with fuel caps If the first failure of	Purge volume while Tank vacuum After setting the DTC for the first time, 0 liters of fuel must be consumed before setting the DTC for the second time.	> refer to **P0455 large leak diagnostic displaced purge volume threshold** in Supporting Tables. Calibration threshold (liters) for large leak diagnostic as function of barometric pressure (kPa) < refer to **P0455 large leak diagnostic tank vacuum threshold** in Supporting Tables. Calibration threshold (Pa) for large leak diagnostic as function of barometric pressure (kPa)	Diagnostic is Enabled Fuel Level System Voltage Barometric Pressure Purge Flow No active DTCs: No Active DTCs TFTKO If ECT > IAT, Startup	10 % < Percent < 90 % > 10.0 volts >70 kPa >3.00% MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited FuelLevelDataFault EvapPurgeSolenoidCircuit_FA EvapVentSolenoidCircuit_FA FTP_SensorCircuit_FA PurgePumpDiag_FA Purge Pump LIN Communication Fault Active P0443 P0449 P0452 P0453 P0454 P0458 P0459 P0498 P0499 P1001 P1005 P11FF P130F U18A2	Once per cold start Time is dependent on driving conditions Maximum time before test abort is 1,400 seconds Weak Vacuum Follow-up Test With large leak detected, the follow-up test is limited to 0 seconds. Once the MIL is on, the follow-up test runs indefinitely.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		P0455 occurred after a refueling event was detected and the MIL is off for P0455, the MIL will be commanded off after the first pass of P0455 is reported. If the first failure of P0455 did not occur after a refueling event was detected, the MIL will be commanded off on the ignition cycle after the third consecutive pass of P0455 is reported.the MIL will be commanded off on the ignition cycle after the third consecutive pass of P0455 is reported. On fuel systems without fuel caps The P0455 MIL will be commanded off on the ignition cycle after the third consecutive pass of P0455 is reported.	Weak Vacuum Follow-up Test (fuel cap replacement test) Weak Vacuum Test failed. Passes if tank vacuum Note: Weak Vacuum Follow-up Test can only report a pass.	> 1,993 Pa	temperature delta (ECT-IAT): Startup IAT Startup ECT Weak Vacuum Follow-up Test This test can run following a weak vacuum failure or on a hot restart.	<8 °C 4 °C<Temperature<35 °C <35 °C		

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 1 Performance (For use on vehicles with two fuel senders and mechanical transfer pump)	P0461	This DTC will detect a primary fuel tank level sensor stuck in-range.	1)****************************** Fuel Level in Primary and Secondary Tanks Remain in an Unreadable Range too Long****************************** 1a) If Deadband diagnostic subtest enabled 1b) If fuel volume in primary tank is 1c) and if fuel volume in secondary tank is 1d) and if 1b and 1c indications do not change while fuel volume consumed by engine is OR 2)****************************** Fuel consumed without a Primary Fuel Level Change****************************** 2a) If indicated fuel volume change is 2b) while fuel consumed by the engine is	1a) == Enabled status 1b) >43.9 liters 1c) <4.8 liters 1d) > 14.2 liters 2a) < 3 liters 2b) > 9.8 liters	1a) Diagnostic Enabled 1b) Engine Operational State	1a) ==True 1b) == Running	250 ms / sample	Type B, 2 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 1 Circuit Intermittent (No ELCP - Conventional EVAP Diagnostic)	P0464	This DTC will detect intermittent fuel level sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event. During the EONV test, a change in fuel level is identified as a possible refueling event. If the change occurs while the vent valve is closed, the EONV small-leak test aborts and the refueling rationality test starts. If the refueling rationality test detects a refueling event, the fuel level change is considered “rational.” If the refueling rationality test does not detect refueling, the fuel level change is considered “irrational.” The fuel level change rationality diagnostic is an “X out of Y” test. 1) Each time the EONV test completes, the (Y) sample counter is incremented. 2) Each time the rationality test has an	If a change in fuel level is detected, the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that an actual refueling event occurred. If a refueling event is confirmed, then the test sample is considered passing. Otherwise, if a refueling event is not confirmed, then the test sample is considered failing which indicates an intermittent signal problem. An intermittent fuel level signal problem is defined as: The fuel level changes by and does not remain for 30 seconds during a 600 second refueling rationality test.	 > 15% > 15%	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period.The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.The test will report a failure if 2 out of 3 samples are failures. 100 ms / sample	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cooling Fan Speed Low [LIN Bus Electric PWM Fans Only- Internal or External controller]	P0494	Measured actual fan speed is monitored against a calibrated lower acceptable limit for the cooling fan RPM under normal operating conditions. The diagnostic is set when the threshold is crossed. This diagnostic ensures that the fan is not under cooling. Only after first fan activation, the fan will be held commanded on for enough time to ensure this monitor has an opportunity to mature a decision.	Measured Fan Speed	<= Speed Low Limit [Supporting Table] **P0494_LIN_Threshold**	a] Diagnostic Enabled b] Configuration calibration for number of fans c] Diagnostic System Disabled d] Battery Voltage In-Range e] LIN Bus based Fan Operation Enabled f] LIN Bus Lost Communication Fault Active g] LIN Bus Continuous Operation Fault Active h] Fan Commanded On	a] == 1.00 [True if 1; False if 0] b] >= 1 unit c] <>True d] > 11.00 volts e] == TRUE f] <>True g] <> True h] ==TRUE	16.00 failures/ 20.00 samples; 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) System Flow During Non-Purge (No ELCP - Conventional EVAP Diagnostic - with purge pump - with Fuel Tank Zone Module (FTZM))	P0496	This DTC will determine if the purge valve solenoid is leaking into the induction system or is leaking between the purge pump and purge valve solenoid. It does this by sealing the EVAP system (purge and vent valve closed) and then monitors fuel tank vacuum level. The fuel tank vacuum level should not increase. If tank vacuum increases above a threshold, a malfunction is indicated. Additional Information The purge valve leak diagnostic exists to helps service replace leaking purge valves that could otherwise be detected with the EONV small leak diagnostic (P0442).	Tank Vacuum for Test time	> refer to **P0496 purge valve leak diagnostic vacuum threshold** in Supporting Tables. Calibration threshold (Pa) for purge valve leak diagnostic as func (baro) as a function of barometric pressure (kPa) 5 seconds < refer to **P0496 purge valve leak test time as a function of fuel level and barometric pressure** in Supporting Tables. Test time only increments when engine vacuum > 10.0 kPa.	Diagnostic is Enabled Fuel Level System Voltage Barometric pressure Startup IAT Startup ECT Engine Off Time Initial purge pump pressure P146C EVAP Purge Pump System Misassembled diagnostic is not running Purge pump over tempertaure status is False No active DTCs: No pending DTCs:	 10 % < Percent < 90 % > 10.0 volts >70 kPa 4 °C<Temperature<35 °C <35 °C >28,800.0 seconds >3.1 kPa MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited FuelLevelDataFault EvapPurgeSolenoidCircuit_FA EvapVentSolenoidCircuit_FA FTP_SensorCircuit_FA PurgePumpDiag_FA Purge Pump LIN Communication Fault Active	Once per cold start Cold start: max time is 1,400 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					No Active DTC’s TFTKO	Purge Pump LIN Communication Fault Pending P0443 P0449 P0452 P0453 P0454 P0458 P0459 P0498 P0499 P1001 P1005 P11FF P130F U18A2		

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankcase Ventilation System Disconnected	P04DB	The Crankcase Ventilation System Disconnected Diagnostic monitors the performance of the Positive Crankcase Ventilation (PCV) System. After the enable conditions are met, this monitor will will evaluate the signal of the Crankcase Ventilation Pressure sensor. This sensor is mounted in the PCV hose between the crankcase and the engine induction system. During normal operation, the sensor will see a pressure drop that varies in conjunction with the engine airflow. Additionally, the sensor will see pressure pulses as the cylinders go up and down in the crankcase. This monitor evaluates both the signal offset based on the pressure drop, and the signal noise based on the pressure pulses. The product of the	ScaledSignalLo * ScaledNoiseLo or ScaledSignalHi * ScaledNoiseHi Where ScaledSignalLo = Where ScaledNoiseLo = Where ScaledSignalHi =	< 1.20 kPa* kPa > 9,999.00 kPa * kPa Average Crankcase Ventilation Pressure Signal value calculated over the sample period and normalized as a function of engine air flow based on table **P04DB: Crankcase Pressure Signal Normalization for Air Flow, low case** 0.00 kPa is subtracted from the normalized value. The absolute value of the result is taken to get the final ScaledSignalLo. Average Crankcase Ventilation Pressure Signal delta calculated over the sample period and normalized as a function of engine speed based on table **P04DB: Crankcase Pressure Noise Normalization for Engine Speed, low case** Average Crankcase Ventilation Pressure	Diagnostic is Enabled Outside Air Temperature Engine Coolant Temperature Barometric Pressure Stability conditions: Engine Air Flow Engine Air Flow Engine Vacuum Engine Vacuum Engine Speed Engine Speed Maximum Engine Air Flow - Minimum Engine Air Flow over the sample period Time that stability conditions must be met prior to sampling data Stability conditions must continue to be met as the data sample is collected over a period DTCs Active: DTCs Pending:	 >= -9.0 Degrees C >= 65.0 Degrees C >= 70.0 kPa >= 56.0 Grams/Second <= 77.0 Grams/Second >= -120.0 kPa <= -50.0 kPa >= 1,900 RPM <= 2,700 RPM <= 20.0 Grams/Second = 0.5 Seconds = 0.5 Seconds MAF_SensorFA MAP_SensorFA OAT_PtEstFiltFA AmbPresDfltdStatus ECT_Sensor_FA PCV_Sensor_FA PCV_Sensor_Circuit_FA	The DTC will fail immediately if the malfunction criteria are met	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		signal offset and signal noise is compared to a calibration threshold during certain engine operating conditions. If this product is between two failure thresholds, the system is operating as expected, and the monitor passes. If the product is outside of the two failure thresholds, the system is disconnected, and the monitor fails.		Signal value calculated over the sample period and normalized as a function of engine air flow based on table **P04DB: Crankcase Pressure Signal Normalization for Air Flow, high case** 0.00 kPa is subtracted from the normalized value. The absolute value of the result is taken to get the final ScaledSignalHi.				
			Where ScaledNoiseHi =	Average Crankcase Ventilation Pressure Signal delta calculated over the sample period and normalized as a function of engine speed based on table **P04DB: Crankcase Pressure Noise Normalization for Engine Speed, high case**				
			The Crankcase Ventilation Pressure Sensor is sampled every 3.125 msec to calculate ScaledSignalLo/Hi and ScaledNoiseLo/Hi. ScaledSignalLo/Hi and ScaledNoiseLo/Hi values are accumulated over a period of 0.5 Seconds.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankcase Ventilation Hose Connection Sensor Circuit Low	P04E2	Detects a continuous open or short to ground in the Crankcase Ventilation Pressure signal circuit by monitoring the Crankcase Ventilation Pressure sensor output voltage and failing the diagnostic when the Crankcase Ventilation Pressure voltage is too low. The Crankcase Ventilation Pressure sensor is a pressure transducer which outputs a voltage proportional to the gauge pressure between the crankcase ventilation hose and the atmosphere.	Crankcase Ventilation Pressure Voltage	<=4.3% of 5 Volt Range (This is equal to -5.71 kPa)	Diagnostic is Enabled		1,280 failures out of 1,600 samples 1 sample every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankcase Ventilation Hose Connection Sensor Circuit High	P04E3	Detects a continuous short to power in the Crankcase Ventilation Pressure signal circuit by monitoring the Crankcase Ventilation Pressure sensor output voltage and failing the diagnostic when the Crankcase Ventilation Pressure voltage is too high. The Crankcase Ventilation Pressure sensor is a pressure transducer which outputs a voltage proportional to the gauge pressure between the crankcase ventilation hose and the atmosphere.	Crankcase Ventilation Pressure Voltage	>= 95.5% of 5 Volt Range (This is equal to 5.69 kPa)	Diagnostic is Enabled		1,280 failures out of 1,600 samples 1 sample every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Crankcase Ventilation Hose Connection Sensor Range/ Performance	P04FB	Detects a performance failure in the Crankcase Ventilation Pressure sensor, such as when the sensor value is stuck in range. If the engine has been off for a sufficient amount of time, the pressure in the crankcase ventilation system will equalize to atmospheric pressure. The Crankcase Ventilation Pressure sensor value is checked to see if it is within the normal expected range around the expected value of 0 kPa. If it is not, the Crankcase Ventilation Pressure performance diagnostic will fail. The Crankcase Ventilation Pressure sensor is a pressure transducer which outputs a voltage proportional to the gauge pressure between the crankcase ventilation hose and the atmosphere.	Crankcase Ventilation Pressure OR Crankcase Ventilation Pressure	>= 0.63 kPa <= -0.63 kPa	Diagnostic is Enabled Engine is not rotating Time since engine has stopped rotating Engine Coolant Temperature DTCs Active:	 >= 10.0 seconds >= 70.0 deg C PCV_Sensor_Circuit_FA ECT_Sensor_FA EngineModeNotRunTimer Error	128 failures out of 160 samples 1 sample every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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	> 95.00 rpm	Baro	> 70 kPa	Diagnostic runs in every 12.5 ms loop	Type B, 2 Trips
			Filter coefficient	0.00375	Coolant Temp	> 60 °C	Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	
					Engine run time	> 60 sec		
					Ignition voltage	32 > volts > 11		
					Time since gear change	> 3 sec		
					Time since a TCC mode change	> 3 sec		
					IAT	> -20 °C		
					Vehicle speed	< 1.24 mph, 2kph		
					Commanded RPM delta	< 25 rpm		
					Idle time	> 10 sec		
					For manual transmissions: Clutch Pedal Position	> 90.00 pct		
					or Clutch Pedal Position	< 16.00 pct		
						PTC not active		
						Transfer Case not in 4WD LowState		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						Off-vehicle device control (service bay control) must not be active. following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimitAND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion) Clutch is not depressed		
					No active DTCs	TCJBoostPresSnsrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorCircuitFA EvapFlowDuringNonPurge_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver_FA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFault LowFuelConditionDiagnostic Clutch Sensor FA AmbPresDfltdStatus		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
High Engine Speed Idle System	P0507	This DTC indicates that actual engine speed is higher than desired engine speed at idle so that it is out of speed control capability. Testing is performed when basic conditions are met. If filtered engine speed error exceeds a calibrated threshold for a calibrated duration, code is set. This testing is performed continuously per trip if basic conditions are met	Filtered Engine Speed Error. It is calculated with a calibrated filter coefficient	< -190.00 rpm	Baro	> 70 kPa	Diagnostic runs in every 12.5 ms loop Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	Type B, 2 Trips
					Coolant Temp	> 60 °C		
			Filter coefficient	0.00375				
					Engine run time	> 60 sec		
					Ignition voltage	32 > volts > 11		
					Time since gear change	> 3 sec		
					Time since a TCC mode change	> 3 sec		
					IAT	> -20 °C		
					Vehicle speed	< 1.24 mph, 2kph		
					Commanded RPM delta	< 25 rpm		
					For manual transmissions: Clutch Pedal Position	> 90.00 pct		
					or Clutch Pedal Position	< 16.00 pct		
						PTO not active		
						Transfer Case not in 4WD LowState		
						Off-vehicle device control (service bay control) must not be active.		

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cold Start Rough Idle	P050D	Monitors the combustion performance when the cold start emission reduction strategy is active by accumulating and determining the percentage of engine cycles that have less than complete combustion relative to the total number of engine cycles in which Dual Pulse is active.	Deceleration index vs. Engine Speed Vs Engine load Deceleration index calculation is tailored to specific vehicle. Tables used are 1st tables encountered that are not max of range. Undetectable region at a given speed/load point is where all tables are max of range point. Incomplete combustion identified by P0300 threshold tables:	(>Idle SCDAND >Idle SCD ddt Tables) OR (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables)	Misfire Algorithm Enabled (Refer to P0300 for Enablement Requirements) OBD Manufacturer Enable Counter To enable the diagnostic, the Cold Start Emission Reduction Strategy Must Be Active per the following: Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure AND NumCLOEvents In addition, Dual Pulse Strategy Is Enabled and Active Per the following: Engine Speed Accel Position Engine Run Time For the engine speeds and loads in which Dual	= 0 < 400.00 degC > -12.00 degC <= 66.00 degC >= 72.00 KPa < 1.00 >= 450.00 RPM <= 2,800.00 RPM <= 35.00 Pct < 100 seconds	Runs once per trip when the cold start emission reduction strategy is active and Dual Pulse is enabled and active. Frequency: 100ms Test completes after Dual Pulse is no longer active OR The first 500 engine cycles have been reached	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Pulse is active:			
					Dual Pulse Error induced misfires percentage	>= catalyst damaging misfire		
					Dual Pulse Error induced misfires percentage	< 90% of the maximum achieveable catalyst damaging misfire.		
					Engine Cycles	>= 80.00 <501		
					The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:			
					Catalyst Temperature AND	>= 700.00 degC		
					Engine Run Time	>= 0.00 seconds		
					OR			
					Engine Run Time	> **P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit table is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details.		
					OR			
					Barometric Pressure	< 72.00 KPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Dual Pulse Strategy will exit per the following:			
					Engine Speed OR Accel Position	> 3,000.00 RPM > 40.00 Pct		
					Engine Run Time	>= 100 seconds		
					Dual Pulse Strategy will also exit if the any of the "Additional Dual Pulse Enabling Criteria" is not satisfied:			
					"Additional Dual Pulse Enabling Criteria":			
					Green Engine Enrichment	Not Enabled		
					Misfire Converter Protection strategy	Not being requested		
					Engine Metal Overtemp strategy	Not being requested		
					Fuel control state	Open Loop		
					Output State Control	Not being requested for fuel		
					DOD Or DFCO	Not Active		
					Power Enrichment	Not Active		
					Dynamic Power Enrichment	Not Active		
					Piston Protection	Not Active		
					Hot Coolant Enrichment	Not Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Injector Flow Test	Not Active		
					General Enable			
					DTC's Not Set:	EngineMisfireDetected_FA AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFA CrankSensor_FA FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA AnyCamPhaser_TFTKO ClutchPstnSnsr FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA FuelInjectorCircuit_TFTK0 FHPR_b_FRP_SnsrCkt_FA FHPR_b_FRP_SnsrCkt_TFTKO FHPR_b_PumpCkt_FA FHPR_b_PumpCkt_TFTK0 TransmissionEngagedState_FA EngineTorqueEstInaccurate FuelPumpRlyCktFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure (EOP) Sensor Performance - Continuously Variable Displacement 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 running test and engine off test. The engine running test compares the measured oil pressure to threshold. If the measured oil pressure is out of the thresholds, then the error counter increments. The engine off test compares the measured oil pressure against thresholds after the engine has stopped rotating. If the measured oil pressure is out of the thresholds, then the error counter increments.	**Two Stage Oil Pump EOP Sensor Test with Engine Running, High Pressure State** To Fail when previously passing with the engine running: Filtered Engine Oil Pressure below threshold OR Filtered Engine Oil Pressure above threshold To pass when previously failing: Filtered Engine Oil Pressure above low threshold plus an offset OR Filtered Engine Oil Pressure below high threshold minus an offset	Filtered Oil Pressure < (**P0521_CVDOP_MinOilPresFail** kPa) OR Filtered Oil Pressure > (**P0521_CVDOP_MaxOilPressure** kPa) Filtered Oil Pressure > (**P0521_CVDOP_MinOilPresFail** + 10.0 kPa) OR Filtered Oil Pressure < (**P0521_CVDOP_MaxOilPressure** - 10.0 kPa)	Variable Displacement Oil Pump is Present = TRUE Engine Running Diagnostic Status Engine Off Rationality Test Diagnostic Reporting Status Oil Pressure Sensor In Use Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 5,000 RPM for longer than **TimeForOilAeration** seconds) Filtered Engine Speed within range Sensed Oil Temperature within range Engine Speed stable No active DTC's	Enabled Enabled Test not report a fail state Yes >15.0 seconds >70.0 kPa FALSE 1,200 RPM < Filtered Engine Speed < 4,500 RPM 40.0 deg C < Sensed Oil Temperature <120.0 deg C (RPM - Previous RPM) < 35 Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA CrankSensor_FA	> 40 errors out of 50 samples. Performed every 100 msec > 10passes out of 50 samples. Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Two Stage Oil Pump EOP Sensor Test with Engine Off If enabled: To Fail when previously passing with the engine off: Difference between oil pressure and Barometric pressure is Greater than a threshold OR Less than a threshold	(Oil Pressure - Barometric Pressure) >-50.0 kPa OR <30.0 kPa	Two Stage Oil Pump is Present = TRUE Engine Off Rationality Test Diagnostic Status Engine Running Rationality Test Diagnostic Status Modelled Oil Temperature No Engine Movement No active DTC's	Enabled Enabled Test not report a fail state > 60.0 deg C > 10.0 seconds EngineModeNotRunTimer_FA EngOilTempFA EngOilPressureSensorCktFA CrankSensor_FA	> 20 errors out of 40 samples. Run once per trip	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure (EOP) Sensor Circuit Low Voltage	P0522	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too low. This diagnostic compares the EOP circuit voltage to the reference voltage.	(Engine Oil Pressure Sensor Circuit Voltage) + 5 Volts) *100	< 5.00 percent Deadband: < 5 percent or > 95 percent	Engine Speed Enable Engine Speed Disable Oil Pressure Sensor In Use Diagnostic Status	> 540 rpm < 490 rpm Yes Enabled	1,280 failures out of 1,600 samples Performed every 3.125 msec	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Mutil-Functon Switch Circuit	P0564	Detect when cruise control multi-function switch circuit (analog) voltage is in an invalid range. "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in an invalid range, 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."	Cruise Control analog circuit voltage must be "between ranges" for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "between ranges" when the ratio is measured in the following ranges: 0.28 -0.31, 0.415-0.445, 0.585-0.615 0.78-0.81, 1.005- 1.035	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 0.500 seconds	Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control On Switch Circuit	P0565	Detects a failure of the cruise on/off switch in a continously applied state "Emissions Neutral Default Action - When the BCM tells the ECM that the cruise control analog input voltage is in the Momentary Cruise On/Off 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." Only applicable for vehicles with a momentary on/off cruise switch architecture.	Cruise Control On switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 20.00 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Resume range for too long, the code is set and cruise control is disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	Cruise Control Resume switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, 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 Ilium.
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Set range for too long, the code is set and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	Cruise Control Set switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, 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 Ilium.
Cruise Control Cancel Switch Circuit	P056C	Detects a failure of the cruise cancel switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Cancel range for too long, 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."	Cruise Control Cancel switch remains applied for greater than a calibratable period of time.	fail continously in the applied state for greater than 20.00 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Input Circuit	P0575	Determines if cruise switch state received from the BCM is valid. "Emissions Neutral Default Action : When the ECM determines that a serial communication fault from the BCM has occurred with frame $1E1, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	If x of y rolling count/ protection value faults occur, disable cruise for duration of fault	Message <> 2's complement of message Message milling countoprevious message rolling count value plus one	Diagnostic is enabled. Cruise Control Switch Serial Data Error Diagnostic Enable Serial communication to BCM Power Mode Engine Running	0.00 No loss of communication = RUN = TRUE	9 failures out of Z17 samples Performed on every received message 9 rolling count failures out of Z17 samples Performed on every received messagw	Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Brake Pedal Position Sensor Circuit Range/ Performance	P057B	This diagnostic monitors the Brake Pedal Position Sensor for a stuck in range failure	.Brake pedal position sensor movement diagnostic cal is enabled 1.00	True	Diagnostic is enabled. Brake Pedal Position Sensor Circuit Range / Performance Diagnostic Enable	1.00 ignition voltage > 10.00		MIL: Type A, 1 Trips
			Calculated EWMA value must be greater than calibratable theshold after calibratable number of tests have completed to report a "test passed" for P057B	EWMA value looked up in supporting table **P057B KtBRKI_K_FastTestPointWeight** P057B as a function of calculated brake pedal position delta EWMA value is > 0.80	calculated brake pedal position delta sample counter > 50.00 for fast test OR calculated brake pedal position delta sample counter > 1,000.00 for slow test	calculated brake pedal position delta > 2.74 OR (for slow test) shift lever has been in park once this key cycle vehicle speed >= 5.00 accelerator pedal position < 5.00	total number of EWMA tests > 20.00	
			Calculated EWMA Value must be less than calibratable threshold after calibratable number of tests have completed to report a "test failed" for P057B. This test runs once per key cycle	EWMA value looked up in supporting table **P057B KtBRKI_K_CmpltTestPointWeight** P057B as a function of calculated brake pedal position delta EWMA value is less thatn 0.40	no DTC's active (P057C, P057D)	shift lever has been in park once this key cycle vehicle speed >= 5.00 accelerator pedal position < 5.00	total number of EWMA tests > 2.00	

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Brake Pedal Position Sensor Circuit Intermittent/ Erratic	P057E	detects noisy / erratic ouput for brake pedal position sensor	If x of y samples are observed above failure threshold, default brake pedal position to zero percent and set DTC	22.40	Diagnostic is enabled. Brake Pedal Position Sensor Circuit Intermittent / Erratic Diagnostic Enable	1.00	5.00/ 20.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Multi-function Circuit Low Voltage	P0580	detects short to ground failure for cruise multi-function switch circuit "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise switch circuit voltage is too low for too long, 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." Only applicable for vehicles with a momentary on/off cruise switch architecture.	Cruise Control analog circuit voltage must be in an "Open Short To Ground" range for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "open short to ground when the ratio is measured in the following rangs: 0-0.185	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Multi-Function Input B Circuit	P0589	Detect when cruise control multi-function switch circuit B (analog) voltage is in an illegal range "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise switch for the secondary cruise switch circuit is detected Out of Range for too long, 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." Only applicable for applications with a secondary cruise switch circuit.	Cruise Control analog circuit B voltage must be "between ranges" for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "between ranges" when the ratio is measured in the following ranges: 0.28 -0.31, 0.415-0.445, 0.585-0.615, 0.78-0.81, 1.005- 1.035	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 0.500 seconds	Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

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

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

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

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Active Grill Air Shutter A Performance /Stuck OFF	P059F	A2-part diagnostic. Part 1 continuously monitors for failure to achieve a commanded shutter actuator position [Suspect Stuck Condtion] when X failures occur in Y samples after an electronic command latency delay. A Part 1 failure result then enables Part 2 which makes a fixed number of repeat attempts to reach the commanded postion [ReTry to clear obstruction]. The DTC is set when the calibrated fault threshold count of repeat attempts is reached without achieving the original commanded shutter position. Retry attempts will continue until the commanded position is achieved or the trip ends.	[Smart Shutter Actuator 1 Position Response **OR** Shutters Not Initialized **OR** The absolute difference between Smart Shutter Actuator 1 Position Response and Shutter response and Commanded Position percent] **AND** Shutter 1 Diagnostic Delay Threshold count	[Indeterminate **OR** = TRUE **OR** > 5.00] **AND** Counter > 109.00 counts	a. Command ShutterI Enable. b. ShutterI Performance Diagnostic Enabled c. Off Vehicle Communication Service Request Diagnostic Enabled Any of the following conditions are met: d. Run Crank Active All of the following conditions are met: e. Run Crank Active f. Command On and Key Off g. ECU Awake h. Run Crank Voltage in Range i. Ignition Powertrain Relay Voltage in Range j. Actuator Initialization Complete Any of the following conditions are met k. If Enabled, performance diagnostics will be enabled even in the	a. = TRUE b. = Enabled c. = TRUE d. = TRUE e. = FALSE f. = TRUE g. = TRUE h. >=11.00 AND <= 32.00 i. >= 11.00 AND <= 32.00 j. = TRUE k. = Disabled	0.1 seconds out of a 0.1 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					presence of a communication fault. All of the following conditions are met: l. LIN communication NOT faulted.(DTC: U028400, U058500) m. No LIN communication Fault Pending n. LIN communication Data is Ready	l. = TRUE m. =TRUE n. = TRUE		
			Shutter 1 Performance Test count	= 5.00 counts	a. Command Shutterl Enable. b. Shutterl Performance Diagnostic Enabled c. Off Vehicle Communication Service Request Diagnostic Enabled Any of the following conditions are met: d. Run Crank Active All of the following conditions are met: e. Run Crank Active f. Command On and Key Off	a. = TRUE b. = Enabled c. = TRUE d. = TRUE e. = FALSE f. = TRUE	1-5 actuator cycles [1 cycle typically requires 10-25 seconds]	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					g. ECU Awake h. Run Crank Voltage in Range i. Ignition Powertrain Relay Voltage in Range j. Actuator Initialization Complete Any of the following conditions are met k. If Enabled, performance diagnostics will be enabled even in the presence of a communication fault. All of the following conditions are met: l. LIN communication NOT faulted.(DTC: U028400, U058500) m. No LIN communication Fault Pending n. LIN communication Data is Ready	g. = TRUE h. >=11.00 AND <= 32.00 i. >= 11.00 AND <=32.00 j. = TRUE k. = Disabled l. = TRUE m. =TRUE n. = TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft System Cold Start Performance - Bank 1	P05CC	Detects a VVT system error during Cold Starts by comparing the desired and actual cam positions when VVT is activated. This is the same type diagnostic as P0011 except this detects excessive deviations of position while the cold start phaser positions are being commanded.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	Cam Position Error > 6.00 deg.	Diagnositc is Enabled **Intake Cam Phsr Enable** System Voltage Engine Running Power Take Off (PTO) active **Catalyst Warmup Enabled** Desired cam position Desired AND Measured cam position Desired cam position variation No Active DTCs	 '=TRUE > 11.00 Volts = TRUE = FALSE = TRUE > 0 deg > 6.00 deg AND < 26.00 deg < 3.00 deg for (**P0011_P05CC_StablePositionTimeId**) seconds P0010 P2088 P2089	65 failures out of 75 samples 100 ms /sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft System Cold Start Performance - Bank 1	P05CE	Detects a VVT system error during Cold Starts by comparing the desired and actual cam positions when VVT is activated. This is the same type diagnostic as P0014 except this detects excessive deviations of position while the cold start phaser positions are being commanded.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	Cam Position Error > 6.00 deg.	Diagnostic is Enabled **Exhaust Cam Phsr Enable** System Voltage Engine Running Power Take Off (PTO) active **Catalyst Warmup Enabled** Desired cam position Desired AND Measured cam position Desired cam position variation No Active DTCs	 = TRUE > 11.00 volts = TRUE = FALSE = TRUE > 0 deg > 6.00 deg AND < 32.00 deg <3.00 deg for (**P0014_P05CE_StablePositionTimeEd**) sec P0013 P2090 P2091	65 failures out of 75 samples 100 ms /sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect or the flash memory detects an uncorrectable error via the Error Correcting Code.	The Primary Processor's calculated checksum does not match the stored checksum value. Covers all software and calibrations.	1 failure if the fault is detected during the first pass. 5.00 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	Type A, 1 Trips
			The Primary Processor's Error Correcting Code hardware in the flash memory detects an error. Covers all software and calibrations.	254 failures detected via Error Correcting Code			Diagnostic runs continuously via the flash hardware.	
			The Primary Processor's calculated checksum does not match the stored checksum value for a selected subset of the calibrations.	2 consecutive failures detected or 5 total failures detected.			Diagnostic runs continuously. Will report a detected fault within 200 ms.	
				In all cases, the failure count is cleared when controller shuts down				

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
ECM RAM Failure	P0604	Indicates that the ECM has detected a RAM fault. This includes Primary Processor System RAM Fault, Primary Processor Cache RAM Fault, Primary Processor TPU RAM Fault, Primary Processor Update Dual Store RAM Fault, Primary Processor Write Protected RAM Fault, and Secondary Processor RAM Fault. This diagnostic runs continuously.	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	Type A, 1 Trips
			Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written >=	5 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor detects a mismatch between the data and dual data is found during RAM updates. Detects a mismatch in data and dual data updates >	0.46250 s			When dual store updates occur.	

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

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Starter Relay Control Circuit Open (12VSS)	P0615	Controller specific output driver circuit diagnoses the Starter relay (12VSS) low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground.	Starter control diag enable Engine speed Run Crank voltage	Enabled >=0.00RPM >= 11.00 volts	40 failures out of 50 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Starter Relay Control Circuit Low Voltage (12VSS)	P0616	Controller specific output driver circuit diagnoses the Starter relay (12VSS) low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 0.5 Ohms impedance between signal and controller ground	Starter control diag enable Engine speed Run Crank voltage	Enabled >=0.00RPM >= 6.41 volts	8 failures out of 10 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Starter Relay Control Circuit High Voltage (12VSS)	P0617	Controller specific output driver circuit diagnoses the Starter relay low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 0.5 Ohms impedance between signal and controller power	Starter control diag enable Engine speed Run Crank voltage	Enabled >=0.00RPM >= 6.41 volts	40 failures out of 50 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Generator 1 F-Terminal Circuit	P0622	This DTC checks the alternator F-Terminal circuit for electrical integrity during operation.	Generator field winding duty cycle	>= 65.00 [Pct]	Test enabled by calibration; and (Generator present and Generator 1 F-Terminal Circuit test fault in engine running) Run Crank voltage and No Active DTCs and Engine Running and Engine Crank movement detected and (Starter engaged OR Run Crank voltage above 11.00) for a time)	1.00 [Boolean] ==1.00 [Boolean] == FALSE >=11.00 [V] CrankSensor_FA CamSensorAnyLocationFA == FALSE == FALSE == FALSE 1.00	5.00 [s] (Debouncing performed based on cumulative time in faulty condition) Task rate = 50 ms	Type A, 1 Trips
			Generator field winding duty cycle	<= 5.00 [Pct]	Test enabled by calibration;	1.00 [Boolean]	5.00 [s] (Debouncing performed based on cumulative	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					and (Generator present and Generator 1 F-Terminal Circuit test fault in key on) and Engine speed and L-Terminal_FA and Generator 1 F-Terminal present and Generator PWM command and No Active DTCs and Engine Running and Generator control disabled and Generator Service Device Control Command Request	==1.00 [Boolean] == FALSE < 1,000.00 [rpm] == FALSE == 1.00 [Boolean] > 42.00 [Pct] CrankSensor_FA CamSensorAnyLocationFA == TRUE == FALSE == FALSE	time in faulty condition) Task rate = 50 ms	

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1 by monitoring the reference percent Vrefl and failing the diagnostic when the percent Vrefl is too low or too high or if the delta between the filtered percent Vrefl and non-filtered percent Vrefl is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vrefl < or ECM percent Vrefl > or the difference between ECM filtered percent Vrefl and percent Vrefl >	4.875 % Vrefl 5.125% Vrefl 0.0495 % Vrefl	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 >6.41 Volts = 25.00 Seconds = FALSE >8.41 Volts = TRUE	19/39 counts; or 187.5000 ms continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module 02 Sensor Processor Performance Bank 1) (For use with WRAF	P064D	Diagnoses the WRAF Application-Specific Integrated Circuit (ASIC) for Controller Status and Measure Valid faults. These faults can impact closed loop fuel control. This DTC when enabled, monitors the two different failure counters it receives from the WRAF ASIC. The individual diagnostic failure counters are incremented based on the message received from the ASIC. The DTC is set based on any of the two individual fail and sample counters.	B1S1 WRAF ASIC indicates control module faults	Controller Status fail counts and Measure Valid fail counts are accumulated to determine fault status	Diagnostic is Enabled Engine Run or Auto stop Heater Warm-up delay WRAF circuit diagnostic delay since power up	 = True = Complete > 20.0 sec	128 controller status fail counts out of 160 samples OR 128 measure valid fail counts out of 160 samples 25 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on the 5 volt reference circuit #2 by monitoring the reference percent Vref2 and failing the diagnostic when the percent Vref2 is too low or too high or if the delta between the filtered percent Vref2 and non-filtered percent Vref2 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref2 < or ECM percent Vref2 > or the difference between ECM filtered percent Vref2 and percent Vref2 >	4.875 % Vref2 5.125% Vref2 0.0495 % Vref2	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 >6.41 Volts = 25.00 Seconds = FALSE >8.41 Volts = TRUE	19/39 counts; or 187.5000 ms continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powertrain Relay Control (ODM) Open	P0685	Detects an open circuit in the Powertrain Relay driver. This diagnostic reports the DTC when an open circuit failure is present. Monitoring occurs when the output is powered off. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	Open Circuit: > 200 K Q ohms impedance between output and controller ground	Powertrain relay Open circuit diagnostic diagnostic enable = TRUE Run/Crank Voltage	1.00 Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0686 may also set (Powertrain Relay Control Short to Ground).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powertrain Relay Control (ODM) Low	P0686	Detects a short to ground in the Powertrain Relay low side driver. This diagnostic reports the DTC when a short to ground failure is present. Monitoring occurs when the output is powered off. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to ground: < 0.5 Q impedance between output and controller ground	Powertrain relay Low Side driver short to ground diagnostic diagnostic enable = TRUE Run/Crank Voltage	1.00 Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0685 may also set (Powertrain Relay Control Open Circuit).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powertrain Relay Control (ODM) High	P0687	Detects a short to power in the Powertrain Relay low side driver. This diagnostic reports the DTC when a short to power failure is present. Monitoring occurs when the output is powered off. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	Short to power: < 0.5 Ω impedance between output and controller power	Powertrain relay Low Side driver short to power diagnostic enable = TRUE Run/Crank Voltage	1.00 Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powertrain Relay Feedback Circuit High	P0690	Detects higher than expected voltage in the powertrain relay feedback circuit. This diagnostic reports the DTC when higher than expected voltage is present. For example, the powertrain relay could be stuck on. Monitoring occurs when the relay is commanded "off' for a calibrated duration.	Powertrain Relay Voltage	>= 4.00 volts will increment the fail counter	Powertrain relay high voltage feedback circuit diagnostic enable = TRUE Powertrain relay commanded “OFF” No active DTCs:	1.00 >=2.00 seconds PowertrainRelayStateOn_FA	50 failures out of 63 samples 100ms / Sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
5 Volt Reference #3 Circuit	P0697	Detects a continuous or intermittent short on the 5 volt reference circuit #3 by monitoring the reference percent Vref3 and failing the diagnostic when the percent Vref3 is too low or too high or if the delta between the filtered percent Vref3 and non-filtered percent Vref3 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref3 < or ECM percent Vref3 > or the difference between ECM filtered percent Vref3 and percent Vref3 >	4.875 % Vref3 5.125% Vref3 0.0495 % Vref3	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 >6.41 Volts = 25.00 Seconds = FALSE >8.41 Volts = TRUE	19/39 counts; or 187.5000 ms continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
5 Volt Reference #4 Circuit	P06A3	Detects a continuous or intermittent short on the 5 volt reference circuit #4 by monitoring the reference percent Vref4 and failing the diagnostic when the percent Vref4 is too low or too high or if the delta between the filtered percent Vref4 and non-filtered percent Vref4 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref4 < or ECM percent Vref4 > or the difference between ECM filtered percent Vref4 and percent Vref4 >	4.875 % Vref4 5.125% Vref4 0.0495 % Vref4	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 >6.41 Volts = 25.00 Seconds = FALSE >8.41 Volts = TRUE	19/39 counts; or 187.5000 ms continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Knock Sensor Processor 1 Performance	P06B6	This diagnostic checks for a fault with the internal test circuit (sensor #1) used only for the '20 kHz' method of the Open Circuit Diagnostic. A fault is present when the signal level from the 20 kHz range of the FFT output falls between the Open Test Circuit thresholds.	FFT Diagnostic Output	**> P06B6_P06B7_OpenTestCktThrshMin** **AND** **< P06B6_P06B7_OpenTestCktThrshMax** **See Supporting Tables**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow	Yes > 0.0 seconds > 650 RPM and < 3,400 RPM > 300 Revs > 10 mg/cylinder and < 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0103 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Knock Sensor Processor 2 Performance	P06B7	This diagnostic checks for a fault with the internal test circuit (sensor #2) used only for the '20 kHz' method of the Open Circuit Diagnostic. A fault is present when the signal level from the 20 kHz range of the FFT output falls between the Open Test Circuit thresholds.	Individual Sensor Threshold Enabled? FFT Diagnostic Output	1.00 , Use Case 2 **Case** 1: > **P06B6_P06B7_OpenTestCktThrshMin** **AND** **< P06B6_P06B7_OpenTestCktThrshMax** **See Supporting Tables** **Case 2:** > **P06B7_OpenTestCktMin2** **AND** < **P06B7_OpenTestCktMax2** **See Supporting Tables**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow	Yes > 0.0 seconds > 650 RPM and < 3,400 RPM > 300 Revs >10 mg/cylinder and < 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient **Case 1 Weight Coefficient =** 0.0103 Updated each engine event **Case 2 Weight Coefficient =** 0.0103 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure Control Circuit/Open	P06DA	Controller specific output driver circuit diagnoses the oil pump low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	Open Circuit > 200 k Q impedance between output and controller ground	Powertrain Relay Voltage Run/Crank Active Cranking State	> 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type A, 1 Trips Note: In certain controllers P06DB may also set (Engine Oil Pressure Control Circuit Short To Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure Control Circuit Low	P06DB	Controller specific output driver circuit diagnoses the oil pump low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to Ground Circuit < 0.5 Q impedance between output and controller ground	Powertrain Relay Voltage Run/Crank Active Cranking State	> 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type A, 1 Trips Note: In certain controllers P06DA may also set (Engine Oil Pressure Control Circuit Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure Control Circuit High	P06DC	Controller specific output driver circuit diagnoses the oil pump low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	Short to Power < 0.5 Q impedance between output and controller power	Powertrain Relay Voltage Run/Crank Active Cranking State	> 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Oil Pump Control Circuit Performance - Continuously Variable Displacement Oil Pump	P06DD	Diagnoses the performance of the oil pump controls. The test determines if the oil pump is capable of meeting the pressure demand.	Absolute Oil Pressure Error = ABS [Desired Oil Pressure - Measured Oil Pressure] A first-order lag filter is applied to the error value, every 100ms: Filtered Pressure Error = Previous Error + 0.00400 *(New Error - Previous Error) <u>Fail from passing state:</u> Filtered Oil Pressure Error is greater than a threshold AND the cycler algorithm is unable to clear the fault. Pass from failing state:	 Filtered Pressure Error > 35.00 kPa AND Cycler Algorithm has cycled the pump solenoid for 4.50 seconds AND Filtered Pressure Error ≥ **P06DD_CVDOP_MaxPressErr** after the cycler is complete	<u>Common Criteria:</u> Closed Loop Pump Control Active Engine Running Powertrain Relay Voltage Desired Oil Pressure in Range Oil Temperature in Range Engine Speed in Range	 > 11.00 **P06DD_CVDOP_MinDesPres** < Desired Oil Pressure < **P06DD_CVDOP_MaxDesPress** 40.00 °C < Oil Temp < 120.00 °C 1,200 RPM <= Engine Speed <= 4,500	Performed every 100ms.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Filtered Oil Pressure Error is less than a threshold	Filtered Pressure Error < **P06DD_CVDOP_MaxPressErr**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBCM is valid	Serial Communication 2's complement message - ($1C7/$1C9 for engine torque, $1CA/$1C6for axle torque) OR Serial Communication message ($1C7/$1C9 for engine torque, $1CA/ $1C6 for axle torque) rolling count index value OR Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period Torque request greater than torque request diagnostic maximum threshold	Message <> 2's complement of message Message rolling count value <> previous message rolling count value plus one Requested torque intervention type toggles from not increasing request to increasing request > 250 Nm for engine torque based traction torque system, OR > 4,000 Nm for axle torque based traction torque system	Active Communication with EBCM Power Mode Engine Running Status of traction in GMLAN message ($4E9) Run/Crank Active Ignition Voltage	Received serial data = Run = True = Traction Present > 0.50 seconds > 6.41 volts	>= 8 failures out of 10 Performed on every received message 8 rolling count failures out of 10 samples Performed on every received message >= 5 multi-transitions out of 5 samples. Performed every 200 ms >= 4 out of 10 samples Performed on every received message	Type C, No SVS Emissions Neutral Diagnostic - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Reset Signal Message Counter Incorrect	P1000	This DTC monitors for an error in communication with the Fuel Pump Driver Control Module Reset Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Fuel Tank Zone Module Info 9 ARC Fuel Tank Zone Module Info 9 CSUM	>= 3.00 counts out of >= 10.00 counts >=3.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Fuel Tank Zone Module Info 9 ARC samples every 250.00 milliseconds. Fuel Tank Zone Module Info 9 CSUM samples every 250.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Evaporative Emission (EVAP) System Signals Message Counter Incorrect	P1001	This DTC monitors for an error in communication with the Evaporative Emission (EVAP) System Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Fuel Tank Zone Module Info 11 ARC Fuel Tank Zone Module Info 11 CSUM	>= 8.00 counts out of >= 18.00 counts >=8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Fuel Tank Zone Module Info 11 ARC samples every 15.00 milliseconds. Fuel Tank Zone Module Info 11 CSUM samples every 15.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Control System Signals Message Counter Incorrect	P1003	This DTC monitors for an error in communication with the Fuel Control System Signals.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for:		Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.		Fuel Tank Zone Module Info 12 ARC samples every 25.00 milliseconds. Fuel Tank Zone Module Info 12 CSUM samples every 25.00 milliseconds.	Type B, 2 Trips
			Fuel Tank Zone Module Info 12 ARC	>= 8.00 counts out of >= 18.00 counts	All the following conditions are met for:	>= 3,000.00 milliseconds		
					Battery voltage	>= 11.00 volts		
			Fuel Tank Zone Module Info 12 CSUM	>= 8.00 counts out of >= 18.00 counts	Accessory mode to off mode transition not pending			
					If controller is a non-OBD controller then battery voltage	<= 18.00 volts		
					Controller type: OBD Controller			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Reset Error	P1005	This diagnostic is intended to monitor a message from the Fuel Pump Driver Control Module/Fuel Tank Zone Module and use the information in the message to diagnose if the module is resetting unexpectedly. The message contains the time since the last reset as measured by the module. If the time since the last reset decreases from one message to another without indicating that a timer rollover occurred, a reset of the external module will be indicated. If too many resets occur in a sample window the diagnostic will fail.	If the diagnostic has detected that an unexpected reset has occured: The time since last module reset event data value received from the FPDCM/FTZM is less than the previous value and also And The rollover occurred value received from the FPDCM/FTZM is false for out of total samples	<=0.50 seconds >= 2.00 counts >=400.00 counts	DTC is enabled Sensor bus relay is on Battery voltage No FTZM reconfiguration is requested for A new message that contains the FPDCM/ FTZM reset data is received The following DTCs that diagnose the message that contains the FPDCM/ FTZM reset data are not active: P1000 U18A2	Enabled > 11.00 Volts 1.00 second(s)	This diagnostic samples every 100.00 milliseconds.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver 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.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Fuel Tank Zone Module Info 7 ARC Fuel Tank Zone Module Info 7 CSUM	>= 3.00 counts out of >= 10.00 counts >= 3.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Fuel Tank Zone Module Info 7 ARC samples every 100.00 milliseconds. Fuel Tank Zone Module Info 7 CSUM samples every 100.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Monitor Module Temperature Erratic	P100C	This DTC monitors for an erratic Temperature signal via LIN bus from the Battery Monitor Module.	Communication of the Temperature signal from the Battery Monitor Module has become erratic or is incorrect for out of total samples	>= 4 counts >= 5 counts	The diagnostic is enabled All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	Enabled >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Samples every 250.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Monitor Internal Temperature Circuit Erratic	P100D	This DTC monitors for an erratic Temperature Circuit signal via LIN bus from the Battery Monitor Module.	Communication of the Temperature Circuit signal from the Battery Monitor Module has become erratic or is incorrect for out of total samples	>= 4 counts >= 5 counts	The diagnostic is enabled All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	Enabled >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Samples every 250.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Wastegate Actuator "A" Control Circuit Shorted	P103A	Controller specific output driver circuit diagnostic, diagnosing for the 'electric waste gate actuator A' actuator' H-bridge driver load short failure. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	Voltage measurement outside of controller specific acceptable range during driver on state indicates a load short failure.	< 0.5 0 impedance between motor output A and motor output B	Diagnostic enabled Powertrain relay voltage Engine does not crank Diagnostic system not disabled	True >= 11.0 Volts	10 failures out of 12 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Heater Supply Voltage Sense Circuit Range/ Performance	P103B	The P103B diagnostic determines if the heater supply circuit is rational by comparing the heater supply voltage to the run crank voltage and calculating the difference. The heater supply voltage input is connected to the 02 heater supply circuit inside the vehicle relay center. It is representative of the voltage supplied to the 02 heaters. The 02 heater voltage is used by the HWIO to calculate the 02 heater resistance on switching type 02 sensors (non-WRAF). With a fault set, the resistance calculation is performed with run crank voltage. The diagnostic failure counter is incremented if the voltage difference is greater than the threshold. This DTC is set based on the fail and sample counters.	The absolute value of Heater Supply Voltage delta from Run Crank voltage	> 2.00 volts	Diagnostic is Enabled Powertrain relay in range (Relay in range is defined as relay voltage Run Crank signal active	= True > 11.00 volts) = True (Please see **"Run/Crank Active conditiions"** in Supporting Tables)	8 failures out of 10 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Heater Supply Voltage Sense Circuit Low	P103C	The P103C diagnostic determines if the heater supply circuit is low by comparing the heater supply voltage to the threshold. The heater supply voltage input is connected to the 02 heater supply circuit inside the vehicle relay center. It is representative of the voltage supplied to the 02 heaters. The 02 heater voltage is used by the HWIO to calculate the 02 heater resistance on switching type 02 sensors (non-WRAF). With a fault set, the resistance calculation is performed with run crank voltage. The diagnostic failure counter is incremented if the heater supply voltage is less than the threshold. This DTC is set based on the fail and sample counters.	Heater Supply Voltage	< 6.00 volts	Diagnostic is Enabled Powertrain relay in range (Relay in range is defined as relay voltage Run Crank signal active	 = True > 11.00 volts) = True (Please see **"Run/Crank Active conditiions"** in Supporting Tables)	8 failures out of 10 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump Control Signal Message Counter Incorrect	P103D	This DTC monitors for an error in communication with the Engine Coolant Pump Control Signals.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Main Coolant Pump ARC	 >= 8.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Main Coolant Pump ARC samples every 100.00 milliseconds.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Bypass Valve C Position Sensor Circuit Low	P1096	Circuit Continuity This DTC detects a short to ground in the position sensor signal circuit. This is accomplished by monitoring the reported position. If the position goes out of the expected range the DTC is set.	Engine Coolant Bypass Valve C Positions Sensor SENT digital read value	<50	Diagnostic is Enabled SENT communitation is not in error Run Crank Ignition in Range Engine not cranking Engine Diag System	 VECR_MRV_LoC_FP = True = True = Enabled	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Bypass Valve C Position Sensor Circuit High	P1097	Circuit Continuity This DTC detects a short to power in the position sensor signal circuit. This is accomplished by monitoring the reported position. If the position goes out of the expected range the DTC is set.	Engine Coolant Bypass Valve C Positions Sensor SENT digital read value	>4,050	Diagnostic is Enabled SENT communitation is not in error Run Crank Ignition in Range Engine not cranking Engine Diag System	 VECR_MRV_LoC_FP = True = True = Enabled	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Bypass Valve C Position Sensor Stop Performance	P1098	Performance Check This DTC checks for an invalid endstop learn. The valve is moved against each endstop. If the learned position is out of range a DTC will be set.	If any of the following conditions are met a failure will be recorded: Condition 1 (closed): Learned bypass valve position or and the learn has completed Condition 2 (open): Learned bypass valve position or and the learn has completed	 >0.00 degrees <-11.00 degrees >314.50 degrees <304.50 degrees	Diagnostic is Enabled No DTCs Engine Diag System Bypass Valve Learn Engine Outlet Coolant OR OBD Coolant Enable Criteria Engine Outlet Coolant AND Engine Hot Light	 EECR_EngineOutlet_FA VECR_MRV_LoC_FA VECR_MRV_PstnSnsrCkt_FA VECR_MRV_PstnSnsrCkt_TFTKO VECR-M RV_Pstn Perf_FA = Enabled = Successful or Inprogress >-40.0 °C = TRUE <9,999.0 °C = Inactive	Within 60.0 seconds after engine shutdown.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Bypass Valve C Motor Current High	P10A0	Controller specific output driver circuit detects an overcurrent condition in the load circuit for the Engine Coolant Bypass Valve C when the H-Bridge is energized.	Current measurement outside of controller specific acceptable range when H-Bridge is energized	8.1A<X< 12.8A	Diagnostic is Enabled Run Crank Ignition in Range Engine not cranking Engine Diag System Driver over current status is not	 = True = True = Enabled = Indeterminate	2 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Bypass Valve C Control Circuit Shorted	P10A1	Controller specific output driver circuit detects a short to ground in the load circuit for the Engine Coolant Bypass Valve C when the H-Bridge is energized.	Current measurement outside of controller specific acceptable range when H-Bridge is energized	9.8A < X < 15.8A	Diagnostic is Enabled Run Crank Ignition in Range Engine not cranking Engine Diag System Driver control circuit load short status is not	 = True = True = Enabled = Indeterminate	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 1 Injection Pulse Performance	P10A3	Diagnostic to determine if injection pulse total compensation for cylinder 1 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< **P10A3 P10A5P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 1 Injection Pulse Performance	P10A4	Diagnostic to determine if injection pulse total compensation for cylinder 1 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> **P10A4P10A6 P10A8 P10AAP10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below)	= True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips
					FULR_b_FPV_MeasDiag _TFTKO	= True		
					Uncompensated Injection Pulse Width (Injection is commanded)	> 0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 2 Injection Pulse Performance	P10A5	Diagnostic to determine if injection pulse total compensation for cylinder 2 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< **P10A3 P10A5P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 2 Injection Pulse Performance	P10A6	Diagnostic to determine if injection pulse total compensation for cylinder 2 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> **P10A4P10A6 P10A8 P10AAP10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 3 Injection Pulse Performance	P10A7	Diagnostic to determine if injection pulse total compensation for cylinder 3 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< **P10A3 P10A5P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below)	= True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips
					FULR_b_FPV_MeasDiag _TFTKO	= True		
					Uncompensated Injection Pulse Width (Injection is commanded)	> 0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 3 Injection Pulse Performance	P10A8	Diagnostic to determine if injection pulse total compensation for cylinder 3 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> **P10A4P10A6 P10A8 P10AAP10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 4 Injection Pulse Performance	P10A9	Diagnostic to determine if injection pulse total compensation for cylinder 4 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< **P10A3 P10A5P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 4 Injection Pulse Performance	P10AA	Diagnostic to determine if injection pulse total compensation for cylinder 4 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> **P10A4P10A6 P10A8 P10AAP10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Press Regulator Solenoid Control Circuit Short	P10E8	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid high sided driver for a short to low side when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1.1 or 15 Amps selectable thershold based on High pressure Pump.	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Status Message Counter Incorrect	P10F5	This DTC monitors for an error in communication with the EVAP Purge Pump Status Message Signals.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: EVAP Purge Pump ARC	>= 8.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >=11.00 volts <= 18.00 volts	EVAP Purge Pump ARC samples every 100.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 2 Signal Message Counter Incorrect	P1100	This DTC monitors for an error in communication with the Fuel Pump Control Module (FTZM) Fuel Level Sensor 2 Signal Message Counter.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Fuel Tank Zone Module Info 4 ARC Fuel Tank Zone Module Info 4 CSUM	 >= 3.00 counts out of >= 10.00 counts >=3.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Fuel Tank Zone Module Info 4 ARC samples every 250.00 milliseconds. Fuel Tank Zone Module Info 4 CSUM samples every 250.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Inlet Airflow System Performance (single turbo)	P1101	Detects a performance failure in the Manifold Pressure (MAP) sensor, Turbocharger Boost Pressure sensor, Throttle Position sensor (TPS) or Mass Air Flow (MAF) sensor that cannot be uniquely identified as a failure in one individual sensor. This diagnostic can set when more than one of these sensors has a performance concern. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from these four sensors. These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with	See table **P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix** for combinations of model failures that can set this DTC. MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered MAPI model fails when ABS(Measured MAP - MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered TPS model fails when Filtered Throttle Model Error TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP -	>20.0 grams/sec > 25.0 kPa > 30.0 kPa > 30.0 kPa > 30.0 kPa > 250 kPa*(g/s)	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 400 RPM <= 6,200 RPM >= -9 Deg C = TRUE) <= 130 Deg C = FALSE) >= -20 Deg C <= 100 Deg C >= 0.50 Modeled Air Flow Error multiplied by **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM** and **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAPI Residual Weight Factor based on RPM**	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		the system, but no single failed sensor can uniquely be identified. In this case, the Inlet Airflow System Performance diagnostic will fail.	measured MAP - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset** OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset** TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time High Engine Air Flow is TRUE when Mass Air Flow	> 30.0 kPa > 30.0 kPa > 1.0 seconds > 1.0 seconds > a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow**	No Active DTCs: No Pending DTCs:	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP Model 3 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM** TIAP Model 1 Error multiplied by **P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM** Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			AND Manifold Pressure	> a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP**	Diagnostic is Enabled	MnfdTempSensorCktFP		
			AND Filtered Mass Air Flow - Mass Air Flow	< 3.0 gm/sec				
			Low Engine Air Flow is TRUE when Mass Air Flow	< a threshold in gm sec as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow**				
			AND Manifold Pressure	< a threshold in kPa as a function of engine speed See table **P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP**				
			AND Mass Air Flow - Filtered Mass Air Flow	< 3.0 gm/sec				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor Not Plausible	P111E	This DTC detects either a biased high or low ECT (Engine Coolant temperature) sensor. This is done by comparing the ECT sensor output to two other temperature sensor outputs after a soak condition.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsrl Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6		Diagnostic is Enabled No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSn	 OAT_PtEstFiltFA PSAR_PropSysInactveCrs_FA = FALSE EECR_EngineOutlet_CktFA EECR_CylHeadCoolant_CktFA EECR_BlockCoolant_CktFA EECR_EngineInlet_CktFA EECR_EngineOutlet_CktFA EECR_HeaterCoreInlet_CktFA EECR_HeaterCoreOutlet_CktFA EECR_RadiatorOutlet_CktFA EECR_BypassInlet_CktFA EECR_CylHeadMetal1_CktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the physical (Temperature) sensor number. **Bypass Inlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkEngOilSnsr Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkCylHdClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B:	 20.00 °C 10.00 °C 30.00 °C 10.00 °C	sr - BiasChk_EGR_DwnStmSnsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr Comparison sensors The following thresholds are based on the sensor under diagnosis **Bypass Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Coolant:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature	EGRTempSensorUPSS_FA EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl = Availible > 28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Engine Inlet: CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkRad OutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkMa nfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeE EC R_e_AuxH eaterB i asHigh Threshold A: Threshold B:	 25.00 °C 17.00 °C	**Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature	>28,800 seconds >-9.0 °C		
					Comparison sensor 1 & 2 are not	= CeEECR_e_BiasChkNoS election		
			Head Coolant: CeEECR_e_PhysSnsr6 Comparison sensor 1: CeEECR_e_BiasChkBlo ckClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OilSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B: **Heater Inlet:** CeEECR_e_PhysSnsr4 Comparison sensor 1: CeEECR_e_BiasChkByp InClntSnsr Comparison sensor 2:	 20.00 °C 10.00 °C	Aux Heat Detection Aux heat detection can only be enabled the following are met: No Active DTCs At power-up a warm sensor and cool sensor are compared Warm sensor Cool sensor If the warm sensor is compared to the cool sensor Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature	Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlock ClntSnsr CeAEHR_e_BlkHtrRadO utClntSnsr >10.00 °C > 0 seconds >28,800 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CeEECR_e_BiasChkMa		There are 4 different	>-9.00 °C		
			nfldAirSnsr		types of aux heater			
			Fuel Operated heater:		detection for this			
			CeE EC R_e_AuxH eaterN		application:			
			oEffect					
			Block Heater:		2x2 signature	Enabled		
			CeEECR_e_AuxHeaterBi		Absolute Drop	Enabled		
			asHigh		IAT Drop	Disabled		
			Threshold A:	15.00 °C	Temperature Derivative	Disabled		
			Threshold B:	10.00 °C				
					2x2 Signature Criteria:			
			Heater Outlet:					
			CeEECR_e_PhysSnsr5		The warm sensors			
			Comparison sensor 1:		Sensor 1:	CeAEHR_e_BlkHtrCylHd		
			CeEECR_e_BiasChkEng			ClntSnsr		
			OilSnsr		Sensor 2:	CeAEHReBlkHtrEngIn		
			Comparison sensor 2:			ClntSnsr		
			CeEECR_e_BiasChkMa					
			nfldAirSnsr		The cool sensors			
			Fuel Operated heater:		Sensor 1:	CeAEHR_e_BlkHtrRadO		
			CeEECR_e_AuxHeaterN			utClntSnsr		
			oEffect		Sensor 2:	CeAEHR_e_BlkHtrOutsid		
			Block Heater:			eAirSnsr		
			CeEECR_e_AuxHeaterBi					
			asBoth		A block heater will be			
			Threshold A:	25.00 °C	detected if the warm			
			Threshold B:	17.00 °C	sensors are within	10.0 °C		
					AND			
			Radiator Outlet:		The cool sensors are			
			CeEECR_e_PhysSnsr3		within	10.0 °C		
			Comparison sensor 1:		AND			
			CeEECR_e_BiasChkEng		The delta between the			
			InClntSnsr		two groups (warm/cold)	>10.0 °C		
			Comparison sensor 2:					
			CeEECR_e_BiasChkMa		**Absolute Drop Criteria:**			
			nfldAirSnsr					
			Fuel Operated heater:		The	CeAEHR_e_BlkHtrBlock		
			CeE EC R_e_AuxH eaterN		is monitored for a drop.	ClntSnsr		
			oEffect					
			Block Heater:		The drop will be			
			CeEECR_e_AuxHeaterBi		monitored for once			
			asLow		coolant flow is	> 9.00 L/min		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Threshold A:	30.00 °C	AND			
			Threshold B:	17.00 °C	Flow time is between	0.0 - 60.0 seconds		
					AND either			
			A failure will be reported if any of the following conditions are met. Evaluated in order:		Engine runtime is OR Insufficent coolant flow is present for	< 120.0 seconds >300.0 seconds		
			1) This sensor is above both comparison sensors	>A °C	A block heater is detected if a drop is	>5.0 °C		
					IAT Drop Criteria:			
			2) This sensor is below both comparison sensors	>A °C	The sensor will be used as IAT for this method	CeAEHR_e_BlkHtrIntakeAirSnsr		
			3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew	>B °C	A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time	 >5.0 °C >400.0 seconds		
			4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	>B °C	Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows	>24.0kph 0.5 times the seconds with vehicle speed below the threshold above		
					This detection method will abort if the engine is off OR Engine runtime	> 180.0 seconds > 1,800 seconds		
					Temperature Derivative Criteria:			
					Derivative will be monitored using	CeAEHR_e_BlkHtrBlockClntSnsr		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Derivative will be monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficent coolant flow is present for Derivative count will increment if derivative is If counts are a block heater is detected =================	>-1.00 L/min 5.0 -15.0 seconds < 75.0 seconds >300.0 seconds <-0.10°C/sec > 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENTSIDI High Pressure Rail Temperature Sensor Performance	P111F	This DTC Diagnoses Fuel Temperature sensors rationality by comparing Primary sensor (T1) vs. Secondary sensor (T2)	Fuel Temperature Error (Absolute delta between sensori and sensor2)	> 20.00 degC	Fuel Temperature Rationality Diagnostic Enabled	True	100.00 failures out of 125.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
						Temperature sensors 1 out of range Low or High Fault Active (P0182, P0182)		
					No Fault Active on	Temperature sensors 2 out of range Low or High (P0187, P0188)		
						SENT Communication Fault Active (U0625, U101B, U0670, U0671)		
						SENT Intenal Error Fault Active (P126E, P126F)		
						Fuel Temperature Sensor SENT Message Error Fault Active (P128C, P128D)		
					No Fault Pending on	SENT Communication Fault Pending (U0625, U101B, U0670, U0671)		
						Fuel Temperature Sensor SENT Message Error Fault Pending (P128C, P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Radiator Coolant Temperature Sensor Not Plausible	P112F	This DTC detects either a biased high or low RCT (Radiator Coolant Temperature) sensor. This is done by comparing the RCT sensor output to two other temperature sensor outputs after a soak condition.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadiatorCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolantTempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6		Diagnostic is Enabled No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr -	 OAT_PtEstFiltFA PSAR_PropSysInactveCrs_FA = FALSE EECR_RadiatorOutlet_CktFA EECR_CylHeadCoolant_CktFA EECR_BlockCoolant_CktFA EECR_EngineInlet_CktFA EECR_EngineOutlet_CktFA EECR_HeaterCoreInlet_CktFA EECR_HeaterCoreOutlet_CktFA EECR_RadiatorOutlet_CktFA EECR_BypassInlet CktFA EECR_CylHeadMetal1_CktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSSFA	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the physical (Temperature) sensor number.		BiasChk_EGR_DwnStmSnsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr Comparison sensors	EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl = Availible		
			Bypass Inlet: CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkEngOilSnsr Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B:	 20.00 °C 10.00 °C	The following thresholds are based on the sensor under diagnosis **Bypass Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature	 > 28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C		
			Engine Block: CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkCylHdClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasBoth Threshold A:	 30.00 °C	**Head Coolant:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature	 >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Threshold B:	10.00°C				
			Engine Inlet: CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkRadOutClntSnsr		Comparison sensor 1 & 2 are not	= CeEECR_e_BiasChkNoSelection		
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr		Aux Heat Detection			
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		Aux heat detection can only be enabled the following are met:			
			Block Heater: CeEECR_e_AuxHeaterBiasHigh		No Active DTCs	Same set as listed above and EngineModeNotRunTimerError EngineModeNotRunTimer_FA VehicleSpeedSensor_FA		
			Threshold A:	25.00°C				
			Threshold B:	17.00°C				
			Head Coolant: CeEECR_e_PhysSnsr6 Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr		At power-up a warm sensor and cool sensor are compared			
			Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr		Warm sensor	CeAEHR_e_BlkHtrBlockClntSnsr		
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		Cool sensor	CeAEHR_e_BlkHtrRadOutClntSnsr		
			Block Heater: CeEECR_e_AuxHeaterBiasBoth		If the warm sensor is compared to the cool sensor	>10.00°C		
			Threshold A:	20.00°C				
			Threshold B:	10.00°C				
			Heater Inlet: CeEECR_e_PhysSnsr4		Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature	> 0 seconds >28,800 seconds >-9.00°C		
			Comparison sensor 1: CeEECR_e_BiasChkBypInClntSnsr		There are 4 different types of aux heater detection for this			
			Comoarison sensor 2:					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CeEECR_e_BiasChkMa		application:			
			nfldAirSnsr					
			Fuel Operated heater:		2x2 signature	Enabled		
			CeE EC R_e_AuxH eaterN		Absolute Drop	Enabled		
			oEffect		IAT Drop	Disabled		
			Block Heater:		Temperature Derivative	Disabled		
			CeEECR_e_AuxHeaterBi					
			asHigh		**2x2 Signature Criteria:**			
			Threshold A:	15.00 °C				
			Threshold B:	10.00 °C	The warm sensors			
			Heater Outlet:		Sensor 1:	CeAEHR_e_BlkHtrCylHd		
			CeEECR_e_PhysSnsr5			ClntSnsr		
			Comparison sensor 1:		Sensor 2:	CeAEHR_e_BlkHtrEngIn		
			CeEECR_e_BiasChkEng			ClntSnsr		
			OilSnsr					
			Comparison sensor 2:		The cool sensors			
			CeEECR_e_BiasChkMa					
			nfldAirSnsr		Sensor 1:	CeAEHR_e_BlkHtrRadO		
			Fuel Operated heater:			utClntSnsr		
			CeEECR_e_AuxHeaterN		Sensor 2:	CeAEHR_e_BlkHtrOutsid		
			oEffect			eAirSnsr		
			Block Heater:					
			CeEECR_e_AuxHeaterBi		A block heater will be			
			asBoth		detected if the warm			
			Threshold A:	25.00 °C	sensors are within	10.0 °C		
			Threshold B:	17.00 °C	AND			
					The cool sensors are			
			Radiator Outlet:		within	10.0 °C		
			CeEECR_e_PhysSnsr3		AND			
			Comparison sensor 1:		The delta between the			
			CeEECR_e_BiasChkEng		two groups (warm/cold)	>10.0 °C		
			InClntSnsr					
			Comparison sensor 2:		**Absolute Drop Criteria:**			
			CeEECR_e_BiasChkMa					
			nfldAirSnsr		The	CeAEHR_e_BlkHtrBlock		
			Fuel Operated heater:		is monitored for a drop.	ClntSnsr		
			CeE EC R_e_AuxH eaterN					
			oEffect		The drop will be			
			Block Heater:		monitored for once			
			CeEECR_e_AuxHeaterBi		coolant flow is	> 9.00 L/min		
			asLow		AND			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Threshold A: Threshold B: A failure will be reported if any of the following conditions are met. Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	30.00 °C 17.00 °C >A °C >A °C >B °C >B °C	Flow time is between AND either Engine runtime is OR Insufficent coolant flow is present for A block heater is detected if a drop is **IAT Drop Criteria:** The sensor will be used as IAT for this method A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be	0.0 - 60.0 seconds < 120.0 seconds >300.0 seconds >5.0 °C CeAEHR_e_BlkHtrIntakeAirSnsr >5.0 °C >400.0 seconds >24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlockClntSnsr		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficent coolant flow is present for Derivative count will increment if derivative is If counts are a block heater is detected =================	>-1.00 L/min 5.0 -15.0 seconds < 75.0 seconds >300.0 seconds <-0.10°C/sec > 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module 5V Reference 1 Circuit	P1176	This DTC monitors for an error in the Fuel Pump Driver Control Module 5V Reference 1 Circuit.	Raw Fuel Pump Driver Control Module 5V Reference 1 is or Raw Fuel Pump Driver Control Module 5V Reference 1 is or Absolute difference of the filtered Fuel Pump Driver Control Module 5V Reference 1 and Raw Fuel Pump Driver Control Module 5V Reference 1 is For a non-continuous failure of out of For a continuous failure of	> 92.25 Percent <87.75 Percent > 99.00 Percent 40.00 counts 80.00 counts 0.20 seconds	Diagnostic is enabled Run/Crank Ignition Voltage PT Sensor Bus Relay The following DTCs that diagnose the message that contains the FPDCM/ FTZM reference circuit data are not active: P165C U0076 U18A2	Enabled >=11.00 Volts Commanded on (if present)	Samples every 12.50 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module 5V Reference 2 Circuit	P1177	This DTC monitors for an error in the Fuel Pump Driver Control Module 5V Reference 2 Circuit.	Raw Fuel Pump Driver Control Module 5V Reference 2 is or Raw Fuel Pump Driver Control Module 5V Reference 2 is or Absolute difference of the filtered Fuel Pump Driver Control Module 5V Reference 2 and Raw Fuel Pump Driver Control Module 5V Reference 2 is For a non-continuous failure of out of For a continuous failure of	> 92.25 Percent <87.75 Percent > 99.00 Percent 40.00 counts 80.00 counts 0.20 seconds	Diagnostic is enabled Run/Crank Ignition Voltage PT Sensor Bus Relay The following DTCs that diagnose the message that contains the FPDCM/ FTZM reference circuit data are not active: P165C U0076 U18A2	Enabled >=11.00 Volts Commanded on (if present)	Samples every 12.50 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit	P1178	This DTC monitors for an error in the Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit	Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is or Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is or Absolute difference of the filtered Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit and Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is For a non-continuous failure of out of For a continuous failure of	> 92.25 Percent <87.75 Percent > 99.00 Percent 40.00 counts 80.00 counts 0.20 seconds	Diagnostic is enabled Run/Crank Ignition Voltage PT Sensor Bus Relay The following DTCs that diagnose the message that contains the FPDCMZ FTZM reference circuit data are not active: P1200 U0076 U18A2	Enabled >=11.00 Volts Commanded on (if present)	Samples every 250.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Fuel Level Sensor 2 Internal Supply Circuit	P1179	This DTC monitors for an error in the Fuel Pump Driver Control Module Fuel Level Sensor 2 Internal Supply Circuit	Raw Fuel Pump Driver Control Module Fuel Level Sensor 2 Internal Supply Circuit is or Raw Fuel Pump Driver Control Module Fuel Level Sensor 2 Internal Supply Circuit is or Absolute difference of the filtered Fuel Pump Driver Control Module Fuel Level Sensor 2 Internal Supply Circuit and Raw Fuel Pump Driver Control Module Fuel Level Sensor 2 Internal Supply Circuit is For a non-continuous failure of out of For a continuous failure of	> 92.25 Percent <87.75 Percent > 99.00 Percent 40.00 counts 80.00 counts 0.20 seconds	Diagnostic is enabled Run/Crank Ignition Voltage PT Sensor Bus Relay The following DTCs that diagnose the message that contains the FPDCM/ FTZM reference circuit data are not active: P1200 U0076 U18A2	Enabled >=11.00 Volts Commanded on (if present)	Samples every 250.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Bypass Valve D Control Signal Message Counter Incorrect	P117A	This DTC monitors for an error in communication with the Engine Coolant Bypass Valve D Control Signals.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Engine Coolant Bypass Valve D ARC	>= 8.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Engine Coolant Bypass Valve D ARC samples every 100.00 milliseconds.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Block Coolant Valve Position Sensor Circuit Low Voltage	P118A	This diagnostic continuously detects if the Block Rotary Valve Position Feedback signal is too low and out of the expected operating range, defined by any position below the lower mechanical end-stop. If the enable criteria are met and the raw position feedback is below the out of range low position fail threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a Fail, and if not it will report a Pass. The diagnostic will continue to report as long as the enablement criteria are met. This diagnostic will suspend when a matured fault is detected while the valve is performing the integrity check and will re-enable when the valve performs the integrity check again at the end of the next drive cycle.	Coolant Valve Position Feedback	< -7.00°	Diagnostic is Enabled 12V System Voltage VECR_BRV_Pstn Fdbk_Av , VECR_BRV_PstnFdbk_Fol PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On Diagnostic Position Override Enable	 >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active = True = False	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Block Coolant Valve Position Sensor Circuit High Voltage	P11C9	This diagnostic continuously detects if the Block Rotary Valve Position Feedback signal is too high and out of the expected operating range, defined by any position above the upper mechanical endstop. If the enable criteria are met and the raw position feedback is greater than the out of range high fail threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a Fail, and if not it will report a Pass. The diagnostic will continue to report as long as the enablement criteria are met. This diagnostic will suspend when a matured fault is detected while the valve is performing the integrity check and will re-enable when the valve performs the integrity check again at the end of the next drive cycle.	Coolant Valve Position Feedback	> 117.00°	Diagnostic is Enabled 12V System Voltage VECR_BRV_Pstn Fdbk_Av , VECR_BRV_PstnFdbk_Fol PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On Diagnostic Position Override Enable	 >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active = True = False	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 1 Signal Message Counter Incorrect	P1200	This DTC monitors for an error in communication with the Fuel Pump Control Module (FTZM) Fuel Level Sensor 1 Signal Message Counter.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Fuel Tank Zone Module Info 3 ARC Fuel Tank Zone Module Info 3 CSUM	 >= 3.00 counts out of >= 10.00 counts >=3.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Fuel Tank Zone Module Info 3 ARC samples every 250.00 milliseconds. Fuel Tank Zone Module Info 3 CSUM samples every 250.00 milliseconds.	Type B, 2 Trips

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Temperature Sensor 1 Internal Fault - Error Code	P126E	This DTC Diagnoses the SENT Fuel Temperature Sensor 1 internal failure	Fuel Temperature Sensor 1 SENT digital read value	>= 4,089.00	No Fault Active on	Enabled when a code clear is not active or not exiting device control SENT Communication Fault Active (U0625, U101B, U0670, U0671) Fuel Temperature Sensor SENT Message Error Fault Active (P128C)	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
					No Fault Pending on	Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Temperature Sensor 2 Internal Fault - Error Code	P126F	This DTC Diagnoses the SENT Fuel Temperature Sensor 2 internal failure	Fuel Temperature Sensor 2 SENT digital read value	>= 4,089.00			50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
					No Fault Active on	Enabled when a code clear is not active or not exiting device control SENT Communication Fault Active (U0625, U101B, U0670, U0671) Fuel Temperature Sensor SENT Message Error Fault Active (P128D)		
					No Fault Pending on	Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail High Pressure Sensor 2 Out of Range	P127C	This DTC diagnose SENT high pressure sensor 2 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	High Pressure Rail Sensor 2 SENT digital read value	=< 66			Time Based: 400 Failuer out of 500 Samples 6.25 ms per Sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure Sensor 1 Internal Performance	P128A	This DTC determines if there is internal error within the SENT pressure sensor 1 (i.e. Broken wire bond internal to the SENT Sensor). Once the internal error is detected a fixed faulted digital values is communicated to the ECU.	Digital pressure sesnor 1 value	>= 4,089		Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples	Type A, 1 Trips
					SENT Fuel Rail Pressure Sensor Internal Performance Enable	True	6.25 ms per Sample Continuous	
					No Fault Pending	U0625 P16E5 P128F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure Sensor 2 Internal Performance	P128B	This DTC determines if there is internal error within the SENT pressure sensor 2 (i.e. Broken wire bond internal to the SENT Sensor). Once the internal error is detected a fixed faulted digital values is communicated to the ECU.	Digital pressure sesnor 2 value	>= 4,089	 SENT Fuel Rail Pressure Sensor Internal Performance Enable No Fault Pending	Enabled when a code clear is not active or not exiting device control True U0625 P16E5 P128F	400 failures out of 500 samples 6.25 ms per Sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure &Temperature Sensor Temperature 1 Message Incorrect	P128C	This DTC diagnoses the the communication errors on the temperature 1 serial data channel	Serial Message 1 Age	>= 0.03 ms	SENT signal Serial waveform diagnostics enable SENT power up delay No Fault Active	True >=0.00 seconds U0625 P16E5	134 failures out of 167 samples 6.25 ms per sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure & Temperature Sensor Temperature 2 Message Incorrect	P128D	This DTC diagnoses the the communication errors on the temperature 2 serial data channel	Serial Message 2 Age	>= 0.03 ms	SENT signal Serial waveform diagnostics enable SENT power up delay No Fault Active	True >=0.00 seconds U0625 P16E5	134 failures out of 167 samples 6.25 ms per sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SENT Fuel Rail Pressure & Temperature Sensor Pressure Message Incorrect	P128F	This DTC determines if there is any SENT signal waveform for discrepancies (i.e. too many pulse, too few pulse, clock shift). The SENTHWIO Determines message waveform fault (i.e.too many pulse, too few pulse, clock shift) and if the message age is too long.	SENT HWIO Determines message fault (i.e.too many pulse, too few pulse, clock shift)	= true	SENT signal Serial waveform diagnostics enable	True	400 failures out of 500 samples	Type A, 1 Trips
			Message Age	> 1.69 ms	SENT power up delay	>= 0.00 seconds	6.25 ms per sample Continuous	
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	U0625 P16E5		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Control Module (Fuel Tank Zone Module) Control Signal Message Counter Incorrect	P12A8	This DTC monitors for an error in communication with the Fuel Pump Control Module (FTZM) Control Signal Message.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Fuel Tank Zone Module Info 8 ARC Fuel Tank Zone Module Info 8 CSUM	>= 8.00 counts out of >= 18.00 counts >=8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Fuel Tank Zone Module Info 8 ARC samples every 15.00 milliseconds. Fuel Tank Zone Module Info 8 CSUM samples every 15.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Run/ Start Voltage Signal Message Counter Incorrect	P130F	This DTC monitors for an error in the Ignition Run/Start Voltage Signal Message Counter.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Fuel Tank Zone Module Info 5 ARC Fuel Tank Zone Module Info 5 CSUM	 >=4.00 counts out of >= 10.00 counts >=4.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Fuel Tank Zone Module Info 5 ARC samples every 60.00 milliseconds. Fuel Tank Zone Module Info 5 CSUM samples every 60.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Torque Solver Performance	P134C	The performance of internal control module torque solver is monitored by the iteration number required to complete the computation as well as comparison of the values determined by the solver against constraints. The torque solver performance is monitored only if the torque control is enabled.	Reported iteration number exceeds threshold. Internal control module torque solver requires a certain number of iterations to complete the computation. During normal operation, this number should be smaller than a pre-defined threshold. Two cases are considered as failure: 1) the computation is not completed when the iteration number exceeds the threshold. The reported iteration number is set equal to 1+ maximum number of iterations allowed for the torque solver. 2) the computation is not completed before overrunning the control loop. In this case, the reported iteration number is set equal to the sum of the current iteration number and maximum number of iterations allowed for the torque solver.	> refer to **Maximum number of iterations allowed for torque solver** in supporting tables	Diagnostic enabled and Control module resource monitor enabled	= Enabled = Enabled	5.00 failures out of 8.00 samples 25 ms / sample	Type B, 2 Trips
			Reported solution exceeds lower/upper bounds by more than allowed value.	Solution minus lower bound <-10.00 or	Diagnostic enabled	= Enabled	5.00 failures out of 8.00 samples 25ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			If not in Case 1 or Case 3, the solution determined by internal control module torque solver should remain higher or equal to pre-determined lower bound and lower or equal to pre-determined upper bound. Due to the nature of floating point computation in ECM (engine control module), the solution is allowed to exceed its lower/upper bounds by a value determined by the threshold. Exceeding lower/upper bounds by more than allowed value is considered as failure.	Solution plus upper bound > 10.00 .				
			Reported iteration number is negative. The normal range of iteration number that allows the internal control module torque solver to find a solution is between 0 and maximum number of iterations allowed. The reported iteration number becomes negative in the following two cases which are both considered as failure: 1) the torque solver	Reported iteration number < 0.	Diagnostic enabled	= Enabled	1 failure	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			cannot further proceed before finding a solution AND before the iteration number reaches maximum allowed value. In this case, the reported iteration number is set equal to the negative of the current iteration number. 2) the torque solver returns a solution and is not in Casel, but the solution is not accurate due to error accumulation of floating point computation. In this case, the reported iteration number is set equal to the negative of the current iteration number minus the maximum allowed iteration number minus 1.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Coil Positive Voltage Circuit Group 1 * * SIDI ONLY * *	P135A	This diagnostic checks for minimum voltage at the fuse which supplies power to the Ignition Coils (applicable only for SIDI applications). A diagnostic failure indicates a blown fuse.	Ignition Module Supply Voltage.	<2.5 Volts	Diagnostic Enabled? Three possible Ignition Coil Power Sources (only 1 used): Ignition Coil Power Source = Case 1: Battery Delay starting at Key-On Case 2: Ignition Run/ Crank Ignition Run/Crank Voltage Case 3: PT Relay PT Relay Voltage	Yes PT Relay (Case 3) 5 Engine Revs > 5.0 volts >11.0 volts	24 Failures out of 30 Samples 6.25 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cooling Fan 1 Status Signals Message Counter Incorrect	P135C	This DTC monitors for an error in communication with the Cooling Fan 1 Status Signals.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Coolant Fan 1 ARC	 >= 8.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Coolant Fan 1 ARC samples every 1,000.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Block Coolant Valve Stop Performance	P1387	This is an intrusive diagnostic that runs at the end of every drive cycle for detecting the valve hardware integrity. The valve is commanded to both the lower range and upper range boundary. If the valve hardware is not broken, the valve shall return feedback at the endstop positions. Otherwise, the feedback will return out of range feedback. A diagnostic determination is reported at the completion of the procedures. If both endstops return pass, then a PASS is reported, If any of the endstops returns a fail, then a FAIL is reported.	**Lower Endstop:** Coolant Valve Position Feedback **Upper Endstop:** Coolant Valve Position Feedback	<= -7.00° >= 117.00°	Diagnostic is Enabled 12V System Voltage No pending DTCs No Active DTCs Powertrain Relay Commanded On Engine Block Coolant Temperature is Used on this application Run Crank Active Coolant System Mode	>= 11.00 V (hystersis disable < 10.00 V) VECR_B RV_Pstn Fdbk_A v VECR_B RV_Pstn Fdbk_F ol PowertrainRelayStateOn_FA Powertrain Relay Feedback Circuit DTCs P0689, P0690 = True >= -40.00 °C (hystersis disable <= -41.00 °C) = False = Coolant System Initialization	Both endstop tests occur in series and both must complete before a decision is made. **Lower Endstop:** 4 seconds out of a 5 seconds window **Upper Endstop:** 4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Pressure High Control Circuit Low	P13B1	Controller specific output driver circuit diagnoses the oil pump high-sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to Ground Circuit < 0.5 Ω impedance between output and controller ground	Powertrain Relay Voltage Run/Crank Active Cranking State	> 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type A, 1 Trips Note: In certain controllers P06DA may also set (Oil Pump Control Circuit Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cold Start Emissions Reduction System Fault	P1400	Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range.	Average desired accumulated exhaust power - Average actual accumulated exhaust power (too much energy delivered to catalyst) Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst) (EWMA filtered) Average Power = output of **P1400_EngineSpeedResidual_Table** * output of **P1400_SparkResidual_Table** NOTE: Desired accumulated power would use the desired catalyst light off spark and desired engine speed and the actual accumuated power would use the final commanded spark and actual engine speed. Refer to the Supporting Tables for details	< -32.00 KJ/s (high RPM failure mode) > 15.50 KJ/s (low RPM failure mode)	To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following: Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following: Catalyst Temperature AND Engine Run Time OR Engine Run Time OR Barometric Pressure	< 400.00 degC > -12.00 degC <= 66.00 degC >= 72.00 KPa >= 700.00 degC >= 0.00 seconds > **P1400_Catalystl_ightOffExtendedEngineRunTimeExit** This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details. < 72.00 KPa	Runs once per trip when the cold start emission reduction strategy is active Frequency: 100ms Loop Test completes after 12 seconds of accumulated qualified data.	EWMA Based - Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Other Enable Criteria:			
					OBD Manufacturer Enable Counter	0		
					Vehicle Speed	<1.24MPH		
					Allow diagnostic to calculate residual in an off-idle state. If the value of the OffIdleEnable is equal to 1 then the "DriverOffAccelPedal" will not be checked. However, if the value of OffIdleEnable is 0 then driver must be off the accel pedal	0 (A value of 1 allows diagnostic to run and calculate the residual while off idle. A value of 0 requires calculation of the residual at idle)		
					A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. Therefore when the:			
					Pedal Close Delay Timer	> 3.50 seconds		
					the diagnostic will continue the calculation.			
					A change in gear will initiate a delay in the calculation of the average qualified residual value to			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					allow time for the actual engine speed and actual final commanded spark to achieve their desired values. Therefore, when the:			
					Gear Shift Delay Timer	> 2.00 seconds		
					the diagnostic will continue the calculation			
					For Manual Transmission vehicles:			
					Clutch Pedal Position	> 90.00 %		
					Clutch Pedal Position	<16.00%		
					The diagnostic will delay calculation of the residual value and potentially weight the residual calculation differently based on engine run time. This is to ensure the diagnostic is operating in idle speed control as well as during the peak catalyst light off period.			
					The time weighting factor must be :	>0 These are scalar values that are a function of engine run time. Refer to		

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor B Reference Feedback Range/ Performance [For use on vehicles with FTZM and Secondary Fuel Tank]	P143E	This DTC will detect a fault in Secondary 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 1 Period Error Maximum [Measured Ref V Period - Commanded RefV Period]	> 25.00 millisec	a] CAN serial data available [$2D7] b] Calibration - Reference Voltage Command Source c] Timer - Reference Voltage Pulse Width Available Synchronization d] Timer - Reference Voltage Period Available Delay e] Diagnostic System Disabled f] FTZM Serial Data Info4 Rolling Counter Check Error g] Reference Voltage Performance 1 Diagnostic Enabled	a] == True b] == ECM c] > 1.25 sec d] > 0.75 sec e] <> True f] <> True g] == TRUE	250 ms / sample 16 Failures/ 20 Samples	Type B, 2 Trips
			Reference Voltage 1 Pulse Width Error Maximum [Measured Ref V PW - Commanded Ref V PW]	> 1.50 millisec	a] CAN serial data available [$2D7] b] Calibration - Reference Voltage Command Source c] Timer - Reference Voltage Pulse Width Available Synchronization d] Timer - Reference Voltage Period Available Delay e] Diagnostic System Disabled	a] == True b] == ECM c] > 1.25 sec d] > 0.75 sec e] <> True	250 ms / sample 16 Failures/ 20 Samples	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					f] FTZM Serial Data Info4 Rolling Counter Check Error g] Reference Voltage Performance 1 Diagnostic Enabled	f] <> True g] == TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump On Speed Performance	P1467	Purge pump speed does not match requested pump speed when pump is commanded on	Purge pump speed	> refer to **Purge pump speed on value too high** in Supporting Tables. Calibration threshold for pump speed too high as func of pump supply voltage	Diagnostic is Enabled		100 failures out of 125 samples 100 msec / sample	Type B, 2 Trips
					Propulsion system on			
					Purge pump commanded on			
					LIN data available for	> 2 counts		
			Purge pump speed	< refer to **Purge pump speed on value too low** in Supporting Tables. Calibration threshold for pump speed too low as func of pump supply voltage	Outside Air Temp	>-20 °C		
					Powertrain relay voltage	>11.0 volts		
					Barometric pressure	>70 kPa		
					Time delay	> 14 seconds for purge pump speed to spool up (pump off to on)		
					Purge Pump Over Temperature Status	= False		
					No active DTCs	P1469 - Purge Pump Speed OOR Low P146A- Purge Pump Speed OOR High P148E - Purge Pump Voltage OOR Low P148F - Purge Pump Voltage OOR High P1490 - Purge Pump Voltage Performance P14A4- EVAP Purge Pump Temperature Too High		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					No pending DTC's	Purge Pump LIN Communication Fault Active AmbientAirDefault OAT_AmbientSensorFA P1469 - Purge Pump Speed OCR Low P146A- Purge Pump Speed OCR High Purge Pump LIN Communication Fault Pending		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Off Speed Performance	P1468	Purge pump speed does not match requested pump speed when pump is commanded off	Absolute value of purge pump speed	> 240 RPM	Diagnostic is Enabled		50 failures out of 63 samples 100 msec / sample	Type B, 2 Trips
					Propulsion system on			
					Purge pump commanded off			
					LIN data available for	> 2 counts		
					Powertrain relay voltage	>11.0 volts		
					Time delay	> 21 seconds for purge pump speed to spool up (pump on to off)		
					No active DTCs	P1469 - Purge Pump Speed OOR Low Fault Active P146A- Purge Pump Speed OOR High Fault Active P148E - Purge Pump Voltage OOR Low P148F - Purge Pump Voltage OOR High P1490 - Purge Pump Voltage Performance Purge Pump LIN Communication Fault Active		
					No pending DTCs	P1469 - Purge Pump Speed OOR Low P146A- Purge Pump Speed OOR High		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Speed Too Low	P1469	Purge pump speed signal is out of range low	Purge pump speed	< -100RPM	Diagnostic is Enabled		50 failures out of 63 samples 100 msec / sample	Type B, 2 Trips
					LIN data available for	> 2 counts		
					Powertrain relay voltage	>11.0 volts		
					No active DTCs	P148E - Purge Pump Voltage OOR Low P148F - Purge Pump Voltage OOR High P1490 - Purge Pump Voltage Performance Purge Pump LIN Communication Fault Active		
					No pending DTCs	Purge Pump LIN Communication Fault Pending		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Speed Too High	P146A	Purge pump speed signal is out of range high	Purge pump speed	> 55,000 RPM	Diagnostic is Enabled LIN data available for Powertrain relay voltage No active DTCs No pending DTCs	 > 2 counts >11.0 volts P148E - Purge Pump Voltage OOR Low P148F - Purge Pump Voltage OOR High P1490 - Purge Pump Voltage Performance Purge Pump LIN Communication Fault Active Purge Pump LIN Communication Fault Pending	50 failures out of 63 samples 100 msec / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump System Performance (Continuous Flow Version)	P146B	Purge pump system flow performance, based on pressure sensor feedback, is too low or too high. A purge system, that employs a purge pump, will monitor the purge flow delivery through the evaporative emission system. The estimated purge flow is calculated as a function of pressure across the purge solenoid valve. The failure threshold purge flow is calculated as a function of purge valve duty cycle and barometric pressure. The ratio of the estimated purge flow and failure threshold purge flow is calculated and compared to a threshold. A fault pending is set when the calculated ratio is greater than or less than calibration thresholds. These fault pending states are processed by X out of Y logic.	Purge pump flow ratio low Purge pump flow ratio low = estimated purge flow as a function of pressure across purge solenoid valve / failure threshold for purge low flow as a function of purge valve duty cycle and barometric pressure Purge pump flow ratio high Purge pump flow ratio high = estimated purge flow as a function of pressure across purge solenoid valve / failure threshold for purge high flow as a function of purge valve duty cycle and barometric pressure	< refer to **Purge pump performance low flow ratio threshold** in Supporting Tables. Calibration threshold for performance too low as func of purge valve duty cycle and barometric pressue > refer to **Purge pump performance high flow ratio threshold** in Supporting Tables. Calibration threshold for performance too high as func of purge valve duty cycle and barometric pressure	Diagnostic is Enabled Propulsion system on Conditions for Estimated Ambient Temperature Using OAT Sensor to be Valid (read description for details) Outside Air Temperature Outside Air Temperature Barometric Pressure Pump speed on timer No device control Averaging of pump pressure sensor reading is valid Purge is enabled EVAP diagnostics are not running (This means purge valve leak (P0496), large leak (P0455), and canister vent restriction (P0446) diagnostics have completed or did not need to run) and delay timer LIN data available for LIN IAT data available Powertrain relay voltage	= TRUE > 0 °C < 50 °C > 70 kPa > 14 seconds = TRUE = TRUE > 5.0 Seconds > 2 counts > 11.0 volts	80 failures out of 100 samples 100 msec / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					***************************	***************************		
					When entering or re-entering the enable criteria in this section a delay timer needs to expire	>1.0 Seconds		
					Engine RPM to enable	400 RPM <X< 6,800 RPM		
					Engine RPM to remain enabled	350 RPM <X< 6,850 RPM		
					Engine airlow to enable	0 g/s <X< 30 g/s		
					Engine airlow to remain enabled	-5 g/s <X< 35 g/s		
					Purge solenoid DC to enable	5<X<101 %		
					Purge solenoid DC to remain enabled	2<X<104%		
					Purge gas flow ratio to enable	**Purge System Low Purge Flow Enable** <X< **Purge System High Purge Flow Enable** in Supporting Tables.		
					Purge gas flow ratio to remain enabled	**Purge System Low Purge Flow Remain Enabled** <X< **Purge System High Purge Flow Remain Enabled** in Supporting Tables.		
					Purge flow to enable	0.0 <X< 1.5 g/s		
					Purge flow to remain enabled	-0.1 <X<1.6g/s		
					Induction vacuum to			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					enable	<0.3 kPa		
					Induction vacuum to remain enabled	<0.5 kPa		
					Vehicle Speed to enable	>3.1 mph		
					Vehicle Speed to remain enabled	>1.9mph		
					IAT to enable	0.0 <X< 100.00 deg C		
					IAT to remain enabled	-5.0 <X< 105.00 deg C		
					Purge DC change per 100 ms loop to enable	X<5.0%		
					Purge DC change per 100 ms loop to remain enable	X<6.0%		
					******************************	******************************		
					No active DTCs	P1467-EVAP Purge Pump On Speed Performance P1469 - Purge Pump Speed OOR Low P146A- Purge Pump Speed OOR High P146D - Purge Pump Pressure Sensor OOR Low P146E - Purge Pump Pressure Sensor OOR High P146F - Purge Pump Pressure Sensor Performance P148E - Purae Pumo		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					No pending DTC's	Voltage OOR Low P148F - Purge Pump Voltage OOR High P1490 - Purge Pump Voltage Performance P14A4-EVAP Purge Pump Temperature Too High Purge Pump LIN Communication Fault Active AmbientAirDefault ConvVenting_FA ConvPurgeCkt_FA VehicleSpeedSensor_FA OAT_EstAmbTemp_FA IAT_SensorFA P14A4- EVAP Purge Pump Temperature Too High Purge Pump LIN Communication Fault Pending IAT_SensorFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump System Misassembled	P146C	Purge pump pressure is too low for a given pump speed with the purge valve commanded closed. Detects a disconnected hose between the purge pump and purge valve.	Average Purge Pump Pressure Reading - Initial Purge Pump Pressure Reading Readings are averaged for 5 seconds.	< **Purge Pump Misassembled Failure Threshold** * (times) **Purge Pump Diagnostic IAT Multiplier Factor** both in Supporting Tables Calibration threshold (kPa) as a func of (Average Purge Pump Speed and barometric pressure) * IAT multiplier factor (unitless) as a func of IAT	Diagnostic is Enabled Purge duty cycle is commanded to zero Purge pump commanded on Engine running LIN data available for LIN IAT data available Powertrain relay voltage Barometric pressure Purge pump initial speed Outside Air Temperature Initial average purge pump pressure calculated and in range Outside air temperature No device control Pump spool up time delay Allow test time Purge pump over temperature status Initial pump speed capture period	 >2 counts >11.0 volts >70 kPa <240RPM -20°C<X<50°C -3 kPa <X<13kPA >0 °C (only if pressure sensor is not in the range of -3 kPa <X<13 kPA) >7 seconds <36 seconds = FALSE >4 counts	Once per trip	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Purge pump speed	>35,000 RPM		
					No active DTCs	P1467-EVAP Purge Pump On Speed Performance P1469 - Purge Pump Speed OOR Low P146A- Purge Pump Speed OOR High P146D - Purge Pump Pressure Sensor OOR Low P146E - Purge Pump Pressure Sensor OOR High P146F - Purge Pump Pressure Sensor Performance P148E - Purge Pump Voltage OOR Low P148F - Purge Pump Voltage OOR High P1490 - Purge Pump Voltage Performance P14A4-EVAP Purge Pump Temperature Too High Purge Pump LIN Communication Fault Active AmbientAirDefault OAT_AmbientSensorFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					No pending DTC's	ConvPurgeCkt_FA IAT_SensorFA ECT_Sensor_FA P1469 - Purge Pump Speed OOR Low P146A- Purge Pump Speed OOR High P146D - Purge Pump Pressure Sensor OOR Low P146E - Purge Pump Pressure Sensor OOR High Purge Pump LIN Communication Fault Pending IAT_SensorFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Pressure Sensor Circuit Low Voltage	P146D	This DTC will detect a Purge Pump Pressure sensor signal that is too low out of range. The Purge Pump Pressure sensor circuit out of range diagnostic compares the raw sensor % of 5 V ref to a lower threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the sensor % of 5 V ref is below the lower threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported for P146D DTC. A pass is reported for P146D DTC if the low sample counter reaches its threshold.	Purge pump pressure sensor signal The normal operating range of the purge pump pressure sensor is 0.5 volts (~ -6000 Pa) to 4.5 volts (~ 26000 Pa).	<3.0% of 5 Vref (0.1 V or -8,800 Pa)	Diagnostic is 1.00		1,280 failures out of 1,600 samples 6.25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Pressure Sensor Circuit High Voltage	P146E	This DTC will detect a Purge Pump Pressure sensor signal that is too high out of range. The Purge Pump Pressure sensor circuit out of range diagnostic compares the raw sensor % of 5 V ref to a upper threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the sensor % of 5 V ref is above the upper threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported for P146E DTC. A pass is reported for P146E DTC if the high sample counter reaches its threshold.	Purge pump pressure sensor signal The normal operating range of the purge pump pressure sensor is 0.5 volts (~ -6000 Pa) to 4.5 volts (~ 26000 Pa).	> 97.0 % of 5 Vref (4.9 V or 28,800 Pa	Diagnostic is 1.00		1,280 failures out of 1,600 samples 6.25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Pressure Sensor Performance	P146F	Purge pump pressure sensor offset pressure is out of range when sensor re-zero occurs. The DTC will be set if the purge pump pressure sensor offset is out of range when it tries to re-zero at the beginning of a cold start drive cycle. The re-zero test determines if the purge pump pressure sensor signal falls within a calibratable window about atmospheric pressure. The results of the re-zero test are used to determine if there is a re-zero problem. 1) An individual re-zero test generates a re-zero ratio. The ratio goes from 0.0 to 1.0. 2) A 0.0 means that the re-zero pressure signal achieved exactly the previous learned offset. 3) A ratio of 1.0 means that the re-zero pressure did not get within the window. 4) Re-zero pressure within the window generates values between 0.0 and 1.0.	The purge pump pressure sesnor signal is compared to a window about barometric pressure (sensor voltage offset (~1.25 volts)) Upper pressure threshold (pressure addition above the nominal barometric pressure) The learned delta above the previous learned offset needs to be Lower pressure threshold (pressure subtraction below the nominal barometric pressure) The learned delta below the previous learned offset needs to be The difference between purge pump pressure sensor signal and the previous learned offset is then normalized against the appropriate threshold listed above to produce a ratio between 0.0 and 1.0. This normalized re-zero ratio is then filtered with a EWMA (with 0= perfect pass and 1=perfect fail). When EWMA is the DTC light is	0.96 kPa rezero max < 1.68 kPa delta max -0.96 kPa rezero min >-1.68 kPa delta min > 0.73 (EWMA Fail Threshold),	Diagnostic is Enabled Soak timer Power up coolant temperature Barometric pressure Engine not cranking Power up IAT Power up IAT LIN IAT data available Power Up Coolant temp - Power Up IAT temp Average purge pump pressure calculated No Active DTC's No Pending DTC's	>3,600 seconds <35 °C >70 kPa >4 °C <35 °C <8 °C P146D - Purge Pump Pressure Sensor OCR Low Fault Active P146E - Purge Pump Pressure Sensor OCR High Fault Active IAT_SensorFA ECT_Sensor_FA EngineModeNotRunTimer_FA AmbientAirDefault P146D - Purge Pump Pressure Sensor OCR Low Fault Active P146E - Purge Pump Pressure Sensor OCR High Fault Active	100 ms	Type A, 1 Trips EWMA Average run length: 6 Run length is 2 trips after code clear

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		The resulting re-zero ratio is filtered using an exponentially weighted moving average (EWMA). When the EWMA exceeds a fail threshold, the purge pump pressure sensor signal re-zero test reports a failure. Once the purge pump pressure sensor signal re-zero test fails, the EWMA fall below a lower re-pass threshold before it can pass the purge pump pressure sensor signal re-zero test again.	illuminated. The EWMA calculation uses a 0.20 weighting coefficient. The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 3 additional consecutive trips.	< 0.40 (EWMA Re-Pass Threshold				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Voltage Sensor Circuit Low	P148E	This DTC will detect a purge pump voltage sensor signal that is out of range low (short to ground or open circuit). The purge pump voltage sensor signal out of range diagnostic compares the voltage sensor signal reading to a lower voltage threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the voltage sensor signal reading 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 P148E DTC. A pass is reported for P148E DTC if the low sample counter reaches its threshold.	Purge pump voltage sensor reading	< 3.5 volts	Diagnostic is Enabled LIN data available for Powertrain relay voltage No active DTCs Np pending DTCs	 > 2 counts >11.0 volts Purge Pump LIN Communication Fault Active Purge Pump LIN Communication Fault Pending	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Voltage Sensor Circuit High	P148F	This DTC will detect a purge pump voltage sensor signal that is out of range high (short to power). The purge pump voltage sensor signal out of range diagnostic compares the voltage sensor signal reading to a upper voltage threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the voltage sensor signal reading is above the upper voltage threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported for P148F DTC. A pass is reported for P148F DTC if the low sample counter reaches its threshold.	Purge pump voltage sensor reading	>28.0 volts	Diagnostic is Enabled LIN data available for Powertrain relay voltage No active DTCs Np pending DTCs	 > 2 counts >11.0 volts Purge Pump LIN Communication Fault Active Purge Pump LIN Communication Fault Pending	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Voltage Sensor Performance	P1490	This diagnostic fails when the difference between purge pump voltage sensor reading and powertrain relay voltage reading is too large.	Absolute value of (Purge pump voltage sensor - powertrain relay voltage)	>2.0 volts	Diagnostic is Enabled		80 failures out of 100 samples 100 ms / sample	Type B, 2 Trips
					Propulsion system on			
					Powertrain relay voltage	>11.0 volts		
					Engine not cranking			
					Voltage stabilization delay time after engine crank (> 2 seconds)	> 2.0 seconds		
					LIN data available for	>2 counts		
					No Active DTC's	P148E - Purge Pump Voltage OCR Low P148F - Purge Pump Voltage OCR High Purge Pump LIN Communication Fault Active		
					No Pending DTC's	P148E - Purge Pump Voltage OOR Low P148F - Purge Pump Voltage OOR High Purge Pump LIN Communication Fault Pending		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 2 Not Plausible	P149A	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6 The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the		Diagnostic is Enabled No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmS	 OAT_PtEstFiltFA PSAR_PropSysInactveCrs_FA = FALSE EECR_TS2_CktFA EECR_CylHeadCoolant_CktFA EECR_BlockCoolant Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_CktFA EECR_HeaterCoreOutlet_CktFA EECR_RadiatorOutlet CktFA EECR_BypassInlet_CktFA EECR_CylHeadMetal1_CktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_FA	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			physical (Temperature) sensor number. **Bypass Inlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkEng OilSnsr Comparison sensor 2: CeEECR_e_BiasChkMa nfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asHigh Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkCyl HdClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OilSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B: **Engine Inlet:** CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkRad OutClntSnsr	Bypass Inlet Threshold A: 20.00 °C Bypass Inlet Threshold B: 10.00 °C Engine Block Threshold A: 30.00 °C Engine Block Threshold B: 10.00 °C	nsr - BiasChk_EGR_LowPrsSn sr - BiasChkFuelSnsr Comparison sensors ================== The following thresholds are based on the sensor under diagnosis **Bypass Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Coolant:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature	EGRTempSensorDNSS_F A LPE_TempSnsrFA HRTR_b_FuelSensor_FA _Bndl = Availible > 28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr					
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		Comparison sensor 1 & 2 are not	= CeEECR_e_BiasChkNoSelection		
			Block Heater: CeEECR_e_AuxHeaterBiasHigh		Aux Heat Detection			
			Threshold A:	25.00 °C	Aux heat detection can only be enabled the following are met:			
			Threshold B:	17.00 °C				
			Head Coolant: CeEECR_e_PhysSnsr6		No Active DTCs	Same set as listed above and EngineModeNotRunTimerError EngineModeNotRunTimer_FA VehicleSpeedSensor_FA		
			Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr					
			Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr					
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		At power-up a warm sensor and cool sensor are compared			
			Block Heater: CeEECR_e_AuxHeaterBiasBoth		Warm sensor	CeAEHR_e_BlkHtrBlockClntSnsr		
					Cool sensor	CeAEHR_e_BlkHtrRadOutClntSnsr		
			Threshold A:	20.00 °C				
			Threshold B:	10.00 °C				
					If the warm sensor is compared to the cool sensor	>10.00 °C		
			Heater Inlet: CeEECR_e_PhysSnsr4					
			Comparison sensor 1: CeEECR_e_BiasChkBypInClntSnsr		Propulsion Off Soak Time	> 0 seconds		
					Engine Off Soak Time	>28,800 seconds		
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr		Ambient Air Temperature	>-9.00 °C		
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		There are 4 different types of aux heater detection for this application:			
			Block Heater:		2x2 signature	Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CeE EC R_e_AuxH eaterB i		Absolute Drop	Enabled		
			asHigh		IAT Drop	Disabled		
			Threshold A:	15.00 °C	Temperature Derivative	Disabled		
			Threshold B:	10.00 °C				
					2x2 Signature Criteria:			
			Heater Outlet:		The warm sensors			
			CeEECR_e_PhysSnsr5		Sensor 1:	CeAEHR_e_BlkHtrCylHd		
			Comparison sensor 1:			ClntSnsr		
			CeEECR_e_BiasChkEng		Sensor 2:	CeAEHR_e_BlkHtrEngIn		
			OilSnsr			ClntSnsr		
			Comparison sensor 2:		The cool sensors			
			CeEECR_e_BiasChkMa		Sensor 1:	CeAEHR_e_BlkHtrRadO		
			nfldAirSnsr			utClntSnsr		
			Fuel Operated heater:		Sensor 2:	CeAEHR_e_BlkHtrOutsid		
			CeEECR_e_AuxHeaterN			eAirSnsr		
			oEffect					
			Block Heater:		A block heater will be			
			CeEECR_e_AuxHeaterBi		detected if the warm			
			asBoth		sensors are within	10.0 °C		
			Threshold A:	25.00 °C	AND			
			Threshold B:	17.00 °C	The cool sensors are			
					within	10.0 °C		
			Radiator Outlet:		AND			
			CeEECR_e_PhysSnsr3		The delta between the			
			Comparison sensor 1:		two groups (warm/cold)	>10.0 °C		
			CeEECR_e_BiasChkEng					
			InClntSnsr		**Absolute Drop Criteria:**			
			Comparison sensor 2:		The	CeAEHR_e_BlkHtrBlock		
			CeEECR_e_BiasChkMa		is monitored for a drop.	ClntSnsr		
			nfldAirSnsr					
			Fuel Operated heater:		The drop will be			
			CeEECR_e_AuxHeaterN		monitored for once			
			oEffect		coolant flow is	> 9.00 L/min		
			Block Heater:		AND			
			CeE EC R_e_AuxH eaterB i		Flow time is between	0.0 - 60.0 seconds		
			as Low		AND either			
			Threshold A:	30.00 °C	Engine runtime is	< 120.0 seconds		
			Threshold B:	17.00 °C	OR			
					Insufficent coolant flow is			
			A failure will be reported if		present for	>300.0 seconds		
			any of the following					
			conditions are met.		A block heater is detected			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	 >A°C >A°C >B°C >B °C	if a drop is **IAT Drop Criteria:** The sensor will be used as IAT for this method A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficent coolant flow is present for	>5.0 °C CeAEHR_e_BlkHtrIntakeAirSnsr >5.0 °C >400.0 seconds >24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlockClntSnsr >-1.00 L/min 5.0 - 15.0 seconds < 75.0 seconds >300.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Derivative count will increment if derivative is	<-0.10°C/sec		
					If counts are a block heater is detected	> 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 3 Not Plausible	P149B	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr3 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6 The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the		Diagnostic is Enabled No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmS	 OAT_PtEstFiltFA PSAR_PropSysInactveCrs_FA = FALSE EECR_TS3_CktFA EECR_CylHeadCoolant_CktFA EECR_BlockCoolant Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_CktFA EECR_HeaterCoreOutlet_CktFA EECR_RadiatorOutlet Ck tFA EECR_BypassInlet_CktFA EECR_CylHeadMetal1_CktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_FA	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			physical (Temperature) sensor number. **Bypass Inlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkEng OilSnsr Comparison sensor 2: CeEECR_e_BiasChkMa nfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asHigh Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkCyl HdCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OilSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B: **Engine Inlet:** CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkRad OutCIntSnsr	 20.00 °C 10.00 °C 30.00 °C 10.00 °C	nsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr Comparison sensors ================= The following thresholds are based on the sensor under diagnosis **Bypass Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Coolant:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature	EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl = Availible > 28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr		Comparison sensor 1 & 2 are not	= CeEECR_e_BiasChkNoSelection		
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect					
			Block Heater: CeEECR_e_AuxHeaterBiasHigh		Aux Heat Detection			
			Threshold A:	25.00 °C	Aux heat detection can only be enabled the following are met:			
			Threshold B:	17.00 °C				
			Head Coolant: CeEECR_e_PhysSnsr6		No Active DTCs	Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer_FA VehicleSpeedSensor_FA		
			Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr					
			Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr					
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		At power-up a warm sensor and cool sensor are compared			
			Block Heater: CeEECR_e_AuxHeaterBiasBoth		Warm sensor	CeAEHR_e_BlkHtrBlockClntSnsr		
					Cool sensor	CeAEHR_e_BlkHtrRadOutClntSnsr		
			Threshold A:	20.00 °C				
			Threshold B:	10.00 °C				
					If the warm sensor is compared to the cool sensor	>10.00 °C		
			Heater Inlet: CeEECR_e_PhysSnsr4					
			Comparison sensor 1: CeEECR_e_BiasChkBypInClntSnsr		Propulsion Off Soak Time	> 0 seconds		
					Engine Off Soak Time	>28,800 seconds		
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr		Ambient Air Temperature	>-9.00 °C		
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		There are 4 different types of aux heater detection for this application:			
			Block Heater:		2x2 signature	Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CeEECR_e_AuxHeaterBi asHigh Threshold A: Threshold B: **Heater Outlet:** CeEECR_e_PhysSnsr5 Comparison sensor 1: CeEECR_e_BiasChkEng OilSnsr Comparison sensor 2: CeEECR_e_BiasChkMa nfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B: **Radiator Outlet:** CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEng InClntSnsr Comparison sensor 2: CeEECR_e_BiasChkMa nfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: A failure will be reported if any of the following conditions are met.	 15.00 °C 10.00 °C 25.00 °C 17.00 °C 30.00 °C 17.00 °C	Absolute Drop IAT Drop Temperature Derivative **2x2 Signature Criteria:** The warm sensors Sensor 1: Sensor 2: The cool sensors Sensor 1: Sensor 2: A block heater will be detected if the warm sensors are within AND The cool sensors are within AND The delta between the two groups (warm/cold) **Absolute Drop Criteria:** The is monitored for a drop. The drop will be monitored for once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficent coolant flow is present for	Enabled Disabled Disabled CeAEHR_e_BlkHtrCylHd ClntSnsr CeAEHR_e_BlkHtrEngIn ClntSnsr CeAEHR_e_BlkHtrRadO utClntSnsr CeAEHR_e_BlkHtrOutsid eAirSnsr 10.0 °C 10.0 °C >10.0 °C CeAEHR_e_BlkHtrBlock ClntSnsr > 9.00 L/min 0.0 - 60.0 seconds < 120.0 seconds >300.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Evaluated in order:					
			1) This sensor is above both comparison sensors	>A°C	A block heater is detected if a drop is	>5.0 °C		
			2) This sensor is below both comparison sensors	>A°C	**IAT Drop Criteria:** The sensor will be used as IAT for this method	CeAEHR_e_BlkHtrIntake AirSnsr		
			3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew	>B°C	A block heater will be detected if:			
					IAT has a drop of during a drive defined by:	>5.0 °C		
					Drive time	>400.0 seconds		
					Vehicle speed	>24.0 kph		
			4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	>B °C	Addtional drive time is provided when vehicle speed drops below above threshold as follows	0.5 times the seconds with vehicle speed below the threshold above		
					This detection method will abort if the engine is off	> 180.0 seconds		
					OR Engine runtime	> 1,800 seconds		
					Temperature Derivative Criteria: Derivative will be monitored using	CeAEHR_e_BlkHtrBlock ClntSnsr		
					Derivative will be monitored once coolant flow is	>-1.00 L/min		
					AND Flow time is between	5.0 - 15.0 seconds		
					AND either Engine runtime is	< 75.0 seconds		
					OR			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Insufficent coolant flow is present for Derivative count will increment if derivative is If counts are a block heater is detected ================	>300.0 seconds <-0.10°C/sec > 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 4 Not Plausible	P149C	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr4 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6 The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the		Diagnostic is Enabled No Active DTCs Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmS	 OAT_PtEstFiltFA PSAR_PropSysInactveCrs_FA = FALSE EECR_TS4_CktFA EECR_CylHeadCoolant_CktFA EECR_BlockCoolant Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_CktFA EECR_HeaterCoreOutlet_CktFA EECR_RadiatorOutlet CktFA EECR_BypassInlet_CktFA EECR_CylHeadMetal1_CktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_FA	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			physical (Temperature) sensor number.		nsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr	EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl		
			Bypass Inlet: CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkEngOilSnsr Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh		Comparison sensors ================== The following thresholds are based on the sensor under diagnosis **Bypass Inlet:** Propulsion Off Soak Time Ambient Air Temperature	= Availible > 28,800 seconds >-9.0 °C		
			Threshold A: Threshold B:	20.00 °C 10.00 °C	**Engine Block:** Propulsion Off Soak Time Ambient Air Temperature	 >28,800 seconds >-9.0 °C		
			Engine Block: CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkCylHdClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasBoth		**Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Coolant:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature	 >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C		
			Threshold A: Threshold B:	30.00 °C 10.00 °C	**Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature	 >28,800 seconds >-9.0 °C		
			Engine Inlet: CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkRadOutClntSnsr		**Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature	 >28,800 seconds >-9.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		Comparison sensor 1 & 2 are not	= CeEECR_e_BiasChkNoSelection		
			Block Heater: CeEECR_e_AuxHeaterBiasHigh		Aux Heat Detection			
			Threshold A: Threshold B:	25.00 °C 17.00 °C	Aux heat detection can only be enabled the following are met:			
			Head Coolant: CeEECR_e_PhysSnsr6 Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr		No Active DTCs	Same set as listed above and EngineModeNotRunTimerError EngineModeNotRunTimer_FA VehicleSpeedSensor_FA		
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		At power-up a warm sensor and cool sensor are compared			
			Block Heater: CeEECR_e_AuxHeaterBiasBoth		Warm sensor	CeAEHR_e_BlkHtrBlockClntSnsr		
					Cool sensor	CeAEHR_e_BlkHtrRadOutClntSnsr		
			Threshold A: Threshold B:	20.00 °C 10.00 °C				
			Heater Inlet: CeEECR_e_PhysSnsr4		If the warm sensor is compared to the cool sensor	>10.00 °C		
			Comparison sensor 1: CeEECR_e_BiasChkBypInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr		Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature	> 0 seconds >28,800 seconds >-9.00 °C		
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater:		There are 4 different types of aux heater detection for this application:			
					2x2 signature	Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CeE EC R_e_AuxH eaterB i		Absolute Drop	Enabled		
			asHigh		IAT Drop	Disabled		
			Threshold A:	15.00 °C	Temperature Derivative	Disabled		
			Threshold B:	10.00 °C				
					2x2 Signature Criteria:			
			Heater Outlet:		The warm sensors			
			CeEECR_e_PhysSnsr5		Sensor 1:	CeAEHR_e_BlkHtrCylHd		
			Comparison sensor 1:			ClntSnsr		
			CeEECR_e_BiasChkEng		Sensor 2:	CeAEHR_e_BlkHtrEngIn		
			OilSnsr			ClntSnsr		
			Comparison sensor 2:					
			CeEECR_e_BiasChkMa		The cool sensors			
			nfldAirSnsr		Sensor 1:	CeAEHR_e_BlkHtrRadO		
			Fuel Operated heater:			utClntSnsr		
			CeEECR_e_AuxHeaterN		Sensor 2:	CeAEHR_e_BlkHtrOutsid		
			oEffect			eAirSnsr		
			Block Heater:					
			CeEECR_e_AuxHeaterBi		A block heater will be			
			asBoth		detected if the warm			
			Threshold A:	25.00 °C	sensors are within	10.0 °C		
			Threshold B:	17.00 °C	AND			
					The cool sensors are			
			Radiator Outlet:		within	10.0 °C		
			CeEECR_e_PhysSnsr3		AND			
			Comparison sensor 1:		The delta between the			
			CeEECR_e_BiasChkEng		two groups (warm/cold)	>10.0 °C		
			InClntSnsr					
			Comparison sensor 2:		**Absolute Drop Criteria:**			
			CeEECR_e_BiasChkMa		The	CeAEHR_e_BlkHtrBlock		
			nfldAirSnsr		is monitored for a drop.	ClntSnsr		
			Fuel Operated heater:					
			CeEECR_e_AuxHeaterN		The drop will be			
			oEffect		monitored for once			
			Block Heater:		coolant flow is	> 9.00 L/min		
			CeE EC R_e_AuxH eaterB i		AND			
			as Low		Flow time is between	0.0 - 60.0 seconds		
			Threshold A:	30.00 °C	AND either			
			Threshold B:	17.00 °C	Engine runtime is	< 120.0 seconds		
					OR			
			A failure will be reported if		Insufficent coolant flow is	>300.0 seconds		
			any of the following		present for			
			conditions are met.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	 >A°C >A°C >B°C >B °C	A block heater is detected if a drop is **IAT Drop Criteria:** The sensor will be used as IAT for this method A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficent coolant flow is	>5.0 °C CeAEHR_e_BlkHtrIntake AirSnsr >5.0 °C >400.0 seconds >24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlock ClntSnsr >-1.00 L/min 5.0 -15.0 seconds < 75.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					present for Derivative count will increment if derivative is If counts are a block heater is detected =================	>300.0 seconds <-0.10°C/sec > 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 5 Not Plausible	P149D	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr5 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6 The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the		Diagnostic is Enabled No Active DTCs Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdCIntSnsr - BiasChkBlockClntSnsr - BiasChkEngInCIntSnsr - BiasChkEngOutCIntSnsr - BiasChkHtrCrInCIntSnsr - BiasChkHtrCrOutCInSnsr - BiasChkRadOutCIntSnsr - BiasChkBypInCIntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmS	 OAT_PtEstFiltFA PSAR_PropSysInactveCrs_FA = FALSE EECR_TS5_CktFA EECR_CylHeadCoolant_CktFA EECR_BlockCoolant Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_CktFA EECR_HeaterCoreOutlet_CktFA EECR_RadiatorOutlet CktFA EECR_BypassInlet_CktFA EECR_CylHeadMetal1_CktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_FA	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			physical (Temperature) sensor number. **Bypass Inlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkEng OilSnsr Comparison sensor 2: CeEECR_e_BiasChkMa nfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECReAuxHeaterBi asHigh Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkCyl HdCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OilSnsr Fuel Operated heater: CeE EC R_e_AuxH eaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B: **Engine Inlet:** CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkRad OutCIntSnsr	 20.00 °C 10.00 °C 30.00 °C 10.00 °C	nsr - BiasChk_EGR_LowPrsSn sr - BiasChkFuelSnsr Comparison sensors The following thresholds are based on the sensor under diagnosis **Bypass Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Coolant:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature	EGRTempSensorDNSS_F A LPE_TempSnsrFA HRTR_b_FuelSensor_FA _Bndl = Availible > 28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C >28,800 seconds >-9.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		Comparison sensor 1 & 2 are not	= CeEECR_e_BiasChkNoSelection		
			Block Heater: CeEECR_e_AuxHeaterBiasHigh		Aux Heat Detection			
			Threshold A: Threshold B:	25.00 °C 17.00 °C	Aux heat detection can only be enabled the following are met:			
			Head Coolant: CeEECR_e_PhysSnsr6 Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr		No Active DTCs	Same set as listed above and EngineModeNotRunTimerError EngineModeNotRunTimer_FA VehicleSpeedSensor_FA		
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		At power-up a warm sensor and cool sensor are compared Warm sensor	CeAEHR_e_BlkHtrBlockClntSnsr		
			Block Heater: CeEECR_e_AuxHeaterBiasBoth		Cool sensor	CeAEHR_e_BlkHtrRadOutClntSnsr		
			Threshold A: Threshold B:	20.00 °C 10.00 °C	If the warm sensor is compared to the cool sensor	>10.00 °C		
			Heater Inlet: CeEECR_e_PhysSnsr4 Comparison sensor 1: CeEECR_e_BiasChkBypInClntSnsr		Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature	> 0 seconds >28,800 seconds >-9.00 °C		
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		There are 4 different types of aux heater detection for this application:			
			Block Heater:		2x2 signature Absolute Drop	Enabled Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CeE EC R_e_AuxH eaterB i		IAT Drop	Disabled		
			asHigh		Temperature Derivative	Disabled		
			Threshold A:	15.00 °C				
			Threshold B:	10.00 °C	**2x2 Signature Criteria:**			
					The warm sensors			
			Heater Outlet:		Sensor 1:	CeAEHR_e_BlkHtrCylHd		
			CeEECR_e_PhysSnsr5			ClntSnsr		
			Comparison sensor 1:		Sensor 2:	CeAEHR_e_BlkHtrEngIn		
			CeEECR_e_BiasChkEng			ClntSnsr		
			OilSnsr					
			Comparison sensor 2:		The cool sensors			
			CeEECR_e_BiasChkMa		Sensor 1:	CeAEHR_e_BlkHtrRadO		
			nfldAirSnsr			utClntSnsr		
			Fuel Operated heater:		Sensor 2:	CeAEHR_e_BlkHtrOutsid		
			CeEECR_e_AuxHeaterN			eAirSnsr		
			oEffect					
			Block Heater:		A block heater will be			
			CeEECR_e_AuxHeaterBi		detected if the warm			
			asBoth		sensors are within	10.0 °C		
			Threshold A:	25.00 °C	AND			
			Threshold B:	17.00 °C	The cool sensors are			
					within	10.0 °C		
			Radiator Outlet:		AND			
			CeEECR_e_PhysSnsr3		The delta between the			
			Comparison sensor 1:		two groups (warm/cold)	>10.0 °C		
			CeEECR_e_BiasChkEng					
			InClntSnsr		**Absolute Drop Criteria:**			
			Comparison sensor 2:		The	CeAEHR_e_BlkHtrBlock		
			CeEECR_e_BiasChkMa		is monitored for a drop.	ClntSnsr		
			nfldAirSnsr					
			Fuel Operated heater:		The drop will be			
			CeEECR_e_AuxHeaterN		monitored for once			
			oEffect		coolant flow is	> 9.00 L/min		
			Block Heater:		AND			
			CeE EC R_e_AuxH eaterB i		Flow time is between	0.0 - 60.0 seconds		
			as Low		AND either			
			Threshold A:	30.00 °C	Engine runtime is	< 120.0 seconds		
			Threshold B:	17.00 °C	OR			
					Insufficent coolant flow is			
			A failure will be reported if		present for	>300.0 seconds		
			any of the following					
			conditions are met.		A block heater is detected			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	 >A°C >A°C >B°C >B °C	if a drop is **IAT Drop Criteria:** The sensor will be used as IAT for this method A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficent coolant flow is present for	>5.0°C CeAEHR_e_BlkHtrIntake AirSnsr >5.0°C >400.0 seconds >24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlock ClntSnsr >-1.00 L/min 5.0-15.0 seconds < 75.0 seconds >300.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Derivative count will increment if derivative is	<-0.10°C/sec		
					If counts are a block heater is detected	> 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 6 Not Plausible	P149E	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr6 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6 The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the		Diagnostic is Enabled No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmS	 OAT_PtEstFiltFA PSAR_PropSysInactveCrs_FA = FALSE EECR_TS6_CktFA EECR_CylHeadCoolant_CktFA EECR_BlockCoolant Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_CktFA EECR_HeaterCoreOutlet_CktFA EECR_RadiatorOutlet CktFA EECR_BypassInlet_CktFA EECR_CylHeadMetal1_CktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_FA	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			physical (Temperature) sensor number.		nsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr	EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl		
			Bypass Inlet: CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkEngOilSnsr		Comparison sensors	= Availible		
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		================== The following thresholds are based on the sensor under diagnosis			
			Block Heater: CeEECR_e_AuxHeaterBiasHigh		**Bypass Inlet:** Propulsion Off Soak Time Ambient Air Temperature	> 28,800 seconds >-9.0 °C		
			Threshold A: Threshold B:	20.00 °C 10.00 °C	**Engine Block:** Propulsion Off Soak Time Ambient Air Temperature	>28,800 seconds >-9.0 °C		
			Engine Block: CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkCylHdClntSnsr		**Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature	>28,800 seconds >-9.0 °C		
			Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		**Head Coolant:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:**	>28,800 seconds >-9.0 °C		
			Block Heater: CeEECR_e_AuxHeaterBiasBoth		Propulsion Off Soak Time Ambient Air Temperature	>28,800 seconds >-9.0 °C		
			Threshold A: Threshold B:	30.00 °C 10.00 °C	**Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature	>28,800 seconds >-9.0 °C		
			Engine Inlet: CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkRadOutClntSnsr		**Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature	>28,800 seconds >-9.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr					
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		Comparison sensor 1 & 2 are not	= CeEECR_e_BiasChkNoSelection		
			Block Heater: CeEECR_e_AuxHeaterBiasHigh		Aux Heat Detection			
			Threshold A:	25.00 °C	Aux heat detection can only be enabled the following are met:			
			Threshold B:	17.00 °C				
			Head Coolant: CeEECR_e_PhysSnsr6		No Active DTCs	Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer_FA VehicleSpeedSensor_FA		
			Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr					
			Comparison sensor 2: CeEECR_e_BiasChkEngOilSnsr					
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		At power-up a warm sensor and cool sensor are compared			
			Block Heater: CeEECR_e_AuxHeaterBiasBoth		Warm sensor	CeAEHR_e_BlkHtrBlockClntSnsr		
					Cool sensor	CeAEHR_e_BlkHtrRadOutClntSnsr		
			Threshold A:	20.00 °C				
			Threshold B:	10.00 °C				
					If the warm sensor is compared to the cool sensor	>10.00 °C		
			Heater Inlet: CeEECR_e_PhysSnsr4					
			Comparison sensor 1: CeEECR_e_BiasChkBypInClntSnsr		Propulsion Off Soak Time	> 0 seconds		
					Engine Off Soak Time	>28,800 seconds		
			Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr		Ambient Air Temperature	>-9.00 °C		
			Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect		There are 4 different types of aux heater detection for this application:			
			Block Heater:		2x2 signature	Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			CeE EC R_e_AuxH eaterB i		Absolute Drop	Enabled		
			asHigh		IAT Drop	Disabled		
			Threshold A:	15.00 °C	Temperature Derivative	Disabled		
			Threshold B:	10.00 °C				
					2x2 Signature Criteria:			
			Heater Outlet:		The warm sensors			
			CeEECR_e_PhysSnsr5		Sensor 1:	CeAEHR_e_BlkHtrCylHd		
			Comparison sensor 1:			ClntSnsr		
			CeEECR_e_BiasChkEng		Sensor 2:	CeAEHR_e_BlkHtrEngIn		
			OilSnsr			ClntSnsr		
			Comparison sensor 2:					
			CeEECR_e_BiasChkMa		The cool sensors			
			nfldAirSnsr		Sensor 1:	CeAEHR_e_BlkHtrRadO		
			Fuel Operated heater:			utClntSnsr		
			CeEECR_e_AuxHeaterN		Sensor 2:	CeAEHR_e_BlkHtrOutsid		
			oEffect			eAirSnsr		
			Block Heater:					
			CeEECR_e_AuxHeaterBi		A block heater will be			
			asBoth		detected if the warm			
			Threshold A:	25.00 °C	sensors are within	10.0 °C		
			Threshold B:	17.00 °C	AND			
					The cool sensors are			
			Radiator Outlet:		within	10.0 °C		
			CeEECR_e_PhysSnsr3		AND			
			Comparison sensor 1:		The delta between the			
			CeEECR_e_BiasChkEng		two groups (warm/cold)	>10.0 °C		
			InClntSnsr					
			Comparison sensor 2:		**Absolute Drop Criteria:**			
			CeEECR_e_BiasChkMa		The	CeAEHR_e_BlkHtrBlock		
			nfldAirSnsr		is monitored for a drop.	ClntSnsr		
			Fuel Operated heater:					
			CeEECR_e_AuxHeaterN		The drop will be			
			oEffect		monitored for once			
			Block Heater:		coolant flow is	> 9.00 L/min		
			CeE EC R_e_AuxH eaterB i		AND			
			as Low		Flow time is between	0.0 - 60.0 seconds		
			Threshold A:	30.00 °C	ANDeither			
			Threshold B:	17.00 °C	Engine runtime is	< 120.0 seconds		
					OR			
			A failure will be reported if		Insufficent coolant flow is			
			any of the following		present for	>300.0 seconds		
			conditions are met.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	 >A°C >A°C >B°C >B °C	A block heater is detected if a drop is **IAT Drop Criteria:** The sensor will be used as IAT for this method A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficent coolant flow is present for	>5.0°C CeAEHR_e_BlkHtrIntakeAirSnsr >5.0°C >400.0 seconds >24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlockClntSnsr >-1.00 L/min 5.0 - 15.0 seconds < 75.0 seconds >300.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Derivative count will increment if derivative is If counts are a block heater is detected	<-0.10°C/sec > 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EVAP Purge Pump Temperature Too High	P14A4	Purge pump indicates it is too hot to operate and is in a protection mode (shuts down and/ or will not turn on). Diagnostic rationalizes the purge pump too hot status against environmental and vehicle operating conditions.	Purge pump over temperature status AND Intake Air Temperature AND OBD Max Coolant Achieved (read description for details)	= True <45.0 °C = FALSE	Diagnostic is Enabled Propulsion system on LIN data available for LIN IAT data available Engine running time Powertrain relay voltage No Active DTC's No Pending DTC's	 > 2 counts >30 seconds >11.0 volts IAT_SensorFA ECT_Sensor_FA Purge Pump LIN Communication Fault Active Purge Pump LIN Communication Fault Pending	80 failures out of 100 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for:		Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.		Temperature and Humidity ARC samples every 35.00 milliseconds. Pressure ARC samples every 35.00 milliseconds.	Type A, 1 Trips
			Temperature and Humidity ARC	>= 8.00 counts out of >= 10.00 counts	All the following conditions are met for:	>= 3,000.00 milliseconds		
					Battery voltage	>= 11.00 volts		
			Pressure ARC	>=8.00 counts out of >= 10.00 counts	Accessory mode to off mode transition not pending			
					If controller is a non-OBD controller then battery voltage	<= 18.00 volts		
					Controller type: OBD Controller			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Driver Control Module Configuration Command Signal 1 Message Counter Incorrect	P14CD	The FTZM monitors its specific command data serial message frames [message FTZM CommandI $0CE] received from the ECM over its private CAN channel and evaluates whether these data are updating regularly. The FTZM diagnostic runs every 10msec. Each FTZM diagnostic evaluation is sent back to the ECM over the private bus. When the ECM diagnostic detects that the transmitted message counter and the received message counter do not match, it will increment a fail counter. The diagnostic status is monitored using X/Y counting and the Diagnostic Trouble Code is set when the failure count has matured to its threshold value. The X/Y counting is a rolling array type where X of the most recent Y samples represent a failing status, and it is updated continuously with each execution loop and resets only on an end-of-trip event.	FTZM bus CAN Message CommandI $0CE Alive Rolling Counter transmitted from ECM OR FTZM bus CAN Message CommandI $0CE Protection Value checksum transmitted from ECM	<> ARC sequence at FTZM OR <> Protection Value checksum at FTZM	a) Diagnostic is .. b) Diagnostic System Disabled c) System Voltage [Batt In Range] d) FTZM bus [Sensor Bus] Wakeup signal e) Diagnostic delay time f) Message Received status g) Data Received status h) No message fault conditions present	a) .. Enabled b) == False c) > 8.00 volts d) ==TRUE e) > 3,000.00 miilisec f) ==TRUE g) == TRUE h) == TRUE	15.00 Fail counts out of 16.00 Sample counts continuously updated rolling array 12.5 msec loop execution	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Engine Speed Request Circuit	P150C	This DTC monitors for an error in communication with the Transmission Engine Speed Request Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for:		Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.		Transmission 199 ARC samples every 35.00 milliseconds. Transmission ARC samples every 35.00 milliseconds. Transmission Engine Speed Request PV samples every 35.00 milliseconds.	Type B, 2 Trips
			Transmission 199 ARC	>= 8.00 counts out of >= 18.00 counts	All the following conditions are met for:	>= 3,000.00 milliseconds		
					Battery voltage	>=11.00 volts		
			Transmission ARC	>=8.00 counts out of >= 18.00 counts	Accessory mode to off mode transition not pending			
			Transmission Engine Speed Request PV	>= 8.00 counts out of >= 18.00 counts	If controller is a non-OBD controller then battery voltage	<= 18.00 volts		
					Controller type: OBD Controller			

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Communication Error with Active Grill Air Shutter Module “A”	P151E	This DTC monitors for an internal error or error in communication with the Active Grill Air Shutter Module A.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for:		Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.		Aeroshutter Control Module 1 Initialization ARC samples every 500.00 milliseconds.	Type B, 2 Trips
			Aeroshutter Control Module 1 Initialization ARC	>= 8.00 counts out of >= 10.00 counts	All the following conditions are met for:	>= 3,000.00 milliseconds		
					Battery voltage	>= 11.00 volts		
					Accessory mode to off mode transition not pending			
					If controller is a non-OBD controller then battery voltage	<= 18.00 volts		
					Controller type: OBD Controller			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Adaptive Cruise Control Signal Circuit	P1553	Detects rolling count or protection value errors in Adaptive Cruise Control Axle Torque Command serial data signal "Emissions Neutral Default Action : When the ECM determines that a serial communication fault has occurred with the EOCM or the ACC module in data frame $2CB, the code is set and the Adaptive Control Cruise will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails." Only applicable for applications with ACC feature.	If x of y rolling count/ protection value faults occur, disable adaptive cruise control for duration of fault		Diagnostic is enabled. Adaptive Cruise Control Command Serial Data Error Diagnostic Enable	0.00	9 / 17 counts	Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Switch State Undertermin ed	P155A	Detects when cruise switch state cannot be determined, such as low voltage conditions "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise switch “Data Invalid” (latched on/off switch architectures) or “Indeterminate” (mome ntary on/off switch architectures) is detected for too long, 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."	cruise switch state is received as "undetermined" for greater than a calibratable time	fail continuously for greater than 3.0 seconds	Diagnostic is enabled.		fail continuously for greater than 3.0 seconds	Type C, No SVS , "Emissio ns Neutral Diagnost ics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Set/ Coast Signal 2 Circuit	P155B	Detects a failure of the cruise set 2 switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the secondary cruise control switch circuit voltage is stuck in Decrease High state for too long, 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." Only applicable for applications with the secondary cruise switch circuit.	Cruise Control Set 2 switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	Diagnostic is enabled. 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 Ilium.
Cruise Control Resume/ Acceleration Signal 2 Circuit	P155C	Detects a failure of the cruise resume 2 switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the secondary cruise control switch circuit voltage is stuck in Increase High state for too long, 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." Only applicable for applications with the secondary cruise switch circuit.	Cruise Control Resume 2 switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	MIL: Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Actuator Voltage Signal Message Counter Incorrect	P155E	This DTC monitors for an error in communication with the DC/DC Converter Actuator Voltage Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: DC Converter Actuator Voltage ADC ARC DC Converter Actuator Voltage ADC PV	 >= 8.00 counts out of >= 18.00 counts >=8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	DC Converter Actuator Voltage ADC ARC samples every 15.00 milliseconds. DC Converter Actuator Voltage ADC PV samples every 15.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Ignition Switch Run/ Start Position Signal Message Counter Incorrect	P156D	This DTC monitors for an error in communication with the DC/DC Converter Ignition Switch Run/ Start Position Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: DC Converter Run Crank Terminal Status ARC DC Converter Run Crank Terminal Status PV	 >= 8.00 counts out of >= 18.00 counts >=8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	DC Converter Run Crank Terminal Status ARC samples every 15.00 milliseconds. DC Converter Run Crank Terminal Status PV samples every 15.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Crank Control Signal Message Counter Incorrect	P156E	This DTC monitors for an error in communication with the DC/DC Converter Crank Control Terminal Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: DC Converter Crank Control Terminal Status ARC DC Converter Crank Control Terminal Status PV	>= 8.00 counts out of >= 18.00 counts >=8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	DC Converter Crank Control Terminal Status ARC samples every 15.00 milliseconds. DC Converter Crank Control Terminal Status PV samples every 15.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cruise Control Calibration Incorrect	P158A	Type of cruise in Body Control Module does not match that in the Engine Control Module for 2.5 seconds "Emissions Neutral Default Action : This diagnostic compares the BCM and the ECM configuration calibrations of whether No Cruise, Conventional Cruise Control, or ACC is available on the vehicle. If the calibration for the cruise system type in the ECM does not match the value in $4E9 signal Vehicle Speed Control System Type, a P158A DTC is set and cruise control is disabled."	Type of cruise system in GMLAN $4E9 does not match with that in the Engine Control Module for a fix time.	2.5 seconds	Diagnostic is enabled. DID $40 from BCM says cruise system is present (ECM recieves programmble information from Body Control Module) OR ECM will not receive Programmable information for Cruise from Body Control Module	True	fail continuously for greater than 2.5 seconds.	Type C, No SVS "Emissions Neutral Diagnostics - Special Type C"

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Analog Mode Switch Circuit High	P15A0	This DTC will detect an analog driver mode switch input that is too high out of range.	For button type NormalJButton Analog Mode Switch high voltage threshold % of 5V range For button type Enhanced_Button Analog Mode Switch high voltage threshold % of 5V range For button type Mulitple_Button Analog Mode Switch high voltage threshold % of 5V range	 >= 88.80 % >=94.10% >= 95.30 %	Vehicle mode analog switch button type	= CeDMDG_e_Enhanced_ Button	200 failures out of 250 samples 25 ms / sample	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Front Object Detection Control Module Torque Request Signal Message Counter Incorrect	P15F6	Detects rolling count or protection value errors in Collision Preparation System Axle Torque Command serial data signal "Emissions Neutral Default Action : When the ECM determines that a serial communication fault has occurred with the EOCM in frame $2CD, the code is set and the Collision Preparation System is disabled." Only applicable for applications with Full Speed Range Adaptive Cruise Control and Collision Preparation System feature.	If x of y rolling count/ protection value faults occur, disable collision preparation system for duration of fault		Diagnostic is enabled. Front Object Detection Module Torque Request Serial Data Error Diagnostic Enable	0.00	4 / 10 counts	Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Automatic Braking Engine Torque Request Signal Message Incorrect	P15F8	Detects rolling count or protection value errors Rear Virtual Bumper Axle Torque Command serial data signal "Emissions Neutral Default Action : When the ECM determines that a serial communication fault has occurred with the EOCM in frame $2F9, the code is set and the auto braking feature is disabled for the remainder of the key cycle." Only applicable for applications with Full Speed Range Adaptive Cruise Control and Collision Preparation System feature.	If x of y rolling count/ protection value faults occur, disable rear virtual bumper or collision preparation system for duration of fault		Diagnostic is enabled. Automatic Braking Engine Torque Request Serial Data Error Diagnostic Enable	0.00	4 / 10 counts	Type C, No SVS , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Monitor Sensor Signal Message Counter Incorrect	P15FF	This DTC monitors for an internal error or error in communication with the Battery Monitor Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: IBS MVIARC IBS Calculated Data ARC IBS Measured Temperature ARC NAHr Charge ARC NAHr Discharge ARC Current FOM ARC Voltage FOM ARC IBS FOM ARC Vehicle Startup ARC	>= 8.00 counts out of >= 10.00 counts >=8.00 counts out of >= 10.00 counts >= 8.00 counts out of >= 10.00 counts >=8.00 counts out of >= 10.00 counts >= 8.00 counts out of >= 10.00 counts >=8.00 counts out of >= 10.00 counts >= 8.00 counts out of >= 10.00 counts >= 8.00 counts out of >= 10.00 counts >= 8.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	IBS MVIARC samples every 250.00 milliseconds. IBS Calculated Data ARC samples every 500.00 milliseconds. IBS Measured Temperature ARC samples every 250.00 milliseconds. NAHr Charge ARC samples every 500.00 milliseconds. NAHr Discharge ARC samples every 500.00 milliseconds. Current FOM ARC samples every 2,000.00 milliseconds. Voltage FOM ARC samples every 2,000.00 milliseconds. IBS FOM ARC samples every 2,000.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Battery Rational ARC	out of >= 10.00 counts >= 8.00 counts out of >= 10.00 counts			Vehicle Startup ARC samples every 1,000.00 milliseconds. Battery Rational ARC samples every 1,000.00 milliseconds.	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Ignition voltage out of correlation error(P1682) not active and			
					Barometric Pressure	>= 70.0 KPA		
					Inlet Air Temp	>= -20.0 degC		
					Fuel Temp	-12 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Sensor Reference Voltage Status Message Counter Incorrect	P165C	This DTC monitors for an error in communication with the Sensor Reference Voltage Status Signals.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for:		Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.		Fuel Tank Zone Module Info 1 ARC samples every 12.50 milliseconds. Fuel Tank Zone Module Info 1 CSUM samples every 12.50 milliseconds.	Type B, 2 Trips
			Fuel Tank Zone Module Info 1 ARC	>= 8.00 counts out of >= 18.00 counts	All the following conditions are met for:	>= 3,000.00 milliseconds		
					Battery voltage	>= 11.00 volts		
			Fuel Tank Zone Module Info 1 CSUM	>=8.00 counts out of >= 18.00 counts	Accessory mode to off mode transition not pending			
					If controller is a non-OBD controller then battery voltage	<= 18.00 volts		
					Controller type: OBD Controller			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Voltage Signal Message Counter Incorrect	P167F	This DTC monitors for an error in the FTZM Battery Voltage Signal Message Counter.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Fuel Tank Zone Module Info 2 ARC Fuel Tank Zone Module Info 2 CSUM	>= 8.00 counts out of >= 18.00 counts >=8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Fuel Tank Zone Module Info 2 ARC samples every 15.00 milliseconds. Fuel Tank Zone Module Info 2 CSUM samples every 15.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Voltage 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 AND (Run/Crank voltage > Table, f(IAT). See supporting tables: **P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)** OR PT Relay Ignition voltage > 5.50 Volts) AND Run/Crank voltage > 5.50 Volts	240/480 counts; or 0.175 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Sensor Bus Relay Control Circuit Open	P16D7	Detects an open circuit in the sensor bus relay circuit. This diagnostic reports the DTC when an open circuit is present. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	Open Circuit: > 200 K Q ohms impedance between output and controller ground	Sensor Bus relay circuit open diagnostic = TRUE Run/Crank Voltage	1.00 Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P16D8 may also set (Sensor Bus Relay Control Circuit Low).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Sensor Bus Relay Control Circuit Low	P16D8	Detects a short to ground in the sensor bus relay circuit. This diagnostic reports the DTC when a short to ground is present. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to ground: < 0.5 Q impedance between output and controller ground	Sensor Bus relay circuit short to ground diagnostic = TRUE Run/Crank Voltage	1.00 Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P16D7 may also set (Sensor Bus Relay Control Circuit Open).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Sensor Bus Relay Control Circuit High	P16D9	Detects a short to power in the sensor bus relay circuit. This diagnostic reports the DTC when a short to power is present. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	Short to power: < 0.5 Q impedance between output and controller power	Sensor Bus relay circuit short to power diagnostic = TRUE Run/Crank Voltage	1.00 Voltage > 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Monitor Module Data Incompatible	P16E3	This DTC monitors for a battery module data incompatible fault	Battery Module data received over LIN bus is incompatible. (Measured by any of the following)		The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled	Enabled Enabled	Diagnostic runs in the 250 ms loop	Type B, 2 Trips
			Historical Test	Upon IBS wakeup, if any of the below Historical Test conditions are satisfied, the diagnostic fails.	Power Mode	Not equal off		
					12V System Reference Voltage	> 9.00 Volts		
					LIN Bus Off or Battery Module Communication Faults Active	= False		
			Absolute value of IBS battery capacity C20 data (IBS Return Nominal C20 - 80.00 Ah)	> 5.00 Ah	Outside Air Temperature	> -20.00 Celsius and < 50.00 Celsius		
			or					
			IBS Returns a battery type that is not equal to	CeBSER_e_IBS_Cfg BatAGM	Outside Air Temperature Validity Bit	= True		
			or		IBS Configuration Data Available over LIN bus	= True		
			Absolute value of (IBS Return Battery Calibration#! U40@25 C - 12.15V)	>0.50 Volts	Historical Test Only Host Controller MEC Counter	<= 0		
			or					
			Absolute value of (IBS Return Battery Calibration#! U80@25 C - 12.66 V)	> 0.50 Volts				
			Continuous Test	If any of the below conditions are satisfied for 16.00 fail counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Absolute value of IBS battery capacity C20 data (IBS Return Nominal C20 - 80.00 Ah) or IBS Returns a battery type that is not equal to or Absolute value of (IBS Return Battery Calibration#! U40@25 C - 12.15V) or Absolute value of (IBS Return Battery Calibration#! U80@25 C - 12.66 V)	out of 20.00 sample counts, the diagnostic fails. > 5.00 Ah CeBSER_e_IBS_Cfg BatAGM > 0.50 Volts > 0.50 Volts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Redundant Memory Performance (Gasoline applications ONLY)	P16F3	Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures For all of the following cases: If the individual diagnostic threshold is equal to 2048 ms, this individual case is not applicable. If any of the following cases are X out of Y diagnostics and the fail (x) is greater than the sample (Y), this individual case is also not applicable.	Equivance Ratio torque compensation exceeds threshold	-70.00 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	70.00 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	70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range	99.41 mg	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference between the previous Final Advance and the current Final Advance not Adjusted for Equivalence Ratio is out of bounds given by threshold range	15.00 degrees		Engine speed >0rpm	Up/down timer 425 ms continuous, 0.5 down time multipier	
			Torque Learn offset is out of bounds given by threshold range	High Threshold 0.00 Nm Low Threshold 0.00	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
				Nm				
			One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold	80.00 mg		Engine speed > 800 rpm	Up/down timer 450 ms continuous, 0.5 down time multipier	
			Difference between Unmanaged Spark and PACS Spark is greater than threshold	15.00 degrees	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 1,138.96 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 1,138.96 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range	70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Arbitrated Air-Per-Cylinder filter coefficient is out of bounds given by threshold range	High Threshold 1.000 Low Threshold 0.074	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Launch spark is active but the launch spark redundant path indicates it should not be active	N/A		Engine speed < 8,191.88 or 8,191.88 rpm (hysteresis pair)	Up/down timer 150 ms continuous, 0.5 down time multipier	
			Rate limited vehicle speed and its dual store do not equal	N/A		Time since first CAN message with vehicle speed >= 0.500 sec	10/40 counts; 25.0msec/count	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Cylinders active greater than commanded	2 cylinders		Engine run flag = TRUE > 2.00 s Number of cylinder events since engine run > 24 No fuel injector faults active	Up/down timer 450 ms continuous, 0.5 down time multipier	
			Transfer case neutral request from four wheel drive logic does not match with operating conditions	N/A	Ignition State	Accessory, run or crank Transfer case range valid and not over-ridden FWD Apps only	7.00/ 10.00 counts; 25.0msec/count	
			Driver progression mode and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							multipier	
			Predicted torque for uncorrected zero pedal determination is greater than calculated limit.	Table, f(Engine, Oil Temp). **P16F3_Speed Control External Load f(Oil Temp, RPM)** + 70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Predicted Request Without Motor is greater than its redundant calculation plus threshold	69.00 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 olus threshold	69.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							down time multipier	
			Positive Torque Offset is greater than its redundant calculation plus threshold OR Positive Torque Offset is less than its redundant calculation minus threshold	70.00 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	70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, down timo	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							multipier0.5	
			Commanded Hybrid Predicted Crankshaft Request is greater than its redundant calculation plus threshold	4,096.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Hybrid Immediate Crankshaft Request is less than its redundant calculation minus threshold	4,096.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Regeneration Brake Assist is not within a specified range	Brake Regen Assist < 0 Nm or Brake Regen Assist > 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta	15.00 degrees	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			1. Cylinder Torque Offset exceeds step size threshold OR	1. 70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			2. Sum of Cylinder Torque Offset exceeds sum threshold	2. 70.00 Nm				
			Engine Capacity Minimum Immediate Without Motor is greater than its dual store plus threshold	70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Engine Capacity Minimum Engine Off is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Engine Capacity Minimum Engine Immediate Without Motor is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Immediate Engine Request is greater than its redundant calculation plus threshold	70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than Orpm	Up/down timer 150 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Engine Speed Lores Intake Firing timing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than Orpm	Up/down timer 150 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)** + 70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Idle speed control calculated predicted minimum torque without reserves exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: **P16F3_Speed Control External Load f(Oil Temp, RPM)** +	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
				70.00 Nm				
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	1,138.96 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Driver Immediate Request is less than its redundant calculation minus threshold	1,138.96 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded Immediate Request is greater than its redundant calculation plus threshold	1,138.96 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			OR Commanded Immediate Request is less than its redundant calculation minus threshold				multipier	
			Commanded Immediate Response Type is set to Inactive	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference between Cruise Axle Torque Arbitrated Request and Cruise Axle Torque Request exceeds threshold	42.71 Nm		Cruise has been engaged for more than 4.00 seconds	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Desired engine torque request greater than redundant calculation plus threshold	69.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Engine min capacity above threshold	70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 100 ms continuous, 0.5 down time multipier	
			No fast unmanaged retarded spark above the applied spark plus the threshold	15.00 Degree		Engine speed greater than Orpm	Up/down timer 425 ms continuous, 0.5 down time multipier	
			Absolute difference of adjustment factor based on temperature and its dual store above threshold	2.76 m/s	Ignition State	Accessory, run or crank	Up/down timer 138 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			1. Absolute difference of redundant calculated engine speed above threshold	500 RPM		Engine speed greater than 0 RPM	Up/down timer 150 ms continuous, 0.5 down time multipier	
			After throttle blade pressure and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Speed Control's Preditcted Torque Request and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Engine oil temperature and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 325 ms continuous, 0.5 down time multipier	
			Desired throttle position greater than redundant calculation plus threshold	10.00 percent	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of the rate limited pre-throttle pressure and its redundant calculation greater than threshold	0.06 kpa	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Throttle desired torque above desired torque plus threshold	70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Difference of Final Torque feedback proportional plus integral term and its redundant calculation is out of bounds given by threshold range	High Threshold 70.00 Nm Low Threshold -70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range	High Threshold 0.0000455 Low Threshold -0.0000455	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Difference of base friction torque and its redundant calculation is out of bounds given by threshold	High Threshold 70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			range	Low Threshold -70.00 Nm			down time multipier	
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 70.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			AC friction torque is greater than commanded by AC control software or less than threshold limit	High Threshold 39.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 70.00 Nm Low Threshold -70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Generator friction torque is out of bounds given by threshold range	High Threshold 70.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Absolute difference	70.00	Ignition State	Accessory, run or crank	Up/down timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			between the Supercharger friction torque and its redundant calculation greater than threshold	Nm			475 ms continuous, 0.5 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 70.00 Nm Low Threshold -70.00 Nm Rate of change threshold 4.38 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 70.00 Nm Low Threshold 0.00	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
				Nm				
			Delta Torque Baro compensation is out of bounds given by threshold range	High Threshold 6.60 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			1. Difference of reserve torque value and its redundant calculation exceed threshold OR 2. Reserve request does not agree with operating conditions or Difference of final predicted torque and its redundant calculation exeed threshold OR	1.69.00 Nm 2. N/A 3.69.00 Nm 4.69.00 Nm	3. &4.: Ignition State	1. &2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 70.00 Nm 3. &4.:	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			3. Rate of change of reserve torque exceeds threshold, increasing direction only OR 4. Reserve engine torque above allowable capacity threshold			Accessory, run or crank		
			Engine Vacuum and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of the calculated Intake Manifold Pressure during engine event versus during time event is greater than threshold	Table, f(Desired Engine Torque). See supporting tables: **P16F3_Delta MAP Threshold f(Desired Engine Torque)**		Engine speed >0rpm	Up/down timer 150 ms continuous, 0.5 down time multipier	
			Min. Axle Torque Capacity is greater than threshold	0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Driver Predicted Request is greater than its redundant calculation plus threshold OR Driver Predicted Request is less than its redundant calculation minus threshold	1,138.96 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			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 ftOil**	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
				Temp, RPM) + 70.00 Nm			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 changing and one loop after React command Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of Weighting factor for number of cylinders fueled and its redundant calculation is above threshold	0.26		Engine run flag = TRUE > 10.00 s	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range	15.00 degrees	Ignition State	Accessory, run or crank	Up/down timer 150 ms continuous, 0.5 down time multipier	
			Difference of commanded spark advance and adjusted delivered is out of bounds given by threshold range	15.00 degrees		Engine speed >0rpm	Up/down timer 425 ms continuous, 0.5 down time multipier	
			Absolute difference between Estimated Engine Torque and its dual store are above a threshold	70.00 Nm		Engine speed >0rpm	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Absolute difference between Estimated Engine Torque without reductions due to torque control and its dual store are above a threshold	70.00 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	15.00 degrees		Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 70.00 Nm	Up/down timer 450 ms continuous, 0.5 down time multipier	
			Absolute difference of Engine Capacity Minimum Running Immediate Brake Torque Excluding Cylinder Sensitivity and its redundant calculation is out of bounds given by threshold range	70 Nm		Engine speed >0rpm	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			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 > 800 rpm	Up/down timer 450 ms continuous, 0.5 down time multipier	
			Rate limited cruise axle torque request and its dual store do not match within a threshold	42.71 Nm	Ignition State	Accessory, run or crank	Up/down timer 163 ms continuous, 0.5 down time multipier	
			1. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its redundant calculation is out of bounds given by threshold range OR	1. 3.50 % 2. N/A 3. N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			2. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its dual store do not equal OR 3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal					
			Commanded axle torque is greater than its redundant calculation by threshold	1,138.96 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Commanded axle torque is less than its redundant calculation by threshold	1,708.44 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Preload timer and its redundant calculation do not equal	N/A	Ignition State	Accessory, run or crank AFM apps only	Up/down timer 150 ms continuous, 0.5 down time multipier	
			AC friction torque is greater than commanded by AC control software	39.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Engine Speed Lores Intake Firing (time based) calculation does not equal its redundant calculation	N/A		Engine speed >0rpm	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of the calculated spark offset for equivalence ratio and its redundant cacluation is greater than a threshold	15.00 degrees		Engine speed >0rpm	Up/down timer 150 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 138	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			and its redundant cacluation is greater than a threshold				ms continuous, 0.5 down time multipier	
			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	
			Difference between Estimated Engine Torque and Commanded Engine Torque is greater than an offset -OR- Difference between Engine Torque Control Feedback and its redundant feedback calculation are beyond its safety bounds -OR-	70.00 Nm Greater than 70.00 Nm or Lower than 70.00 Nm	Engine State	Running	Up/down timer 200.00 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Immediate Feedback Control is active beyond allowed -OR- Torque Control Solver Failure is active	2.00 seconds				
			Calculated or Commanded Engine to Axle ratio is lower than a threshold -OR- Engine to Axle Offset is greater than a threshold	0.9 70.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175.00 ms continuous, 0.5 down time multipier	
			Difference between Cruise Arbritration Request and its redundant calcultion exceeds a threshold -OR- Difference between Cruise Accleration Request and its redundant calcultion exceeds a threshold	42.71 Nm 0.05 KPH/Second	Ignition State	Accessory, run or crank	Up/down timer 500.00 ms continuous, 0.5 down time multipier	
			Difference between commanded Axle Torque and its redundant calcultion is greater than a threshold -OR- Difference between commanded Axle Toraue	1,138.96 Nm 1,708.44 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,047.97 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			and its redundant calcultion is less than a threshold					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Acceleration Sensor Signal Message Counter Incorrect	P175F	The diagnostic monitor detects an alive rolling count error or checksum error in the CAN frame containing the lateral acceleration signal value and longitudinal acceleration sensor signal value. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Acceleration Sensor Value ARC Acceleration Sensor CSUM	>=4.00 counts out of >= 10.00 counts >= 15.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >=11.00 volts <= 18.00 volts	Executes in 12.5ms loop.	Type C, No SVS "Emissions Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Mode Switch Signal Circuit Include for programs that are NOT hybrid start stop conventional	P1762	BCM to ECM Rolling Count check for CAN frame $1E1. - Only utilize when calibration variable KelNFG_e_HybridType does not equal CelNFR_e_StartStopConv. (Note: Not Equal To is represented by <>)	Rolling count value received from BCM does not match expected value	= TRUE	Engine Speed Engine Speed Engine speed between min/max for Vehicle Speed for Hybrid type	>200RPM <7,500 RPM >5.0 seconds < 318.14MPH > 5.0 seconds <>CelNFR_e_StartStopConv	>3 error counts for> 10.0 seconds 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Powerflow Engaged Signal Message Incorrect	P1772	This DTC monitors for an error in communication with the Powerflow Engaged Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: If Non-Hybrid Application: Transmission Engaged Powerflow Information Alive Rolling Count 197 ARC Transmission Engaged Powerflow Information Alive Rolling Count 197 PV If Hybrid Application: Transmission Engaged Powerflow Information Alive Rolling Count 1AB ARC Transmission Engaged Powerflow Information Alive Rolling Count 1AB PV	>=8.00 counts out of >= 18.00 counts >= 8.00 counts out of >= 18.00 counts >= 8.00 counts out of >= 18.00 counts >= 8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >=11.00 volts <= 18.00 volts	Transmission Engaged Powerflow Information Alive Rolling Count 197 ARC samples every 35.00 milliseconds. Transmission Engaged Powerflow Information Alive Rolling Count 197 PV samples every 35.00 milliseconds. Transmission Engaged Powerflow Information Alive Rolling Count 1AB ARC samples every 35.00 milliseconds. Transmission Engaged Powerflow Information Alive Rolling Count 1AB PV samples every 35.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IMS State Signal Message Incorrect	P1773	This DTC monitors for an error in communication with the IMS State Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: If Non-Hybrid Application: Transmission Actual Range Status 197 ARC Transmission Actual Range Status 197 PV If Hybrid Application: Transmission Actual Range Status 1AB ARC Transmission Actual Range Status 1AB PV	>=8.00 counts out of >= 18.00 counts >= 8.00 counts out of >= 18.00 counts >= 8.00 counts out of >= 18.00 counts >= 8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Transmission Actual Range Status 197 ARC samples every 35.00 milliseconds. Transmission Actual Range Status 197 PV samples every 35.00 milliseconds. Transmission Actual Range Status 1AB ARC samples every 35.00 milliseconds. Transmission Actual Range Status 1AB PV samples every 35.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Range Signal Message Counter Incorrect	P188B	This DTC monitors for an error in communication with the Transmission Range Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Dual Track Pulse Width Crank Permission Status ARC Dual Track Pulse Width Crank Permission Status PV	 >= 8.00 counts out of >= 18.00 counts >=8.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Dual Track Pulse Width Crank Permission Status ARC samples every 35.00 milliseconds. Dual Track Pulse Width Crank Permission Status PV samples every 35.00 milliseconds.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Park Assistance System Performance	P18CB	Determines if Park assist active bit from EBCM is valid	Speed Error - APA active ($1C6/$1C7) above a vehicle speed threshold OR Initialization Error -APA active ($1C6/$1C7) without an active torque request OR Exit Error - APA transitions to inactive during active torque request above a vehicle speed threshold	>10.00 APA active boolean transitions from False to True with Torque Intervention = No request APA active boolean transitions from True to False with Torque Intervention <> No request when vehicle speed is > 1.00	Active Communication with EBCM Power Mode Engine Running Status of traction in GMLAN message ($4E9) Run/Crank Active Ignition Voltage	Received serial data = Run = True = Traction Present > 0.50 seconds > 6.41 volts	>= 4 failures out of10 Performed every 12.5ms >= 4 failures out of10 Performed every 12.5ms When transition occurs, no number of samples Performed every 12.5ms	Type C, No SVS Emissions Neutral Diagnostic - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 2 Performance (For use on vehicles with two fuel senders and mechanical transfer pump)	P2066	This DTC will detect a secondary fuel tank level sensor stuck in-range.	1) If Deadband diagnostic subtest Enabled AND 2a) If fuel volume in primary tank is and 2b) if fuel volume in secondary tank is and 2c) and if 2a and 2b indications do not change while fuel volume consumed by engine is	1) == Enabled status 2a) >43.9 liters 2b) <4.8 liters 2c) >14.2 liters	Ia) Diagnostic Enabled Ib) Engine Operational Status	Ia) == True Ib) == Running	250 ms / sample	Type B, 2 Trips
			1) If Secondary sensor rationality diagnostic subtest enabled AND 2a) Volume in primary tank is 2b) and volume in secondary tank is 2c) and remains in this condition for	1) == Disabled status 2a) <44 liters 2b) >5 liters 2c) >1,800 seconds	Ia) Diagnostic Enabled Ib) Engine Operational StatusEngine Running	Ia) == True Ib) == Running	250 ms / sample	
			a) If indicated fuel volume change is b) while fuel consumed by the engine is	a) < 3.00 liters b) > 20 liters	Ia) Diagnostic Enabled Ib) Engine Operational StatusEngine Running 2) Secondary tank volume [Not Empty] is	Ia) == True Ib) == Running 2) >4.8 liters	250 ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 2 Circuit Low Voltage (For use on vehicles with two fuel senders connected to an FTZM)	P2067	This DTC will detect a fuel sender out-of-range low in the secondary fuel tank.	Fuel level Sender % of 5V range	< 10%	a) Diagnostic enabled status b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	a) == True b) == True c) == True d) <> True	40 failures out of 50 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Level Sensor 2 Circuit High Voltage (For use on vehicles with two fuel senders connected to an FTZM)	P2068	This DTC will detect a fuel level sensor out-of-range high in the secondary fuel tank.	Fuel level Sender % of 5V range	> 60 %	a) Diagnostic enabled status b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	a) == True b) == True c) == True d) <> True	40 failures out of 50 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Actuator Solenoid Circuit Low-Bank 1	P2088	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Actuator Solenoid Circuit High - Bank 1	P2089	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Actuator Solenoid Circuit Low-Bank 1	P2090	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Actuator Solenoid Circuit High - Bank 1	P2091	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply voltage Output driver Ignition switch	 > 11.00 Volts On Crank or Run	20 failures out of 25 samples 250 ms /sample, continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Post Catalyst Fuel Trim System Too Lean Bank 1	P2096	Determines if the post catalyst 02 sensor based fuel control system is indicating a lean exhaust gas condition. If the lean condition is such that the control system utilizes all or most of its available high limit authority (high limit = 100% authority), then P2096 will set. The monitor can be calibrated to fail based on the Average Integral Offset % Authority, the Average Total Offset % Authority or both combined. The Average Total Offset metric consists of the average of the Integral Offset+ Proportional Offset. Note: When the post catalyst 02 voltage is too lean, the post catalyst 02 integral and proportional offset control is increased (positive % authority). This applies a rich bias to fuel control in an attempt to counteract the lean condition. A perfectly balanced control system (no rich or lean bias required) is represented by integral	The Average Integral Offset % Authority AND The Average Total Offset % Authority (Note: any value greater than or equal to +100% effectively nullifies the Average Total Offset % Authority criteria) High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 29 % for >= 1.0 seconds AND the % Authority metric is approaching the failure threshold. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 25 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	>=98.0 % >=62.8 % If the P2096 is actively failing then the Average Integral Offset must be < 98.0 % and the Average Total Offset must be < 62.8 % for the diagnostic to report a pass.	The post cat fuel trim diagnostic is enabled The diagnostic is enabled during: Deceleration Idle Cruise Light Acceleration Heavy Acceleration Ambient Air Pressure Engine AirFlow Intake Manifold Pressure Induction Air Temperature Start-up Coolant Temp. PTO Intrusive diag. fuel control Ethanol Estimation in Progress 02 Heater Learned Resistance Long Term Secondary Fuel Trim Enabled for (see **"Long Term Secondary Fuel Trim Enable Criteria"** in Supporting Tables) High Vapor Conditions Green Cat System	 No No Yes No No >= 70 kPa >= 5.0 g/s <= 10,000.0 >= 20 kPa <= 256 >= -20 deg. C <= 150 >= -20 deg. C (or OBD Coolant Enable Criteria = TRUE) Not Active Not Active Not Active = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") >= 0.1 seconds Not Present = Not Valid,	Frequency: Continuous Monitoring in 100ms loop. The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 37.5 seconds (375 samples) before comparing to their respective failure thresholds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst 02 sensor that is within its optimal operating range (neither rich nor lean).			Condition	Green Cat System condition is considered valid until the accumulated air flow is greater than 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is above 22grams/sec.		
					Delay during GPF Regeneration If the diagnostic delays during a GPF Regen, it will continue to delay following completion of the Regen until the following number of samples have been accumulated. (1 sample = 100ms): Deceleration Idle Cruise Light Acceleration Heavy Acceleration	No Delay 0.00 0.00 0.00 0.00 0.00		
					No Fault Active for:	AmbientAirDefault AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						CamSensorAnyLocationFA EvapEmissionSystem_FA EvapFlowDuringNonPurge_FA FuelTankPressureSnsrCkt_FA EvapPurgeSolenoidCircuit_FA EvapSmallLeak_FA EvapVentSolenoidCircuit_FA FuelInjectorCircuit_FA MAF_SensorFA MAF_SensorTFTKO MAP_SensorFA MAP_EngineVacuumStatus EngineMisfireDetected_FA A/F Imbalance BankI O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA		
					For the cells identified as enabled (i.e. those containing a "Yes" at the beginning of the Enable Conditions column), the minimum accumulated samples required before the fuel control metric is considered usable for that cell (1 sample = 100ms):			
					Deceleration	100		
					Idle	100		
					Cruise	100		
					Light Acceleration	100		
					Heavy Acceleration	100		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					(Note: A value in any of the above operating "cells" that is an order of magnitude (or more) higher than other cells is an indication that the diagnostic is not capable of diagnosing in that cell).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Post Catalyst Fuel Trim System Too Rich Bank 1	P2097	Determines if the post catalyst 02 sensor based fuel control system is indicating a rich exhaust gas condition. If the rich condition is such that the control system utilizes all or most of its available low limit authority (low limit = -100% authority), then P2097 will set. The monitor can be calibrated to fail based on the Average Integral Offset % Authority, the Average Total Offset % Authority or both combined. The Average Total Offset metric consists of the average of the Integral Offset+ Proportional Offset. Note: When the post catalyst 02 voltage is too rich, the post catalyst 02 integral and proportional offset control is decreased (negative % authority). This applies a lean bias to fuel control in an attempt to counteract the rich condition. A perfectly balanced control system (no rich or lean bias required) is represented by integral	The Average Integral Offset % Authority AND The Average Total Offset % Authority (Note: any value less than or equal to -100% effectively nullifies the Average Total Offset % Authority criteria) High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 29 % for >= 1.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 25 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	<= -98.0 % <= -70.0% If the P2097 is actively failing then the Average Integral Offset must be > -98.0 % and the Average Total Offset must be > -70.0 % for the diagnostic to report a pass.	Same as P2096	Same as P2096	Frequency: Continuous Monitoring in 100ms loop. The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 37.5 seconds (375 samples) before comparing to their respective failure thresholds.	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error. This is determined if the difference between measured throttle position and modeled throttle position is greater than a threshold or less than a threshold. This diagnostic only runs when the engine is running and the voltage is high enough and there is not a voltage failure and the throttle position minimum learn is not active and the throttle is being controlled 2) Throttle control is driving the throttle in the incorrect direction. This is determined if the throttle position is greater than a threshold percent and the powertrain relay voltage is high enough and the throttle position minimum learn is active.	Difference between measured throttle position and modeled position, (modeled = MAX (Commanded vs. Commanded Filtered)) > OR Difference between modeled position (modeled = MIN (Commanded vs. Commanded Filtered)) and measured throttle position >	10.00 percent 10.00 percent	TPS minimum learn is not active AND Powertrain Relay Contactl Fault is FALSE (no P1682 fault) AND Throttle Control is not in Service or DVT control AND Throttle is being Controlled AND ((Engine Running AND Run/Crank Voltage) OR Run Crank Voltage) AND (PT Relay Command On OR ((Engine Running AND Powertrain Relay Voltage) OR Powertrain Relay Voltage))	> 5.50 Volts >8.41 Volts > 5.50 Volts >8.41 Volts	15 counts; 12.5 ms/count in the primary processor	Type A, 1 Trips
			Throttle Position >	52.71 percent	TPS minimum learn active AND Powertrain Relay Contactl Fault is FALSE (no P1682 fault) AND Throttle Control is not in Service or DVT control	= TRUE	11 counts; 12.5 ms/count in the primary processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Throttle Return to Default Performance	P2119	Throttle unable to return to default throttle position after de-energizing ETC motor.	(Normalized TPS1 percent Vref > AND Normalized TPS2 percent Vref> On the main processor) OR (Normalized TPS1 percent Vref < AND Normalized TPS2 percent Vref< On the main processor)	2.3810% Vref 2.3840 % Vref 2.0590 % Vref 2.0560 % Vref	Throttle de-energized due to one of the following conditions: Powerup Default Learn OR Default Throttle Authority OR PT Relay Voltage OR Main System Shutdown OR Battery Saver Active OR (Powertrain Relay On AND Run/Crank Active)	= TRUE = TRUE < 5.500 Volts = TRUE = TRUE = FALSE = FALSE	0.4969 s if ETC motor command is STOP (when Default Throttle Authority or Main System Shutdown is causing Throttle de-energize) 5.0000 s if ETC motor command is not STOP	Type B, 2 Trips

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	Detect a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor. 1.) The diagnostic monitors the difference in position between APP1 and the APP2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. 2.) The diagnostic also monitors the difference in reference voltage between normalized min APP1 and the normalized min APP2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor	Difference between APP1 displaced and APP2 displaced >	5.000 % offset at min. pedal position with a linear threshold to 10.001 % at max. pedal position	Run/Crank voltage No APP sensor faults No 5V reference errors or faulst for # 3 & # 4 5V reference circuits	> 6.41 Volts (P2122, P2123.P2127, P2128) (P06A3, P0697)	19/39 counts intermittent; or 15 counts continuous, 12.5 ms/count in the main processor	Type A, 1 Trips
			Difference between (normalized min APP1) and (normalized min APP2) >	3.500 % Vref	Run/Crank voltage No APP sensor faults No 5V reference errors or faulst for # 3 & # 4 5V reference circuits	> 6.41 Volts (P2122, P2123.P2127, P2128) (P06A3, P0697)	19/39 counts intermittent; or 15 counts continuous, 12.5 ms/count in the main processor	

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

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

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

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 2 Circuit Low	P2184	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 55.0 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 55.0 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 55.0 Ohms Temp Sensor 7: 55.0 Ohms	Diagnostic is Enabled		5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 2 Circuit High	P2185	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolantTempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6	> X Ohms X is equal to: Temp Sensor 1: 174,069 Ohms Temp Sensor 2: 174,069 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 174,069 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 174,069 Ohms Temp Sensor 7: 174,069 Ohms	Diagnostic is Enabled Engine run time OR IAT min	 > 10.0 seconds > -20.0 °C	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 2 Circuit Intermittent/ Erratic	P2186	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature 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.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4		Diagnostic is Enabled No Active DTC's	 EECR_TS2_Erratic_TFTK 0 EECR_TS2_CktHiLo_FA	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6 The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 10.0 seconds -60.0 °C 150.0 °C 10.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 7.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the calculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. *****************************	 5.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Bank 1 Air-Fuel Ratio Imbalance	P219A	This monitor determines if there is an Air Fuel Imbalance in the fueling system for a cylinder on Bank 1. Detection is based on a the pre catalyst oxygen sensor voltage. The pre catalyst 02 voltage is used to generate a variance metric that represents the statistical variation of the 02 sensor voltage over a given engine cycle. This metric is proportional to the air-fuel ratio imbalance (variance is higher with an imbalance than without). The observed Variance is dependent on engine speed and load and is normalized by comparing it to a known "good system" result for that speed and load, and generating a Ratio metric. The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table	Standard Mode Filtered Ratio The EWMA calculation uses the weighting coefficient from the following supporting table: **P219A EWMA Coefficient** For this program, the Optional Mode is NOT used Optional Mode Filtered Ratio The EWMA calculation uses the weighting coefficient from the following supporting table while in Optional Mode:	>0.50 If the diagnostic has reported a failure on the prior trip, the EWMA Filtered Ratio must fall below 0.45 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing. > 1.00 If the diagnostic has reported a failure on the prior trip, the Optional Mode Filtered Ratio must fall below 0.50 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing.	The A/F imbalance diagnostic is enabled System Voltage Fuel Level Engine Coolant Temperature Cumulative engine run time Diagnostic enabled at Idle (regardless of other operating conditions) Engine speed range Engine speed delta during a short term sample period Mass Airflow (MAF) range Cumulative delta MAF during a short term sample period Filtered MAF delta between samples Note: first order lag filter coefficient applied to MAF	 No lower than 11.0 Volts for more than 0.2 seconds > 10.0% The diagnostic will disregard the fuel level criteria if the fuel sender is faulty. > -20 deg. C (or OBD Coolant Enable Criteria = TRUE) > 0.0 seconds No 1,100 to 4,000 RPM <200 RPM 5 to 1,000 g/s <5 g/s <0.75 g/s	Minimum of 1 test per trip, up to 10 tests per trip during RSR or FIR. The front 02 sensor voltage is sampled once per cylinder event. Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 16.80 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm. This data is collected only when enable conditions are met, and as such significantly more operating time is required than is indicated above. Generally, a report will be	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		P219A Variance Threshold Bankl Table) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17x17 table (see Supporting Table **P219A Normalizer Bankl Table).** This quotient is then multiplied by a quality factor calibration from a 17x17 table (see Supporting Table **P219A Quality Factor Bankl Table)** . This result is referred to as the Ratio. Note that the quality factor ranges between 0 and 1 and represents robustness to false diagnosis in the current operating region. Regions with low quality factors are not used. Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered	**P219A EWMA Coefficient Opt Table**		= 0.100 Air Per Cylinder (APC) APC delta during short term sample period Filtered APC delta between samples Note: first order lag filter coefficient applied to APC = 0.100 Spark Advance Throttle Area (percent of max) Intake Cam Phaser Angle Exhaust Cam Phaser Angle -------------------------------- Electronic Waste Gate (eWG) present If eWG = yes then Waste Gate Position Intrusive eWG Feature If intrusive Waste Gate positin is enabled then the electronic Waste Gate will be commanded to the following range when the other enable conditions have been met. Intrusive Waste Gate Position Min	 160 to 650 mg/cylinder <85mg/cylinder <10.00 percent 0 to 100 degrees 2 to 200 percent 0 to 100 degrees 0 to 100 degrees --------------------------------- Yes -5.0 to 105.0 Disabled 25.0	made within 5 minutes of operation. For RSRorFIR, 20 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 Ilium.
		Ratio. The range of the Filtered Ratio metric is application specific since both the emissions sensitivity and relationship between imbalance and the Variance metric are application specific. Some applications may need to command a unique cam phaser value before performing the above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use his feature. For programs using Active Fuel Management or Multiple Cam profiles, a secondary Imbalance Ratio can be calculated while in the secondary operating modes. This secondary ratio is an optional calculation and is labeled as the "Optional Mode Ratio". The Optional Mode Ratio is calculated the same as explained above with the following sucoortino			Intrusive Waste Gate Position Max	100.0		
					Delay during GPF Regeneration	No Delay		
					Active Fuel Management Firing Fraction if the Optional Mode is enabled (see Malfunction Criteria) Active Fuel Management Firing fraction for Optional Mode calculations Intrusive Firing Fraction during Fast Initial Response or Rapid Step Response If the intrusive Firing Fraction feature is enabled the Active Fuel Management firing fraction will be forced to a value above this threshold when in Fast Initial Response or in Rapid Step Response.	0.00 to 1.01 0.00 to 1.00 Disabled >=0.00		
					For programs using multi-step cam profiles: High Lift Cam Profile will use:	Standard Mode Filtered Ratio		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						resistance has learned since NVM reset)		
					Rapid Step Response (RSR): RSR will trigger if the Ratio result from the last test is AND it exceeds the last Filtered ratio by	>= 0.50 >=0.50		
					Once triggered, the filtered ratio is reset to:	0.00		
					Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to:	0.00		
					No Fault Active for:	MAP_SensorFA MAF_SensorFA ECT_Sensor_FA TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA EvapExcessPurgePsbl_FA CamSensorAnyLocationFA FuelTrimSystemB1_FA O2S_Bank_1_Sensor_1_FA O2S_Bank 1 Sensor 2_FA WRAF_Bank_1_FA		

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Barometric Pressure (BARO) Sensor Circuit Intermittent (applications with LIN MAF)	P2230	Detects a noisy or erratic signal in the barometric pressure (BARO) circuit by monitoring the BARO sensor and failing the diagnostic when the BARO signal has a noisier output than is expected. When the value of BARO in kilopascals (kPa) is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of BARO readings. The result of this summation is called a “string length”. Since the BARO signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic BARO signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current BARO reading - BARO reading from 25 milliseconds previous)	> 100 kPa 40 consecutive BARO readings	Diagnostic is Enabled LIN communications established with MAF		4 failures out of 5 samples Each sample takes 1.0 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Pumping Current Circuit/Open Bank 1 Sensor 1 (For use with WRAF& Gen IV ECM	P2237	This DTC determines if theB1S1 WRAF 02 Sensor Pump Current signal circuit is Open. When enabled, the diagnostic monitors the failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The diagnostic failure counter is incremented based on the fault bit message received from the ASIC. The DTC is set based on fail and sample counters.	B1S1 WRAF ASIC indicates a Open circuit on the Pump Current circuit signal. Open fail counts are accumulated to determine fault status. Note: This ASIC is referred to asATIC142 (Continental).	The ASIC provides a fault indication when the pumping current circuit pin is open, or pump cell voltage is > 1,2V and reference cell voltage is < 1,2V Note: the fault must exist for previous 2.5 seconds, it is split in two stages, a passive stage of 1.875 seconds and an active stage of 0.625 seconds.	Diagnostic is Enabled DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop *kickic'kicicic'k'kicicicic'icicic'kicicicickic'kic Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) *************************	WRAF_Bank_1_FA P0135, P0030, P0031, P0032 = Valid = Ready = True = Complete > 20.0 seconds	20 failures out of 24 samples Continuous in 25 milli - second loop	Type B, 2 Trips
			B1S1 WRAF ASIC indicates a Open circuit on the Pump Current circuit signal. Open fail counts are accumulated to determine fault status. This application uses the following type of WRAF sensor: For NGK_ZFAS_U2 For Bosch_LSU_4p9	The ASIC provides a fault indication when the pumping current circuit fails the following criteria; Based on the type of WRAF sensor used; CeWRSG_e_NGK_ZFAS_U2 element resistance > 400 ohms pump cell reference resistance > Nernst	Diagnostic is Enabled DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************* Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) *************************	WRAF_Bank_1_FA P0135, P0030, P0031, P0032 = Valid = Ready = True = Complete > 20.0 seconds	20 failures out of 24 samples Continuous in 25 milli - second loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Note: This ASIC is referred to as CJ136 (next Gen version of CJ135 from Bosch).	reference resistance Note: the faults must exist for more than 10 msec to qualify for a fail flag.				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Pumping Current Performance Bank 1 (For use with WRAF - non E80	P223C	This DTC determines if the WRAF 02 sensor pumping current has an incorrect or out of range value. This DTC will detect open circuit faults to the Pump current, Ref Cell voltage, Ref Ground circuits. When enabled, the diagnostic monitors the pumping current in three different fault regions during DFCO. The individual diagnostic failure counters are incremented based on the diagnostic results in each region. The DTC is set based on any of the three individual fail and sample counters.	Fault condition present when the pump current is in any of the fault regions when this test is enabled during DFCO.	The three pump current fault regions are: A) Pump current >5.00 ma B) Pump current < 0.30 ma and > -0.30 ma C) Pump current < -0.10 ma The three fault regions have individual X out of Y calibrations. When the X out of Y is reached in any region this DTC is set.	Diagnostic is Enabled DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) ************************** Test starts when time in DFCO Test stops when time in DFCO	 WRAF_Bank_1_FA P0135, P0030, P0031, P0032 = Valid = Ready = True = Complete > 20.0 seconds > 5.0 seconds > 10.0 seconds	Region A: 128 failures out of 160 samples OR Region B: 128 failures out of 160 samples OR Region C: 128 failures out of 160 samples Sample rate is 25 msec. Test enabled during DFCO.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Reference Resistance Out Of Range Bank 1	P223E	This DTC determines if the WRAF 02 sensor reference cell has an incorrect or out of range resistance value. This test compares the element's resistance (from the WRAF sensor Application-Specific Integrated Circuit (ASIC)) to the expected values for the enabled condition. The element temperature is directly related to the element resistance based on the released sensor element specifications. The diagnostic failure counter is incremented if the element temperature is outside the expected range. This DTC is set based on the fail and sample counters.	Measured Reference cell temperature	< 650 Deg C OR >1,000.0 Deg C	Diagnostic is Enabled DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then Delay after WRAF circuit diagnostic delay **************************	 WRAF_Bank_1_FA P0135, P0030, P0031, P0032 = Valid = Ready = True = Complete > 20.0 seconds	128 failures out of 160 samples Sample rate is 25 msec Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Reference Voltage Circuit/Open Bank 1 Sensor 1 (For use with WRAF& Gen IV ECM	P2243	This DTC determines if theB1S1 WRAF 02 Reference Voltage signal circuit is Open. When enabled, the diagnostic monitors the failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The diagnostic failure counter is incremented based on the fault bit message received from the ASIC. The DTC is set based on fail and sample counters.	B1S1 WRAF ASIC indicates a Open circuit on the Reference Voltage circuit signal. Open fail counts are accumulated to determine fault status. Note: This ASIC is referred to asATIC142 (Continental).	The ASIC provides a fault indication when the reference voltage circuit pin is open, or reference cell voltage is > 1,2V and pump cell voltage is < 1,2V Note: the fault must exist for previous 2.5 seconds, it is split in two stages, a passive stage of 1.875 seconds and an active stage of 0.625 seconds.	Diagnostic is Enabled DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete). **************************	WRAF_Bank_1_FA P0135, P0030, P0031, P0032 = Valid = Ready = True = Complete > 20.0 seconds	20 failures out of 24 samples Continuous in 25 milli - second loop	Type B, 2 Trips
			B1S1 WRAF ASIC indicates a Open circuit on the Reference Voltage circuit signal. Open fail counts are accumulated to determine fault status. Note: This ASIC is referred to as CJ136 (next Gen version of CJ135 from Bosch).	The ASIC provides a fault indication when the reference voltage circuit fails the following criteria; |Nernst signal - 0.45| >1.0 volts Note: the faults must exist for more than 10 msec to qualify for a fail flag.	DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete). **************************	WRAF_Bank_1_FA P0135, P0030, P0031, P0032 = Valid = Ready = True = Complete > 20.0 seconds	20 failures out of 24 samples Continuous in 25 milli - second loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Reference Ground Circuit/Open Bank 1 Sensor 1 (For use with WRAF& Gen IV ECM	P2251	This DTC determines if theB1S1 WRAF 02 Reference Ground signal circuit is Open. When enabled, the diagnostic monitors the failure counters it receives from the WRAF Application-Specific Integrated Circuit (ASIC). The diagnostic failure counter is incremented based on the fault bit message received from the ASIC. The DTC is set based on fail and sample counters.	B1S1 WRAF ASIC indicates a Open circuit on the Reference Ground circuit signal. Open fail counts are accumulated to determine fault status. Note: This ASIC is referred to asATIC142 (Continental).	The ASIC provides a fault indication when the reference ground circuit pin is open, or pump cell voltage is > 1,2V and reference cell voltage is > 1,2V Note: the fault must exist for previous 2.5 seconds, it is split in two stages, a passive stage of 1.875 seconds and an active stage of 0.625 seconds.	Diagnostic is Enabled DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) **************************	WRAF_Bank_1_FA P0135, P0030, P0031, P0032 = Valid = Ready = True = Complete > 20.0 seconds	20 failures out of 24 samples Continuous in 25 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			B1S1 WRAFASIC indicates a Open circuit on the Reference Ground circuit signal. Open fail counts are accumulated to determine fault status. Note: This ASIC is referred to as CJ136 (next Gen version of CJ135 from Bosch).	The ASIC provides a fault indication when the reference ground circuit fails the following criteria; CJ136 H/W detection Note: the faults must exist for more than 10 msec to qualify for a fail flag.	Diagnostic is Enabled DTC's Not active this key cycle Measure Valid status (ASIC) Controller status (ASIC) Engine Run or Auto stop ************************** Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete). **************************	 WRAF_Bank_1_FA P0135, P0030, P0031, P0032 = Valid = Ready = True = Complete > 20.0 seconds	20 failures out of 24 samples Continuous in 25 milli - second loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Turbo/Super Charger Bypass Valve - Mechanical Turbocharger with wastegate. Not supercharger with mechanical compressor	P2261	This DTC indicates the compressor recirculation valve being stuck closed. This diagnostic is active at coast down let off conditions, where an airflow pulsation criteria is used as basis of this diagnostic.	When measuring time accumulated air mass flow derivate boost pressure is high pass filtered with filter frequency ***************************** A failure is detected when Acc. Filtered Air Mass Flow or Acc.Der.Filtered boost pressure	< 1.00 Second, = 10.91 Hz ************************* >120.00 g/s >50,000.00 kPa/s	Diagnostic enabled ***************************** Engine speed ***************************** Bypass valve commanded open duty cycle For at least ***************************** Pressure ratio over the compressor relative limit Condition keep true for x seconds extra ***************************** Negative transient -> TRUE Relative boost and Pressure derivate Hysteresis negative transient -> FALSE Relative boost or Pressure derivate ***************************** No Active DTCs:	True ***************************** >= 1,200 rpm ***************************** >10.00% >= 0.30 s ***************************** > refer to **P00C4 P2261: Compressor Surge Line** in Supporting Tables 1.00 s ***************************** TRUE >=20.00 kPa <=-160.00 kPa/s < 0.00 kPa > 65.00 kPa/s ***************************** BSTR_b_TurboBypassCktFA BSTR_b_BoostSnsrFA MAF_SensorFA	4 Failed tests out of 5 tests 25ms/ sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Signal Stuck Lean Bank 1 Sensor 2	P2270	The P2270 diagnostic is the first in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor is stuck in a normal lean voltage range and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required rich voltage before the accumulated mass air flow threshold is reached.	Post 02 sensor signal AND The Accumulated mass airflow monitored during the Stuck Lean Voltage Test	< 850mvolts > 99 grams	Diagnostic is Enabled No Active DTCs B1S2 DTCs Not active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTK0 02S_Bank_ 2TFTK0 P013A, P013B, P013E, P013F, P2270 or P2271 >11.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "H02S Heater Resistance DTCs") = Not Valid, Green 02S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Pedal position	< 3.0 %		
					Engine Airflow	2.0 < gps < 20.0		
					Closed loop integral	0.80 < C/LInt < 1.08		
					Closed Loop Active	= TRUE (Please see **"Closed Loop Enable Clarification"** in Supporting Tables).		
					Evap	not in control of purge		
					Ethanol Estimation in Progress	= Not Active (Please see **"Ethanol Estimation in Progress"** in Supporting Tables).		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					Crankshaft Torque	<75.0Nm		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	> 60.0 sec		
					Transmission Temp	> -40.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Predicted Catalyst temp Fuel State	500 < °C < 800 = DFCO possible		
					All of the above met for at least 0.0 seconds, and then check the following Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled)	 1,100 < RPM < 3,000 1,000 < RPM < 3,100 34.2 < MPH < 80.8 31.1 < MPH < 87.0		
					All of the above met for at least 1.0 seconds, and then the Force Cat Rich intrusive stage is requested.			
					During Stuck Lean test the following must stay TRUE or the test will abort: Commanded Fuel Crankshaft Torque	 0.95 < EQR < 1.10 < 60.0 Nm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	The P2271 diagnostic is the fourth in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary 02 sensor is stuck in a normal rich voltage range and thereby can no longer be used for secondary 02 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary 02 sensor does not achieve the required lean voltage before the accumulated mass air flow threshold is reached.	Post 02 sensor signal AND The Accumulated mass airflow monitored during the Stuck Rich Voltage Test	> 100 mvolts >25.0 grams	Diagnostic is Enabled No Active DTCs B1S2 DTCs Not Active this key cycle System Voltage Learned heater resistance Green 02S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTKO 02S_Bank_ 2TFTKO P013A, P013B, P013E, P013F or P2270 >11.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Barometric Pressure Sensor C Circuit Intermittent/ Erratic	P227E	Detects a noisy or erratic signal in the barometric pressure (BARO) C circuit by monitoring the BARO C sensor and failing the diagnostic when the BARO C signal has a noisier output than is expected. When the value of BARO C in kilopascals (kPa) is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of BARO C readings. The result of this summation is called a “string length”. Since the BARO C signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic BARO C signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current BARO C reading - BARO C reading from 25 milliseconds previous)	> 100 kPa 40 consecutive BARO C readings	Diagnostic is Enabled LIN communications established with MAF		4 failures out of 5 samples Each sample takes 1.0 seconds	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	>=70.0 KPA >=-20.0 degC -12 <=Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
SIDI High Pressure Pump Performance	P228D	This DTC determines if the high pressure pump is delivering high pressure that desired pressure. The fault is set if the measured fuel rail pressure is higher than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	<= **P228D P2C20 - High Pressure Pump Control (HPC) fail threshold for pressure too high** Mpa (see supporting tables)	High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP orTFTKO)and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IATJAT2.ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement	True >= 11 Volts >0.275 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking	Negative Pressure Error - 10.00 second failures out of 12.50 second samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	 >= 70.0 KPA : -20.0 DegC -12 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #1 CIRCUIT LOW	P2300	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 < 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #1 CIRCUIT High	P2301	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Power fault. Controller specific output driver circuit diagnoses the low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #2 CIRCUIT Low	P2303	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #2 CIRCUIT High	P2304	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #3 CIRCUIT Low	P2306	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #3 CIRCUIT High	P2307	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 < 100 Q impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #4 CIRCUIT Low	P2309	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
IGNITION CONTROL #4 CIRCUIT High	P2310	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 < 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	20 Failures out of 25 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Control Torque Request Circuit	P2544	Determines if the torque request from the TCM is valid	Protect error - Serial Communication message 2's complement not equal ($189/$199) OR Rolling count error - Serial Communication message ($189/$199) rolling count index value OR Range Error - Serial Communication message - ($189/$199) TCM Requested Torque Increase OR Multi-transition error - Trans torque intervention type request change	Message <> two's complement of message Message <> previous message rolling count value + one > 350 Nm Requested torque intervention type toggles from not increasing request to increasing request	Diagnostic Status Power Mode Ignition Voltage Engine Running Run/Crank Active No Serial communication loss to TCM (U0101)	Enabled = Run >6.41 volts = True > 0.50 Sec No loss of communication	>=16 failures out of 20 samples. Performed on every received message >= 6 Rolling count errors out of 10 samples. Performed on every received message >=6 range errors out of 10 samples. Performed on every received message >=5 multi-transitions out of 5 samples. Performed every 200 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Hood Switch Performance	P257D	This DTC monitors the hood switch rationality	Hood Switch position is in an invalid position. The hood switch reading is invalid in these ranges. Hood Switch Type: CeVIOS_e_GlobalA If Hood Switch type is CeVIOS_e_GlobalA If Hood Switch type is CeVIOS_e_GlobalB	43.4% to 45.7% 59.34% to 66.96%	The diagnostic is enabled Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable	Enabled Use Run/Crank as Enable	80 failed samples within 100 total samples Diagnostic runs in the 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Hood Switch Short to Ground / Low Voltage	P257E	This DTC monitors the hood switch for a short to ground or low voltage condition	Hood Switch position reading is lower than an expected bounds for The hood switch reading is lower than expected bounds at: Hood Switch Type: CeVIOS_e_GlobalA If Hood Switch type is CeVIOS_e_GlobalA If Hood Switch type is CeVIOS_e_GlobalB	< 17.2% < 28.54%	The diagnostic is enabled Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable	Enabled Use Run/Crank as Enable	80 failed samples within 100 total samples Diagnostic runs in the 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Hood Switch Short to Voltage / High Voltage	P257F	This DTC monitors the hood switch for a short to voltage or high voltage condition	Hood Switch position reading is higher than an expected bounds for The hood switch reading is higher than expected bounds at: Hood Switch Type: CeVIOS_e_GlobalA If Hood Switch type is CeVIOS_e_GlobalA If Hood Switch type is CeVIOS_e_GlobalB	 > 67.8% > 85.2%	The diagnostic is enabled Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable	Enabled Use Run/Crank as Enable	80 failed samples within 100 total samples Diagnostic runs in the 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
02 Sensor Pumping Current Trim Circuit/Open Bank 1 Sensor 1 (For use with WRAF& E81 or GenIV ECM	P2626	This DTC determines if the WRAF 02S trim circuit is open. The trim circuit fine tunes the WRAF 02S pump current signal. The diagnostic is an Application-Specific Integrated Circuit (ASIC) intrusive test which runs when the Run/Crank signal changes from False to True. The diagnostic failure counter is incremented if the ASIC test fails and the enable conditions are met. This DTC is set based on the fail and sample counters.	B1S1 Trim circuit Open test. This application uses the following type of WRAF sensor: The ASIC Open trim test detects a fault if the trim circuit resistance is: For NGK_ZFAS_U2 For Bosch_LSU_4p9 Note: This ASIC is referred to asATIC142 (Continental).	CeWRSG_e_NGK_ZFAS_U2 > 4,644 ohms > 379.5 ohms	Diagnostic is Enabled DTC's Not active this key cycle Run/Crank Signal WRAF circuit diagnostic delay (since heater Warm-up delay is complete) Fuel Control State Off Stoich Closed Loop DFCO WRAF Pump current	WRAF_Bank_1_FA P0135, P0030, P0031, P0032 changes from false to true > 20.0 seconds = Closed Loop = Not active = Not active < 1.0 ma	1 fail counts out of 1 samples 25 ms / sample Continuous	Type B, 2 Trips
			B1S1 Trim circuit Open test. This application uses the following type of WRAF sensor: The ASIC Open trim test detects a fault if the trim circuit resistance is: For NGK_ZFAS_U2 For Bosch_LSU_4p9	CeWRSG_e_NGK_ZFAS_U2 < 118 ohms or > 4K ohms <30 ohms or >300 ohms AND	Diagnostic is Enabled DTC's Not active this key cycle Run/Crank Signal WRAF circuit diagnostic delay (since heater Warm-up delay is complete) Fuel Control State Off Stoich Closed Loop DFCO WRAF Pump current	WRAF_Bank_1_FA P0135, P0030, P0031, P0032 changes from false to true > 20.0 seconds = Closed Loop = Not active = Not active	1 fail counts out of 1 samples 25 ms / sample Continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Note: This ASIC is referred to as CJ136 (next Gen version of CJ135 from Bosch).	Pump current circuit not detected open		< 1.0 ma		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Power Off Timer Performance	P262B	This DTC determines if the hardware timer does not initialize or count properly. There are two tests to ensure proper functioning of the timer: Count Up Test (CUT) and Range Test (RaTe). Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment. Range Test (RaTe): When the run/crank is not active both the hardware and mirror timers are started. The timers are compared when module shutdown is initiated or run/crank becomes active.	Count Up Test: Time difference between the current read and the previous read of the timer Range Test: The variation of the HWIO timer and mirror timer is	> 1.50 seconds > 0.25%.			Count Up Test: 4 failures out of 20 samples 1 sec / sample Continuous while run/crank is not active and until controller shutdown is initiated. Range Test: Once per trip when controller shutdown is initiated or run/ crank becomes active.	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Fault Active [DTCP12A6]			
					c11) Fuel Pump Driver Module OverTemp Fault Active [DTC P1255]	c11)<> TRUE		
					c12) Fuel Pump Speed Fault Active [DTCP129F]	c12) <> TRUE		
					c13) CAN Sensor Bus message $0C3 Comm Fault [CFMR_b_FTZM_lnfo1_UcodeCmFADTC P165C]	c13) <> TRUE		
					c14) CAN Sensor Bus Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_UcodeCmFA DTC]	c14] <> TRUE		
					c15) Sensor Configuration [FDBR_e_FuelPresSnsrConfig]	c15) == CeFDBR_e_WiredTo_ECM		
					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) 9.00 volts <= Run_Crank_V <= 32.00 volts		
					h) High Pres Fuel Pump	h) <> TRUE		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Bypass Valve C Control Circuit/Open	P26B7	Controller specific output driver circuit detects an open circuit in the load circuit for the Engine Coolant Bypass Valve C when the H-Bridge is energized.	Driver reports an open control cirucit condition	= TRUE	Diagnostic is Enabled Run Crank Ignition in Range Engine not cranking Engine Diag System Driver control circuit open status is not	 = True = True = Enabled = Indeterminate	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Bypass Valve C Range/ Performance	P26BB	This DTC will detect when the valve cannot achieve the desired position within a calibrated threshold (degrees (angle)) after the Target position has stabilized for a calibratable amount of time or is moving slower than a calibratable rate. A failure of this diagnostic would indicate a slow or stuck part.	Absolute position deviation between target and actual	> 12.0 Degrees	Diagnostic is Enabled No DTCs Closed Loop position control Soft Closing function Soft Opening function Valve anti-sticking routine Engine Diag System Engine not cranking Run Crank Ignition in Range Engine Outlet Coolant OR OBD Coolant Enable Criteria	 VECR_MRV_LoC_FA VECR_MRV_PstnSnsrCkt_FA VECR_MRV_PstnSnsrCkt_TFTKO VECR-M RV_Pstn Perf_FA = Active = Inactive = Inactive = Inactive = Enabled = True = True >-20.0 °C = TRUE	8 seconds out of a 10 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Block Coolant Valve Stuck Open	P26C0	This diagnostic detects the performance of the Block Rotary Valve, bounded by the two mechanical endstops. It monitors the difference between raw position feedback and position request. If the enable criteria are met and the position difference exceeds the failed threshold and the raw position feedback reports a value that is above the calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a Fail, and if not it will report a Pass. The diagnostic will continue to report as long as the enablement criteria are met.	Absolute value of the position difference between position request and position feedback AND Coolant Valve Position Feedback	>= 5.00° >= 50.00°	Diagnostic is Enabled The following shall be satisfied for [12V System Voltage VECR_BRV_Pstn Fdbk_Av, VECR_BRV_PstnFdbk_Fol, VECR_B RV_CktLo_F P, VECR_BRV_CktHi_FP VECR_B R V C k t L o F A, VECR_BRV_CktHi_FA PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On Coolant Valve Position Command If Use Engine Block Coolant Temperature is TRUE, then the following shall be used [Engine Block Coolant Enable Temperature] Coolant Valve Calibration	 >= 0.10 seconds >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active = No Fault Active = True = between -5.00 ^{0} and 115.00° = 1.00 >= -40.00 °C (hystersis disable <= -41.00 °C) Has not been triggered for	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Run**	greater than 37.00 seconds		
					Change in Two Consecutive Coolant Valve Position Command]	<= 5.00 ° for more than 3.00 seconds		
					** Calibration run is a set of pre-defined valve movements for calibrating the position sensor and learning the position of the endstops.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Block Coolant Valve Stuck Closed	P26C2	This diagnostic detects the performance of the Block Rotary Valve, bounded by the two mechanical endstops. It monitors the difference between raw position feedback and position request. If the enable criteria are met and the position difference exceeds the failed threshold and the raw position feedback reports a value that is below the calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a Fail, and if not it will report a Pass. The diagnostic will continue to report as long as the enablement criteria are met.	Absolute value of the position difference between position request and position feedback AND Coolant Valve Position Feedback	>= 5.00° < 50.00°	Diagnostic is Enabled The following shall be satisfied for [12V System Voltage VECR_BRV_Pstn Fdbk_Av VECR_BRV_PstnFdbk_Fol VECR_B RV_CktLo_F P, VECR_BRV_CktHi_FP VECR_B R V C k t L o F A, VECR_BRV_CktHi_FA PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On Coolant Valve Position Command If Use Engine Block Coolant Temperature is TRUE, then the following shall be used [Engine Block Coolant Enable Temperature] Coolant Valve Calibration	 >= 0.10 seconds >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active = No Fault Active = True = between -5.00 ^{0} and 115.00° = 1.00 >= -40.00 °C (hystersis disable <= -41.00 °C)	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Run** Change in Two Consecutive Coolant Valve Position Command] ** Calibration run is a set of pre-defined valve movements for calibrating the position sensor and learning the position of the endstops.	Has not been triggered for greater than 37.00 seconds <= 5.00 ° for more than 3.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump Overspeed	P26CE	The purpose of the performance diagnostic is to detect and report a failure of the component. If the enable criteria are met, the difference between the commanded speed and the component actual speed is calculated. An overspeed condition is when the commanded speed is less than the component actual speed. The speed difference is filtered and when the difference is less than the overspeed calibrated fault threshold, the diagnostic reports a FAIL. If filtered speed difference does not exceed the overspeed calibrated fault threshold, the diagnostic reports a PASS. The diagnostic will continue to report as long as the enablement criteria are met. There are two different failure criteria as the pump feedback speed is dependent on the system voltage.	Any of the following fail criteria is met: **Criterial:** Filtered (Pump Command Speed - Pump Feedback Speed) 12V System Voltage **Criteria 2:** Filtered (Pump Command Speed - Pump Feedback Speed) 12V System Voltage	**< P26CE Pump Overspeed Fail Threshold** >= -9,999.00 V **< P26CE Pump Overspeed Fail Threshold Low Voltage** < -9,999.00 V	Diagnostic is Enabled Difference in Pump Command Speed from previous data sample to present data sample Any of the following criteria is met: **Criteria 1:** Calibration to use fault pending is TRUE PECR_EMP_SpeedOORL_FP PECR_EMP_SpeedOORH_FP **Criteria 2:** Calibration to use fault pending is FALSE If either condition is achieved PECR_EMP_SpeedOORL_FA AND PECR_EMP_SpeedOORL-TFTKO OR PECR_EMP_SpeedOORH_FA AND PECR_EMP_SpeedOORH_TFTKO	< 50.00 RPM for >= 3.00 s = 1.00(1 is TRUE) = Not Active = 1.00 (0 is FALSE) = Not Active = Not Active	8 seconds out of a 10 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					PECR_MainCoolPmpSpdAct_Av PECR_MainCoolPmpSpdAct_Fol Either of the following criteria is met: **Criteria 1:** Engine inlet coolant temperature check calibration is TRUE **Criteria 2:** a) EECR EngineInlet FA b) Engine Inlet Coolant Temperature All of the following criteria are met for 12V System Voltage Pump Command Speed Pump Enable	= Not Active = 0 (1 is TRUE) = Not Active >= -40.00 °C **P2B85 26CE Pump Speed Performance > Initialization Delay** > 11.00 V (with hysteresis disable <10.00 V) >= 300.00 RPM = True		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Starter Relay Drive Pinion Circuit Open (12VSS)	P26E4	Controller specific output driver circuit diagnoses the Tandem Starter Pinion Relay high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground.	Starter relay pinion diag enable Engine speed Run Crank voltage	Enabled >=0.00RPM >= 11.00 volts	40 failures out of 50 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Starter Relay Drive Pinion Circuit Low Voltage (12VSS)	P26E5	Controller specific output driver circuit diagnoses the Tandem Starter Pinion Relay high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 0.5 Ohms impedance between signal and controller ground	Starter control diag enable Engine speed Run Crank voltage	Enabled >=0.00RPM >= 6.41 volts	8 failures out of 10 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Starter Relay Drive Pinion Circuit High Voltage (12VSS)	P26E6	Controller specific output driver circuit diagnoses the Tandem Starter Pinion Relay high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 0.5 Ohms impedance between signal and controller power	Starter control diag enable Engine speed Run Crank voltage	Enabled >=0.00RPM >= 11.00 volts	40 failures out of 50 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Range Sensor B Circuit Low	P2802	Controller specific PWM circuit diagnoses the internal range sensor (IRS) B for a short to ground failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates short to ground failure Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to ground	< 0.5 0 impedance between signal and controller ground	diagnostic monitor enable battery voltage update battery voltage timer PWM % duty cycle when voltage directly proportional OR PWM % duty cycle when voltage inversly proportional circuit sensor type	= 1 Boolean > 9.00 volts < 8.79 % > 8.79 % CeTRGD_e_VoltDirctProP	fail time > 0.50 seconds out of sample time > 1.00 seconds battery voltage timer > 1.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Range Sensor B Circuit High	P2803	Controller specific PWM circuit diagnoses the internal range sensor (IRS) B for a power short or open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit or power short failure Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit or power short	< 0.5 0 impedance between signal and controller voltage source OR > 200 K Q impedance between signal and controller ground	diagnostic monitor enable battery voltage update battery voltage timer PWM % duty cycle when voltage directly proportional OR PWM % duty cycle when voltage inversly proportional circuit sensor type	= 1 Boolean > 9.00 volts > 91.21 % < 91.21 % CeTRGD_e_VoltDirctProP	fail time > 0.50 seconds out of sample time > 1.00 seconds battery voltage timer > 1.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Wastegate Position Sensor "A" Circuit Low	P2AB8	Detects a continuous or intermittent short low or open in eWG position circuit by monitoring the eWG position sensor percent Vref and failing the diagnostic when the eWG percent Vref is too low. This diagnostic only runs when powertrain relay voltage is high enough. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	Raw position value	<1.0%	Diagnostic enabled Powertrain relay voltage Engine does not crank Diagnostic system not disabled	True >= 11.0 Volts	10 failures out of 12 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Wastegate Position Sensor "A" Circuit High	P2AB9	Detects a continuous or intermittent short high in eWG position circuit by monitoring the eWG position sensor percent Vref and failing the diagnostic when the eWG percent Vref is too high. This diagnostic only runs when powertrain relay voltage is high enough. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	Raw position value	> 99.0 %	Diagnostic enabled ***************************** Powertrain relay voltage ***************************** Engine does not crank Diagnostic system not disabled	True ***************************** >= 11.0 Volts *****************************	10 failures out of 12 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 4 Circuit Low	P2AFE	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr4 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 55.0 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 55.0 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 55.0 Ohms Temp Sensor 7: 55.0 Ohms	Diagnostic is Enabled		5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 4 Circuit High	P2AFF	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolantTempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6	> X Ohms X is equal to: Temp Sensor 1: 174,069 Ohms Temp Sensor 2: 174,069 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 174,069 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 174,069 Ohms Temp Sensor 7: 174,069 Ohms	Diagnostic is Enabled Engine run time OR IAT min	 > 10.0 seconds > -20.0 °C	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 1 Injection Pulse Performance	P2B00	Diagnostic to determine if any of the commanded injection pulses for cylinder 1 was not delivered due to the injector pintle/ armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 2 Injection Pulse Performance	P2B01	Diagnostic to determine if any of the commanded injection pulses for cylinder 2 was not delivered due to the injector pintle/ armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 3 Injection Pulse Performance	P2B02	Diagnostic to determine if any of the commanded injection pulses for cylinder 3 was not delivered due to the injector pintle/ armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cylinder 4 Injection Pulse Performance	P2B03	Diagnostic to determine if any of the commanded injection pulses for cylinder 4 was not delivered due to the injector pintle/ armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cold Start Cylinder 1 Injection Pulse Performance	P2B08	Diagnostic to determine if any of the commanded injection pulses for cylinder 1 during catalyst warm up was not delivered due to the injector pintle/armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/ armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Catalyst Warm up enabled (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True = True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cold Start Cylinder 2 Injection Pulse Performance	P2B09	Diagnostic to determine if any of the commanded injection pulses for cylinder 2 during catalyst warm up was not delivered due to the injector pintle/armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/ armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Catalyst Warm up enabled (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True = True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cold Start Cylinder 3 Injection Pulse Performance	P2B0A	Diagnostic to determine if any of the commanded injection pulses for cylinder 3 during catalyst warm up was not delivered due to the injector pintle/armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/ armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Catalyst Warm up enabled (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True = True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cold Start Cylinder 4 Injection Pulse Performance	P2B0B	Diagnostic to determine if any of the commanded injection pulses for cylinder 4 during catalyst warm up was not delivered due to the injector pintle/armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/ armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Catalyst Warm up enabled (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True = True	50.00 to 100.00 samples Continuous Cylinder event sample rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 5 Circuit Low	P2B2D	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr5 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 55.0 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 55.0 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 55.0 Ohms Temp Sensor 7: 55.0 Ohms	Diagnostic is Enabled		5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 5 Circuit High	P2B2E	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	> X Ohms X is equal to: Temp Sensor 1: 174,069 Ohms Temp Sensor 2: 174,069 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 174,069 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 174,069 Ohms Temp Sensor 7: 174,069 Ohms	Diagnostic is Enabled Engine run time OR IAT min	 > 10.0 seconds > -20.0 °C	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 2 Control Circuit Open	P2B33	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 2 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 2 Control Circuit Low Voltage	P2B34	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 2 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 2 Control Circuit High Voltage	P2B35	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 2 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 2 Circuit Open	P2B39	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 2 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 2 Circuit Low Voltage	P2B3A	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 2solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 2 Circuit High Voltage	P2B3B	Controller specific output driver circuit diagnoses the Exhasut Camshaft Profile Actuator 2 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 2 Performance	P2B4F	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 2	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled System voltage Engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 2 Performance	P2B51	An unintended pin firing without controller command. Exhaust Camshaft Profile Actuator 2	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled System voltage Engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 2 Pin Stuck	P2B53	Monitors Sliding Cam Actuator Hall Sensor Feedback looking for an extended pin when it should have been returned and be reporting above the "RETRACTED" threshold. Monitors Intake Camshaft Profile Actuator 2 for a pin stuck out condition.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00) If EXTENDING and or EXTENDED have been obtained but RETRACTED is not obtained before the end of the engine cycle, Pin Stuck out is reported.	Feed back has reported below EXTENDING 55.00 and or below EXTENDED 45.00 , but has not reported above RETRACTED by the end of the engine cycle the fault is reported 68.00 ,	Diagnostic is Enabled System voltage Engine running	 > 11.00 Volts = TRUE	1.00 failure report out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Wastegate Position Sensor “A” Circuit Performance	P2B81	Detects a performance failure on the electronic wastegate acutuator system The diagnose will fail if at least one of supervision fails. * Position deviation supervision * Actuator current supervision * Actuator Duty Cycle supervision In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	Actuator is in Normal operation Abs(Position Error) for at least	>10.0% >2.0 sec	Diagnostic enabled Engine not in crank mode Engiene is not in cold start conditions Diagnostic system not disabled Device control Component test not active	True	29 failures out of 30 samples 100ms / sample	Type A, 1 Trips
			Abs(Actuator current) for at least	>1.0A > 1.0 sec	Diagnostic enabled Engine not in crank mode Engiene is not in cold start conditions Diagnostic system not disabled Device control Component test not active	True	29 failures out of 30 samples 100ms / sample	
			Abs(Actuator DC) for at least	>40.0% DC > 1.0 sec	Diagnostic enabled Engine not in crank mode Engiene is not in cold start conditions Diagnostic system not disabled Device control Component test not active	True	29 failures out of 30 samples 100ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump Underspeed	P2B85	The purpose of the performance diagnostic is to detect and report a failure of the component. If the enable criteria are met, the difference between the commanded speed and the component actual speed is calculated. An underspeed condition is when the commanded speed is greater than the component actual speed. The speed difference is filtered and when the difference is greater than the underspeed calibrated fault threshold, the diagnostic reports a FAIL. If filtered speed difference does not exceed the underspeed calibrated fault threshold, the diagnostic reports a PASS. The diagnostic will continue to report as long as the enablement criteria are met. There are two different failure criteria as the pump feedback speed is dependent on the system voltage.	Any of the following fail criteria is met:		Diagnostic is Enabled		8 seconds out of a 10 seconds window	Type A, 1 Trips
			Criteria1:					
			Filtered (Pump Command Speed - Pump Feedback Speed)	> **P2B85 Pump Underspeed Fail Threshold**	Difference in Pump Command Speed from previous data sample to present data sample	< 50.00 RPM for >= 3.00 s		
			12V System Voltage	>= -9,999.00 V	=================			
					Any of the following criteria is met:			
			Criteria 2:		**Criteria 1:**			
			Filtered (Pump Command Speed - Pump Feedback Speed)	> **P2B85 Pump Underspeed Fail Threshold Low Voltage**	Calibration to use fault pending is TRUE	= 1.00(1 is TRUE)		
			12V System Voltage	< -9,999.00 V	PECR_EMP_SpeedOORL_FP PECR_EMP_SpeedOORH_FP	= Not Active		
					Criteria 2: Calibration to use fault pending is FALSE	= 1.00 (0 is FALSE)		
					If either condition is achieved			
					PECR_EMP_SpeedOORL_FA AND PECR_EMP_SpeedOORL_TFTKO	= Not Active		
					OR			
					PECR_EMP_SpeedOORH_FA AND PECR_EMP_SpeedOORH_TFTKO	= Not Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					================== PECR_MainCoolPmpSpdAct_Av PECR_MainCoolPmpSpdAct_Fol Either of the following criteria is met: **Criteria 1:** Engine inlet coolant temperature check calibration is TRUE **Criteria 2:** a) EECR_EngineInlet_FA b) Engine Inlet Coolant Temperature All of the following criteria are met for 12V System Voltage Pump Command Speed Pump Enable	= Not Active = 0 (1 is TRUE) = Not Active >= -40.00 °C **P2B85 26CE Pump Speed Performance > Initialization Delay** > 11.00 V (with hysteresis disable < 10.00 V) >= 300.00 RPM = True		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Wastegate A Position Exceeded Learning Limit	P2B93	This DTC indicates a failure that the close position learning of the electronic waste gate 'A' was not successful. The learned raw close position was out of the boundaries. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	eWG raw position ***************************** OR ***************************** Never learned a valid Close Position and Engine speed	> 85.0 % ************************* ************************* = FALSE > 1000 rpm	Diagnostic enabled when electronic waste gate is present.	True	on event	Type A, 1 Trips
			eWG raw position and eWG Stable condition detected: Position deviation Stable Time	<50.0% < 1.00 % >0.10sec	Diagnostic enabled when electronic waste gate is present. ***************************** Coolant Temperature ***************************** No DTCs:	[illegible] [illegible] °C	on event	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cold Start Injection Pulse Performance	P2B95	Monitors injector pulses when the cold start emission reduction strategy is active by accumulating and determining the percentage of engine cycles that missed a pulse relative to the total number of pulses when multi pulse is active.	Injector voltage feedback is not able to detect an opening magnitude on any pulse for any cylinder Or Measured Voltage feedback converted to Injector Opening Magnitude on any pulse for any cylinder	=< **P2B96 - Opening Magnitude Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below) OBD Manufacturer Enable Counter To enable the diagnostic, the Cold Start Emission Reduction Strategy Must Be Active per the following: Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure In addition, Multi Pulse Strategy Is Enabled and Active Per the following: Engine Speed Accel Position Engine Run Time	= True = True = 0 < 400.00 degC > -12.00 degC <= 66.00 degC >= 72.00 KPa >= 450.00 RPM <= 2,800.00 RPM <= 35.00 Pct < 100 seconds	Runs once per trip when the cold start emission reduction strategy is active and Dual Pulse is enabled and active. Frequency: 100ms Test completes after Dual Pulse is no longer active OR The first 500 engine cycles have been reached	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:			
					Catalyst Temperature AND	>= 700.00 degC		
					Engine Run Time	>= 0.00 seconds		
					OR			
					Engine Run Time	> **P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit table is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details.		
					OR			
					Barometric Pressure	< 72.00 KPa		
					Multi Pulse Strategy will exit per the following:			
					Engine Speed OR	> 3,000.00 RPM		
					Accel Position	> 40.00 Pct		
					Engine Run Time	>= 100 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Mulit Pulse Strategy will also exit if the any of the "Additional Dual Pulse Enabling Criteria" is not satisfied:			
					"Additional Multi Pulse Enabling Criteria":			
					Green Engine Enrichment	Not Enabled		
					Misfire Converter Protection strategy	Not being requested		
					Engine Metal Overtemp strategy	Not being requested		
					Fuel control state	Open Loop		
					Output State Control	Not being requested for fuel		
					DOD Or DFCO	Not Active		
					Power Enrichment	Not Active		
					Dynamic Power Enrichment	Not Active		
					Piston Protection	Not Active		
					Hot Coolant Enrichment	Not Active		
					Injector Flow Test	Not Active		
					General Enable			
					DTC's Not Set:	AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFA CrankSensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA AnyCamPhaser_TFTKO ClutchPstnSnsr FA 1AC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA FuelInjectorCircuit TFTK 0 FHPR_b_FRP_SnsrCkt_F A FHPR_b_FRP_SnsrCkt_T FTKO FHPR_b_PumpCkt_FA FHPR b PumpCkt TFTK 0 TransmissionEngagedStat e_FA EngineTorqueEstInaccura te FuelPumpRlyCktFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injection Pulse Performance Global missing pulse diags	P2B96	Diagnostic to determine if any of the commanded injection pulses for any of the cylinders was not delivered due to the injector pintle/armature not moving (total engine based). The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude on any pulse for any cylinder Or Measured Voltage feedback converted to Injector Opening Magnitude on any pulse for any cylinder	=< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit** => **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude 2 Misisng Pulse Fail Limit** =< **P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude 2 Delta Misisng Pulse Fail Limit** (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below) Above Engine Temperature	= True = True >--30.00 0	100.00 Frequency: 100ms Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump Stuck/ Stalled	P2BA2	The purpose of the diagnostic is to detect and report a failure of the component. This diagnostic checks the commanded off state of the pump to ensure that it is not reporting an actual speed that would represent a commanded on state. If the enable criteria are met when the pump is commanded off, the actual speed is evaluated. If the actual speed is greater than the calibrated fault threshold, the diagnostic reports a FAIL. If the actual speed does not exceed the calibrated fault threshold, the diagnostic reports a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Pump Feedback Speed	>= 10.00 RPM	Diagnostic is Enabled 12V System Voltage PECR_MainCoolPmpSpdAct_Av PECR_MainCoolPmpSpdAct_Fol Any of the following criteria are met for a) Pump Enable b) Pump Command Speed in Range	 > 11.00 V (with hysteresis disable < 10.00 V) = Not Active >= 3.00 s = False 0.00 RPM to 4.00 RPM	8 seconds out of a 10 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Fuel Pump Secondary C ircuit Performance [FTZM Brushed Motor Fuel Pump applications only]	P2BB3	The FPDCM periodically monitors fuel pump duty cycle control error. The diagnostic detects whether the pump output duty cycle [measured] value differs too much compared to the received [commanded] Fuel Pump Control Duty Cycle.	Fuel Pump Duty Cycle Command [Measured]	<> Fuel Pump Duty Cycle Command [Received]	a) Ignition Switch Run_Crank Position Circuit Voltage b) Diagnostic enabled c) CAN serial data available [$0CB] d) CAN serial data faulted status [$0D9] e) Fuel pump control circuit faults [P0231, P0232, P023F] f) No fuel pump driver over-temperature fault [P1255] g) Sensor Bus Relay On h) Duty Cycle diagnostic synchronization delay time [expiration] j) Diagnostic System Disabled	a) > 9.00 volts b) == TRUE c) == TRUE d) <> True e) <> True f) <> True g) == TRUE h) > 100 milliseconds j) <> True	12.5 millisec/ sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 4 Circuit Intermittent/ Erratic	P2BB4	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature 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.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr4 Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolantTempSnsr4		Diagnostic is Enabled No Active DTC's	 EECR_TS4_Erratic_TFTK0 EECR_TS4_CktHiLo_FA	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6 The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 10.0 seconds -60.0 °C 150.0 °C 10.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 7.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the calculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. *****************************	 5.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 5 Circuit Intermittent/ Erratic	P2BB5	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature 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.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr5 Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolantTempSnsr4		Diagnostic is Enabled No Active DTC's	 EECR_TS5_Erratic_TFTK0 EECR_TS5_CktHiLo_FA	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6 The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 10.0 seconds -60.0 °C 150.0 °C 10.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 7.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the calculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. *****************************	 5.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 6 Circuit Low	P2BB8	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr6 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 55.0 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 55.0 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 55.0 Ohms Temp Sensor 7: 55.0 Ohms	Diagnostic is Enabled		5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 6 Circuit High	P2BB9	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr6	> X Ohms X is equal to: Temp Sensor 1: 174,069 Ohms Temp Sensor 2: 174,069 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 174,069 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 174,069 Ohms Temp Sensor 7: 174,069 Ohms	Diagnostic is Enabled Engine run time OR IAT min	 > 10.0 seconds > -20.0 °C	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Temperature Sensor 6 Circuit Intermittent/ Erratic	P2BBA	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature 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.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr6 Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsrl Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolantTempSnsr4		Diagnostic is Enabled No Active DTC's	 EECR_TS6_Erratic_TFTK0 EECR_TS6_CktHiLo_FA	5 seconds out of a 6 seconds window Continuously sampled	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6 The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 10.0 seconds -60.0 °C 150.0 °C 10.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 5.0 seconds -60.0 °C 150.0 °C 7.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the calculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. *****************************	 5.0 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor A Circuit Bank 1	P2C05	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor A driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor A Range/ Performance Bank 1	P2C06	Intake Hall Sensor 1 position feedback not matching expected	DTC detects shift Pin Position Hall feedback failures If Hall Feedback signal seen but no shift command was sent to actuator. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00)	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00,	Diagnostic is Enabled System Voltage Engine Running No active PCODES	 > 11.00 Volts = TRUE CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO	4.00 samples out of 5.00 reading	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor A Circuit Low Bank 1	P2C07	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor A solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor A Circuit High Bank 1	P2C08	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor A driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded off Ignition switch is in crank or run position	 > 11.00 Volts	4.00 fail reports out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor B Circuit Bank 1	P2C09	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor B driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor B Range/ Performance Bank 1	P2C0A	Intake Hall Sensor 2 position feedback not matching expected	DTC detects shift Pin Position Hall feedback failures If Hall Feedback signal seen but no shift command was sent to actuator. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00)	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	Diagnostic is Enabled System Voltage Engine Running No active P codes	> 11.00 Volts = TRUE CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO	4.00 samples out of 5.00 reading	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor B Circuit Low Bank 1	P2C0B	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor B solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor B Circuit High Bank 1	P2C0C	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor B driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded off Ignition switch is in crank or run position	 > 11.00 Volts	4.00 fail reports out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor C Circuit Bank 1	P2C0D	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor C driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor C Range/ Performance Bank 1	P2C0E	Intake Hall Sensor 3 position feedback not matching expected	DTC detects shift Pin Position Hall feedback If Hall Feedback signal seen but no shift command was sent to actuator. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00)	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	Diagnostic is Enabled System Voltage Engine Running No Active P codes	> 11.00 Volts = TRUE CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO	4.00 samples out of 5.00 reading	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor C Circuit Low Bank 1	P2C0F	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor C solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor C Circuit High Bank 1	P2C10	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor C driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded off Ignition switch is in crank or run position	 > 11.00 Volts	4.00 fail reports out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Actuator Position Sensor A Circuit Bank 1	P2C12	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator Position Sensor A driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Actuator Position Sensor A Range/ Performance Bank 1	P2C13	Exhaust Hall Sensor 1 position feedback not matching expected	DTC detects shift Pin Position Hall feedback If Hall Feedback signal seen but no shift command was sent to actuator. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00)	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	Diagnostic is Enabled System Voltage Engine Running No Active P Codes	 > 11.00 Volts = TRUE CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO	4.00 samples out of 5.00 reading	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Actuator Position Sensor A Circuit Low Bank 1	P2C14	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator Position Sensor A solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	1 > 11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Actuator Position Sensor A Circuit High Bank 1	P2C15	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator Position Sensor A driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded off Ignition switch is in crank or run position	 > 11.00 Volts	4.00 fail reports out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Actuator Position Sensor B Circuit Bank 1	P2C16	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator Position Sensor B driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Actuator Position Sensor B Range/ Performance Bank 1	P2C17	Exhaust Hall Sensor 2 position feedback not matching expected	DTC detects shift Pin Position Hall feedback failures If Hall Feedback signal seen but no shift command was sent to actuator. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00)	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	Diagnostic is Enabled System Voltage Engine Running No Active P Codes	 > 11.00 Volts = TRUE CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO	4.00 samples out of 5.00 reading	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Actuator Position Sensor B Circuit Low Bank 1	P2C18	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator Position Sensor B solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Actuator Position Sensor B Circuit High Bank 1	P2C19	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator Position Sensor B driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded off Ignition switch is in crank or run position	 > 11.00 Volts	4.00 fail reports out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module SIDI High Pressure Pump min/ max authority During Catalyst Warm Up	P2C1E	This DTC determines when the high pressure pump control has reached to its max or min authority during Cataylst Warm up	High Pressure Fuel Pump Delivery Angle OR High Pressure Fuel Pump Delivery Angle	>= 92° <= 0°	Catalyst Warm Up High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Barometric Pressure Inlet Air Temp Fuel Temp Catalyst Warm up enabled (See Definition in Supporting Material below) Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP orTFTKO)and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or	True >=11 Volts > 0.275 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking >= 70.0 KPA >= -20.0 degC -12<=Temp degC <= 132 = True	Windup High/ Low 10.00 seconds failures out of 12.50 Seconds samples	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active			

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	 >=70.0 KPA >=-20.0 degC -12<=Temp degC <= 132		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	 >= 70.0 KPA >= -20.0 DegC -12 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Oil Temperature Sensor A/B Correlation	P2C21	Determines if one of the redundant oil temperature sensors is biased or stuck in range. Three independent tests can be used.1) Cold Start Test Compares EOT to ECT and IAT at powerup after a long soak (Fast and regular tests). 2) Warm Up Test Compares EOT to a target EOT after a large enough accumulated airflow has occurred. 3) Continuous Test Compares Sensor A to Sensor B.	**Fast Cold Start Test** To indicate an fast fail: Absolute value of Powerup EOT - Powerup ECT AND Absolute value of Powerup IAT - Powerup ECT To indicate a fast pass: Absolute value of Powerup EOT - Powerup ECT AND Absolute value of Powerup EOT - Powerup IAT	EOT Temp Diff > **FastFailTempDiff** (See P0196 details on Supporting Tables Tab) AND < 16 degrees C < 16 degrees C AND < 16 degrees C	EOT Diagnostic main Status AND Engine Running Cold Start Specific EOT Test Conditions: Use Cold Start Diagnostic Engine Off Time Engine Off Timer Validity No active DTC's	Enabled = True Enabled > 540 Seconds = True Fault bundles: IgnitionOffTimer_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuit FA	Cold Start Fast Test - one failure out of one sample - test performed once per second	Type B, 2 Trips
			Cold Start Test Pass Condition 1: Absolute value of Powerup EOT - Powerup ECT AND Absolute value of Powerup EOT - minIAT OR Pass Condition 2: Absolute value of Powerup EOT - Powerup ECT	<= 16 Deg C <= 16 Deg C OR > 16 Deg C	All three tests (Cold/ Warm/Continuous) EOT Diagnostic main enable AND Engine Running Cold Start Specific EOT Test Conditions: Use Cold Start Diagnostic Engine Off Time Engine Off Timer Validity	Enabled = True Enabled > 540 Seconds = True	Cold Start Regular Test - one failure out of one sample - test performed once per second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			AND (IAT minimum observed with Block Heater or (IAT minimum observed and Absolute value of power up IAT - min. observed IAT)) AND Absolute value of Powerup EOT - Powerup IAT AND Absolute value of Powerup EOT - minIAT Fail Condition: Absolute value of Powerup EOT - Powerup ECT AND (IAT minimum observed with Block Heater or (IAT minimum observed and Absolute value of power up IAT - min. observed IAT)) AND (Absolute value of Powerup EOT - Powerup IAT or Absolute value of Powerup EOT - minIAT) AND Absolute value of Powerup ECT - Powerup IAT	AND > -9 Deg C > -10 Deg C <= 5 Deg C AND <= 16 Deg C <= 16 Deg C > 16 Deg C AND > -9 Deg C > -10 Deg C <= 5 Deg C AND > 16 Deg C > 16 Deg C AND <= 16 Deg C	Time above Minimum Vehicle Speed Time less than Vehicle speed resets above timer No active DTC's	> 9 MPH for > 400 seconds < 15.0 for > 20.0 seconds Fault bundles: IgnitionOflTimer_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuit FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			AND Absolute value of Powerup ECT - minIAT	AND <= 16 Deg C				
			Warmup Test Warm Up Fail Condition: EOT Warm Up Test Pass Condition: EOT	 < 70 Deg C => 70 Deg C	EOT Diagnostic main enable Engine Running Warm Up EOT Test Specific Conditions: Use Warm Up EOT Diagnostic Power up ECT Power up ECT Total accumulated engine airflow since engine start DISABLE CONDITIONS (for all three tests)No active DTC's	Enabled = True Disabled > 200 degrees C < 200 degrees C >= **P0196_TotalAccumulatedFlow** (See P0196 details on Supporting Tables Tab) Fault bundles: IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuitFA	Warm up Tests - one failure out of one sample - test performed once per second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Continuous Test Pass Condition: (Measured Oil Temperature A - Measured Oil Temperature B) OR Absolute value of (Measured Oil Temperature A - Measured Oil Temperature B) Fail Condition: (Measured Oil Temperature A - Measured Oil Temperature B) AND Absolute value of (Measured Oil Temperature A - Measured Oil Temperature B)	>= 0 and <= 15.8 OR >= 0 and <= 15.8 > 15.8 AND > 15.8	Redundant Sensor Enable EOT Diagnostic main Enable Engine Running Continuous EOT Test Specific Conditions: Power up ECT and ECT All of three criteria above AND EOT Model Oil Temperature reach Equilibrium OR Use quick transition to equilibrium state and ECT DISABLE CONDITIONS (for all three tests)No active DTC's	Enabled Enabled = True Enabled >= -9 and <= 105 Deg C >= 45 and <= 105 Deg C >= 70 Deg C Enabled and >= ECT from 5 sec previous Fault bundles: IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuitFA IAT_SensorCircuitFA EngOilModeledTempValid	Continuous Test 8 failures out of 10 samples performed once per second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cold Start Wastegate Position Sensor A Circuit Performance	P2C9B	Detects a performance failure on the electronic wastegate acutuator system during engine cold start conditions The diagnose will fail if at least one of supervision fails. * Position deviation supervision * Actuator current supervision * Actuator Duty Cycle supervision In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	Actuator is in Normal operation Abs(Position Error) for at least	>10.0% >2.0 sec	Diagnostic enabled Engine not in crank mode Engine is in cold stard conditions Diagnostic system not disabled Device control Component test not active	True	29 failures out of 30 samples 100ms / sample	Type A, 1 Trips
			Abs(Actuator current) for at least	>1.0A > 1.0 sec	Diagnostic enabled Engine not in crank mode Engine is in cold stard conditions Diagnostic system not disabled Device control Component test not active	True	29 failures out of 30 samples 100ms / sample	
			Abs(Actuator DC) for at least	>40.0% DC > 1.0 sec	Diagnostic enabled Engine not in crank mode Engine is in cold stard conditions Diagnostic system not disabled Device control Component test not active	True	29 failures out of 30 samples 100ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Actuator Voltage Sensor Circuit 1 Low Voltage	P3051	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 1 for short to ground faults.	DC/DC Converter Actuator Voltage Raw Value 1	< 1 Volt	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Battery Voltage	1 0 TRUE TRUE FALSE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Actuator Voltage Sensor Circuit 2 Low Voltage	P3052	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 2 for short to ground faults.	DC/DC Converter Actuator Voltage Raw Value 2	< 1 Volt	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Battery Voltage	1 0 TRUE TRUE FALSE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Actuator Voltage Sensor Circuit 1 High Voltage	P3053	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 1 for short to battery faults.	DC/DC Converter Actuator Voltage Raw Value 1	> 28 Volt	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Battery Voltage	1 0 TRUE TRUE FALSE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Actuator Voltage Sensor Circuit 2 High Voltage	P3054	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 2 for short to battery faults.	DC/DC Converter Actuator Voltage Raw Value 2	> 28 Volt	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Battery Voltage	1 0 TRUE TRUE FALSE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Actuator Voltage 1 Performance	P3055	Detects DC/DC Converter Actuator Voltage 1 Performance issues	Bypass Mode: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 1 and ECM Run/Crank	> 1 Volt	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Engine running OR Engine stopped Battery Voltage	1 0 TRUE TRUE FALSE for > 160 loops in 6.25 ms loop for > 160 loops in 6.25 ms loop >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips
			Stabilize Mode- Auto-Cranking: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 1 and ECM Run/Crank	> 1 Volt	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Engine auto-cranking Battery Voltage	1 0 TRUE TRUE FALSE for > 0 loops in 6.25 ms loop >= 6.60 Volts	16 failed samples out of 32 samples in 6.25 ms loop	
			Stablize Mode-Auto-Cranking Events: Number of failed auto-cranking events exceeds threshold	> 2 failed auto-cranking events	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory)	1 0 TRUE	2 failed auto-crank events out of 3 consecutive auto-crank events	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Engine auto-cranking	 TRUE FALSE has occurred		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Actuator Voltage 2 Performance	P3056	Detects DC/DC Converter Actuator Voltage 2 Performance issues	Bypass Mode: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 2 and ECM Run/Crank	> 1 Volt	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Engine running OR Engine stopped Battery Voltage	1 0 TRUE TRUE FALSE for > 160 loops in 6.25 ms loop for > 160 loops in 6.25 ms loop >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips
			Stabilize Mode- Auto-Cranking: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 2 and ECM Run/Crank	> 1 Volt	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Engine auto-cranking Battery Voltage	1 0 TRUE TRUE FALSE for> 0 loops in 6.25 ms loop >= 6.60 Volts	16 failed samples out of 32 samples in 6.25 ms loop	
			Stablize Mode-Auto-Cranking Events: Number of failed auto-cranking events exceeds threshold	> 2 failed auto-cranking events	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory)	1 0 TRUE	2 failed auto-crank events out of 3 consecutive auto-crank events	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) Engine auto-cranking	 TRUE FALSE has occurred		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Ignition Switch Run/ Start Position Ciruit High Voltage	P305B	Diagnoses the DC/DC Converter Ignition Switch Run/Start Position circuit for circuit high faults	DC/DC Converter Ignition Switch Run/Start Position	<> ECM Ignition Switch Run/Start Position	Diagnostic enabled Run/Crank Accessory Battery Voltage	1 FALSE TRUE >= 6.60 Volts	320 failed samples out of 400 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Ignition Switch Run/ Start Position Ciruit Low Voltage	P305C	Diagnoses the DC/DC Converter Ignition Switch Run/Start Position circuit for circuit low faults	DC/DC Converter Ignition Switch Run/Start Position	<> ECM Ignition Switch Run/Start Position	Diagnostic enabled Run/Crank Accessory Battery Voltage	1 TRUE TRUE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Crank Control Circuit High Voltage	P305D	Diagnoses the DC/DC Converter Crank Control Circuit for circuit high faults	DC/DC Converter Crank Control	<> ECM Crank Control	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) ECM Crank Control Battery Voltage	1 0 TRUE TRUE FALSE FALSE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
DC/DC Converter Crank Control Circuit Low Voltage	P305E	Diagnoses the DC/DC Converter Crank Control Circuit for circuit low faults	DC/DC Converter Crank Control	<> ECM Crank Control	Diagnostic enabled If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active) ECM Crank Control Battery Voltage	1 0 TRUE TRUE FALSE TRUE >= 6.60 Volts	24 failed samples out of 32 samples in 6.25 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump Speed Out of Range Low	P3071	This diagnostic detects if the actual speed is out of range low. If the enable criteria are met and the actual speed is below a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Pump Feedback Speed	<= -10.00RPM	Diagnostic is Enabled All of the following criteria are met for 12V System Voltage PECR_MainCoolPmpSpdAct_Av PECR_MainCoolPmpSpdAct_Fol	 >= 3.00 s > 11.00 V (with hysteresis disable < 10.00 V) = Not Active	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump Speed Out of Range High	P3072	This diagnostic detects if the actual speed is out of range high. If the enable criteria are met and the actual speed is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Pump Feedback Speed	>= 6,280.00 RPM	Diagnostic is Enabled All of the following criteria are met for 12V System Voltage PECR_MainCoolPmpSpdAct_Av PECR_MainCoolPmpSpdAct_Fol	 >= 3.00 s > 11.00 V (with hysteresis disable < 10.00 V) = Not Active	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump Current Out of Range Low	P3073	This diagnostic detects if the actual motor current is out of range low. If the enable criteria are met and the actual current is below a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met. There are two different failure criteria depending on the pump commanded state (ON, OFF), however one time window is used to mature the diagnostic, and is not independent for each commanded state.	Pump Motor AC Current	< 0.00A	Diagnostic is Enabled 12V System Voltage PECR_MainCoolPmpMtr ACC_Av PECRJVIainCoolPmpMtr ACC_Fol	 > 11.00 V (with hysteresis disable < 10.00 V) = Not Active	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump Current Out of Range High	P3074	This diagnostic detects if the actual motor current is out of range high. If the enable criteria are met and the actual current is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Pump Motor AC Current	>= 80.00 A	Diagnostic is Enabled 12 System Voltage PECR_MainCoolPmpMtr ACC_Av PECRJVIainCoolPmpMtr ACC_Fol	 > 11.00 V (with hysteresis disable < 10.00 V) = Not Active	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump Low Current Performance	P3075	The current performance diagnostic detects and reports failure of the pump or the cooling system flow. The diagnostic consists of an intrusive test performed each drive cycle if the necessary enable conditions are met and a passive test that runs continuously when the intrusive test is not executing. Only the intrusive test can report a diagnostic fail or pass result. Pump low current condition is when the actual electrical current is less than the expected electrical current for the reported pump speed. If the enable criteria are met, the intrusive test controls the pump to a calibratable speed for a calibratable time, during this time, if the actual current is less than the low current calibration failure threshold, the diagnostic reports a FAIL. If the actual current does not fall below the low current calibration failure threshold, the	Intrusive Test: Any of the following criteria is met Criteria 1: **P3075 3076 Pump** a) **Current Scaled** (A) b) EECR_EngineInlet_FA is Not Active Criteria 2: a) Pump Motor AC Current (See supporting tables for the above threshold values) The intrusive test runs at least once every drive cycle, but may be enabled again if the passive test has determined a potential failure after the intrusive diagnostic has passed.	< **P3075 Pump Low Current Performance Failure Threshold** (A) (See supporting tables for the above threshold values)	Diagnostic is Enabled 12V System Voltage PECRJVIainCoolPmpMtr ACC-Av PECR_MainCoolPmpMtr ACC_Fol PECR_MainCoolPmpSpd Act_Av PECR_MainCoolPmpSpd Act_FoFA PECRJVIainCoolPmpSpd Act_Fol PECR_MainCoolPmpSpd ActLcFA PECR_EMP_CurrOORL_FA PECR_EMP_CurrOORH_FA PECR_EMP_SpdBndl_FA PECR_EMP_CurrPerfLo_TFTKO PECR_EMP_CurrPerfHi_TFTKO VECR_BRV_Ckt_FA VECR_BRV_Performance_FA VECR_MRV_ActrFA EECR_EngineOutlet_FA Pump Enable Engine Block Valve Coolant Flow in Range Coolant Flow Restriction Factor in Range Pump Intrusive Test Timer Pump Speed Feedback in	>= 10.20 V = Not Active = True 20.00 to 100.00% 0.20 to 1.00 < 20.00 s	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		diagnostic reports a PASS.			Range	3,800.00 RPM to 4,200.00 RPM		
					All of the following criteria are met for	>= 2.00 s		
					a) Coolant Distribution Mode (Criteria is met when the array table for the given distribution mode is TRUE)	**P3075 3076 Pump Current Performance Coolant Distribution =Mode** (1 is TRUE)		
					b) Coolant System Mode (Criteria is met when the array table for the given distribution mode is TRUE)	**P3075 3076 Pump Current Performance Coolant System Mode =Select** (1 is TRUE)		
					Any of the following criteria is met for	>= 2.00 s		
					Criteria 1:			
					a) Passive Test Result	= Fail		
					b) Desired Air Per Cylinder	>120.00 mg (with hysteresis disable < 100.00 mg)		
					Criteria 2:			
					a) Passive Test Result	= Not Fail		
					b) Desired Air Per Cylinder	>120.00 mg (with hysteresis disable < 100.00 mg)		
					Any of the following criteria is met:			
					Criteria 1:			
					a)			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					PECR_EMP_CurrPerf HiTPTKO PECR_EMP_CurrPerf LoTPTKO b) Pump Intrusive Test Attempts Criteria 2: a) Passive Test Result b) Pump Passive Requests Any of the following criteria is met: a) Engine Outlet Coolant Temperature b) OBD Coolant Enable	= Not Active <= 3.00 Count = Fail <= 3.00 Count >= 50.00 °C = True		
			Passive Test: Pump Motor AC Current The passive test has fewer enable conditions than the intrusive, and is disabled while the intrusive test runs. The passive test monitors the reported current at any given pump speed and flow restriction. Flow restriction is calculated	<= **P3075 Pump Low Current Passive Test Fail Threshold** (A) (See supporting tables for the above threshold values)	Diagnostic is Enabled 12V System Voltage PECR_MainCoolPmpMtr ACC-Av PECR_MainCoolPmpMtr ACC_FoI PECR_MainCoolPmpSpd Act_Av PECR_MainCoolPmpSpd Act_FoFA PECR_MainCoolPmpSpd Act_FoI PECR_MainCoolPmpSpd ActLcFA PECR_EMP_CurrOORL_FA PECR_EMP_CurrOORH_FA	 >= 10.20 V	4 seconds out of a 5 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			based on the current system valve configuration and pump speed. If the passive test determines a potential fault, then the intrusive test is re-enabled. All of the intrusive enable conditions must still be met prior to executing the intrusive test and making a diagnostic pass/fail decision.		PECR_EMP_SpdBndl_FA PECR_EMP_CurrPerfLo_TFTKO PECR_EMP_CurrPerfHi_TFTKO VECR_BRV_Ckt_FA VECR_BRV_Performance_FA VECR_MRV_ActrFA EECR_EngineOutlet_FA	= Not Active		
					Pump Enable	= True		
					Pump Intrusive Test Override	= Not Active		
					Difference in Pump Command Speed from previous data sample to present data sample	< 50.00 RPM for >= 3.00 s		
					Pump Speed Feedback in Range	810.00 RPM to 6,180.00 RPM for >=2.00 s		
					Any of the following criteria is met: a) Engine Outlet Coolant Temperature	>=50.00 °C		
					b) OBD Coolant Enable	= True		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Coolant Pump High Current Performance	P3076	The current performance diagnostic detects and reports failure of the pump or the cooling system flow. The diagnostic consists of an intrusive test performed each drive cycle if the necessary enable conditions are met and a passive test that runs continuously when the intrusive test is not executing. Only the intrusive test can report a diagnostic fail or pass result. Pump high current condition is when the actual electrical current is greater than the expected electrical current for the reported pump speed. If the enable criteria are met, the intrusive test controls the pump to a calibratable speed for a calibratable time, during this time, if the actual current is greater than the high current calibration failure threshold, the diagnostic reports a FAIL. If the actual current does not exceed the high current calibration failure threshold, the	Intrusive Test Any of the following criteria is met Criteria 1: **P3075 3076 Pump** a) **Current Scaled** (A) b) EECR_EngineInlet_FA is Not Active Criteria 2: a) Pump Motor AC Current (See supporting tables for the above threshold values) The intrusive test runs at least once every drive cycle, but may be enabled again if the passive test has determined a potential failure after the intrusive diagnostic has passed.	> **P3076 Pump High Current Performance Failure Threshold** (A) (See supporting tables for the above threshold values)	Diagnostic is Enabled 12V System Voltage PECRJVIainCoolPmpMtrACC-Av PECR_MainCoolPmpMtrACC_Fol PECR_MainCoolPmpSpdAct_Av PECR_MainCoolPmpSpdAct_FoFA PECRJVIainCoolPmpSpdAct_Fol PECR_MainCoolPmpSpdActLcFA PECR_EMP_CurrOORL_FA PECR_EMP_CurrOORH_FA PECR_EMP SpdBndl FA PECR_EMP_CurrPerfLo_TFTKO PECR_EMP_CurrPerfHi_TFTKO VECR_BRV_Ckt_FA VECR_BRV_Performance_FA VECR_MRV_ActrFA EECR_EngineOutlet_FA Pump Enable Engine Block Valve Coolant Flow in Range Coolant Flow Restriction Factor in Range Pump Intrusive Test Timer Pump Speed Feedback in	 >= 10.20 V = Not Active = True 20.00 to 100.00% 0.20 to 1.00 < 20.00 s	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		diagnostic reports a PASS.			Range	3,800.00 RPM to 4,200.00 RPM		
					All of the following criteria are met for	>= 2.00 s		
					a) Coolant Distribution Mode (Criteria is met when the array table for the given distribution mode is TRUE)	**P3075 3076 Pump Current Performance Coolant Distribution =Mode** (1 is TRUE)		
					b) Coolant System Mode (Criteria is met when the array table for the given distribution mode is TRUE)	**P3075 3076 Pump Current Performance Coolant System Mode =Select** (1 is TRUE)		
					Any of the following criteria is met for	>= 2.00 s		
					Criteria 1:			
					a) Passive Test Result	= Fail		
					b) Desired Air Per Cylinder	> 120.00 mg (with hysteresis disable < 100.00 mg)		
					Criteria 2:			
					a) Passive Test Result	= Not Fail		
					b) Desired Air Per Cylinder	> 120.00 mg (with hysteresis disable < 100.00 mg)		
					Any of the following criteria is met:			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Criteria 1: a) PECR_EMP_CurrPerfHi_TPTKO PECR_EMP_CurrPerfLo_TPTKO b) Pump Intrusive Test Attempts Criteria 2: a) Passive Test Result b) Pump Passive Requests Any of the following criteria is met: a) Engine Outlet Coolant Temperature b) OBD Coolant Enable	= Not Active <= 3.00 Count = Fail <= 3.00 Count >= 50.00 °C = True		
			Passive Test: Pump Motor AC Current The passive test has fewer enable conditions than the intrusive, and is disabled while the intrusive test runs. The passive test monitors the reported current at any given pump speed	>= **P3076 Pump High Current Passive Test Fail Threshold** (A) (See supporting tables for the above threshold values)	Diagnostic is Enabled 12V System Voltage PECR_MainCoolPmpMtrACC_Av PECR_MainCoolPmpMtrACC_Fol PECR_MainCoolPmpSpdAct_Av PECR_MainCoolPmpSpdAct_FoFA PECR_MainCoolPmpSpdAct_Fol PECR_MainCoolPmpSpdAct_LcFA PECR_EMP_CurrOORL_FA	 >= 10.20 V	4 seconds out of a 5 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			and flow restriction. Flow restriction is calculated based on the current system valve configuration and pump speed. If the passive test determines a potential fault, then the intrusive test is re-enabled. All of the intrusive enable conditions must still be met prior to executing the intrusive test and making a diagnostic pass/fail decision.		PECR_EMP_CurrOORH_FA PECR_EMP_SpdBndl_FA PECR_EMP_CurrPerfLo_TFTKO PECR_EMP_CurrPerfHi_TFTKO VECR_BRV_Ckt_FA VECR_BRV_Performance_FA VECR_MRV_ActrFA EECR_EngineOutlet_FA Pump Enable Pump Intrusive Test Override Difference in Pump Command Speed from previous data sample to present data sample Pump Speed Feedback in Range Any of the following criteria is met: a) Engine Outlet Coolant Temperature b) OBD Coolant Enable	= Not Active = True = Not Active < 50.00 RPM for >= 3.00 s 810.00 RPM to 6,180.00 RPM for >=2.00 s >=50.00 °C = True		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 4 Control Circuit Open	P3080	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 4 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 4 Control Circuit Low Voltage	P3081	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 4 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 4 Control Circuit High Voltage	P3082	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 4 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 4 Performance	P3083	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 4	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 4 Pin Stuck	P3084	Monitors Sliding Cam Actuator Hall Sensor Feedback looking for an extended pin when it should have been returned and be reporting above the "RETRACTED" threshold. Monitors Intake Camshaft Profile Actuator 4 for a pin stuck out condition.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00) If EXTENDING and or EXTENDED have been obtained but RETRACTED is not obtained before the end of the engine cycle, Pin Stuck out is reported.	Feed back has reported below EXTENDING 55.00 and or below EXTENDED 45.00 , but has not reported above RETRACTED by the end of the engine cycle the fault is reported 68.00 ,	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	1.00 failure report out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 5 Control Circuit Open	P3085	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 5 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 5 Control Circuit Low Voltage	P3086	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 5 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 5 Control Circuit High Voltage	P3087	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 5 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 5 Performance	P3088	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 5	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 5 Pin Stuck	P3089	Monitors Sliding Cam Actuator Hall Sensor Feedback looking for an extended pin when it should have been returned and be reporting above the "RETRACTED" threshold. Monitors Intake Camshaft Profile Actuator 5 for a pin stuck out condition.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00) If EXTENDING and or EXTENDED have been obtained but RETRACTED is not obtained before the end of the engine cycle, Pin Stuck out is reported.	Feed back has reported below EXTENDING 55.00 and or below EXTENDED 45.00 , but has not reported above RETRACTED by the end of the engine cycle the fault is reported 68.00 ,	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	1.00 failure report out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 6 Control Circuit Open	P308A	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 6 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 6 Control Circuit Low Voltage	P308B	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 6 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 6 Control Circuit High Voltage	P308C	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 6 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 6 Performance	P308D	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 6	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 6 Pin Stuck	P308E	Monitors Sliding Cam Actuator Hall Sensor Feedback looking for an extended pin when it should have been returned and be reporting above the "RETRACTED" threshold. Monitors Intake Camshaft Profile Actuator 6 for a pin stuck out condition.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00) If EXTENDING and or EXTENDED have been obtained but RETRACTED is not obtained before the end of the engine cycle, Pin Stuck out is reported.	Feed back has reported below EXTENDING 55.00 and or below EXTENDED 45.00 , but has not reported above RETRACTED by the end of the engine cycle the fault is reported 68.00 ,	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	1.00 failure report out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 7 Control Circuit Open	P308F	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 7 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 7 Control Circuit Low Voltage	P3090	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 7 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 7 Control Circuit High Voltage	P3091	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 7 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 7 Performance	P3092	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 7	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 7 Pin Stuck	P3093	Monitors Sliding Cam Actuator Hall Sensor Feedback looking for an extended pin when it should have been returned and be reporting above the "RETRACTED" threshold. Monitors Intake Camshaft Profile Actuator 7 for a pin stuck out condition.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00) If EXTENDING and or EXTENDED have been obtained but RETRACTED is not obtained before the end of the engine cycle, Pin Stuck out is reported.	Feed back has reported below EXTENDING 55.00 and or below EXTENDED 45.00 , but has not reported above RETRACTED by the end of the engine cycle the fault is reported 68.00 ,	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	1.00 failure report out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 8 Control Circuit Open	P3094	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 8 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 8 Control Circuit Low Voltage	P3095	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 8 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 8 Control Circuit High Voltage	P3096	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator 8 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 8 Performance	P3097	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 8	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intake Camshaft Profile Actuator 8 Pin Stuck	P3098	Monitors Sliding Cam Actuator Hall Sensor Feedback looking for an extended pin when it should have been returned and be reporting above the "RETRACTED" threshold. Monitors Intake Camshaft Profile Actuator 8 for a pin stuck out condition.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00) If EXTENDING and or EXTENDED have been obtained but RETRACTED is not obtained before the end of the engine cycle, Pin Stuck out is reported.	Feed back has reported below EXTENDING 55.00 and or below EXTENDED 45.00 , but has not reported above RETRACTED by the end of the engine cycle the fault is reported 68.00 ,	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	1.00 failure report out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 4 Circuit Open	P3099	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 4 driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnositc is Enabled System supply voltage Ignition switch is in crank or run position	 >11.00 Volts	4.00 Fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 4 Circuit Low Voltage	P309A	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 4 solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 4 Circuit High Voltage	P309B	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator 4 driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Exhaust Camshaft Profile Actuator 4 Performance	P309C	An unintended pin firing without controller command. Exhaust Camshaft Profile Actuator 4	Detected an Uninteded pin firing wlithout controller command.	System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) If actuator below 55.00 threshold without command	Diagnostic is Enabled system voltage engine running	 > 11.00 Volts = TRUE	4.00 incorrect positions out of 5.00 cylinder event position reads	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor D Circuit Bank 1	P30B0	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor D driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Ω impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 >11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor D Range/ Performance Bank 1	P30B1	Intake Hall Sensor 4 position feedback not matching expected	DTC detects shift Pin Position Hall feedback If Hall Feedback signal seen but no shift command was sent to actuator. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED(Pin returned to home position 68.00)	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	Diagnostic is Enabled System Voltage Engine Running No Active P Codes	> 11.00 Volts = TRUE CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO	4.00 samples out of 5.00 reading	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor D Circuit Low Bank 1	P30B2	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor D solenoid driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 0 impedance between signal and controller ground	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position	 > 11.00 Volts	4.00 failures out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Actuator Position Sensor D Circuit High Bank 1	P30B3	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position Sensor D driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 0 impedance between signal and controller power	Diagnostic is Enabled System supply Output driver is commanded off Ignition switch is in crank or run position	 > 11.00 Volts	4.00 fail reports out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Control Sleeve Position Sensor A Circuit Bank 1	P30BE	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Position Sensor A driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position No P Codes active	 >11.00 Volts CamSensorAnyLctnTFTK 0 CrankSensor_TFTKO	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Control Sleeve Position Sensor A Range/ Performance Bank 1	P30BF	Monitors the output of the Sliding Cam Position Sensor for expected and in range signals. Intake sensor 1	First section of Diagnostic is the same as our CAM Sensor Performance Diagnostic Logic, it is using the same Sensors for Camshaft Profile Control Sleeve Position detection diagnostics. Hence they are diagnosed using the same methods. The diagnostic looks at the number of rising and falling edges seen in an engine cycle. 2 edges per engine cycle = PASS 0 edges per engine cycle with signal low = Short to Ground or Open OR 0 edges per engine cycle with signal High = Short to Power OR (2nd SECTION) Failed lift state change attempt signal sequence. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position	number of edges read this engine cycle <> 2.00 Buffer reading low signals Buffer reading High signals System feed back has reported less than all of the following: EXTENDING (below 55.00), EXTENDED (below45.00) RETRACTED (above 68.00), and the barrel	Diagnostic is Enabled system voltage engine running No active Pcodes	 >11.00 Volts = TRUE CamSensorAnyLctnTFTKO CrankSensor_TFTKO	16.00 fails out of 20.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			68.00) We expect to see all 3 steps in sequence followed by the Position Sensor indicating a new lift state. Failure to receive any of the above indicate a failure.	position sensor identifying that the lift state has changed. Observation window. Not missing EXTENDED reading: 30.00 events Missing the EXTENDED reading: 20.00 events				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Control Sleeve Position Sensor B Circuit Bank 1	P30C2	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Position Sensor B driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position No P Codes active	 >11.00 Volts CamSensorAnyLctnTFTK 0 CrankSensor_TFTKO	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Control Sleeve Position Sensor B Range/ Performance Bank 1	P30C3	Monitors the output of the Sliding Cam Position Sensor for expected and in range signals Intake 2	First section of Diagnostic is the same as our CAM Sensor Performance Diagnostic Logic, it is using the same Sensors for Camshaft Profile Control Sleeve Position detection diagnostics. Hence they are diagnosed using the same methods. The diagnostic looks at the number of rising and falling edges seen in an engine cycle. 2 edges per engine cycle = PASS 0 edges per engine cycle with signal low = Short to Ground or Open OR 0 edges per engine cycle with signal High = Short to Power OR (2nd SECTION) Failed lift state change attempt signal sequence. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00)	number of edges read this engine cycle <> 2.00 Buffer reading low signals Buffer reading High signals System feed back has reported less than all of the following: EXTENDING (below 55.00), EXTENDED (below 45.00) RETRACTED (above 68.00), and the barrel position sensor identifying that the lift state has changed.	Diagnostic is Enabled system voltage engine running No active Pcodes	 >11.00 Volts = TRUE CamSensorAnyLctnTFTKO CrankSensor_TFTKO	16.00 fails out of 20.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			We expect to see all 3 steps in sequence followed by the Position Sensor indicating a new lift state. Failure to receive any of the above indicate a failure.	Observation window. Not missing EXTENDED reading: 30.00 events Missing the EXTENDED reading: 20.00 events				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Control Sleeve Position Sensor A Circuit Bank 1	P30C6	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Position Sensor A driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	Diagnostic is Enabled System supply voltage Output driver is commanded on Ignition switch is in crank or run position No P Codes active	 >11.00 Volts CamSensorAnyLctnTFTK0 CrankSensor_TFTKO	4.00 fails out of 5.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Control Sleeve Position Sensor A Range/ Performance Bank 1	P30C7	Monitors the output of the Sliding Cam Position Sensor for expected and in range signals Exhaust 1	First section of Diagnostic is the same as our CAM Sensor Performance Diagnostic Logic, it is using the same Sensors for Camshaft Profile Control Sleeve Position detection diagnostics. Hence they are diagnosed using the same methods. The diagnostic looks at the number of rising and falling edges seen in an engine cycle. 2 edges per engine cycle = PASS 0 edges per engine cycle with signal low = Short to Ground or Open OR 0 edges per engine cycle with signal High = Short to Power OR (2nd SECTION) Failed lift state change attempt signal sequence. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00)	number of edges read this engine cycle <> 2.00 Buffer reading low signals Buffer reading High signals System feed back has reported less than all of the following: EXTENDING (below 55.00), EXTENDED (below 45.00) RETRACTED (above 68.00), and the barrel position sensor identifying that the lift state has changed.	Diagnostic is Enabled system voltage engine running No active Pcodes	 >11.00 Volts = TRUE CamSensorAnyLctnTFTKO CrankSensor_TFTKO	16.00 fails out of 20.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			We expect to see all 3 steps in sequence followed by the Position Sensor indicating a new lift state. Failure to receive any of the above indicate a failure.	Observation window. Not missing EXTENDED reading: 30.00 events Missing the EXTENDED reading: 20.00 events				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
“B" Camshaft Profile Control Sleeve Position Sensor B Circuit Bank 1	P30CA	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Position Sensor B driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	Diagnostic is Enabled		4.00 fails out of 5.00 samples	Type A, 1 Trips
					System supply voltage	>11.00 Volts		
					Output driver is commanded on			
					Ignition switch is in crank or run positionsystem voltage			
					No P Codes active	CamSensorAnyLctnTFTK 0 CrankSensor_TFTKO		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Control Sleeve Position Sensor B Range/ Performance Bank 1	P30CB	Monitors the output of the Sliding Cam Position Sensor for expected and in range signals Exhaust 2	First section of Diagnostic is the same as our CAM Sensor Performance Diagnostic Logic, it is using the same Sensors for Camshaft Profile Control Sleeve Position detection diagnostics. Hence they are diagnosed using the same methods. The diagnostic looks at the number of rising and falling edges seen in an engine cycle. 2 edges per engine cycle = PASS 0 edges per engine cycle with signal low = Short to Ground or Open OR 0 edges per engine cycle with signal High = Short to Power OR (2nd SECTION) Failed lift state change attempt signal sequence. System measures 3 states for each shift, EXTENDING (Pin started firing 55.00), EXTENDED (Pin completely fired 45.00), RETRACTED (Pin returned to home position 68.00) We expect to see all 3	number of edges read this engine cycle <> 2.00 Buffer reading low signals Buffer reading High signals System feed back has reported less than all of the following: EXTENDING (below 55.00), EXTENDED (below 45.00) RETRACTED (above 68.00), and the barrel position sensor identifying that the lift state has changed. Observation window.	Diagnostic is Enabled system voltage engine running No active Pcodes	 >11.00 Volts = TRUE CamSensorAnyLctnTFTKO CrankSensor_TFTKO	16.00 fails out of 20.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			steps in sequence followed by the Position Sensor indicating a new lift state. Failure to receive any of the above indicate a failure.	Not missing EXTENDED reading: 30.00 events Missing the EXTENDED reading: 20.00 events				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Control Sleeve "A" Alignment	P30CE	The system monitors the Sliding Cam Control Sieve Position Sensors looking for an unintended shift. A recorded change in lift state without a control system command for a state change.	The system monitors the Sliding Cam Control Sieve Position Sensors looking for an unintended shift. A recorded change in lift state without a control system command for a state change. Sieve Position Sensors identify a shift from High Lift, Low Lift or AFM to one of the other states with out the control system commanding the shift.	If current Barrel state (High Lift, Low Lift, AFM) is not equal to previous Barrel state (High Lift, Low Lift, AFM) and a state change was not commanded a failure is registered.	Diagnostic is Enabled system voltage engine run state No active Pcodes	 >11.00 Volts = TRUE CamSensorAnyLctnTFTK0 CrankSensor_TFTKO	3.00 reading out of 200.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"A" Camshaft Profile Control Sleeve "B" Alignment	P30CF	The system monitors the Sliding Cam Control Sieve Position Sensors looking for an unintended shift. A recorded change in lift state without a control system command for a state change.	The system monitors the Sliding Cam Control Sieve Position Sensors looking for an unintended shift. A recorded change in lift state without a control system command for a state change. Sieve Position Sensors identify a shift from High Lift, Low Lift or AFM to one of the other states with out the control system commanding the shift.	If current Barrel state (High Lift, Low Lift, AFM) is not equal to previous Barrel state (High Lift, Low Lift, AFM) and a state change was not commanded a failure is registered	Diagnostic is Enabled system voltage engine run state No active Pcodes	 >11.00 Volts = TRUE CamSensorAnyLctnTFTK0 CrankSensor_TFTKO	3.00 reading out of 200.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Control Sleeve "A" Alignment	P30D0	The system monitors the Sliding Cam Control Sieve Position Sensors looking for an unintended shift. A recorded change in lift state without a control system command for a state change.	The system monitors the Sliding Cam Control Sieve Position Sensors looking for an unintended shift. A recorded change in lift state without a control system command for a state change. Sieve Position Sensors identify a shift from High Lift, Low Lift or AFM to one of the other states with out the control system commanding the shift.	If current Barrel state (High Lift, Low Lift, AFM) is not equal to previous Barrel state (High Lift, Low Lift, AFM) and a state change was not commanded a failure is registered	Diagnostic is Enabled system voltage engine run state No active Pcodes	 >11.00 Volts = TRUE CamSensorAnyLctnTFTK0 CrankSensor_TFTKO	3.00 reading out of 200.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
"B" Camshaft Profile Control Sleeve "B" Alignment	P30D1	The system monitors the Sliding Cam Control Sieve Position Sensors looking for an unintended shift. A recorded change in lift state without a control system command for a state change.	The system monitors the Sliding Cam Control Sieve Position Sensors looking for an unintended shift. A recorded change in lift state without a control system command for a state change. Sieve Position Sensors identify a shift from High Lift, Low Lift or AFM to one of the other states with out the control system commanding the shift.	If current Barrel state (High Lift, Low Lift, AFM) is not equal to previous Barrel state (High Lift, Low Lift, AFM) and a state change was not commanded a failure is registered	Diagnostic is Enabled system voltage engine run state No P codes active	 >11.00 Volts = TRUE CamSensorAnyLctnTFTK0 CrankSensor_TFTKO	3.00 reading out of 200.00 samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Injector Circuit Range/ Performance	P30D4	Diagnostic to determine if any of the voltage feedback measured from the analog to digital converter on any cylinder is rational (total engine based). The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit.	Injector voltage feedback is not able to detect an opening magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Measured Voltage feedback converted to Injector Opening Magnitude OR Injector voltage feedback is not able to detect a closing time OR Measured Voltage feedback converted to Injector closing time OR Measured Voltaoe	=< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude** (See supporting table) >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude** (See supporting table) =< **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time** (See supporting table) >=	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below) Injection Pulse Width	= True >= **P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width**	2.50 Second Fail count out of 10.00 seconds Samples Continuous	Type B, 2 Trips

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

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

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

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cooling Fan 1 Out of Range Low [LIN Bus Electric PWM Fans Only - Internal or External controller]	P30EE	The reported actual fan speed in RPM exceeds an lower limit for the fan speed, indicating that there is a failure of the measurement of the fan speed	Measured LIN Fan1 Speed	< = -110.00 rpm	a] Diagnostic Enabled b] Configuration calibration for number of fans c] Diagnostic System Disabled d] Battery Voltage In Range e] LIN Bus based Fan Operation Enabled f] LIN Serial data Lost communication Fault Active g] LIN Serial data Continuous Operation Fault Active	a] ==1.00 [True if 1; False if 0] b] >= 1 unit c] <>True d] > 11.00 volts e] == TRUE f] <> True g] <>True	16.00 failures out of 20.00 samples; 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cooling Fan 1 Out of Range High [LIN Bus Electric PWM Fans Only - Internal or External controller]	P30EF	The reported actual fan speed in RPM exceeds an upper limit for the fan speed, indicating that there is a failure of the measurement of the fan speed	Measured LIN Fan1 Speed	> = 4,000.00 rpm	a] Diagnostic Enabled b] Configuration calibration for number of fans c] Diagnostic System Disabled d] Battery Voltage In Range e] LIN Bus based Fan Operation Enabled f] LIN Bus Lost Communication Fault Active g] LIN Bus serial data Continuous Operation Fault Active	a] == 1.00 [True if 1; False if 0] b] >= 1 unit c] <>True d] > 11.00 volts e] == TRUE f] <>True g] <> True	16.00 failures out of 20.00 samples; 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Brake System Vehicle Speed Limit Request Signal Message Counter Incorrect	P314F	This DTC monitors for an error in communication with the Brake System Vehicle Speed Limit Request Signal.	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Braking System Vehicle Top Speed Limit Request Type ARC Braking System Vehicle Top Speed Limit Request Type PV	 >= 3.00 counts out of >= 10.00 counts >=3.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	 >= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Braking System Vehicle Top Speed Limit Request Type ARC samples every 100.00 milliseconds. Braking System Vehicle Top Speed Limit Request Type PV samples every 100.00 milliseconds.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Communication on Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures equals or exceeds before the sample time of is reached	5 counts (equivalent to 812.51 milliseconds) 812.51 milliseconds	General Enable Criteria: Starter motor engaged for Or Run/Crank ignition voltage All below criteria have been met for CAN channel is requesting full communications Normal CAN transmission on Bus is enabled Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII	 > 15,000.00 milliseconds >8.41 Volts >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If OBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>=11.00 Volts >=9.00 Volts > 15,000.00 milliseconds >8.41 Volts >= 6.41 Volts Enabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Communication on Bus B Off	U0074	This DTC monitors for a BUS B off condition	Bus off failures equals or exceeds	5 counts (equivalent to 812.51 milliseconds)	General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					Starter motor engaged for	> 15,000.00 milliseconds		
					Or			
					Run/Crank ignition voltage	>8.41 Volts		
			before the sample time of is reached	812.51 milliseconds				
					All below criteria have been met for	>= 3,000.00 milliseconds		
					CAN channel is requesting full communications			
					Normal CAN transmission on Bus is enabled			
					Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller			
					Or			
					Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If OBDII:			
					Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD:			
					Run/Crank ignition voltage	>=9.00 Volts		
					If Secure:			
					Starter motor engaged for	> 15,000.00 milliseconds		
					Or			
					Run/Crank ignition voltage	> 8.41 Volts		
					If Hybrid Secure:			
					Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	Enabled		
					Or			
					Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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 before the sample time of is reached	5 counts (equivalent to 812.51 milliseconds) 812.51 milliseconds	General Enable Criteria: Starter motor engaged for Or Run/Crank ignition voltage All below criteria have been met for CAN channel is requesting full communications Normal CAN transmission on Bus is enabled Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII	 > 15,000.00 milliseconds >8.41 Volts >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If OBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>=11.00 Volts >=9.00 Volts > 15,000.00 milliseconds >8.41 Volts >= 6.41 Volts Enabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With TCM	U0101	This DTC monitors for a loss of communication with the Transmission Control Module.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
			Message $0C7:	> 500.00 milliseconds	All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $0F9:	> 500.00 milliseconds	If message is on Bus A: U0073 not active			
			Message $189:	> 500.00 milliseconds	If message is on Bus B: U0074 not active			
			Message $197:	>500.00 milliseconds	If message is on Bus S: U0076 not active			
			Message $19D:	>500.00 milliseconds	CAN channel is requesting full communications			
			Message $1A6:	> 500.00 milliseconds	Normal CAN transmission on Bus is enabled			
			Message $1AF:	> 500.00 milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
			Message $1F5:	> 500.00 milliseconds	Accessory mode to off mode not pending			
			Message $3F5:	> 1,000.00 milliseconds	Battery voltage	>11.00 Volts		
			Message $4AB:	>10,000.00 milliseconds	Conroller is an OBD controller Or Battery Voltage	<=18.00 Volts		
			Message $4C9:	>10,000.00 milliseconds	Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Brake System Control Module	U0129	This DTC monitors for a loss of communication with the Brake System Control Module.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $0C1	> 500.00 milliseconds				
					If message is on Bus A: U0073 not active			
			Message $0C5	> 500.00 milliseconds				
					If message is on Bus B: U0074 not active			
			Message $0D1	> 500.00 milliseconds				
					If message is on Bus S: U0076 not active			
			Message $1C7	>500.00 milliseconds				
			Message $1E9	>500.00 milliseconds	CAN channel is requesting full communications			
			Message $22A	> 1,000.00 milliseconds	Normal CAN transmission on Bus is enabled			
					If bus type is Sensor Bus, sensor bus relay is on			
					Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller Or			
					Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Power Steering Control Module	U0131	This DTC monitors for a loss of communication with the Power Steering Control Module.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type C, No SVS "Safety Emissions Neutral Diagnostic - Type C"
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $1E5	>10,000.00 milliseconds				
					If message is on Bus A: U0073 not active			
					If message is on Bus B: U0074 not active			
					If message is on Bus S: U0076 not active			
					CAN channel is requesting full communications			
					Normal CAN transmission on Bus is enabled			
					If bus type is Sensor Bus, sensor bus relay is on			
					Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for	> 15,000.00 milliseconds		
					Or			
					Run/Crank ignition voltage	>8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	Enabled		
					Or			
					Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for Message $0F1 Message $1E1 Message $1F1 Message $451 Message $120 Message $12A Message $135 Message $140 Message $1F3 Message $3C9 Message $3F1	 > 500.00 milliseconds > 500.00 milliseconds >500.00 milliseconds >500.00 milliseconds >10,000.00 milliseconds > 1,000.00 milliseconds >10,000.00 milliseconds >10,000.00 milliseconds >10,000.00 milliseconds >10,000.00 milliseconds >10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	 >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 12.5 ms loop	Type C, 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 Ilium.
			Message $4C5	>10,000.00 milliseconds	If calibratable low voltage disable mode is not Never Disabled			
			Message $4E1	>10,000.00 milliseconds	Low voltage disable mode: OBDII			
			Message $4E9	>10,000.00 milliseconds	If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Gateway A	U0146	This DTC monitors for a loss of communication with Gateway A.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $3CF	>10,000.00 milliseconds				
			Message $4D4	>10,000.00 milliseconds	If message is on Bus A: U0073 not active			
					If message is on Bus B: U0074 not active			
					If message is on Bus S: U0076 not active			
					CAN channel is requesting full communications			
					Normal CAN transmission on Bus is enabled			
					If bus type is Sensor Bus, sensor bus relay is on			
					Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Battery Monitor Module	U01B0	This DTC monitors for a loss of communication with the Battery Monitor Module on the LIN bus.	Message is not received from device for		General Enable Criteria:		LIN bus communication executes in 500ms loop.	Type B, 2 Trips
					Diagnostic is enabled	Enabled		
			IBSAmpHourChg_18_C02	>=1,250.00 milliseconds	LIN channel is enabled	Enabled		
					LIN module is initialized			
			IBSAmpHourDisChrg_19_C02	>=1,250.00 milliseconds	Slave is calibrated as present			
			IBSCalcData_16_C02	>=1,250.00 milliseconds	All below criteria have been met for	>= 3,000.00 milliseconds		
			IBSCfgDataRtn_1E_C02	>=2,500.00 milliseconds	Accessory mode to off mode not pending			
			IBSCurrentFOMData_1A_C02	>=5,000.00 milliseconds	Battery voltage	>11.00 Volts		
					Conroller is an OBD controller			
			IBSFOMData_1C_C02	>=5,000.00 milliseconds	Or Battery Voltage	<=18.00 Volts		
			IBSMeasuredTemp_17_C02	>= 625.00 milliseconds	Controller type: OBD Controller			
			IBSMVIData_15_C02	>= 625.00 milliseconds	If power mode = Run/ Crank:			
					Power Mode is run			
			IBSVehStartData_1D_C02	>=2,500.00 milliseconds	If calibratable low voltage disable mode is not Never Disabled			
			IBSVoltageFOMData_1B_C02	>=5,000.00 milliseconds	Low voltage disable mode: OBDII			
					IfOBDII: Run/Crank ignition	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	 >=9.00 Volts > 15,000.00 milliseconds >8.41 Volts >=6.41 Volts Enabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with Active Grill Air Shutter Module A	U0284	This DTC monitors for a loss of communication on the LIN bus with Shutter Module A.	Message is not received from device for ACM1Rsp_31_C02	>=1,250.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Actuator relay is powered Or Powertrain Relay is on and powertrain relay state feedback is enabled All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never	Enabled Enabled Disabled >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Disabled Low voltage disable mode: OBDII If OBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	 >=11.00 Volts >=9.00 Volts > 15,000.00 milliseconds >8.41 Volts >=6.41 Volts Enabled >=11.00 Volts		

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Mass or Volume Air Flow Sensor A	U060F	This DTC monitors for a loss of communication on the LIN bus with Mass or Volume Air Flow Sensor A.	Message is not received from device for MAF_Rsp_Press_2B_C03 MAF_Rsp_TmpHum_2A_C03	 >= 87.50 milliseconds >= 250.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII IfOBDII: Run/Crank ignition	 Enabled Enabled >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts	LIN bus communication executes in 500ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					voltage			
					If EOBD:			
					Run/Crank ignition voltage	>=9.00 Volts		
					If Secure:			
					Starter motor engaged for	> 15,000.00 milliseconds		
					Or			
					Run/Crank ignition voltage	>8.41 Volts		
					If Hybrid Secure:			
					Run/Crank ignition voltage	>=6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	Enabled		
					Or			
					Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Engine Coolant Bypass Valve C	U0617	Communication Check This DTC will detect if SENT communication was lost for the Engine Coolant Bypass Valve C Sensor	If any of the following conditions are met a failure count will be recorded: **Condition 1:** HWIO message faults **Condition 2:** Pulse count delta AND Message age **Condition 3:** Voltage on SENT pin is greater than a controller specific threshold AND Message age **Condition 4:** Voltage on SENT pin is less than a controller specific threshold AND Message age	= No Fault >0 > 6.25 ms > 6.25 ms > 6.25 ms	Diagnostic is Enabled Run Crank Ignition in Range Engine not cranking Engine Diag System	= True = True = Enabled	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with Fuel Rail Pressure Sensor Bank 1	U0625	This DTC determines if the SENT signal shorted low, this is determined by monitoring the number pulses on the SENT signal line received at the ECU and the SENT Signal Line State always indicating low.	The number pulses on the SENT signal line SENT Signal Line State	<= 40 = Low	SENT Sensor Communication Circuit Diagnostic Enabled SENT power up delay	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cooling Fan 1 LIN Communication Failure	U0632	This DTC monitors for a loss of communication on the LIN bus with Cooling Fan 1.	Message is not received from device for		General Enable Criteria:		LIN bus communication executes in 500ms loop.	Type B, 2 Trips
					Diagnostic is enabled	Enabled		
			CFM1_Rsp_2D_C02	>=2,500.00 milliseconds	LIN channel is enabled	Enabled		
					LIN module is initialized			
					Slave is calibrated as present			
					Engine is running Or Engine cooling fan operation is enabled via received CAN signal and propulsion system is active for	>= 1.00 seconds		
					All below criteria have been met for	>= 3,000.00 milliseconds		
					Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			
					If calibratable low voltage			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					IfOBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for	> 15,000.00 milliseconds		
					Or Run/Crank ignition voltage	>8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>=6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Loss of communication with wastegate position sensor “A”	U0644	Detects a continuous communication fault on the eWG "A" SENT interface. The diagnostic monitors the SENT message in respect to message pulses and timing validity. In series applications, turbocharger 'A' is the first turbocharger in the direction of exhaust flow. In parallel applications, turbocharger 'A' is associated with engine bank 1.	SENT Mesage Faults SENT Mesage age	> 0 ent >3.13 ms	Diagnostic enabled and Sent Interface used Powertrain relay voltage Engine does not crank Diagnostic system not disabled	[illegible]	10 failures out of 12 samples 100ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with Fuel Temperature Sensor A	U0670	This DTC determines if the SENT signal shorted low, this is determined by monitoring the number pulses on the SENT signal line received at the ECU and the SENT Signal Line State always indicating high.	The number pulses on the SENT signal line SENT Signal Line State	<= 40 = High	SENT Sensor Communication Circuit Diagnostic Enabled SENT power up delay	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with Fuel Temperature Sensor B	U0671	This DTC determines if the SENT signal shorted low, this is determined by monitoring the number pulses on the SENT signal line received at the ECU and the SENT Signal Line State always indicating high.	The number pulses on the SENT signal line SENT Signal Line State	<= 40 = High	SENT Sensor Communication Circuit Diagnostic Enabled SENT power up delay	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with Engine Coolant Pump	U0672	This DTC monitors for a loss of communication on the LIN bus with the Engine Coolant Pump	Message is not received from controller for MWP_Rsp_0F_C05	>= 250.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Actuator relay is powered Or Powertrain Relay is on and powertrain relay state feedback is enabled All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable	Enabled Enabled Disabled >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	LIN bus communication executes in 500ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					mode: OBDII			
					IfOBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Fuel Rail Pressure Sensor Bankl Sensor 2	U101B	This DTC determines if the SENT signal shorted low, this is determined by monitoring the number pulses on the SENT signal line received at the ECU and the SENT Signal Line State always indicating high.	The number pulses on the SENT signal line SENT Signal Line State	<= 40 = High	SENT Sensor Communication Circuit Diagnostic Enabled SENT power up delay	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with Engine Coolant Bypass Valve D	U111A	This DTC monitors for a loss of communication on the LIN bus with Engine Coolant Bypass Valve D	Message is not received from controller for BRV_Rsp_29_C05	 >= 250.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Actuator relay is powered Or Powertrain Relay is on and powertrain relay state feedback is enabled All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable	 Enabled Enabled Disabled >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	LIN bus communication executes in 500ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					mode: OBDII			
					IfOBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with EVAP Purge Pump	U111E	This DTC monitors for a loss of communication on the LIN bus with the EVAP Purge Pump	Message is not received from controller for EVAPP_Rsp_01_C05	>= 250.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Actuator relay is powered Or Powertrain Relay is on and powertrain relay state feedback is enabled All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltaae disable	 Enabled Enabled Disabled >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					mode: OBDII IfOBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	 >=11.00 Volts >=9.00 Volts > 15,000.00 milliseconds >8.41 Volts >= 6.41 Volts Enabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Control Module LIN Bus 1	U1345	This DTC monitors for a LIN bus off condition on LIN Bus 1.	Loss of Communication Method:		Loss of Communication Method:		Dependent on bus loading.	Type B, 2 Trips
			The total number of diagnostic enabled slave nodes on LIN Bus 1	= Total number of slave nodes on LIN Bus 1 that have reported lost communications DTCs	Diagnostic is enabled	Enabled		
					LIN channel is enabled	Enabled		
					LIN module is initialized			
			Or		The following criteria have been enabled for:	>= 3,000.00 milliseconds		
			LIN channel Wakeup Method:		LIN channel is requesting full communications			
			LIN channel wakeup repetition counter	>= 10.00 counts	Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					IfOBDII:			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		
					LIN channel Wakeup Method:			
					Diagnostic is enabled	Enabled		
					LIN channel is enabled	Enabled		

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or	> 15,000.00 milliseconds		
					Run/Crank ignition voltage	>8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown 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 Ilium.
					full communications			
					LIN module is initialized			
					The following criteria have been enabled for:	>= 3,000.00 milliseconds		
					Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<=18.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Control Module LIN Bus 4	U1348	This DTC monitors for a LIN bus 4 off condition.	Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus 4 Or LIN channel Wakeup Method: LIN channel wakeup repetition counter	 = Total number of slave nodes on LIN Bus 4 that have reported lost communications DTCs >= 10.00 counts	Loss of Communication Method: Diagnostic is enabled LIN channel is enabled LIN module is initialized The following criteria have been enabled for: LIN channel is requesting full communications Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII IfOBDII:	 Enabled Enabled >= 3,000.00 milliseconds >11.00 Volts <=18.00 Volts	Dependent on bus loading.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		
					LIN channel Wakeup Method:			
					Diagnostic is enabled	Enabled		
					LIN channel is enabled	Enabled		
					LIN channel is requesting			

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Fuel Pump Driver Control Module	U18A2	This DTC monitors for a loss of communication with the Fuel Pump Driver Control Module.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $0C3	>10,000.00 milliseconds				
					If message is on Bus A:			
			Message $0C4	> 4,000.00 milliseconds	U0073 not active			
					If message is on Bus B:			
			Message $0CB	>10,000.00 milliseconds	U0074 not active			
					If message is on Bus S:			
			Message $0CC	>10,000.00 milliseconds	U0076 not active			
					CAN channel is			
			Message $1E6	>10,000.00 milliseconds	requesting full communications			
			Message $2C1	> 1,131.25 milliseconds	Normal CAN transmission on Bus is enabled			
			Message $2D7	>10,000.00 milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
			Message $2D9	>10,000.00 milliseconds	Accessory mode to off mode not pending			
			Message $3EC	>10,000.00 milliseconds	Battery voltage	>11.00 Volts		
					Conroller is an OBD			
			Message $3EE	>10,000.00 milliseconds	controller Or			
					Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With DC/DC Converter Control Module on Bus B	U18A7	This DTC monitors for a loss of communication with the DC/DC Converter Control Module on Bus B.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $0A0:	>10,000.00 milliseconds				
			Message $1D2:	>10,000.00 milliseconds	If message is on Bus A: U0073 not active			
					If message is on Bus B: U0074 not active			
					If message is on Bus S: U0076 not active			
					CAN channel is requesting full communications			
					Normal CAN transmission on Bus is enabled			
					If bus type is Sensor Bus, sensor bus relay is on			
					Accessory mode to off mode not pending			
					Battery voltage	>11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<=18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>=9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds >8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
CGM Lost Communication with ECM	U18D5	This DTC monitors for a CGM Lost Communication with ECM error as determined by the CGM	A corresponding index within the CGM Diagnostic Status Message Signal indicates that the CGM Lost Communication with ECM DTC has set in the CGM. See CGM summary pages for more information.		General Enable Criteria: The corresponding index within the CGM Diagnostic Status Message Signal Central Gateway Module ECM	 is being received is present on the bus is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
CGM Lost Communication with TCM	U18D7	This DTC monitors for a CGM Lost Communication with TCM error as determined by the CGM	A corresponding index within the CGM Diagnostic Status Message Signal indicates that the CGM Lost Communication with TCM DTC has set in the CGM. See CGM summary pages for more information.		General Enable Criteria: The corresponding index within the CGM Diagnostic Status Message Signal Central Gateway Module TCM	 is being received is present on the bus is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
CGM Lost Communication with BSCM1	U18DC	This DTC monitors for a CGM Lost Communication with BSCM1 error as determined by the CGM	A corresponding index within the CGM Diagnostic Status Message Signal indicates that the CGM Lost Communication with BSCM1 DTC has set in the CGM. See CGM summary pages for more information.		General Enable Criteria: The corresponding index within the CGM Diagnostic Status Message Signal Central Gateway Module BSCM1	 is being received is present on the bus is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Central Gateway Module High Speed CAN Bus Off	U2413	This DTC monitors for a Central Gateway Module High Speed CAN Bus Off error as determined by the CGM	A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module High Speed CAN Bus Off DTC has set in the CGM. See CGM summary pages for more information.		General Enable Criteria: The corresponding index within the CGM Diagnostic Status Message Signal Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Initial Supporting table - CalculatedPerfMaxEd

Description: Maximum desired camshaft position for Exhaust CAM - Bankl

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 6'400 6800]

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
2	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
3	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
4	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
5	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
6	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
7	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
8	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
9	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
10	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
11	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
12	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
13	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
14	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
15	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
16	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
17	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0

Initial Supporting table - CalculatedPerfMaxId

Description: Maximum desired camshaft position for Intake CAM - Bankl

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 6'400 6800]

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
2	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
3	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
4	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
5	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
6	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
7	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
8	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
9	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
10	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
11	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
12	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
13	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
14	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
15	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
16	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
17	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0

Initial Supporting table - FastFailTempDiff

Description: EOT Sensor Cold Start Fast Fail Threshold

Value Units: Threshold between power-up engine oil temperature and power-up engine coolant temperature (Deg C)
X Unit: PowerUp coolant temperature (deg C)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	80.0	80.0	80.0	60.0	60.0	40.0	40.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

Initial Supporting table - P0196_TotalAccumulatedFlow

Description: Total accumulated air consumed by engine since engine start as a function of powerup undefaulted Oil Temperature

Value Units: Minimum accumulated (total) air grams consumed by engine (gram)
X Unit: PowerUp coolant temperature (deg C)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	15,000	14,000	13,000	12,000	11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	5,000	4,000	3,000	3,000	3,000

Initial Supporting table - Maximum number of iterations allowed for torque solver

Description: Maximum number of iterations allowed for torque solver versus controller identifier name

Value Units: Number of iterations allowed
X Unit: Controller identifier enumeration name.
Y Units: Number of iterations allowed, integer values.

Maximum number of iterations allowed for torque solver - Part 1

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	30	30	30	30	30	15	30	30	30	30	30	30	30	30	30	30	30	30	30	15	30	15	30

Maximum number of iterations allowed for torque solver - Part 2

y/x	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	
1	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	

Initial Supporting table - P0128 Maximum Acculated Energy - Primary

Description: KtETHD_E_EOR_WrmUpEnrgyLimTestO

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

y/x	-20.0	-10.0	0.0	10.0	20.0	30.0	40.0
1.0	35,000.0	29,000.0	23,500.0	19,000.0	15,500.0	13,000.0	11,000.0

Initial Supporting table - P0128 Maximum Acculated Energy - Secondary

Description: KtETHD_E_EOR_WrmUpEnrgyLimTest1

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

y/x	-20.0	-10.0	0.0	10.0	20.0	30.0	40.0
1.0	35,000.0	29,000.0	23,500.0	19,000.0	15,500.0	13,000.0	11,000.0

Initial Supporting table - P0128 Maximum Acculated Energy - Tertiary

Description: KtETHD_E_EOR_WrmUpEnrgyLimTest2

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

y/x	-20.0	-10.0	0.0	10.0	20.0	30.0	40.0
1.0	35,000.0	29,000.0	23,500.0	19,000.0	15,500.0	13,000.0	11,000.0

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	0.67	1.00
-9.0	28.0	28.0	28.0	28.0	28.0
0.0	28.0	28.0	28.0	28.0	28.0
10.0	20.0	20.0	20.0	20.0	20.0
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 - P0234 P0299: Desired torque minimum limit overAmbient pressure to enable the WG deviation diagnosis.

Description: Desired torque minimum limit overAmbient pressure to enable the WG deviation diagnosis.

Value Units: [M] Engine torque threshold
X Unit: [p] KnBSTD_p_WG_DevAmbAirPresBP - Ambient pressure

y/x	60	80	100
1	220	230	240

Initial Supporting table - P0234 P0299: Engine speed minimum limit over Ambient pressure to enable the WG deviation diagnosis.

Description: Engine speed minimum limit over Ambient pressure to enable the WG deviation diagnosis.

Value Units: [rpm] Engine speed threshold
X Unit: [p] KnBSTD_p_WG_DevAmbAirPresBP - Ambient pressure

y/x	60	80	100
1	2,000	1,750	1,500

Supporting table - P0234 P0299: Wastegate position deviation diagnostic enable delay as a function of engine speed and ambient pressure

Description: Timer to stabilize enable conditions for wastegate position deviation diagnosis.

Value Units: [sec] Pressure control deviation diagnosis enable delay.
X Unit: [rpm] KnBSTD_n_WG_DevEngSpdBP - Engine Speed
Y Units: [kPa] KnBSTD_p_WG_DevAmbAirPresBP - Ambient Pressure

y/x	1,500	2,300	3,100	3,900	4,700	5,500	6,300
60	2	1	1	1	1	1	1
80	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1

Initial Supporting table - P0299: Additive offset on WG negative deviation ambient correction.

Description: Additive offset on WG negative deviation ambient correction.

Value Units: [Pct] Position deviation ambient correction
X Unit: [kPa] KnBSTD_p_WG_DevAmbAirPresBP - Ambient Air Pressure
Y Units: [rpm] KnBSTD_n_WG_DevEngSpdBP - Engine Speed

y/x	60.0	80.0	100.0
1,500.0	0.0	0.0	0.0
2,300.0	0.0	0.0	0.0
3,100.0	0.0	0.0	0.0
3,900.0	0.0	0.0	0.0
4,700.0	0.0	0.0	0.0
5,500.0	0.0	0.0	0.0
6,300.0	0.0	0.0	0.0

Initial Supporting table - P0299: WG negative deviation fail threshold over engine speed and desired torque.

Description: WG negative deviation fail threshold over engine speed and desired torque.

Value Units: [Pct] Position deviation threshold
X Unit: [M] KnBSTD_M_WG_DevDsrdTrqBP - Desired Torque
Y Units: [rpm] KnBSTD_n_WG_DevEngSpdBP - Engine Speed

y/x	220	250	280	310	340	370
1,500	-20	-19	-19	-18	-18	-18
2,300	-19	-19	-18	-18	-17	-17
3,100	-19	-18	-18	-18	-17	-17
3,900	-19	-18	-18	-18	-17	-17
4,700	-19	-18	-18	-18	-17	-17
5,500	-18	-17	-17	-17	-17	-17
6,300	-18	-17	-17	-17	-17	-17

Initial Supporting table - P0446 canister vent restriction test displaced purge volume limit

Description: Canister vent restriction diagnostic displaced purge volume (liters) as a function of barometric pressure (kPa)

Value Units: Displaced purge volume (Liters)
X Unit: Barometric pressure (kPa)

y/x	70	80	90	100	110
1	12.0	12.0	12.0	12.0	12.0

Initial Supporting table - P0446 canister vent restriction test tank vacuum threshold

Description: Canister vent restriction diagnostic vacuum failure threshold (Pa) as a function of barometric pressure (kPa)

Value Units: Vacuum (Pa)
X Unit: Barometric pressure (kPa) - 70, 80, 90, 100, 110 kPa

y/x	1	2	3	4	5
1	3,000	3,000	3,000	3,000	3,000

Initial Supporting table - P0455 large leak diagnostic displaced purge volume threshold

Description: Large leak diagnostic displaced purge volume threshold as a function of barometric pressure

Value Units: Displaced purge volume threshold (liters)
X Unit: Barometric pressure (kPa)

y/x	70	80	90	100	110
1	10.0	10.0	10.0	10.0	10.0

Initial Supporting table - P0455 large leak diagnostic tank vacuum threshold

Description: Large leak diagnostic tank vacuum threshold as a function of barometric pressure

Value Units: Vacuum (Pa)
X Unit: Barometric pressure (kPa)

y/x	1	2	3	4	5
1	2,000	2,000	2,000	2,000	2,000

Initial Supporting table - P0496 purge valve leak diagnostic vacuum threshold

Description: Purge valve leak diagnostic vacuum failure threshold (Pa) as a function of barometric pressure (kPa)

Value Units: Vacuum (Pa)
X Unit: Barometric pressure (kPa)

y/x	1	2	3	4	5
1	2,500	2,500	2,500	2,500	2,500

Initial Supporting table - P0496 purge valve leak test times as a function of fuel level and barometric pressure

Description: Purge valve leak test time as a function of fuel level (%) and barometric pressures (kPa)

Value Units: Time (Seconds)
X Unit: Barometric pressure (kPa)
Y Units: Fuel level (%)

y/x	70	80	90	100	110
0	75	75	75	75	75
6	74	74	74	74	74
13	73	73	73	73	73
19	71	71	71	71	71
25	70	70	70	70	70
31	69	69	69	69	69
38	68	68	68	68	68
44	66	66	66	66	66
50	65	65	65	65	65
56	64	64	64	64	64
63	63	63	63	63	63
69	61	61	61	61	61
75	60	60	60	60	60
81	59	59	59	59	59
88	58	58	58	58	58
94	56	56	56	56	56
100	55	55	55	55	55

Initial Supporting table - P0521_CVDOP_MaxOilPressure

Description: Maximum oil pressure threshold.

X Unit: Engine Speed, RPM

y/x	40	50	60	70	80	90	100	110	120
1,000	610	610	610	610	610	610	610	610	610
1,500	610	610	610	610	610	610	610	610	610
2,000	610	610	610	610	610	610	610	610	610
2,500	610	610	610	610	610	610	610	610	610
3,000	610	610	610	610	610	610	610	610	610
3,500	610	610	610	610	610	610	610	610	610
4,000	610	610	610	610	610	610	610	610	610
4,500	610	610	610	610	610	610	610	610	610
5,000	610	610	610	610	610	610	610	610	610

Initial Supporting table - P0521_CVDOP_MinOilPresFail

Description: Minimum Oil Pressure fail Threshold

X Unit: Engine Speed (RPM)

y/x	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000
1	73	73	73	83	98	108	113	113	169

Initial Supporting table - P06DD_CVDOP_MaxDesPress

Description: The maximum desired pressure, above which the stuck diagnostic will be disabled.

Value Units: Desired oil pressure, kPa
X Unit: Engine oil temperature, °C

y/x	-20	0	20	40	60	80	100	120	140
1	508	432	408	408	408	408	408	408	408

Initial Supporting table - P06DD_CVDOP_MaxPressErr

Description: Error threshold to set the oil pump performance fault.

Value Units: Absolute Oil Pressure Error, kPa
X Unit: Engine Speed, RPM
Y Units: Engine oil temperature, °C

y/x	600	1,000	1,500	2,000	3,000	4,200	4,201	5,000	6,000
-20	120	120	110	100	90	80	80	70	70
0	105	105	100	90	80	70	70	60	60
20	100	100	90	65	65	60	60	60	60
40	50	50	50	50	50	53	70	55	55
60	50	50	50	50	50	53	70	55	55
80	50	50	50	50	50	53	70	55	55
100	60	50	50	50	50	53	75	55	55
120	50	50	50	50	50	53	75	55	55
140	50	50	50	50	50	53	80	55	55

Initial Supporting table - P06DD_CVDOP_MinDesPres

Description: The minimum desired pressure, below which the stuck diagnostic will be disabled.

Value Units: Desired oil pressure, kPa
X Unit: Engine oil temperature, °C

y/x	-20	0	20	40	60	80	100	120	140
1	200	200	175	145	145	145	145	145	145

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	0.06	0.06	0.06	0.06	0.06

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	0.05	0.05	0.05	0.05	0.05

Initial Supporting table - P219A Quality Factor Bankl Table

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

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

y/x	600	920	1,240	1,560	1,880	2,200	2,520	2,840	3,160	3,480	3,800	4,120	4,440	4,760	5,080	5,400	5,720
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
240	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
280	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
360	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
440	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
480	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
640	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
680	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 - P26CE Pump Overspeed Fail Threshold

Description:

Value Units: Pump overspeed failure threshold (RPM)
X Unit: Commanded pump speed (RPM)

y/x	0	300	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
1	-200	-200	-200	-200	-300	-400	-500	-600	-700	-800

Initial Supporting table - P26CE Pump Overspeed Fail Threshold Low Voltage

Description: Pump overspeed failure threshold in a low voltage condition as a function of pump requested speed

Value Units: Pump overspeed failure threshold low voltage (RPM)
X Unit: Commanded pump speed (RPM)

y/x	0	300	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
1	-9,999	-9,999	-9,999	-9,999	-9,999	-9,999	-9,999	-9,999	-9,999	-9,999

Initial Supporting table - P2B85 Pump Underspeed Fail Threshold

Description: Pump underspeed failure threshold as a function of pump requested speed

Value Units: Pump underspeed failure threshold (RPM)
X Unit: Commanded pump speed (RPM)

y/x	0	300	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
1	200	200	200	200	300	400	500	600	700	800

Initial Supporting table - P2B85 Pump Underspeed Fail Threshold Low Voltage

Description: Pump underspeed failure threshold in a low voltage condition as a function of pump requested speed

Value Units: Pump underspeed failure threshold low voltage (RPM)
X Unit: Commanded pump speed (RPM)

y/x	0	300	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
1	9,999	9,999	9,999	9,999	9,999	9,999	9,999	9,999	9,999	9,999

Initial Supporting table - P3075 3076 Pump Current Performance Coolant Distribution Mode

Description: Current performance intrusive test enable condition as a function of coolant distribution mode selection

Value Units: Coolant distribution mode selection to enable diagnostic
X Unit: Coolant distribution mode enumeration

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

Initial Supporting table - P3075 3076 Pump Current Performance Coolant System Mode Select

Description: Current performance intrusive test enable condition as a function of coolant system mode selection

Value Units: Coolant system mode selection to enable diagnostic
X Unit: Coolant System Mode Enumeration

y/x	0	1	2	3	4	5	6	7	8	9	10
1	0	0	0	1	0	0	0	0	1	1	1

Initial Supporting table - P3075 3076 Pump Current Scaled

Description: Pump current scaled based on engine inlet coolant temperature

Value Units: Pump current scaled (A)
X Unit: Engine inlet coolant temperature (Deg C)

y/x	40	50	60	70	80	90	100	110	120	130
1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - P3075 Pump Low Current Passive Test Fail Threshold

Description: Low current passive test failure threshold as a function of pump command speed and flow restriction

Value Units: Pump passive test low current failure threshold (A)
X Unit: Coolant Flow Restriction (Unitless)
Y Units: Commanded Pump Speed (RPM)

y/x	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
810	1	1	3	3	3	3	3	3	3	3
1,000	1	1	3	3	3	3	3	3	3	3
1,250	1	1	3	3	3	3	3	3	4	4
1,600	1	1	4	4	4	4	4	5	5	5
2,000	1	1	5	5	5	6	6	6	6	6
2,500	1	1	7	7	8	8	9	9	9	9
3,000	1	1	9	10	11	12	12	13	13	13
4,000	1	1	15	17	18	19	20	21	22	22
5,000	1	1	23	25	27	30	31	33	34	34
6,180	1	1	35	39	42	46	48	50	52	52

Initial Supporting table - P3075 Pump Low Current Performance Failure Threshold

Description: Low current performance failure threshold as a function of coolant restriction correction

Value Units: Pump low current failure threshold (A)
X Unit: Coolant restriction correction

y/x	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
1	1.0	1.0	15.2	16.6	17.9	19.9	20.7	21.7	22.6	23.0

Initial Supporting table - P3076 Pump High Current Passive Test Fail Threshold

Description: High current passive test failure threshold as a function of pump command speed and flow restriction

Value Units: Pump passive test high current failure threshold (A)
X Unit: Coolant Flow Restriction (Unitless)
Y Units: Commanded Pump Speed (RPM)

y/x	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
810	80	80	4	4	4	4	5	5	5	5
1,000	80	80	4	4	5	5	5	5	5	5
1,250	80	80	5	5	5	5	5	6	6	6
1,600	80	80	6	6	6	7	7	7	8	8
2,000	80	80	8	8	9	9	10	10	10	10
2,500	80	80	10	11	12	13	14	14	15	15
3,000	80	80	14	15	16	18	19	19	20	21
4,000	80	80	23	25	27	30	31	32	34	35
5,000	80	80	35	38	42	46	48	50	52	54
6,180	80	80	54	59	64	71	74	78	80	80

Initial Supporting table - P3076 Pump High Current Performance Failure Threshold

Description:

Value Units: Pump high current failure threshold (A)
X Unit: Coolant restriction correction

y/x	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
1	80.0	80.0	22.9	24.9	26.9	29.8	31.1	32.5	33.9	34.6

Initial Supporting table - Purge Pump Diagnostic IAT Multiplier Factor

Description: Purge pump diagnostic IAT multiplier factor as a function of intake air temperature (deg C)

Value Units: Purge pump diagnostic IAT multiplier factor (unitless)
X Unit: Intake air temperature (deg C)

y/x	-40	-20	0	20	40	60	80	100	120
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - Purge Pump Misassembled Failure Threshold

Description: Misassembled failure threshold (kPa) as a function of barometric pressure (kPa) and purge pump speed (RPM)

Value Units: Misassembled failure threshold (kPa)
X Unit: Barometric pressure (kPa)
Y Units: Purge pump speed (RPM)

y/x	70	80	90	100	110
35,000	0.5	0.5	0.5	0.5	0.5
36,000	0.5	0.5	0.5	0.5	0.5
37,000	0.6	0.6	0.6	0.6	0.6
38,000	0.6	0.6	0.6	0.6	0.6
39,000	0.6	0.6	0.6	0.6	0.6
40,000	0.7	0.7	0.7	0.7	0.7
41,000	0.7	0.7	0.7	0.7	0.7
42,000	0.7	0.7	0.7	0.7	0.7
43,000	0.8	0.8	0.8	0.8	0.8
44,000	0.8	0.8	0.8	0.8	0.8
45,000	0.8	0.8	0.8	0.8	0.8
46,000	0.9	0.9	0.9	0.9	0.9
47,000	0.9	0.9	0.9	0.9	0.9
48,000	0.9	0.9	0.9	0.9	0.9
49,000	1.0	1.0	1.0	1.0	1.0
50,000	1.0	1.0	1.0	1.0	1.0
51,000	1.1	1.1	1.1	1.1	1.1

Initial Supporting table - Purge pump performance high flow ratio threshold

Description: Purge pump flow ratio = estimated purge flow as func(pressure across purge solenoid valve) / failure threshold purge flow as func(purge valve duty cycle, barometric pressue)

Value Units: Purge pump flow ratio (unitless)
X Unit: Barometric pressure (kPa)
Y Units: Purge solenoid duty cycle (Percent)

y/x	70	80	90	100	110
0	14.4	16.2	18.0	20.1	21.7
6	14.4	16.2	18.0	20.1	21.7
12	14.4	16.2	18.0	20.1	21.7
18	14.4	16.2	18.0	20.1	21.7
24	14.4	16.2	18.0	20.1	21.7
30	14.4	16.2	18.0	20.1	21.7
36	14.4	16.2	18.0	20.1	21.6
42	14.3	16.1	17.9	20.0	21.6
48	14.2	16.0	17.8	19.8	21.4
54	14.1	15.9	17.6	19.6	21.2
60	13.9	15.7	17.4	19.4	20.9
66	13.7	15.4	17.2	19.1	20.6
72	13.5	15.2	16.9	18.8	20.2
78	13.3	14.9	16.6	18.4	19.9
84	13.0	14.6	16.2	18.0	19.5
90	12.7	14.2	15.8	17.6	19.2
100	12.2	13.7	15.2	16.9	18.6

Initial Supporting table - Purge pump performance low flow ratio threshold

Description: Purge pump flow ratio = Estimated purge flow as func(pressure across purge solenoid valve) / failure threshold purge flow as func(purge valve duty cycle, barometric pressure)

Value Units: Purge pump flow ratio (unitless)
X Unit: Barometric pressure (kPa)
Y Units: Purge solenoid duty cycle (Percent)

y/x	70	80	90	100	110
0	2.2	2.3	2.4	2.5	2.6
6	2.1	2.2	2.3	2.4	2.5
12	2.0	2.1	2.2	2.3	2.4
18	1.9	2.0	2.2	2.3	2.4
24	1.9	2.0	2.1	2.2	2.3
30	1.8	1.9	2.0	2.1	2.2
36	1.7	1.8	1.9	2.0	2.1
42	1.6	1.7	1.8	1.9	2.1
48	1.5	1.6	1.7	1.9	2.0
54	1.4	1.5	1.7	1.8	1.9
60	1.3	1.5	1.6	1.7	1.8
66	1.2	1.4	1.5	1.6	1.7
72	1.2	1.3	1.4	1.5	1.7
78	1.1	1.2	1.3	1.5	1.6
84	1.0	1.1	1.2	1.4	1.5
90	0.9	1.0	1.2	1.3	1.4
100	0.9	1.0	1.2	1.3	1.4

Initial Supporting table - Purge pump speed on value too high

Description: Purge pump speed (RPM) error limit as a function of purge pump voltage (volts)

Value Units: Purge pump speed (RPM)
X Unit: Purge pump voltage (volts)

y/x	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000

Initial Supporting table - Purge pump speed on value too low

Description: Purge pump speed (RPM) error limit as a function of purge pump voltage (volts)

Value Units: Purge pump speed (RPM)
X Unit: Purge pump voltage (volts)

y/x	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	29,400	29,400	29,400	32,100	34,700	36,700	38,600	39,300	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000

Initial Supporting table - Purge System High Purge Flow Enable

Description: Purge gas flow ratio (unitless) as a function of barometric pressure (kPa)

Value Units: Purge pump flow ratio (unitless)
X Unit: Barometric pressure (kPa)

y/x	1	2	3	4	5
1	1.1	1.1	1.1	1.1	1.1
2	1.1	1.1	1.1	1.1	1.1
3	1.1	1.1	1.1	1.1	1.1
4	1.1	1.1	1.1	1.1	1.1
5	1.1	1.1	1.1	1.1	1.1
6	1.1	1.1	1.1	1.1	1.1
7	1.1	1.1	1.1	1.1	1.1
8	1.1	1.1	1.1	1.1	1.1
9	1.1	1.1	1.1	1.1	1.1
10	1.1	1.1	1.1	1.1	1.1
11	1.1	1.1	1.1	1.1	1.1
12	1.1	1.1	1.1	1.1	1.1
13	1.1	1.1	1.1	1.1	1.1
14	1.1	1.1	1.1	1.1	1.1
15	1.1	1.1	1.1	1.1	1.1
16	1.1	1.1	1.1	1.1	1.1
17	1.1	1.1	1.1	1.1	1.1

Initial Supporting table - Purge System High Purge Flow Remain Enabled

Description: Purge gas flow ratio (unitless) as a function of barometric pressure (kPa)

Value Units: Purge pump flow ratio (unitless)
X Unit: Barometric pressure (kPa)

y/x	1	2	3	4	5
1	1.2	1.2	1.2	1.2	1.2
2	1.2	1.2	1.2	1.2	1.2
3	1.2	1.2	1.2	1.2	1.2
4	1.2	1.2	1.2	1.2	1.2
5	1.2	1.2	1.2	1.2	1.2
6	1.2	1.2	1.2	1.2	1.2
7	1.2	1.2	1.2	1.2	1.2
8	1.2	1.2	1.2	1.2	1.2
9	1.2	1.2	1.2	1.2	1.2
10	1.2	1.2	1.2	1.2	1.2
11	1.2	1.2	1.2	1.2	1.2
12	1.2	1.2	1.2	1.2	1.2
13	1.2	1.2	1.2	1.2	1.2
14	1.2	1.2	1.2	1.2	1.2
15	1.2	1.2	1.2	1.2	1.2
16	1.2	1.2	1.2	1.2	1.2
17	1.2	1.2	1.2	1.2	1.2

Initial Supporting table - Purge System Low Purge Flow Enable

Description: Purge gas flow ratio (unitless) as a function of barometric pressure (kPa)

Value Units: Purge pump flow ratio (unitless)
X Unit: Barometric pressure (kPa)

y/x	1	2	3	4	5
1	-0.1	-0.1	-0.1	-0.1	-0.1
2	-0.1	-0.1	-0.1	-0.1	-0.1
3	-0.1	-0.1	-0.1	-0.1	-0.1
4	-0.1	-0.1	-0.1	-0.1	-0.1
5	-0.1	-0.1	-0.1	-0.1	-0.1
6	-0.1	-0.1	-0.1	-0.1	-0.1
7	-0.1	-0.1	-0.1	-0.1	-0.1
8	-0.1	-0.1	-0.1	-0.1	-0.1
9	-0.1	-0.1	-0.1	-0.1	-0.1
10	-0.1	-0.1	-0.1	-0.1	-0.1
11	-0.1	-0.1	-0.1	-0.1	-0.1
12	-0.1	-0.1	-0.1	-0.1	-0.1
13	-0.1	-0.1	-0.1	-0.1	-0.1
14	-0.1	-0.1	-0.1	-0.1	-0.1
15	-0.1	-0.1	-0.1	-0.1	-0.1
16	-0.1	-0.1	-0.1	-0.1	-0.1
17	-0.1	-0.1	-0.1	-0.1	-0.1

Initial Supporting table - Purge System Low Purge Flow Remain Enabled

Description: Purge gas flow ratio (unitless) as a function of barometric pressure (kPa)

Value Units: Purge pump flow ratio (unitless)
X Unit: Barometric pressure (kPa)

y/x	1	2	3	4	5
1	-0.2	-0.2	-0.2	-0.2	-0.2
2	-0.2	-0.2	-0.2	-0.2	-0.2
3	-0.2	-0.2	-0.2	-0.2	-0.2
4	-0.2	-0.2	-0.2	-0.2	-0.2
5	-0.2	-0.2	-0.2	-0.2	-0.2
6	-0.2	-0.2	-0.2	-0.2	-0.2
7	-0.2	-0.2	-0.2	-0.2	-0.2
8	-0.2	-0.2	-0.2	-0.2	-0.2
9	-0.2	-0.2	-0.2	-0.2	-0.2
10	-0.2	-0.2	-0.2	-0.2	-0.2
11	-0.2	-0.2	-0.2	-0.2	-0.2
12	-0.2	-0.2	-0.2	-0.2	-0.2
13	-0.2	-0.2	-0.2	-0.2	-0.2
14	-0.2	-0.2	-0.2	-0.2	-0.2
15	-0.2	-0.2	-0.2	-0.2	-0.2
16	-0.2	-0.2	-0.2	-0.2	-0.2
17	-0.2	-0.2	-0.2	-0.2	-0.2

Initial Supporting table - TimeForOilAeration

Description: The timer limit to declare an engine oil aeration condition exists.

X Unit: Engine oil temperature (deg C)

y/x	-40	-20	0	25	35	60	80	100	120	130	140
1	30	30	30	30	30	30	30	30	30	30	30

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	680	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	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000

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	680	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	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.600	0.561	0.520	0.473	0.428	0.369	0.369	0.369	0.369	0.369

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	680	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	2.199	2.178	2.148	2.143	2.113	2.102	2.102	2.102	2.102	2.102	2.102	2.102	2.102	2.102	2.102	2.102	2.102

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	680	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Initial Supporting table - P0331_AbnormalLo2

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

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.413	0.413	0.413	0.413	0.413	0.361	0.299	0.222	0.180	0.144	0.122	0.114	0.114	0.114	0.114	0.114	0.114

Initial Supporting table - P0331_AbnormalLoAFM_2

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

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.413	0.413	0.413	0.413	0.413	0.361	0.299	0.222	0.180	0.144	0.122	0.114	0.114	0.114	0.114	0.114	0.114

Initial Supporting table - P04DB: Crankcase Pressure Noise Normalization for Engine Speed, high case

Description: Value to normalize the Crankcase Pressure signal noise based on engine speed, high case

Value Units: Scaling Factor for Noise (Unitless)
X Unit: Engine Speed (RPM)
Y Units: None

y/x	500	800	1,100	1,400	1,700	2,000	2,300	2,600	2,700
1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00

Initial Supporting table - P04DB: Crankcase Pressure Noise Normalization for Engine Speed, low case

Description: Value to normalize the Crankcase Pressure signal noise based on engine speed, low case

Value Units: Scaling Factor for Noise (Unitless)
X Unit: Engine Speed (RPM)
Y Units: None

y/x	500	800	1,100	1,400	1,700	2,000	2,300	2,600	2,700
1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00

Initial Supporting table - P04DB: Crankcase Pressure Signal Normalization for Air Flow, high case

Description: Value to normalize the Crankcase Pressure signal based on engine air flow, low case

Value Units: Scaling Factor for Signal (Unitless)
X Unit: Engine Air Flow (Grams/Second)
Y Units: None

y/x	10	15	20	25	30	35	40	45	50
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - P04DB: Crankcase Pressure Signal Normalization for Air Flow, low case

Description: Value to normalize the Crankcase Pressure signal based on engine air flow, low case

Value Units: Scaling Factor for Signal (Unitless)
X Unit: Engine Air Flow (Grams/Second)
Y Units: None

y/x	10	15	20	25	30	35	40	45	50
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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	680	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	0.246	0.270	0.270	0.289	0.279	0.320	0.400	0.471	0.529	0.680	0.850	1.189	1.199	1.400	1.600	1.801	2.000

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	680	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	0.000	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 - 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	200	250	300	350	400	450	500	550	600
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	200	250	300	350	400	450	500	550	600
0	30	38	45	53	60	68	75	83	90
2	30	38	45	53	60	68	75	83	90
3	30	38	45	53	60	68	75	83	90
5	30	38	45	53	60	68	75	83	90
6	30	38	45	53	60	68	75	83	90
8	30	38	45	53	60	68	75	83	90
9	30	38	45	53	60	68	75	83	90
11	30	38	45	53	60	68	75	83	90
12	30	38	45	53	60	68	75	83	90
14	30	38	45	53	60	68	75	83	90
15	30	38	45	53	60	68	75	83	90
17	30	38	45	53	60	68	75	83	90
18	30	38	45	53	60	68	75	83	90
20	30	38	45	53	60	68	75	83	90
21	30	38	45	53	60	68	75	83	90
23	30	38	45	53	60	68	75	83	90
24	30	38	45	53	60	68	75	83	90
26	30	38	45	53	60	68	75	83	90
27	30	38	45	53	60	68	75	83	90
29	30	38	45	53	60	68	75	83	90
30	30	38	45	53	60	68	75	83	90
32	30	38	45	53	60	68	75	83	90
33	30	38	45	53	60	68	75	83	90
35	30	38	45	53	60	68	75	83	90
36	30	38	45	53	60	68	75	83	90
38	30	38	45	53	60	68	75	83	90
39	30	38	45	53	60	68	75	83	90
41	30	38	45	53	60	68	75	83	90
42	30	38	45	53	60	68	75	83	90
44	30	38	45	53	60	68	75	83	90
45	30	38	45	53	60	68	75	83	90

Initial Supporting table - P•2635 Threshold High

47	30	38	45	53	60	68	75	83	90
48	30	38	45	53	60	68	75	83	90

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	200	250	300	350	400	450	500	550	600
0	-490	-440	-390	-340	-290	-240	-190	-140	-90
2	-490	-440	-390	-340	-290	-240	-190	-140	-90
3	-490	-440	-390	-340	-290	-240	-190	-140	-90
5	-490	-440	-390	-340	-290	-240	-190	-140	-90
6	-490	-440	-390	-340	-290	-240	-190	-140	-90
8	-490	-440	-390	-340	-290	-240	-190	-140	-90
9	-490	-440	-390	-340	-290	-240	-190	-140	-90
11	-490	-440	-390	-340	-290	-240	-190	-140	-90
12	-490	-440	-390	-340	-290	-240	-190	-140	-90
14	-490	-440	-390	-340	-290	-240	-190	-140	-90
15	-490	-440	-390	-340	-290	-240	-190	-140	-90
17	-490	-440	-390	-340	-290	-240	-190	-140	-90
18	-490	-440	-390	-340	-290	-240	-190	-140	-90
20	-490	-440	-390	-340	-290	-240	-190	-140	-90
21	-490	-440	-390	-340	-290	-240	-190	-140	-90
23	-490	-440	-390	-340	-290	-240	-190	-140	-90
24	-490	-440	-390	-340	-290	-240	-190	-140	-90
26	-490	-440	-390	-340	-290	-240	-190	-140	-90
27	-490	-440	-390	-340	-290	-240	-190	-140	-90
29	-490	-440	-390	-340	-290	-240	-190	-140	-90
30	-490	-440	-390	-340	-290	-240	-190	-140	-90
32	-490	-440	-390	-340	-290	-240	-190	-140	-90
33	-490	-440	-390	-340	-290	-240	-190	-140	-90
35	-490	-440	-390	-340	-290	-240	-190	-140	-90
36	-490	-440	-390	-340	-290	-240	-190	-140	-90
38	-490	-440	-390	-340	-290	-240	-190	-140	-90
39	-490	-440	-390	-340	-290	-240	-190	-140	-90
41	-490	-440	-390	-340	-290	-240	-190	-140	-90
42	-490	-440	-390	-340	-290	-240	-190	-140	-90
44	-490	-440	-390	-340	-290	-240	-190	-140	-90
45	-490	-440	-390	-340	-290	-240	-190	-140	-90

Initial Supporting table - P2635 Threshold Low

47	-490	-440	-390	-340	-290	-240	-190	-140	-90
48	-490	-440	-390	-340	-290	-240	-190	-140	-90

Initial Supporting table - P0494_LIN_Threshold

Description: Tabulated LIN Fan1 Speed Low Limits

Value Units: rpm
X Unit: Commanded LIN Fan1 Speed rpm
Y Units: Sensed LIN Fan1 Speed Lower Limit rpm

y/x	0	800	2,750	2,751	2,752	2,753	2,754	2,755	2,756	2,757	2,758	2,759	2,760	2,761	2,762	2,763	2,764
1	0	600	2,540	2,540	2,540	2,540	2,540	2,540	2,540	2,540	2,540	2,540	2,540	2,540	2,540	2,540	2,540

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

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

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

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

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

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

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

Value Units: Grams
X Unit: Acculmulated Engine Airflow

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

Initial Supporting table - 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	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
800	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1,200	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1,600	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,000	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,400	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,800	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
3,200	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
3,600	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,000	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,400	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,800	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
5,200	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
5,600	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,000	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,400	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,800	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Initial Supporting table - P0011_P0021_P05CC_P05CD_EngOilPressEnbllc

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

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

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	8	8	6	4	3	3	3	3	1	1	1	1	1	1	1	2	2

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	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000

Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdLoEnbllc

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	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800

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	200	200	180	160	150	150	150	150	150	150	150	150	150	150	150	150	150

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	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80

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	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmLoDsbllc

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

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

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350

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	8	8	8	4	3	2	2	2	1	1	1	1	1	1	1	2	2

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	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
800	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
1,200	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
1,600	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2,000	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2,400	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2,800	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3,200	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3,600	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4,000	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4,400	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4,800	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5,200	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5,600	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6,000	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6,400	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6,800	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Initial Supporting table - P0014_CamPosErrorLimEc1

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

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

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
800	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1,200	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1,600	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,000	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,400	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2,800	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
3,200	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
3,600	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,000	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,400	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4,800	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
5,200	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
5,600	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,000	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,400	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
6,800	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

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	8	8	6	4	3	3	3	3	1	1	1	1	1	1	1	2	2

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	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000

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	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800

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	200	200	180	160	150	150	150	150	150	150	150	150	150	150	150	150	150

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	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80

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	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450

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	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350

Initial Supporting table - P0014_PO5CE_StablePositionTimeEc1

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

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

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
800	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
1,200	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
1,600	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2,000	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2,400	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2,800	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3,200	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3,600	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4,000	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4,400	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4,800	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5,200	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5,600	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6,000	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6,400	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6,800	100.0	80.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

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

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

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

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	35.0	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	50.0	24.0	14.0	10.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0

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	5.0	10.0	15.0	20.0	25.0	30.0	50.0	80.0
1.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0

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

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

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

y/x	0.0	5.0	10.0	15.0	20.0	25.0	30.0	50.0	80.0
1.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
5.0	-5.0	-2.0	-1.0	0.0	1.0	2.0	3.0	4.0	5.0
10.0	-4.0	-1.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0
20.0	-2.0	-1.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0
30.0	-1.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0
40.0	0.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0
50.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0
60.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
70.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0

Initial Supporting table - P00C4 P2261: Compressor Surge Line

Description: Turbo compressor recirculation valve diagnosis surge area limit.

Value Units: [ratio] CRV diagnosis surge area limit.
X Unit: [g/sec[] KnBSTD_dm_AirFlowBP - Air FLow

y/x	5.00	10.00	25.00	35.00	50.00	85.00
1	1.030	1.190	1.390	1.610	2.060	3.150

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

Description: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix - This table describes combinations of individual model failures that will set P0101, P0106, P010B, P0121, P0236 and P1101 on turbocharged applications.

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

y/x	1	2	3	4	5	6	7	8	9
1	MAF Model	MAPI Model	MAP2 Model	MAP3 Model	TIAP1 Model	TPS Model	TIAP Correlation	TIAP Correlation	DTC Set
2	Failed	Failed	Failed	Failed	Failed	Failed	Failed	Valid	
3	F	F	F	F	F	F	F	F	No DTC
4	F	F	F	F	F	F	F	T	No DTC
5	F	F	F	F	F	F	T	F	No DTC
6	F	F	F	F	F	F	T	T	No DTC
7	F	F	F	F	F	T	F	F	No DTC
8	F	F	F	F	F	T	F	T	No DTC
9	F	F	F	F	F	T	T	F	No DTC
10	F	F	F	F	F	T	T	T	No DTC
11	F	F	F	F	T	F	F	F	No DTC
12	F	F	F	F	T	F	F	T	No DTC
13	F	F	F	F	T	F	T	F	No DTC
14	F	F	F	F	T	F	T	T	No DTC
15	F	F	F	F	T	T	F	F	P1101
16	F	F	F	F	T	T	F	T	P0121
17	F	F	F	F	T	T	T	F	P1101
18	F	F	F	F	T	T	T	T	P0236
19	F	F	F	T	F	F	F	F	No DTC
20	F	F	F	T	F	F	F	T	No DTC
21	F	F	F	T	F	F	T	F	P1101
22	F	F	F	T	F	F	T	T	P1101
23	F	F	F	T	F	T	F	F	P1101
24	F	F	F	T	F	T	F	T	P1101
25	F	F	F	T	F	T	T	F	P1101
26	F	F	F	T	F	T	T	T	P1101
27	F	F	F	T	T	F	F	F	P1101
28	F	F	F	T	T	F	F	T	P1101
29	F	F	F	T	T	F	T	F	P1101
30	F	F	F	T	T	F	T	T	P1101
31	F	F	F	T	T	T	F	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

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

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

70	F	T	F	F	F	F	T	T	P0236
71	F	T	F	F	F	T	F	F	P1101
72	F	T	F	F	F	T	F	T	P0121
73	F	T	F	F	F	T	T	F	P1101
74	F	T	F	F	F	T	T	T	P0236
75	F	T	F	F	T	F	F	F	P1101
76	F	T	F	F	T	F	F	T	P1101
77	F	T	F	F	T	F	T	F	P1101
78	F	T	F	F	T	F	T	T	P0236
79	F	T	F	F	T	T	F	F	P1101
80	F	T	F	F	T	T	F	T	P0121
81	F	T	F	F	T	T	T	F	P1101
82	F	T	F	F	T	T	T	T	P0236
83	F	T	F	T	F	F	F	F	P1101
84	F	T	F	T	F	F	F	T	P1101
85	F	T	F	T	F	F	T	F	P1101
86	F	T	F	T	F	F	T	T	P1101
87	F	T	F	T	F	T	F	F	P1101
88	F	T	F	T	F	T	F	T	P1101
89	F	T	F	T	F	T	T	F	P1101
90	F	T	F	T	F	T	T	T	P1101
91	F	T	F	T	T	F	F	F	P1101
92	F	T	F	T	T	F	F	T	P1101
93	F	T	F	T	T	F	T	F	P1101
94	F	T	F	T	T	F	T	T	P1101
95	F	T	F	T	T	T	F	F	P1101
96	F	T	F	T	T	T	F	T	P1101
97	F	T	F	T	T	T	T	F	P1101
98	F	T	F	T	T	T	T	T	P1101
99	F	T	T	F	F	F	F	F	P1101
100	F	T	T	F	F	F	F	T	P1101
101	F	T	T	F	F	F	T	F	P1101
102	F	T	T	F	F	F	T	T	P1101
103	F	T	T	F	F	T	F	F	P1101
104	F	T	T	F	F	T	F	T	P1101
105	F	T	T	F	F	T	T	F	P1101
106	F	T	T	F	F	T	T	T	P1101
107	F	T	T	F	T	F	F	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

108	F	T	T	F	T	F	F	T	P1101
109	F	T	T	F	T	F	T	F	P1101
110	F	T	T	F	T	F	T	T	P1101
111	F	T	T	F	T	T	F	F	P1101
112	F	T	T	F	T	T	F	T	P1101
113	F	T	T	F	T	T	T	F	P1101
114	F	T	T	F	T	T	T	T	P1101
115	F	T	T	T	F	F	F	F	P0106
116	F	T	T	T	F	F	F	T	P0106
117	F	T	T	T	F	F	T	F	P0106
118	F	T	T	T	F	F	T	T	P0106
119	F	T	T	T	F	T	F	F	P1101
120	F	T	T	T	F	T	F	T	P1101
121	F	T	T	T	F	T	T	F	P1101
122	F	T	T	T	F	T	T	T	P1101
123	F	T	T	T	T	F	F	F	P1101
124	F	T	T	T	T	F	F	T	P1101
125	F	T	T	T	T	F	T	F	P1101
126	F	T	T	T	T	F	T	T	P1101
127	F	T	T	T	T	T	F	F	P1101
128	F	T	T	T	T	T	F	T	P1101
129	F	T	T	T	T	T	T	F	P1101
130	F	T	T	T	T	T	T	T	P1101
131	T	F	F	F	F	F	F	F	No DTC
132	T	F	F	F	F	F	F	T	No DTC
133	T	F	F	F	F	F	T	F	P1101
134	T	F	F	F	F	F	T	T	P0236
135	T	F	F	F	F	T	F	F	P1101
136	T	F	F	F	F	T	F	T	P0121
137	T	F	F	F	F	T	T	F	P1101
138	T	F	F	F	F	T	T	T	P0236
139	T	F	F	F	T	F	F	F	P1101
140	T	F	F	F	T	F	F	T	P1101
141	T	F	F	F	T	F	T	F	P1101
142	T	F	F	F	T	F	T	T	P0236
143	T	F	F	F	T	T	F	F	P1101
144	T	F	F	F	T	T	F	T	P0121
145	T	F	F	F	T	T	T	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

146	T	F	F	F	T	T	T	T	P0236
147	T	F	F	T	F	F	F	F	P1101
148	T	F	F	T	F	F	F	T	P1101
149	T	F	F	T	F	F	T	F	P1101
150	T	F	F	T	F	F	T	T	P1101
151	T	F	F	T	F	T	F	F	P1101
152	T	F	F	T	F	T	F	T	P1101
153	T	F	F	T	F	T	T	F	P1101
154	T	F	F	T	F	T	T	T	P1101
155	T	F	F	T	T	F	F	F	P1101
156	T	F	F	T	T	F	F	T	P1101
157	T	F	F	T	T	F	T	F	P1101
158	T	F	F	T	T	F	T	T	P1101
159	T	F	F	T	T	T	F	F	P1101
160	T	F	F	T	T	T	F	T	P1101
161	T	F	F	T	T	T	T	F	P1101
162	T	F	F	T	T	T	T	T	P1101
163	T	F	T	F	F	F	F	F	P1101
164	T	F	T	F	F	F	F	T	P1101
165	T	F	T	F	F	F	T	F	P1101
166	T	F	T	F	F	F	T	T	P1101
167	T	F	T	F	F	T	F	F	P1101
168	T	F	T	F	F	T	F	T	P1101
169	T	F	T	F	F	T	T	F	P1101
170	T	F	T	F	F	T	T	T	P1101
171	T	F	T	F	T	F	F	F	P1101
172	T	F	T	F	T	F	F	T	P1101
173	T	F	T	F	T	F	T	F	P1101
174	T	F	T	F	T	F	T	T	P1101
175	T	F	T	F	T	T	F	F	P1101
176	T	F	T	F	T	T	F	T	P1101
177	T	F	T	F	T	T	T	F	P1101
178	T	F	T	F	T	T	T	T	P1101
179	T	F	T	T	F	F	F	F	P1101
180	T	F	T	T	F	F	F	T	P1101
181	T	F	T	T	F	F	T	F	P1101
182	T	F	T	T	F	F	T	T	P1101
183	T	F	T	T	F	T	F	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

184	T	F	T	T	F	T	F	T	P1101
185	T	F	T	T	F	T	T	F	P1101
186	T	F	T	T	F	T	T	T	P1101
187	T	F	T	T	T	F	F	F	P0101 orP010B
188	T	F	T	T	T	F	F	T	P0101 or P010B
189	T	F	T	T	T	F	T	F	P0101 or P010B
190	T	F	T	T	T	F	T	T	P0101 orP010B
191	T	F	T	T	T	T	F	F	P1101
192	T	F	T	T	T	T	F	T	P1101
193	T	F	T	T	T	T	T	F	P1101
194	T	F	T	T	T	T	T	T	P1101
195	T	T	F	F	F	F	F	F	P1101
196	T	T	F	F	F	F	F	T	P1101
197	T	T	F	F	F	F	T	F	P1101
198	T	T	F	F	F	F	T	T	P0236
199	T	T	F	F	F	T	F	F	P1101
200	T	T	F	F	F	T	F	T	P0121
201	T	T	F	F	F	T	T	F	P1101
202	T	T	F	F	F	T	T	T	P0236
203	T	T	F	F	T	F	F	F	P1101
204	T	T	F	F	T	F	F	T	P1101
205	T	T	F	F	T	F	T	F	P1101
206	T	T	F	F	T	F	T	T	P0236
207	T	T	F	F	T	T	F	F	P1101
208	T	T	F	F	T	T	F	T	P0121
209	T	T	F	F	T	T	T	F	P1101
210	T	T	F	F	T	T	T	T	P0236
211	T	T	F	T	F	F	F	F	P1101
212	T	T	F	T	F	F	F	T	P1101
213	T	T	F	T	F	F	T	F	P1101
214	T	T	F	T	F	F	T	T	P1101
215	T	T	F	T	F	T	F	F	P1101
216	T	T	F	T	F	T	F	T	P1101
217	T	T	F	T	F	T	T	F	P1101
218	T	T	F	T	F	T	T	T	P1101
219	T	T	F	T	T	F	F	F	P1101
220	T	T	F	T	T	F	F	T	P1101
221	T	T	F	T	T	F	T	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

222	T	T	F	T	T	F	T	T	P1101
223	T	T	F	T	T	T	F	F	P1101
224	T	T	F	T	T	T	F	T	P1101
225	T	T	F	T	T	T	T	F	P1101
226	T	T	F	T	T	T	T	T	P1101
227	T	T	T	F	F	F	F	F	P1101
228	T	T	T	F	F	F	F	T	P1101
229	T	T	T	F	F	F	T	F	P1101
230	T	T	T	F	F	F	T	T	P1101
231	T	T	T	F	F	T	F	F	P1101
232	T	T	T	F	F	T	F	T	P1101
233	T	T	T	F	F	T	T	F	P1101
234	T	T	T	F	F	T	T	T	P1101
235	T	T	T	F	T	F	F	F	P1101
236	T	T	T	F	T	F	F	T	P1101
237	T	T	T	F	T	F	T	F	P1101
238	T	T	T	F	T	F	T	T	P1101
239	T	T	T	F	T	T	F	F	P1101
240	T	T	T	F	T	T	F	T	P1101
241	T	T	T	F	T	T	T	F	P1101
242	T	T	T	F	T	T	T	T	P1101
243	T	T	T	T	F	F	F	F	P1101
244	T	T	T	T	F	F	F	T	P1101
245	T	T	T	T	F	F	T	F	P1101
246	T	T	T	T	F	F	T	T	P1101
247	T	T	T	T	F	T	F	F	P1101
248	T	T	T	T	F	T	F	T	P1101
249	T	T	T	T	F	T	T	F	P1101
250	T	T	T	T	F	T	T	T	P1101
251	T	T	T	T	T	F	F	F	P1101
252	T	T	T	T	T	F	F	T	P1101
253	T	T	T	T	T	F	T	F	P1101
254	T	T	T	T	T	F	T	T	P1101
255	T	T	T	T	T	T	F	F	P1101
256	T	T	T	T	T	T	F	T	P1101
257	T	T	T	T	T	T	T	F	P1101
258	T	T	T	T	T	T	T	T	P1101

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

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAPI Residual Weight Factor based on RPM

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

y/x	400	800	1,200	1,600	2,001	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,400	6,800
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

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

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

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

y/x	400	800	1,200	1,600	2,001	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,400	6,800
1	0.840	0.840	0.840	0.840	0.840	0.836	0.934	1.000	0.900	0.900	0.900	0.790	0.790	0.790	0.790	0.790	0.790

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP3 Residual Weight Factor based on RPM

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

y/x	400	800	1,200	1,600	2,001	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,400	6,800
1	0.840	0.840	0.840	0.840	0.840	0.832	0.933	1.000	1.000	0.900	0.900	0.790	0.790	0.790	0.790	0.790	0.790

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	400	800	1,200	1,600	2,001	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,400	6,800
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

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

Description: P0101_P0106_P0121_P0236_P1101 TIAP Residual Weight Factor based on RPM

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

y/x	400	800	1,200	1,600	2,001	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,400	6,800
1	0.730	0.730	0.730	0.730	0.720	0.731	0.810	0.841	0.821	0.861	0.900	0.820	0.820	0.820	0.820	0.820	0.820

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max Air Flow

Value Units: Engine Air Flow (Grams/Second)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	25.8	28.8	43.7	38.8	43.6	48.8	51.3	55.1	55.1

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max MAP

Value Units: Manifold Pressure (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	111.5	111.7	101.2	77.4	70.0	73.3	71.6	66.4	66.4

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Offset

Value Units: Pressure Difference (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	6.4	6.4	6.9	5.6	6.0	6.6	7.4	8.8	8.8

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min Air Flow

Value Units: Engine Air Flow (Grams/Second)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	21.7	23.0	50.2	67.2	83.5	96.8	107.5	108.2	108.2

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min MAP

Value Units: Manifold Pressure (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	101.5	102.2	113.0	117.7	123.7	124.3	125.2	120.4	120.4

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Offset

Value Units: Pressure Difference (kPa)
X Unit: Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	3.3	3.1	4.1	4.0	4.3	5.3	5.7	10.3	10.3

Initial Supporting table - P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit

Description: Exit Catalyst Warm-up mode if Engine Run Time is greater than this value. This table is based on percent ethanol (x-axis) and catmon's NormRatio_EWMA value (y-axis). The NormRatio_EWMA value determines the state of the catalyst. Typically, NormRatio_EWMA values below 0.35 (0 is bad and 1 is good) represent catalysts that have degraded. The emission performance of these degraded catalysts can be improved by extending catalyst light off of GetE85R_Pct_FFS_CompAtEngFloat.

y/x	0	25	50	75	100
0.000	35	35	35	35	35
0.125	35	35	35	35	35
0.250	35	35	35	35	35
0.375	35	35	35	35	35
0.500	35	35	35	35	35
0.625	35	35	35	35	35
0.750	35	35	35	35	35
0.875	35	35	35	35	35
1.000	35	35	35	35	35

Initial Supporting table - P1400_CatalystLightOffExtendedEngineRunTimeExit

Description: Exit Catalyst Warm-up mode if Engine Run Time is greater than this value. This table is based on percent ethanol (x-axis) and catmon's NormRatio_EWMA value (y-axis). The NormRatio_EWMA value determines the state of the catalyst. Typically, NormRatio_EWMA values below 0.35 (0 is bad and 1 is good) represent catalysts that have degraded. The emission performance of these degraded catalysts can be improved by extending catalyst light off of GetE85R_Pct_FFS_CompAtEngFloat.

y/x	0	25	50	75	100
0.000	35	35	35	35	35
0.125	35	35	35	35	35
0.250	35	35	35	35	35
0.375	35	35	35	35	35
0.500	35	35	35	35	35
0.625	35	35	35	35	35
0.750	35	35	35	35	35
0.875	35	35	35	35	35
1.000	35	35	35	35	35

Initial Supporting table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTime

Description: Quality weight-based on engine run time. This allows adjustment of the weighting factors at various engine run times in order to prevent the updating of the cumulative quality timer or to change the value of the average qualified residual energy calculation to prevent false Fails of the diagnostic under circumstances inappropriate to update the calculation of the average qualified residual value.

y/x	0	3	3	4	5	10	15	20	30
1	0	0	1	1	1	1	1	1	1

Initial Supporting table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis

Description: This is the x-axis for the KtCSED_K_TimeWght calibration table. Refer to the description for KtCSED_K_TimeWght for details.

y/x	1	2	3	4	5	6	7	8	9
1	0	3	3	4	5	10	15	20	30

Initial Supporting table - P1400_EngineSpeedResidual_Table

Description: This 1x17 table of engine exhaust flow values is used to calculate both the desired and the actual engine exhaust flow based on desired and actual engine speed. The desired engine exhaust flow is gathered from the desired engine speed (VeSPDR_n_EngDsrd). The value used for the actual engine exhaust flow is based on the actual engine RPM value.

y/x	600	700	770	780	800	825	850	875	900	925	1,000	1,050	1,100	1,250	1,400	1,600	2,000
1	1	1	1	4	4	4	4	4	12	16	16	16	16	16	16	16	16

Initial Supporting table - P1400_SparkResidual_Table

Description: Predicted engine-out energy potential based on either the desired cold start spark advance value or the actual spark advance value. ExhEngyPerlInitMass calibration is used to calculate both desired exhaust energy and actual energy. The desired and actual exhaust energy per unit mass values are used in part to calculate the desired exhaust energy per unit time and actual exhaust energy per unit time. Both desired and actual go into the residual exhaust energy per unit time calculation.

y/x	-20	-15	-5	-2	-1	0	5	10	20
1	1.50	1.50	1.50	0.50	0.31	0.31	0.31	0.13	0.13

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	15	30	45	60	75	82	85	89	95	100	110	120	150	200	230	250
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	400	800	1,200	1,600	2,001	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,400	6,800
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.976	0.940	0.939	0.988	1.000	1.000	1.000	1.000	1.000	1.000

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

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

P0606_Last Seed Timeout f(Loop Time) - Part 1

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

P0606_Last Seed Timeout f(Loop Time) - Part 2

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

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

Description: Fail threshold for PSW per operating loop.

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1 OmsSeq	CePISR_e_1 2p5msSeq	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_1 OmsSeq	CePISR_e_1 2p5msSeq	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	40.00	40.00	40.00	40.00	40.00	40.00

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

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

y/x	-40.00	-20.00	-10.00	0.00	50.00	90.00
350.00	148.50	129.83	127.50	135.50	117.00	67.50
450.00	148.50	129.83	127.50	135.50	117.00	67.50
550.00	148.50	129.83	127.50	135.50	117.00	67.50
650.00	148.50	129.83	127.50	135.50	117.00	67.50
750.00	148.50	129.83	127.50	135.50	117.00	67.50
850.00	156.02	136.02	134.44	139.24	120.10	73.51
900.00	160.78	139.12	138.45	139.20	119.73	77.52
1,000-00	170.53	142.20	146.42	137.28	117.27	86.15
1,100.00	183.57	145.29	155.64	139.01	118.29	94.78
1,200.00	191.74	151.15	159.33	149.14	127.97	99.13
1,450.00	192.87	170.65	161.01	163.03	142.17	96.66
1,700.00	118.89	97.37	77.97	70.03	55.60	48.32
1,950.00	90.69	69.86	51.33	44.04	30.72	24.48
2,200.00	69.59	49.11	31.01	24.06	11.29	5.57
3,200.00	-66.00	-66.00	-66.00	-66.00	-66.00	-66.00
4,200.00	-72.60	-72.60	-72.60	-72.60	-72.60	-72.60
6,400.00	-79.20	-79.20	-79.20	-79.20	-79.20	-79.20

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	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.81	2.04	1.21	1.89	0.85	0.74	0.68	1.08	1.10	0.94	0.85	0.80	0.71	0.82	0.70	0.50	0.50
8	1.35	1.70	1.13	2.06	1.12	0.81	0.75	0.91	0.98	0.86	0.94	0.80	0.78	0.94	0.75	0.50	0.55
12	0.84	1.07	0.99	1.90	0.84	0.77	0.58	0.72	0.91	0.83	0.80	0.80	0.69	0.76	0.69	0.53	0.45
16	0.38	0.52	0.79	1.38	0.69	0.63	0.43	0.48	0.70	0.62	0.61	0.59	0.53	0.52	0.50	0.47	0.42
20	0.09	0.20	0.63	1.07	0.60	0.54	0.34	0.33	0.53	0.49	0.50	0.43	0.38	0.39	0.36	0.33	0.27
24	-0.05	-0.02	0.48	0.87	0.54	0.48	0.27	0.24	0.43	0.41	0.43	0.33	0.29	0.30	0.26	0.27	0.22
30	-0.31	-0.23	0.34	0.67	0.48	0.42	0.20	0.14	0.33	0.33	0.36	0.25	0.22	0.20	0.18	0.19	0.13
40	-0.51	-0.45	0.22	0.47	0.41	0.36	0.13	0.04	0.23	0.25	0.29	0.17	0.15	0.13	0.08	0.08	0.03
60	-0.73	-0.66	0.10	0.26	0.35	0.29	0.06	-0.05	0.13	0.17	0.22	0.09	0.07	0.04	-0.01	-0.02	-0.04

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	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	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
8	0.00	0.00	0.00	0.00	-0.84	-0.83	-0.90	-0.82	-0.93	-0.79	-0.92	-0.70	-0.74	-0.77	-0.70	-0.69	-0.69
12	-0.15	-0.16	0.00	-0.40	-1.19	-1.10	-1.20	-1.05	-1.15	-1.00	-1.27	-1.26	-1.22	-1.14	-1.20	-1.00	-1.08
16	-0.38	-0.40	-0.04	-0.79	-1.18	-1.17	-1.18	-1.07	-1.12	-1.00	-1.19	-1.25	-1.33	-1.19	-1.31	-1.09	-1.25
20	-0.52	-0.55	-0.32	-0.95	-1.18	-1.20	-1.16	-1.09	-1.10	-1.00	-1.15	-1.28	-1.32	-1.24	-1.34	-1.22	-1.25
24	-0.62	-0.64	-0.48	-1.04	-1.18	-1.22	-1.16	-1.10	-1.09	-1.00	-1.13	-1.26	-1.37	-1.30	-1.36	-1.25	-1.39
30	-0.72	-0.74	-0.64	-1.12	-1.18	-1.24	-1.15	-1.10	-1.08	-1.00	-1.10	-1.24	-1.38	-1.32	-1.39	-1.33	-1.45
40	-0.82	-0.83	-0.78	-1.20	-1.18	-1.26	-1.14	-1.11	-1.08	-1.00	-1.07	-1.22	-1.35	-1.32	-1.38	-1.35	-1.44
60	-0.92	-0.93	-0.91	-1.27	-1.17	-1.29	-1.13	-1.12	-1.06	-1.00	-1.04	-1.20	-1.32	-1.30	-1.35	-1.36	-1.49

Initial Supporting table - IstFireAfterMisJerkAFM

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

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

y/x	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	1	1	1	1	1	1	1	1	1
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

Initial Supporting table - IstFireAftrMisAcelAFM

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

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

y/x	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0

Initial Supporting table - 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	3	3	2	2	2	2	2	2

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	4.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00

Initial Supporting table - Abnormal SCD Mode

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

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

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

Initial Supporting table - Bank_SCD_Decel

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

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

y/x	400	550	700	800	900	1,000	1,200	1,400	1,600
2	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
8	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
12	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
16	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
20	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
24	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
30	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
40	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60

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	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - 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	700	900	1,100	1,400	1,600	1,800	2,000	2,200	2,400	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
8	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
12	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
16	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
20	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
24	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
30	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
40	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
60	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00

Initial Supporting table - BankCylModeJerk

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

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

y/x	700	900	1,100	1,400	1,600	1,800	2,000	2,200	2,400	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
8	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
12	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
16	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
20	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
24	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
30	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
40	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
60	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00

Initial Supporting table - Catalyst_Damage_Misfire_Percentage

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

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

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
0	22.4	22.4	22.4	20.0	16.0	12.0	12.0	12.0
10	22.4	22.4	22.4	20.0	16.0	12.0	12.0	12.0
20	21.0	21.0	20.0	16.0	13.0	11.0	11.0	11.0
30	20.0	20.0	16.0	14.0	11.0	9.0	9.0	9.0
40	17.0	15.0	8.0	8.0	8.0	7.0	7.0	7.0
50	15.0	10.0	7.0	7.0	7.0	4.6	4.6	4.6
60	12.0	7.0	4.6	4.6	4.6	4.6	4.6	4.6
70	12.0	4.6	4.6	4.6	4.6	4.6	4.6	4.6
80	10.0	4.6	4.6	4.6	4.6	4.6	4.6	4.6
90	9.0	4.6	4.6	4.6	4.6	4.6	4.6	4.6
100	9.0	4.6	4.6	4.6	4.6	4.6	4.6	4.6

Initial Supporting table - ClyAfterAFM_Decel

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

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

y/x	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - 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	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - CombustModeIdleTbl

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

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

CombustModeIdleTbl - Part 1

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

CombustModeIdleTbl - Part 2

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

CombustModeIdleTbl - Part 3

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

Initial Supporting table - ConsecCylModDecel

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

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

y/x	700	900	1,100	1,400	1,600	1,800	2,000	2,200	2,400	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.27	1.29	0.94	0.90	1.12	1.56	0.61	0.65	0.82	0.65	0.75	0.84	0.77	0.77	0.65	0.56	0.64
8	1.18	1.25	0.98	0.88	0.66	1.36	0.67	0.60	0.82	0.67	0.77	0.91	0.89	1.00	0.69	0.63	0.82
12	1.31	1.15	0.87	0.79	0.48	0.72	0.63	0.50	0.73	0.69	0.62	0.95	0.93	0.86	0.81	0.73	0.91
16	1.42	0.97	0.67	0.68	0.51	0.53	0.55	0.41	0.56	0.58	0.45	0.76	0.82	0.72	0.85	0.87	0.92
20	1.51	0.96	0.64	0.71	0.59	0.55	0.52	0.46	0.46	0.48	0.48	0.61	0.78	0.78	0.88	0.94	0.87
24	1.59	1.09	0.86	0.78	0.69	0.65	0.57	0.52	0.46	0.43	0.49	0.51	0.77	0.81	0.90	0.95	0.89
30	1.71	1.32	1.12	0.97	0.78	0.75	0.66	0.58	0.54	0.55	0.50	0.53	0.77	0.85	0.92	1.00	0.91
40	1.87	1.59	1.40	1.16	0.88	0.85	0.75	0.65	0.62	0.66	0.63	0.63	0.78	0.88	0.94	1.03	0.94
60	2.08	1.88	1.68	1.34	0.98	0.95	0.84	0.72	0.69	0.76	0.75	0.72	0.78	0.91	0.95	1.07	0.94

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	700	900	1,100	1,400	1,600	1,800	2,000	2,200	2,400	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0
8	0	-1	-2	-2	-2	-1	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1
12	-1	-1	-2	-2	-3	-1	-1	-1	-2	-2	-2	-1	-1	-1	-1	-1	-1
16	0	-1	-2	-2	-3	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1
20	0	-1	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1
24	0	-1	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1
30	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0
40	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0
60	1	1	0	0	0	0	0	0	-1	-1	-1	-1	0	0	0	0	0

Initial Supporting table - ConsecSCD_Decel

Description: Used for P0300 - P0308, Mulitplier to medres decel to account for different patte rn 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	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - 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	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - 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	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	1	1	1	1	1	1	1	1	1
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

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	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - CylModeDecel

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

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

CylModeDecel - Part 1

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	6,475	4,571	2,783	1,801	1,293	983	734	587	471	351	290	249	146
6	6,938	5,082	3,004	1,886	1,327	892	701	529	433	354	252	236	126
8	7,231	5,375	3,197	1,950	1,347	886	704	520	426	356	258	229	126
10	7,524	5,667	3,357	2,005	1,366	974	746	566	444	358	302	231	153
12	7,817	5,959	3,516	2,133	1,481	1,114	797	617	504	392	339	243	181
14	8,110	6,251	3,675	2,250	1,623	1,243	916	721	575	430	376	284	209
16	8,403	6,544	3,835	2,408	1,766	1,372	1,035	824	646	468	418	325	237
18	8,696	6,836	3,994	2,567	1,909	1,501	1,154	928	717	505	461	366	265
20	8,988	7,128	4,153	2,725	2,051	1,629	1,273	1,032	797	562	516	407	293
22	9,281	7,421	4,313	2,883	2,194	1,758	1,392	1,136	884	633	570	448	321
24	9,574	7,713	4,472	3,042	2,336	1,887	1,511	1,240	972	704	624	489	349
26	9,867	8,005	4,631	3,200	2,479	2,016	1,630	1,344	1,059	774	679	530	377
30	10,453	8,590	4,950	3,517	2,764	2,273	1,869	1,552	1,234	916	787	613	433
40	11,917	10,052	5,746	4,309	3,476	2,917	2,464	2,071	1,670	1,269	1,059	818	573
60	14,845	12,975	7,340	5,893	4,902	4,205	3,655	3,110	2,543	1,977	1,602	1,229	853
78	17,408	15,532	8,734	7,280	6,149	5,331	4,698	4,020	3,307	2,595	2,078	1,588	1,097
97	19,970	18,090	10,128	8,625	7,396	6,458	5,740	4,929	4,071	3,214	2,566	1,948	1,342

CylModeDecel - Part 2

y/x	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
3	117	85	66	50	40	34	23	16	11	10	9	7	6
6	117	90	68	53	43	33	23	14	9	9	9	6	5
8	118	97	69	55	44	33	22	14	9	8	8	6	5
10	118	104	70	56	45	33	22	14	9	8	8	6	5
12	132	121	78	58	47	40	22	15	11	8	8	6	5
14	151	137	91	64	55	46	25	17	13	9	7	6	5
16	170	153	105	74	63	53	29	19	15	10	8	6	5
18	190	170	118	84	72	60	34	22	16	12	9	7	6
20	209	186	131	95	80	67	39	25	18	13	9	8	7
22	228	202	144	105	88	74	44	28	20	14	10	9	7
24	248	219	157	115	96	81	48	31	22	16	11	9	8

Initial Supporting table - CylModeDecel

26	267	235	170	126	104	88	53	34	24	17	12	10	9
30	306	268	197	147	121	102	63	40	27	20	14	12	11
40	402	349	263	198	161	137	86	54	36	27	19	16	14
60	596	513	394	302	243	206	134	83	55	41	28	24	22
78	765	656	510	393	315	267	175	108	70	53	35	31	28
97	934	799	625	484	386	328	216	133	86	65	43	39	35

Initial Supporting table - CylModeJerk

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

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

CylModeJerk - Part 1

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	7,159	4,163	2,943	1,762	1,183	834	683	505	418	300	256	230	152
6	7,940	5,053	3,472	2,224	1,528	1,027	734	537	457	329	256	240	151
8	8,386	5,557	3,774	2,488	1,725	1,137	832	607	494	365	292	246	158
10	8,832	6,060	4,077	2,752	1,922	1,247	964	693	561	429	335	252	168
12	9,278	6,564	4,475	3,016	2,119	1,384	1,141	833	663	494	389	268	192
14	9,725	7,067	4,824	3,283	2,285	1,610	1,318	973	766	558	448	289	231
16	10,171	7,571	5,257	3,646	2,568	1,837	1,495	1,114	873	632	525	349	270
18	10,617	8,074	5,691	4,009	2,851	2,063	1,672	1,254	982	711	602	409	308
20	11,064	8,578	6,124	4,371	3,133	2,289	1,849	1,394	1,103	811	679	470	347
22	11,510	9,082	6,558	4,734	3,416	2,515	2,026	1,535	1,223	912	756	530	386
24	11,956	9,585	6,992	5,097	3,699	2,741	2,203	1,675	1,344	1,013	832	590	425
26	12,403	10,089	7,425	5,460	3,982	2,968	2,379	1,815	1,465	1,114	909	650	463
30	13,295	11,096	8,292	6,185	4,548	3,420	2,733	2,096	1,706	1,316	1,063	771	541
40	15,527	13,614	10,461	7,999	5,962	4,551	3,618	2,797	2,309	1,821	1,447	1,072	735
60	20,000	18,563	14,797	11,626	8,791	6,812	5,387	4,200	3,515	2,830	2,215	1,674	1,126
78	20,000	20,000	18,591	14,800	11,267	8,791	6,934	5,428	4,570	3,713	2,886	2,202	1,475
97	20,000	20,000	20,000	17,973	13,742	10,770	8,482	6,655	5,625	4,596	3,558	2,729	1,824

CylModeJerk - Part 2

y/x	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
3	108	80	69	50	40	35	25	20	15	13	9	7	6
6	107	79	60	50	39	36	25	18	13	10	8	7	6
8	106	84	62	51	43	36	25	18	13	10	8	7	6
10	121	93	70	57	49	36	25	18	13	10	8	7	6
12	149	106	85	68	58	42	25	18	14	10	9	7	6
14	177	125	100	79	67	49	31	20	16	11	10	7	7
16	205	144	115	90	76	57	36	23	19	13	12	8	8
18	232	164	129	101	85	64	41	26	21	15	13	9	8
20	260	183	144	112	94	71	46	30	23	16	14	10	9
22	288	202	159	122	103	79	51	33	25	18	15	11	10
24	316	221	174	133	112	86	56	36	27	20	16	12	11

Initial Supporting table - CylModeJerk

26	344	240	189	144	121	93	61	39	30	21	18	13	12
30	399	278	218	166	139	108	72	46	34	25	20	15	13
40	538	373	292	220	183	145	97	62	45	33	26	20	17
60	816	564	440	329	273	218	149	94	68	50	38	29	25
78	1,059	731	570	425	352	282	194	122	87	64	49	37	32
97	1,302	898	699	520	430	346	239	150	107	79	59	46	39

Initial Supporting table - DeacCylInversionDecel

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

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

y/x	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
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

Initial Supporting table - 0)eacCylInversionJerk

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

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

y/x	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384	-16,384
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

Initial Supporting table - EngineOverSpeedLimit

Description: Engine OverSpeed Limit versus gear

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

EngineOverSpeedLimit - Part 1

y/x	CeTGRR_e_TransGr1	CeTGRR_e_TransGr2	CeTGRR_e_TransGr3	CeTGRR_e_TransGr4	CeTGRR_e_TransGr5	CeTGRR_e_TransGr6	CeTGRR_e_TransGr9
1	6,200	6,200	6,200	6,200	6,200	6,200	6,200

EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGr10	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrRvrs	CeTGRR_e_TransGrPark	CeTGRR_e_TransGr7	CeTGRR_e_TransGr8	
1	6,200	4,000	4,000	4,000	6,200	6,200	

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 CeCMBRJ_CombModesMax means not selected.

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

InfrequentRegen - Part 1

y/x	0	1	2	3	4	5
1	CeCMBRJCombModes Max	CeCMBRJCombModes Max	CeCMBRJCombModes Max	CeCMBRJCombModes Max	CeCMBRJCombModes Max	CeCMBRJCombModes Max

InfrequentRegen - Part 2

y/x	6	7	8	9	10	11
1	CeCMBR_i_CombModes Max	CeCMBRJ_CombModes Max	CeCMBRJ_CombModes Max	CeCMBRJ_CombModes Max	CeCMBRJJDombModes Max	CeCMBRJ_CombModes Max

InfrequentRegen - Part 3

y/x	12	13	14	15	16	
1	CeCMBR_i_CombModes Max	CeCMBRJ_CombModes Max	CeCMBRJ_CombModes Max	CeCMBRJ_CombModes Max	CeCMBRJ_CombModes Max	

Initial Supporting table - Number of Normals

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

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

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

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

Description: High Pressure Pump Control Mode timeout

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

y/x	-40	-32	-24	-16	-8	0	0	8	16	24	32	40	48	64	80	96	112
1	11.0	11.0	10.0	9.0	8.0	5.0	5.0	5.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start

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

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

y/x	-40	-32	-24	-16	-8	0	0	8	16	24	32	40	48	64	80	96	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	-32	-24	-16	-8	0	0	8	16	24	32	40	48	64	80	96	112
0	2.0	2.0	2.0	2.0	0.9	0.6	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	0.9	0.6	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	0.9	0.6	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	0.9	0.6	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	0.9	0.6	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	0.9	0.6	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	0.9	0.6	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	0.9	0.6	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	0.9	0.6	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 thalt 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	-32	-24	-16	-8	0	0	8	16	24	32	40	48	64	80	96	112
0	20.0	15.0	14.0	12.0	10.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
13	20.0	15.0	14.0	12.0	10.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
25	20.0	15.0	14.0	12.0	10.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
38	20.0	15.0	14.0	12.0	10.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
50	20.0	15.0	14.0	12.0	10.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
63	20.0	15.0	14.0	12.0	10.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
75	20.0	15.0	14.0	12.0	10.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
88	20.0	15.0	14.0	12.0	10.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100	20.0	15.0	14.0	12.0	10.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5

Initial Supporting table - P0420_BestFailingOSCTableB1

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

y/x	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	10.50
450.00	0.86	0.82	0.78	0.74	0.70	0.65	0.58	0.51	0.44	0.41	0.38	0.35	0.32	0.29	0.26	0.23	0.20
500.00	0.88	0.84	0.80	0.76	0.72	0.67	0.61	0.54	0.46	0.43	0.41	0.38	0.34	0.32	0.29	0.25	0.22
550.00	0.91	0.87	0.83	0.79	0.75	0.70	0.63	0.56	0.49	0.46	0.43	0.40	0.37	0.34	0.31	0.28	0.25
600.00	0.93	0.89	0.86	0.82	0.78	0.72	0.66	0.58	0.51	0.49	0.46	0.42	0.39	0.37	0.33	0.30	0.28
650.00	0.96	0.92	0.88	0.84	0.80	0.75	0.68	0.61	0.54	0.51	0.48	0.45	0.42	0.39	0.36	0.33	0.30
700.00	0.99	0.95	0.91	0.87	0.83	0.78	0.71	0.63	0.57	0.54	0.50	0.47	0.45	0.42	0.38	0.36	0.33
750.00	1.01	0.97	0.93	0.89	0.85	0.80	0.73	0.66	0.59	0.56	0.53	0.50	0.47	0.44	0.41	0.38	0.35
800.00	1.04	1.00	0.96	0.92	0.88	0.83	0.75	0.68	0.62	0.58	0.55	0.53	0.50	0.46	0.43	0.41	0.38
850.00	1.06	1.02	0.98	0.94	0.90	0.85	0.78	0.71	0.64	0.61	0.58	0.55	0.52	0.49	0.46	0.43	0.40

Initial Supporting table - P0420_WorstPassingOSCTableBI

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

y/x	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	10.50
450.00	1.26	1.19	1.14	1.09	1.04	0.98	0.90	0.82	0.74	0.70	0.66	0.62	0.58	0.54	0.50	0.46	0.42
500.00	1.29	1.21	1.17	1.12	1.07	1.00	0.92	0.84	0.76	0.72	0.68	0.64	0.61	0.57	0.53	0.49	0.45
550.00	1.31	1.24	1.19	1.14	1.09	1.03	0.95	0.87	0.79	0.75	0.71	0.67	0.63	0.59	0.55	0.51	0.47
600.00	1.33	1.26	1.21	1.17	1.12	1.05	0.97	0.89	0.82	0.78	0.74	0.70	0.66	0.62	0.58	0.54	0.50
650.00	1.36	1.29	1.24	1.19	1.14	1.08	1.00	0.92	0.84	0.80	0.76	0.72	0.68	0.64	0.60	0.56	0.52
700.00	1.38	1.32	1.26	1.21	1.17	1.11	1.03	0.95	0.87	0.83	0.79	0.75	0.71	0.67	0.63	0.58	0.54
750.00	1.41	1.34	1.29	1.24	1.19	1.13	1.05	0.97	0.89	0.85	0.81	0.77	0.73	0.69	0.65	0.61	0.57
800.00	1.43	1.37	1.32	1.26	1.21	1.16	1.08	1.00	0.92	0.88	0.83	0.79	0.75	0.71	0.67	0.63	0.59
850.00	1.46	1.39	1.34	1.29	1.24	1.18	1.10	1.02	0.94	0.90	0.86	0.82	0.78	0.74	0.70	0.66	0.62

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	550	700	800	900	1,000	1,200	1,400	1,600
2	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
8	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
12	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
16	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
20	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
24	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
30	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
40	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60

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	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - 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	700	900	1,100	1,400	1,600	1,800	2,000	2,200	2,400	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.00	0.93	0.87	0.87	0.60	0.52	0.56	0.59	0.60	0.56	0.59	0.67	0.55	0.68	0.60	0.56	0.64
8	1.09	0.88	0.85	0.64	0.65	0.67	0.51	0.52	0.58	0.56	0.60	0.48	0.48	0.71	0.50	0.50	0.73
12	1.05	1.04	0.98	0.83	0.79	0.73	0.67	0.57	0.62	0.61	0.59	0.66	0.66	0.71	0.63	0.53	0.73
16	1.10	1.10	0.96	1.06	0.81	0.84	0.81	0.66	0.67	0.71	0.58	0.76	0.76	0.69	0.75	0.80	0.75
20	1.16	1.14	1.04	1.19	0.86	0.90	0.89	0.73	0.73	0.77	0.66	0.77	0.78	0.75	0.80	0.89	0.80
24	1.20	1.17	1.09	1.19	0.91	0.95	0.95	0.77	0.78	0.80	0.72	0.77	0.81	0.77	0.81	0.91	0.83
30	1.24	1.20	1.15	1.19	0.96	0.99	1.01	0.82	0.82	0.84	0.78	0.78	0.82	0.78	0.85	0.93	0.87
40	1.29	1.24	1.20	1.20	1.01	1.04	1.08	0.87	0.86	0.87	0.83	0.78	0.84	0.81	0.89	0.95	0.94
60	1.33	1.28	1.26	1.20	1.06	1.09	1.14	0.93	0.91	0.91	0.89	0.79	0.86	0.82	0.91	0.98	0.94

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	700	900	1,100	1,400	1,600	1,800	2,000	2,200	2,400	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.55	1.56	1.57	1.61	1.31	1.00	1.00	1.10	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.24	1.14	1.28	1.33	1.14	1.06	1.19	1.23	1.19	1.17	1.08	1.00	1.00	1.00	1.00	1.00	1.00
12	1.31	1.37	1.23	1.39	1.46	1.40	1.31	1.33	1.28	1.21	1.31	1.02	1.19	1.04	1.05	1.00	1.08
16	1.40	1.51	1.14	1.62	1.76	1.56	1.33	1.34	1.28	1.16	1.36	1.15	1.30	1.14	1.15	1.00	1.06
20	1.45	1.56	1.30	1.68	1.79	1.65	1.43	1.44	1.38	1.25	1.43	1.23	1.36	1.22	1.25	1.15	1.15
24	1.54	1.58	1.44	1.68	1.80	1.71	1.50	1.51	1.44	1.34	1.47	1.29	1.39	1.26	1.26	1.22	1.30
30	1.54	1.61	1.57	1.68	1.82	1.76	1.56	1.57	1.49	1.42	1.51	1.34	1.42	1.29	1.31	1.25	1.38
40	1.54	1.65	1.71	1.68	1.83	1.81	1.63	1.64	1.55	1.51	1.55	1.38	1.45	1.34	1.34	1.35	1.44
60	1.54	1.68	1.85	1.68	1.84	1.86	1.69	1.70	1.61	1.59	1.59	1.43	1.48	1.39	1.36	1.42	1.56

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	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - 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	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomAFM_Decl

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

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

y/x	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomAFM_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	900	1,000	1,100	1,200	1,400	1,600	2,000	2,400	2,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - 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	700	900	1,100	1,400	1,600	1,800	2,000	2,200	2,400	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.00	1.00	1.00	1.30	1.20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.21	1.42	1.20	1.30	1.25	1.47	1.06	1.07	1.09	1.17	1.40	1.09	1.22	1.47	1.19	1.00	1.09
12	1.47	1.83	1.40	1.40	1.40	1.40	1.40	1.18	1.45	1.61	1.58	1.70	1.72	1.62	1.69	1.33	1.36
16	1.71	2.07	1.60	1.50	1.50	1.46	1.49	1.26	1.50	1.65	1.57	1.81	1.74	1.48	1.80	1.80	1.75
20	1.91	2.26	1.70	1.70	1.61	1.53	1.54	1.33	1.54	1.62	1.60	1.74	1.66	1.56	1.80	1.83	1.73
24	2.08	2.41	1.73	1.55	1.60	1.57	1.58	1.38	1.55	1.66	1.62	1.71	1.71	1.63	1.77	1.86	1.78
30	2.30	2.57	1.84	1.58	1.60	1.62	1.62	1.42	1.58	1.69	1.63	1.67	1.76	1.72	1.82	1.96	1.83
40	2.59	2.76	1.96	1.61	1.59	1.66	1.66	1.48	1.60	1.73	1.66	1.65	1.79	1.79	1.85	1.97	1.94
60	2.97	2.96	2.08	1.64	1.59	1.71	1.70	1.53	1.62	1.76	1.67	1.63	1.83	1.86	1.86	2.05	1.98

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	700	900	1,100	1,400	1,600	1,800	2,000	2,200	2,400	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomRevModDecl

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

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

y/x	3,000	3,500	4,000	4,500	5,000	5,500	6,000	7,000	8,000
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RepetSnapDecayAdjst

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

Value Units: multiplier
X Unit: RPM

y/x	1,000	1,400	1,800	2,200	2,600	3,000	4,000	5,000	6,000
1	1.00	1.00	1.00	1.11	1.11	1.25	1.25	1.25	1.25

Initial Supporting table - RevMode_Decel

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

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

y/x	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
6	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
8	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
10	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
12	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
14	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
16	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
18	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
20	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
22	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
24	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
26	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
30	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
40	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
60	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
78	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
97	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768

Initial Supporting table - Ring Filter

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

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

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

Initial Supporting table - SCD_Decel

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

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

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
6	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
8	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
10	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
12	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
14	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
16	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
18	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
20	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
22	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
24	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
26	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
30	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
40	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
60	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
78	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
97	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768

Initial Supporting table - SCD_Jerk

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

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

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
6	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
8	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
10	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
12	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
14	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
16	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
18	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
20	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
22	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
24	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
26	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
30	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
40	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
60	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
78	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
97	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768

Initial Supporting table - SnapDecayAfterMisfire

Description: Used for P0300 - P0308, multiplier times the ddtjerk value used used to detect misfire at that speed and load to see if size of disturbance has died down as expected of real misfire. Table lookup as a function of engine rpm and trans gear ratio.

Value Units: multiplier
X Unit: RPM
Y Units: gear ratio

y/x	1,000	1,400	1,800	2,200	2,600	3,000	4,000	5,000	6,000
1	1.10	1.00	1.00	0.90	0.90	0.80	0.80	0.80	0.80
1	1.10	1.00	1.00	1.00	0.90	0.90	0.80	0.80	0.80
1	1.10	1.00	1.00	1.00	1.00	0.90	0.90	0.80	0.80
1	1.10	1.10	1.00	1.00	1.00	1.00	0.90	0.90	0.80
2	1.10	1.10	1.10	1.10	1.00	1.00	1.00	0.90	0.90
2	1.10	1.10	1.30	1.20	1.20	1.10	1.00	1.00	0.90
3	1.20	1.20	1.40	1.30	1.30	1.10	1.00	1.00	1.00
3	1.40	1.40	2.20	1.30	1.20	1.10	1.00	1.00	1.00
5	1.40	1.40	1.60	1.20	1.10	1.00	1.00	1.00	1.00

Initial Supporting table - T(□SSRoughRoadThres

Description: Used for P0300-P0308. Only used if Rough Road source = TOSS: dispersion \Value on Transmission Output Speed Sensor above which rough road is indicated present

Value Units: change in rpm per sec (rpm)
X Unit: Engine Speed (RPM)
Y Units: Transmission Speed (RPM)

y/x	600	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000
100	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
200	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
300	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
400	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
500	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
600	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
700	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
800	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
900	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,000	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,100	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,200	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,300	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,400	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

Initial Supporting table - WaitToStart

Description: Used for P0300-P0308. Number of engine cycles to delay if diesel engine is cranked before wait to start lamp is extinguished. This lookup table determines the delay length by taking into account the coolant temperature.

Value Units: Number of Engine Cycles (integer)
X Unit: Engine Coolant (deg C)

y/x	-20	-10	0	10	20	30	40	50	60
1	0	0	0	0	0	0	0	0	0

Initial Supporting table - WSSRoughRoadThres

Description: Used for P0300-P0308. Only used if Wheel speed from ABS is used. If difference between wheel speed readings is larger than this limit, rough road is present

Value Units: acceleration
X Unit: Vehicle Speed (KPH)

y/x	0	12	24	36	48	60	72	85	97	109	121	133	145	157	169	181	193
1	0.55005	0.57996	0.60999	0.69995	0.90002	1.09998	1.34998	1.34998	0.79004	0.80005	0.80005	0.80005	0.80005	0.80005	0.80005	0.80005	0.80005

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	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
65	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.15	0.10	0.25	0.40	0.70	1.00	1.40
75	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	0.10	0.30	0.32	0.50	1.00	1.40	2.00
85	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	0.30	0.40	0.60	0.90	1.10	1.40	2.00
95	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	0.30	0.40	0.60	0.90	1.10	1.40	2.00
105	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	0.30	0.40	0.60	0.90	1.10	1.40	2.00

ZeroTorqueAFM - Part 2

y/x	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
65	1.80	1.60	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
75	1.80	1.60	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
85	1.80	1.60	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
95	1.80	1.60	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
105	1.80	1.60	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44

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	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
65	-2.60	-2.60	-2.60	-2.60	-2.60	-2.60	-2.27	-1.94	-1.61	-1.28	-0.95	-0.62	0.00
75	-2.60	-2.60	-2.60	-2.60	-2.60	-2.60	-2.27	-1.94	-1.61	-1.28	-0.95	-0.62	0.00
85	-2.60	-2.60	-2.60	-2.60	-2.60	-2.60	-2.27	-1.94	-1.61	-1.28	-0.95	-0.62	0.00
95	-2.60	-2.60	-2.60	-2.60	-2.60	-2.60	-2.27	-1.94	-1.61	-1.28	-0.95	-0.62	0.00
105	-2.60	-2.60	-2.60	-2.60	-2.60	-2.60	-2.27	-1.94	-1.61	-1.28	-0.95	-0.62	0.00

ZeroTorqueEngLoad - Part 2

y/x	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
65	0.40	0.30	0.15	0.15	0.40	0.70	1.75	2.80	3.85	4.90	5.95	7.00	8.05
75	0.25	0.25	0.25	0.30	0.55	0.90	1.95	3.00	4.05	5.10	6.15	7.20	8.25
85	0.50	0.60	0.50	0.50	0.70	1.10	2.15	3.20	4.25	5.30	6.35	7.40	8.45
95	0.60	1.00	0.90	0.90	1.00	1.30	2.35	3.40	4.45	5.50	6.55	7.60	8.65
105	0.70	1.10	1.00	1.20	1.30	1.50	2.55	3.60	4.65	5.70	6.75	7.80	8.85

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	2,048	2,048
CiFCLPJdle	2,048	2,048
CiFCLP_Cruise	2,048	2,048
CiFCLPJJghtAccel	2,048	2,048
CiFCLP_HeavyAccel	2,048	2,048

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 - KeEOSDURichThrsh

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	255

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMax

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

Value Units: Celcius

y/x	1
1	950

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP T IntegrationCatalystMin

Description: Minimum allowed estimated catalytic converter temperature to begin using post 02 integration correction terms. Converter temperature must remain above this threshold to ramp-in the post 02 integration adjustments. Once the ramp-in has started, a converter temperature below this threshold will freeze the ramp-in multiplier. Post 02 integration will not be allowed below this converier temperature

Value Units: Celcius

y/x	1
1	450

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	650

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	50

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	1,100

Initial Supporting table - Closed Loop Enable Clarification - KtFCLL_p_AdaptiveLowMAP_Limit

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

Value Units: KPa
X Unit: KPa

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

Initial Supporting table - Closed Loop Enable Clarification - KtFCLP t PostIntglDisableTime

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

Value Units: Time in seconds
X Unit: Degrees Celcius

y/x	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
1	409.0	409.0	409.0	409.0	409.0	50.0	50.0	50.0	50.0	50.0	50.0	20.0	20.0	20.0	20.0	20.0	20.0

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	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	5.0

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
0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
25	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
50	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
75	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
100	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

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
0	409.0	380.0	300.0	240.0	180.0	25.0	25.0	25.0	25.0	25.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
25	409.0	380.0	300.0	240.0	180.0	25.0	25.0	25.0	25.0	25.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
50	409.0	380.0	300.0	240.0	180.0	25.0	25.0	25.0	25.0	25.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
75	409.0	380.0	300.0	240.0	180.0	25.0	25.0	25.0	25.0	25.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
100	409.0	380.0	300.0	240.0	180.0	25.0	25.0	25.0	25.0	25.0	10.0	10.0	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	60	120	210	325	340	350	500	500	500	500	500	500	500

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

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

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

y/x	-10	-4	1	7	13	18	24	29	35	41	46	52	58	63	69	74	80
1	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	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
3	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
4	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
5	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
6	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
7	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
8	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
9	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
10	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
11	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
12	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
13	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
14	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
15	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
16	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2
17	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2	-280.2

Initial Supporting table - P2B85 26CE Pump Speed Performance Initialization Delay

Description: Pump speed performance initialization delay as function of command speed and engine inlet coolant temperature

Value Units: Pump initialization delay (s)
X Unit: Engine inlet coolant temperature (Deg C)
Y Units: Commanded pump speed (RPM)

y/x	-40	0	40
1,000	5	5	5
4,000	5	5	5
6,000	5	5	5

Initial Supporting table - P057B KtBRKI_K_CmpltTestPointWeight

Description:

y/x	0.000	0.001	0.011	0.019	0.027	0.037	0.055	0.200	1.000
1	0	0	0	0	1	1	1	1	1

Initial Supporting table - P057B KtBRKI_K_FastTestPointWeight

Description:

y/x	0.000	0.001	0.011	0.019	0.027	0.037	0.055	0.200	1.000
1	0	0	0	0	1	1	1	1	1

Initial Supporting table - DFCO CoolEnblHi Temp

Description:

y/x	-40	0	25
1	30.0	25.0	20.0

Initial Supporting table - DFCO_DelayAfterStart_Time

Description:

y/x	-30	-10	20	60	90
1	20.0	15.0	10.0	8.0	5.0

Initial Supporting table - DFCO_DsblLo_Vehicle_Speed

Description:

y/x	CeTCOR_e_NonEcoMode	CeTCOR_e_EcoMode
CeTGRR_e_TransGr1	23	23
CeTGRR_e_TransGr2	21	21
CeTGRR_e_TransGr3	18	18
CeTGRR_e_TransGr4	17	17
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	32.0	32.0
CeTGRR_e_TransGr2	24.0	24.0
CeTGRR_e_TransGr3	21.0	21.0
CeTGRR_e_TransGr4	20.0	20.0
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	512.0	512.0
CeTGRR_e_TransGrPark	0.0	0.0
CeTGRR_e_TransGr7	0.0	0.0
CeTGRR_e_TransGr8	0.0	0.0

Initial Supporting table - DFCO EngSpdEnblOfst

Description:

y/x	-1,750	-1,500	-1,250	-1,000	-750	-500	-300	-100	0
1	500	400	250	150	100	50	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	12.86	15.71	18.57	21.43	24.29	27.14	30.00	65.00
1.00	12.70	13.00	17.00	19.00	23.00	45.00	40.00	35.20	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	12.86	15.71	18.57	21.43	24.29	27.14	30.00	65.00
1.00	54.00	55.00	56.00	50.00	40.00	56.00	50.00	43.00	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	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00

Initial Supporting table - P0068_Maximum MAF f(Volts)

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

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

y/x	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00
1.00	511.99	511.99	511.99	511.99	511.99	511.99	511.99	511.99	511.99

Initial Supporting table - P0326_P0331_AbnormalNoise_Thresh_AFM

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

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	0.413	0.413	0.413	0.413	0.413	0.361	0.299	0.222	0.180	0.144	0.122	0.114	0.114	0.114	0.114	0.114	0.114

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_1 OmsSeq	CePISR_e_1 2p5msSeq	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	8.700	9.000	9.200	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	40.00	40.00	40.00	40.00	40.00	40.00

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

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

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

y/x	-40.00	-20.00	-10.00	0.00	50.00	90.00
350.00	148.50	129.83	127.50	135.50	117.00	67.50
450.00	148.50	129.83	127.50	135.50	117.00	67.50
550.00	148.50	129.83	127.50	135.50	117.00	67.50
650.00	148.50	129.83	127.50	135.50	117.00	67.50
750.00	148.50	129.83	127.50	135.50	117.00	67.50
850.00	156.02	136.02	134.44	139.24	120.10	73.51
900.00	160.78	139.12	138.45	139.20	119.73	77.52
1,000-00	170.53	142.20	146.42	137.28	117.27	86.15
1,100.00	183.57	145.29	155.64	139.01	118.29	94.78
1,200.00	191.74	151.15	159.33	149.14	127.97	99.13
1,450.00	192.87	170.65	161.01	163.03	142.17	96.66
1,700.00	118.89	97.37	77.97	70.03	55.60	48.32
1,950.00	90.69	69.86	51.33	44.04	30.72	24.48
2,200.00	69.59	49.11	31.01	24.06	11.29	5.57
3,200.00	-66.00	-66.00	-66.00	-66.00	-66.00	-66.00
4,200.00	-72.60	-72.60	-72.60	-72.60	-72.60	-72.60
6,400.00	-79.20	-79.20	-79.20	-79.20	-79.20	-79.20

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_1 OmsSeq	CePISR_e_1 2p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

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

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

Description: Fail threshold for PSW per operating loop.

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_1 OmsSeq	CePISR_e_1 2p5msSeq	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_1 OmsSeq	CePISR_e_1 2p5msSeq	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	40.00	40.00	40.00	40.00	40.00	40.00

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

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

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

y/x	-40.00	-20.00	-10.00	0.00	50.00	90.00
350.00	148.50	129.83	127.50	135.50	117.00	67.50
450.00	148.50	129.83	127.50	135.50	117.00	67.50
550.00	148.50	129.83	127.50	135.50	117.00	67.50
650.00	148.50	129.83	127.50	135.50	117.00	67.50
750.00	148.50	129.83	127.50	135.50	117.00	67.50
850.00	156.02	136.02	134.44	139.24	120.10	73.51
900.00	160.78	139.12	138.45	139.20	119.73	77.52
1,000-00	170.53	142.20	146.42	137.28	117.27	86.15
1,100.00	183.57	145.29	155.64	139.01	118.29	94.78
1,200.00	191.74	151.15	159.33	149.14	127.97	99.13
1,450.00	192.87	170.65	161.01	163.03	142.17	96.66
1,700.00	118.89	97.37	77.97	70.03	55.60	48.32
1,950.00	90.69	69.86	51.33	44.04	30.72	24.48
2,200.00	69.59	49.11	31.01	24.06	11.29	5.57
3,200.00	-66.00	-66.00	-66.00	-66.00	-66.00	-66.00
4,200.00	-72.60	-72.60	-72.60	-72.60	-72.60	-72.60
6,400.00	-79.20	-79.20	-79.20	-79.20	-79.20	-79.20

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

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

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

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 1

y/x	CeFADR_e_CellOO_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR_e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2
1	65,535	65,535	65,535	65,535

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

y/x	CeFADR_e_Cell04_PurgOnAirMode 1	CeFADR_e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	65,535	65,535	65,535	65,535

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR_e_Cell1 0_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2
1	250	65,535	65,535	65,535

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

y/x	CeFADR_e_Cell1 2_PurgOffAirMode 1	CeFADR_e_Cell1 3_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	65,535	65,535	100	100

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

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

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 1

y/x	CeFADR_e_CellOO_PurgOnAirMode5	CeFADR_e_Cell01_PurgOnAirMode4	CeFADR_e_Cell02_PurgOnAirMode3	CeFADR_e_Cell03_PurgOnAirMode2
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode1	CeFADR_e_Cell05_PurgOnAirMode0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADD_e_SelectedPurgeCell	CeFADDeSelectedPurgeCell	CeFADDeSelectedPurgeCell	CeFADD_e_NonSelectedCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode5	CeFADR_e_Cell09_PurgOffAirMode4	CeFADR_e_Cell10_PurgOffAirMode3	CeFADR_e_Cell11_PurgOffAirMode2
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode1	CeFADR_e_Cell13_PurgOffAirMode0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_NonSelectedCell

Initial Supporting table - 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	194	194	152	110	0	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - RufCyl Decel

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

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

RufCyl_Decel - Part 1

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
2	6,475	4,571	2,783	1,801	1,301	1,105	847	577	447	275	175	159	116
4	6,673	4,459	2,877	1,830	1,307	1,081	799	552	431	275	180	175	127
6	6,938	5,082	3,004	1,886	1,327	1,063	760	531	431	279	187	188	136
8	7,231	5,375	3,197	1,950	1,347	1,044	741	570	444	288	230	201	145
10	7,524	5,667	3,357	2,005	1,366	1,060	753	593	467	318	277	223	165
12	7,817	5,959	3,516	2,133	1,481	1,114	813	655	504	353	325	250	181
14	8,110	6,251	3,675	2,250	1,623	1,243	916	721	575	400	372	284	209
16	8,403	6,544	3,835	2,408	1,766	1,372	1,035	824	646	447	418	325	237
18	8,696	6,836	3,994	2,567	1,909	1,501	1,154	928	717	505	469	366	265
20	8,988	7,128	4,153	2,725	2,051	1,629	1,273	1,032	797	562	516	407	293
22	9,281	7,421	4,313	2,883	2,194	1,758	1,392	1,136	884	633	570	448	321
24	9,574	7,713	4,472	3,042	2,336	1,887	1,511	1,240	972	704	624	489	349
26	9,867	8,005	4,631	3,200	2,479	2,016	1,630	1,344	1,059	774	679	530	377
30	10,453	8,590	4,950	3,517	2,764	2,273	1,869	1,552	1,234	916	787	613	433
40	11,917	10,052	5,746	4,309	3,476	2,917	2,464	2,071	1,670	1,269	1,059	818	573
60	14,845	12,975	7,340	5,893	4,902	4,205	3,655	3,110	2,543	1,977	1,602	1,229	853
78	17,408	15,532	8,734	7,280	6,149	5,331	4,698	4,020	3,307	2,595	2,078	1,588	1,097

RufCyl_Decel - Part 2

y/x	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
2	117	99	77	56	52	34	23	16	11	10	9	7	6
4	117	99	75	61	53	39	23	15	10	10	9	7	6
6	117	99	75	65	54	43	23	15	10	9	9	6	5
8	117	103	79	70	58	46	24	15	10	8	8	6	5
10	135	110	85	74	62	50	25	15	10	8	8	6	5
12	151	121	91	78	66	54	26	16	11	8	8	6	5
14	171	137	99	83	69	58	27	17	13	9	7	6	5
16	192	153	107	87	73	62	29	19	15	10	8	6	5
18	209	170	118	91	78	66	34	22	16	12	9	7	6
20	229	186	131	96	83	73	39	25	18	13	9	8	7
22	248	202	144	105	88	80	44	28	20	14	10	9	7

Initial Supporting table - RufCyl Decel

24	267	219	157	115	96	87	48	31	22	16	11	9	8
26	286	235	170	126	104	94	53	34	24	17	12	10	9
30	323	268	197	147	121	107	63	40	27	20	14	12	11
40	417	349	263	198	161	141	86	54	36	27	19	16	14
60	605	513	394	302	243	209	134	83	55	41	28	24	22
78	769	656	510	393	315	268	175	108	70	53	35	31	28

Initial Supporting table - RufCyl Jerk

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

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

RufCyl_Jerk - Part 1

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
2	7,159	4,163	2,943	1,762	1,183	839	683	450	350	300	225	200	169
4	7,493	4,544	3,169	1,960	1,331	855	683	400	300	200	200	202	146
6	7,940	5,053	3,472	2,224	1,528	876	683	400	350	200	200	200	140
8	8,386	5,557	3,774	2,488	1,725	1,022	800	450	400	250	250	220	143
10	8,832	6,060	4,077	2,752	1,922	1,174	964	550	500	350	335	241	158
12	9,278	6,564	4,475	3,016	2,119	1,384	1,141	750	650	450	389	268	178
14	9,725	7,067	4,824	3,283	2,285	1,610	1,318	950	766	550	448	289	216
16	10,171	7,571	5,257	3,646	2,568	1,837	1,495	1,114	873	632	525	349	270
18	10,617	8,074	5,691	4,009	2,851	2,063	1,672	1,254	982	711	602	409	308
20	11,064	8,578	6,124	4,371	3,133	2,289	1,849	1,394	1,103	811	679	470	347
22	11,510	9,082	6,558	4,734	3,416	2,515	2,026	1,535	1,223	912	756	530	386
24	11,956	9,585	6,992	5,097	3,699	2,741	2,203	1,675	1,344	1,013	832	590	425
26	12,403	10,089	7,425	5,460	3,982	2,968	2,379	1,815	1,465	1,114	909	650	463
30	13,295	11,096	8,292	6,185	4,548	3,420	2,733	2,096	1,706	1,316	1,063	771	541
40	15,527	13,614	10,461	7,999	5,962	4,551	3,618	2,797	2,309	1,821	1,447	1,072	735
60	20,000	18,563	14,797	11,626	8,791	6,812	5,387	4,200	3,515	2,830	2,215	1,674	1,126
78	20,000	20,000	18,591	14,800	11,267	8,791	6,934	5,428	4,570	3,713	2,886	2,202	1,475

RufCyl_Jerk - Part 2

y/x	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
2	122	90	90	72	60	43	27	20	15	13	9	7	7
4	124	91	88	72	59	44	27	19	14	12	9	7	7
6	125	95	87	72	59	45	28	18	13	10	8	7	7
8	127	102	90	75	62	48	28	18	13	10	8	7	7
10	134	106	91	81	66	49	28	18	13	10	8	7	7
12	149	115	98	84	70	52	30	18	14	10	9	7	7
14	177	127	105	92	74	55	33	20	16	11	10	7	7
16	205	144	115	97	79	58	36	23	19	13	12	8	8
18	232	164	129	103	85	64	41	26	21	15	13	9	8
20	260	183	144	112	94	71	46	30	23	16	14	10	9
22	288	202	159	122	103	79	51	33	25	18	15	11	10

Initial Supporting table - RufCyl Jerk

24	316	221	174	133	112	86	56	36	27	20	16	12	11
26	344	240	189	144	121	93	61	39	30	21	18	13	12
30	399	278	218	166	139	108	72	46	34	25	20	15	13
40	538	373	292	220	183	145	97	62	45	33	26	20	17
60	816	564	440	329	273	218	149	94	68	50	38	29	25
78	1,059	731	570	425	352	282	194	122	87	64	49	37	32

Initial Supporting table3 - RufSCD_Decel

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

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

RufSCD_Decel - Part 1

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
2	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
4	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
6	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
8	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
10	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
12	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
14	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
16	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
18	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
20	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
22	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
24	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
26	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
30	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
40	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
60	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
78	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768

RufSCD_Decel - Part 2

y/x	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
2	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
4	32,767	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

Initial Supporting table - RufSCD Decel

20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
78	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold while in SCD mode during Idle or GPF regen. SCD mode uses smaller windows nearTDC. Thresholds are a function of rpm and % engine Load.

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

RufSCD_Jerk - Part 1

y/x	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
2	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
4	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
6	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
8	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
10	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
12	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
14	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
16	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
18	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
20	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
22	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
24	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
26	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
30	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
40	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
60	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768
78	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768	32,768

RufSCD_Jerk - Part 2

y/x	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
2	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
4	32,767	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 Jerk

22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
78	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

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	50	125	175	225	275	325	375	425	475	525	600	700	825	975	1,175	1,425	1,675

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	880	1,110	1,340	1,570	1,800	2,030	2,260	2,490	2,720

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_BinlD_Load_Axis and Misfire_IMEP_BinlD_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	1	18	35	53	70	86	103	120	138
1	1	18	35	53	70	86	103	120	138
2	2	19	36	54	71	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	66	83	100	117	134	151

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	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777

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	-777	-777	50	50	50	70	60	60	45	35	40	50	50	80	80	200	-777

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	-777	50	50	30	60	70	50	80	70	80	30	50	80	80	200	200	-777

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	-777	50	60	50	80	80	70	40	80	50	100	100	200	120	200	200	-777

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	-777	50	50	50	100	100	100	50	80	100	100	100	200	150	150	150	-777

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	-777	50	30	70	100	150	60	50	50	100	160	80	150	100	80	70	-777

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	-777	50	40	50	30	100	100	100	80	80	80	100	200	100	80	80	-777

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	-777	30	35	80	100	100	50	80	60	80	100	100	150	200	200	200	-777

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	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777	-777

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

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

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

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

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

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

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

y/x	1.50	3.00	4.00	15.00	20.00	25.00	27.50	32.00	36.00
1.00	0.75	0.75	0.75	0.75	0.80	0.82	0.86	0.92	0.95

Initial Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Closing Time

Description: Maximum injector closing time function of measured fuel rail pressure

Value Units: Injector Closing Time (us)
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	5.00	10.00	15.00	18.00	19.00	20.00	21.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	35.00	36.00
1.00	134	106	93	81	74	72	69	67	64	59	55	50	46	42	37	35	33

Initial Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude

Description: Maximum injector opening Magnitude voltage function of measured fuel rail pressure

Value Units: Opening Magnitude Voltage
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	5.00	10.00	15.00	18.00	19.00	20.00	21.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	35.00	36.00
1.00	883	975	974	969	975	973	976	980	982	984	985	987	990	992	995	996	996

Initial Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time

Description: Minimum injector closing time function of measured fuel rail pressure

Value Units: Injector Closing Time (us)
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	5.00	10.00	15.00	18.00	19.00	20.00	21.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	35.00	36.00
1.00	134	106	93	81	74	72	69	67	64	59	55	50	46	42	37	35	33

Initial Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude

Description: Minimum injector opening Magnitude voltage function of measured fuel rail pressure

Value Units: Opening Magnitude Voltage
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	5.00	10.00	15.00	18.00	19.00	20.00	21.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	35.00	36.00
1.00	283	375	374	369	375	373	376	380	382	384	385	387	390	392	395	396	396

P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 -Voltage Feedback Rationalities Minimum Pulse Width

Description: Minimum injection pulse width function of measured fuel rail pressure where the voltage feedback measured from the analog to digital converter is rationalized

Value Units: Pulse Width (ms)
X Unit: Measrured Fuel Rail Pressure (MPa)

y/x	0.40	5.00	10.00	15.00	18.00	19.00	20.00	21.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	35.00	36.00
1.00	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Initial Supporting table - P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit

Description: Minimum Small Pulse Compensation Fail Limit function of Pulse Width and Pressure

Value Units: Minimum Small Pulse Compensation Fail Limit (ms)
X Unit: Measrured Fuel Rail Pressure (MPa)
Y Units: Injection Pulse With (ms)

P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit - Part 1

y/x	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.04
0.40	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
5.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.05	-0.05
10.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
15.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
18.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
19.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
20.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
21.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
22.00	-0.01	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04
24.00	-0.01	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04
26.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
28.00	-0.01	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.04	-0.05	-0.05
30.00	-0.01	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.04	-0.05	-0.05
32.00	-0.01	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.04	-0.05	-0.05
34.00	-0.01	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.04	-0.05	-0.05
35.00	-0.01	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.04	-0.05	-0.05
36.00	-0.01	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04	-0.05

P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit - Part 2

y/x	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.10
0.40	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
5.00	-0.05	-0.06	-0.06	-0.07	-0.07	-0.07	-0.08	-0.08	-0.09	-0.09	-0.11
10.00	-0.04	-0.04	-0.05	-0.05	-0.05	-0.07	-0.08	-0.08	-0.09	-0.09	-0.11
15.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.08	-0.08	-0.09	-0.09	-0.11
18.00	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.06	-0.08	-0.09	-0.09	-0.11
19.00	-0.04	-0.04	-0.04	-0.05	-0.05	-0.06	-0.06	-0.08	-0.09	-0.09	-0.11
20.00	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.06	-0.08	-0.09	-0.09	-0.11
21.00	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.06	-0.08	-0.09	-0.09	-0.11
22.00	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.06	-0.09	-0.09	-0.11
24.00	-0.05	-0.05	-0.06	-0.06	-0.06	-0.07	-0.07	-0.08	-0.09	-0.09	-0.11
26.00	-0.04	-0.05	-0.05	-0.05	-0.06	-0.06	-0.07	-0.07	-0.09	-0.09	-0.11

Initial Supporting table - P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit

28.00	-0.06	-0.06	-0.06	-0.07	-0.07	-0.08	-0.08	-0.08	-0.09	-0.09	-0.11
30.00	-0.06	-0.06	-0.06	-0.07	-0.07	-0.08	-0.08	-0.08	-0.09	-0.09	-0.11
32.00	-0.06	-0.06	-0.06	-0.07	-0.07	-0.08	-0.08	-0.08	-0.09	-0.09	-0.11
34.00	-0.06	-0.06	-0.06	-0.07	-0.07	-0.08	-0.08	-0.08	-0.09	-0.09	-0.11
35.00	-0.05	-0.06	-0.06	-0.07	-0.07	-0.07	-0.08	-0.08	-0.09	-0.09	-0.11
36.00	-0.05	-0.06	-0.06	-0.06	-0.07	-0.07	-0.08	-0.08	-0.08	-0.09	-0.11

P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit - Part 3

y/x	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	1.00	1.50
0.40	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.20	-0.20
5.00	-0.16	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
10.00	-0.14	-0.19	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
15.00	-0.14	-0.18	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
18.00	-0.14	-0.19	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
19.00	-0.14	-0.19	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
20.00	-0.14	-0.19	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
21.00	-0.14	-0.19	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
22.00	-0.14	-0.19	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
24.00	-0.15	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
26.00	-0.15	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
28.00	-0.16	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
30.00	-0.16	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
32.00	-0.16	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
34.00	-0.16	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
35.00	-0.16	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
36.00	-0.16	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20

Initial Supporting table - P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit

Description: Maximum Small Pulse Compensation Fail Limit function of Pulse Width and Pressure

Value Units: Maximum Small Pulse Compensation Fail Limit (ms)
X Unit: Measrured Fuel Rail Pressure (MPa)
Y Units: Injection Pulse With (ms)

P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit - Part 1

y/x	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.04
0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
5.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
15.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
18.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
19.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
20.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
21.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
22.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
24.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
26.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
28.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
30.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
32.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
34.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
35.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
36.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20

P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit - Part 2

y/x	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.10
0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
5.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
15.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
18.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
19.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
20.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
21.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
22.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
24.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
26.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20

Initial Supporting table - P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit

28.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
30.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
32.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
34.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
35.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
36.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20

P10A4 P10A6 P10A8 P10AA P10AC P10AE P10B0 P10B2 - Maximum Small Pulse Compensation Limit - Part 3

y/x	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	1.00	1.50
0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
5.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
15.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
18.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
19.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
20.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
21.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
22.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
24.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
26.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
28.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
30.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
32.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
34.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
35.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
36.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20

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

>2Bd P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude 2 De

Description: Opening Magnitude 2 Delta threshold to detect missing injection pulse

Value Units: Opening Magnitude 2 Delta Voltage
X Unit: Measured Fuel Rail Pressure

y/x	0.40	5.00	10.00	15.00	18.00	19.00	20.00	21.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	35.00	36.00
1.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00

0 1>2B01P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude 2

Description: Opening Magnitude 2 threshold to detect missing injection pulse

Value Units: Opening Magnitude 2 Voltage
X Unit: Measured Fuel Rail Pressure

y/x	0.40	5.00	10.00	15.00	18.00	19.00	20.00	21.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	35.00	36.00
1.00	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94	2,047.94

00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitu e F

Description: Opening Magnitude threshold to detect missing injection pulse

Value Units: Opening Magnitude Voltage
X Unit: Measured Fuel Rail Pressure

y/x	0.40	5.00	10.00	15.00	18.00	19.00	20.00	21.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	35.00	36.00
1.00	0.00	109.88	97.19	88.81	79.13	65.81	79.50	70.13	80.19	67.81	70.00	59.00	51.19	53.69	42.38	47.81	47.88

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	1.63	1.63	1.75	1.88	2.13	2.38	2.13	1.88	2.25	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63

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	680	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	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000

Initial Supporting table - P0325_P0330 0penCktThrshMax (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	680	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	0.6191	0.6191	0.6191	0.6191	0.6191	0.6191	0.6191	0.5996	0.5605	0.5195	0.4727	0.4277	0.3691	0.3691	0.3691	0.3691	0.3691

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	680	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	2.1992	2.1777	2.1484	2.1426	2.1133	2.1016	2.1016	2.1016	2.1016	2.1016	2.1016	2.1016	2.1016	2.1016	2.1016	2.1016	2.1016

Initial Supporting table - P0325_P0330 0penCktThrshMin (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	680	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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_0pen_UseExact RPM	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM

P0325_P0330_OpenMethod_2 - Part 2

y/x	5	6	7	8	9
1	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM

P0325_P0330_OpenMethod_2 - Part 3

y/x	10	11	12	13	14
1	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM	CeKNKD_e_Open_UseExact RPM

P0325_P0330_OpenMethod_2 - Part 4

y/x	15	16			
1	CeKNKD_e_0pen_UseExact RPM	CeKNKD_e_Open_UseExact RPM			

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	0	0	0	0

Initial Supporting table - P0326_P0331_AbnormalNoise_Threshold

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

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	0.413	0.413	0.413	0.413	0.413	0.361	0.299	0.222	0.180	0.144	0.122	0.114	0.114	0.114	0.114	0.114	0.114

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	680	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	0.246	0.270	0.270	0.289	0.279	0.320	0.400	0.471	0.529	0.680	0.850	1.189	1.199	1.400	1.600	1.801	2.000

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	680	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	0.000	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

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 1 magnetic flux. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Magnetic flux too low	< 48 gauss	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	8ms (2 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 1 input voltage out of range low or open circuit. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Voltage out of range	< 4.4V	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	8ms (2 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 1 input voltage out of range high or short to power. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Voltage out of range	> 8.8V	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	8ms (2 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 1 internal integrated circuit faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Sensor IC reports fault	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	8ms (2 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 2 magnetic flux. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Magnetic flux too low	< 48 gauss	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	8ms (2 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 2 input voltage out of range low or open circuit. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Voltage out of range	< 4.4V	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	8ms (2 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 2 input voltage out of range high or short to power. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Voltage out of range	> 8.8V	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	8ms (2 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 2 internal integrated circuit faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Sensor IC reports fault	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	8ms (2 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 1 and 2 rationality. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Absolute value of difference of calculated angles of sensors 1 and 2 exceed threshold	> 8.18°	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	20ms (5 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 1 and 2 rationality. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Vernier level skips compared to last value	> 1 level skip	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	8ms (2 failures/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors hand wheel angle sensor 1 and 2 rationality. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Absolute value of difference between previous and calculated value of steering angle exceeds threshold	>850°	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	4ms (1 failure/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Monitors inter-integrated curcuit (I2C) communication faults (Parity, NACK, etc.) Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Communication fault detected by EPS controller	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	4ms (1 failure/ 4ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0460	Checks for correct steering angle sensor trim data in non volatile memory (NVM). Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Steering angle sensor trim data incorrect	SAS trim NVM block corrupt or invalid	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection on start up)	Safety Emissions Neutral Diagnostic - Type C
EEPROM	C056D	Checks cyclic redundancy check (CRC) of torque trim non volatile memory (NVM) block. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	CRC does not match expected value	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection on start up)	Safety Emissions Neutral Diagnostic - Type C

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
EEPROM	C056D	Checks electrically erasable programmable read-only memory (EEPROM) polarity. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Polarity calibration does not match redundtantly stored data	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection on start up)	Safety Emissions Neutral Diagnostic - Type C
Flash Memory	C056D	Monitors for proper Error Signaling Module (ESM) response when error correcting code corruption is injected during initialization. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Correct error signaling module response not observed	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection on start up)	Safety Emissions Neutral Diagnostic - Type C
Flash Memory	C056D	Monitors for flash memory faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Single bit fault detected	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	200ms (20 failures/ lOms/sample)	Safety Emissions Neutral Diagnostic - Type C
Flash Memory	C056D	Monitors for flash memory faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Double bit fault detected	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	200ms (20 failures/ lOms/sample)	Safety Emissions Neutral Diagnostic - Type C
EPSNVM	C056D	Validates critical register against flash memory. Emission neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Mismatch detected	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	100ms (1 shot detection)	Safety Emissions Neutral Diagnostic - Type C
EPSNVM	C056D	Monitors for illegal read/write actions. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Read or write attempt to illegal address	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	2ms (1 shot detection)	Safety Emissions Neutral Diagnostic - Type C
EPSNVM	C056D	Monitors for illegal read/write actions. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Unauthorized write attempt to valid address	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	2ms (1 shot detection)	Safety Emissions Neutral Diagnostic - Type C

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
RAM	C056D	Monitors for general Random Access Memory (RAM) failures. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	IC internal self-test identifies RAM failure	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
RAM	C056D	Monitors for RAM ECC Memory faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Incorrect operation of decode logic	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
RAM	C056D	Monitors for VIM RAM faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Intentional parity fault not detected	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
µProcessor SW	C056D	Monitors for runtime faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Unexpected interrupt generated by hardware	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
µProcessor SW	C056D	Monitors for runtime faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Incorrect operations system conditions or unexpected loss of task list	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
µProcessor SW	C056D	Monitors for runtime faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Unexpected micro reset occurs	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
µProcessor SW	C056D	Monitors for runtime faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	1ms loop counter (x) is not between 1 and 12	$12 < x < 1$	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
µProcessor SW	C056D	Monitors for runtime faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Unexpected sign path deviation	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
uProcessor	C056D	Monitors for uProcessor initialization faults. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Micro self-test failed	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
µProcessor	C056D	Monitors run-time fault. Emissions neutral default action ignore steering angle based auto-stop inhibit and perform auto-stops.	Core compare module detects a mismatch between itself and main processor	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
µProcessor	C056D	Monitors clock performance. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Crystal Frequency (x) OOR	1.378MHz < x < 1.375MHz	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
µProcessor	C056D	Monitors for memory protection unit access violation. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Access violation detected	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
UProcessor	C056D	Monitors for computer operating properly (COP) timeout. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Main micro controller COP period expired	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
piProcessor	C056D	Monitors for pre-fetch and data aborts. Emissions neutra default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Memory access not completed successfully	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C
Watchdog	C056D	Monitors for program flow or deadline fault software not executing out of sequence or incompletely. Emissions neutral default action: ignore steering angle based auto-stop inhibit and perform auto-stops.	Watchdog manager detects checkpoints of microcontroller execution out of sequence or incomplete	Fault Detected	$1F1 (SYSTEMPOWERMODE) $0C9 (ENGINERUNACTIVE) DIAGNOSTICENABLED Voltage	= RUN = TRUE TRUE 6V < voltage < 16V	400ms (one shot detection, micro resets)	Safety Emissions Neutral Diagnostic - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Electronic Control Unit Hardware	B101D	This diagnostic monitors for multiple circuit level failures within the FCM. These include Random Access Memory (RAM), Read Only Memory (ROM), Electrically Erasable Programmable Read-Only Memory (EEPROM) and General Internal Electronic Failures. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within B101D.	The RAM Test Algorithm will cycle through the RAM memory map and verify each bit within each byte of RAM is valid. This is accomplished by writing $AA, then reading the value back, if the value is not $AA the DTC will set. If the value is $AAthe algorithm will write $55, then read the value back, if the value is not $55 the DTC will set.	For any RAM Memory Address, the written/ ready memory value # $AA or $55 (for the second pass test)	Vehicle Power Mode Secondary Parameters Virtual Network condition Calibration is Enabled B101D_34_ENABLE	= Any = 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	The RAM Test algorithm will RUN once on Power Up until it completes. This test is run in its entirety or until a fault is detected.	Safety Emissions Neutral Diagnostics - Special Type C
			The Flash Test Algorithm will cycle through the Flash memory map, byte by byte. The algorithm will sum each byte. If the sum is not (0) then the DTC is set.	Checksum # 0	Vehicle Power Mode Secondary Parameters Virtual Network condition Calibration is Enabled B101D_35_ENABLE	= Any = 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	The Flash Test algorithm will run once at Power up until it completes.	
			Each EEPROM block contains a checksum value, if the contents of the EEPROM Block do not evaluate to the corresponding checksum, three attempts to write to EEPROM will occur before setting the DTC. OR Secondary micro	Three failed Checksums	Vehicle Power Mode Secondary Parameters Virtual Network condition Calibration is enabled B101D_36_ENABLE	= Any = 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	The EEPROM Test algorithm is RUN every time EEPROM is updated.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			indicates EEPROM memory failure check.					
			Power Supplies fall out of range for greater than 10 ms: 1.2 V 1.8 V 3.3 V 5.0 V Vcc1 Vcc1	1.14 < V< 1.26 1.71 < V< 1.89 3.05 <V< 3.57 4.75 <V< 5.25 3.00 <V< 3.60 1.65 < V< 1.94	Vehicle Power Mode Secondary Parameters Virtual Network condition Calibration is enabled B101D_39_ENABLE	= Any = 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	The Voltage Monitoring Algorithm runs every 10 ms. I2C Communication is tested in Powerup. Memory Diagnostics are run on Powerup.	
			No I2C communication between the Imager and Vision Processing Engine then the DTC is set. Additional Failures for the Imager are monitored (Video time-out or Initization of Imager)	Loss of Communication on IC2 network	Vehicle Power Mode Secondary Parameters Virtual Network condition Calibration is enabled B101D_39_ENABLE	= Any = 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	I2C Communication is tested in Powerup.	
			If there is a missing or bad calibration in the Vision Processing Engine then this DTC is set.	Bad or missing calibrations or Vision Processing Engine	Vehicle Power Mode Secondary Parameters Virtual Network condition Calibration is enabled B101D_39_ENABLE	= Any = 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	Memory Diagnostics are run on Powerup.	
			No SPI communication (or faulty communication)	Loss of Communication on SPI	Vehicle Power Mode	= Any	SPI Communication	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			between the Microcontroller and Vision Processing Engine	network	Secondary Parameters Virtual Network condition Calibration is enabled B101D_39_ENABLE	= 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	is tested in Powerup.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Electronic Control Unit Software	B101E	This diagnostic monitors for multiple software errors within the FCM. This can include communications, calibrations, or VIN programming. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within B101E.	Internal Communications Failure - No interprocessor communications OR Cyclic redundancy check failure within the Video Processing Engine internal data structure OR Video Processing Engine identifies corruption within intenal input signal data storage.	Fault Detected	Vehicle Power Mode Secondary Parameters Virtual Network condition Calibration is enabled B101E_3C_ENABLE	= RUN = 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	50 seconds	Safety Emissions Neutral Diagnostics - Special Type C
			Default calibrations are still stored and have not been written	Memory space for calibrations are empty or all OxFF	Vehicle Power Mode Secondary Parameters Virtual Network condition Calibration is enabled B101E_42_ENABLE	= RUN = 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	Once on Power Up.	
			VIN stored in EEPROM contains all bytes with OxFF.	Memory space for VINs are ALL OxFF	Vehicle Power Mode Secondary Parameters Virtual Network condition Manufacturing requirement: MIC Calibration is enabled	= RUN = 9 - 16 V = Any Virtual Network that the ECU participates in is active >= Manufacturing Enable Counter	Once on Power Up.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					B101E_47_ENABLE	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Power Circuit	B1325	Voltage Out of Range. Upon fault detection, the emissions neutral default action of disabling adaptive cruise control will be enabled. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within this fault.	Supply Voltage to FCM	< 9.0V (+/- 0.5 V)	Vehicle Power Mode Virtual Network condition Calibration is enabled B1325_03_ENABLE	= RUN = Any Virtual Network that the ECU participates in is active = TRUE	1 second	Safety Emissions Neutral Diagnostics - Special Type C
			Supply Voltage to FCM	> 16.0V (+/-0.5 V)	Vehicle Power Mode Virtual Network condition Calibration is enabled B1325_07_ENABLE	= RUN = Any Virtual Network that the ECU participates in is active = TRUE	0.5 second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Front Camera Module - Long Range Radar Objects Detected Not Plausible	B1A01	Monitors the message 'freshness' for vehicle yaw and vehicle speed provided by the chassis sub-systems. These messages are send to the Front Camera Module via CAN. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur.	If last valid message associated with yaw or vehicle speed is older than the defined maximum latency on this signal OR If Internal input signals storage check fails Note: This DTC is set after 3 attempts at resetting the Secondary Micro processor and not passing the DTC criteria	Fault Detected.	Vehicle Power Mode Secondary Parameters Virtual Network condition Manufacturing requirement: MIC Calibration is enabled B1A01_00_ENABLE	= Any = 9 - 16 V = Any Virtual Network that the ECU participates in is active >= Manufacturing Enable Counter = TRUE	Inputs are checked for plausibility at startup and continuously after 0.05 seconds.	Safety Emissions Neutral Diagnostics - Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Steering Wheel Controls ACC Gap Up/Down Signal Circuit	B3623	Monitors the 'Lane Keep Assist' Buttons on the steering wheel for Short to Ground and Short to Battery/Open Circuit failures. Stuck buttons are also monitored. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within B3623.	The CAN message for the Cruise Control Switches (as reported by the Body Control Module, over GM High Speed CAN) has not been received for more than 10 seconds OR if those switches are sensed to have an indeterminate value. This is monitored for the Gap switches, Speed up/ down, cancel & resume.	Fault detected (as described in the malfuction criteria)	Vehicle Power Mode Secondary Parameters Virtual Network condition Calibration is enabled B3623_08_ENABLE Five second delay after communication enable	= Run = 9 - 16 V = Any Virtual Network that the ECU participates in is active = TRUE	10 seconds	Safety Emissions Neutral Diagnostics - Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Camera Misaligned	B395D	The diagnoistic reports the Video Processing Engine's test for Camera alightment. This diagnoistic also covers end-of-line (EOL) and in-use alignment. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur.	Camera Alignment is not successful either at EOL / Service Station OR Video Processing Engine reported camera is out of severe alignment	Fault Detected by Video Processing Engine	Vehicle Power Mode Secondary Parameters Virtual Network condition Manufacturing requirement Calibration is enabled B395D_08_ENABLE	= RUN = 9 - 16 V = Any Virtual Network that the ECU participates in is active >= Manufacturing Enable Counter = TRUE	At Power-up and every 0.05 seconds	Safety Emissions Neutral Diagnostics - Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Loss of Communications or Invalid Data with Transmission Controller	DID $05-enm_VBACC_Manual Jnhibit _Reason	This diagnostic monitors critical CAN message frames from the tranmission controller to ensure it is communicating. This diagnostic also monitors Invalid data from the tranmission controller. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID $18.	CAN message ($1F5) from the brake control module not received	No activity of Transmission controller signals for 5 or more seconds.	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	< 3.5 s	Safety Emissions Neutral Diagnostics - DID Type
			This diagnostic monitors brake controller CAN frames ($1F5) for the following faults: - Message Invalid - Checksum Invalid -ARC Invalid - Mask Invalid	Fault detected due to one of the monitoring criteria	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	< 3.5 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Loss of Communications or Invalid Data with Brake Control Module	DID $18- enm_VBACC_AutomaticjnhibiReason	This diagnostic monitors critical CAN message frames from the brake controller to ensure it is communicating. This diagnostic also monitors Invalid data from the brake controller. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID $18	CAN message ($0C5, $214, $1E9) from the brake control module not received	No activity of brake controller signals for 3 or more seconds.	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = Comms enabled = TRUE	<3s	Safety Emissions Neutral Diagnostics- DID Type
			This diagnostic monitors brake controller CAN frames ($0C5, $1E9, $214) for the following faults: - Message Invalid - Checksum Invalid -ARC Invalid - Mask Invalid	Fault detected due to one of the monitoring criteria	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = Comms enabled = TRUE	< 0.5 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Loss of Communications or Invalid Data with Engine Control Module	DID $18- enm_VBACC_Automaticjnhibit_Reason	This diagnostic monitors critical CAN message frames from the engine controller to ensure it is communicating. This diagnostic also monitors Invalid data from the brake controller. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID $18.	CAN message ($1C4) from the engine controller not received	No activity of engine controller signals for 3 or more seconds.	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	<3s	Safety Emissions Neutral Diagnostics- DID Type
			This diagnostic monitors engine controller CAN frames ($1C4) for the following faults: - Message Invalid - Checksum Invalid -ARC Invalid - Mask Invalid	Fault detected due to one of the monitoring criteria	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	< 0.5 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Loss of Communications or Invalid Data with Inertial Measurement Unit	DID $18-enm_VBACC_Automaticjnhibit_Reason	This diagnostic monitors critical CAN message frames from inertial measurement unit to ensure it is communicating. This diagnostic also monitors Invalid data from the inertial measurement unit. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID $18	CAN message $34C from the inertial measurement unit located within the airbag module is not received	No activity of IMU signals for 3 or more seconds.	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	<3s	Safety Emissions Neutral Diagnostics- DID Type
			This diagnostic monitors the $34C CAN frame for the following faults: - Message Invalid - Checksum Invalid -ARC Invalid - Mask Invalid	Fault detected due to one of the monitoring criteria	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	< 0.5 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Loss of Communications or Invalid Data with Steering Angle Sensor	DID $18-enm_VBACC_AutomaticInhibit_Reason	This diagnostic monitors critical CAN message frames from steering angle sensor to ensure it is communicating. This diagnostic also monitors Invalid data from the steering angle sensor. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID $18	CAN message $1E5 from the steering angle sensor located within the electronic steering sensor is not received	No activity of EPS signals for 3 or more seconds.	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	<3s	Safety Emissions Neutral Diagnostics - DID Type
			This diagnostic monitors the $1E5 CAN frame for the following faults: - Parameter Invalid - Checksum Invalid -ARC Invalid - Mask Invalid - Calibration Invalid - SAS Type Incorrect	Fault detected due to one of the monitoring criteria	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled for diagnostic	= RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	0.5 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Low Speed CAN Bus Off	DID $18-enm_VBACC_Automaticjnhibit_Reason	Monitors the GM Low Speed CAN bus for a 'Bus-Off Condition. Upon fault detection, the emissions neutral default action of disabling adaptive cruise control will be enabled.	CAN Bus Failure Detected	= TRUE	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled U0078_00_ENABLE	= OFF, ACCESSORY, RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	Diagnostic Runs Every 1 second	Safety Emissions Neutral Diagnostics - Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
High Speed CAN Bus Off	U0073	Monitors the GM High Speed CAN bus for a 'Bus-Off Condition. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur.	CAN Bus Failure Detected Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur.	= TRUE	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled U0073_00_ENABLE	= OFF, ACCESSORY, RUN = Any Virtual Network that the ECU participates in is active = While in the ECU_COMM_Active state = TRUE	Diagnostic Runs Every 1 second	Safety Emissions Neutral Diagnostics - Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication with Body Control Module	U0140	This diagnostic monitors critical CAN message frames from Body Control Module to ensure it is communicating. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur.	Key CAN messages from the Body Control Module are not received	No activity of BCM signals for 3 seconds	Vehicle Power Mode Virtual Network condition ECU Operational condition Calibration is enabled U0140_00_ENABLE	= RUN = Any Virtual Network that the ECU participates in is active = TRUE	3 seconds	Safety Emissions Neutral Diagnostics - Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Invalid Data Received From Body Control Module	U0422	This diagnoistic monitors for failures in message validity, alive rolling counter, and signal protection between the Body Control Module and Front Camera Module. Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within U0422.	This test is considered failed when the application receives a validity bit set to Invalid for any signal that is used for normal functionality from BCM node. -Transmission engage validity - Brake pedal Mod travel achieved Status validity - Brake pedal initial travel validity - System Power mode validity - Steering wheel angle validity - Steering wheel angle VDA	Any signal invalid for 5 seconds	Vehicle Power Mode Virtual Network condition ECU Operational condition	= RUN = Any Virtual Network that the ECU participates in is active	5 seconds	Safety Emissions Neutral Diagnostics - Special Type C
			A sliding window monitors for Alive Counters that are incorrect or not updated. The following messages are monitored: -Brake Pedal Switch -Cruise Control Switches	3 out of 10 missing or incorrect messages	Vehicle Power Mode Virtual Network condition 5 second delay after Com_enable and voltage in valid range (9 to 16V) Calibration is enabled U0422_72_ENABLE	= RUN = TRUE	0.15 second out of 0.5 second window	
			A sliding window monitors for Data Protection Calculations that are incorrect or not updated. The following messages are monitored:	3 out of 10 missing or incorrect messages	Vehicle Power Mode Virtual Network condition 5 second delay after Com_enable and voltage in valid range (9 to 16V)	= RUN	0.15 second out of 0.5 second window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			-Brake Pedal Switch -Cruise Control Switches		Calibration is enabled U0422_74_ENABLE	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Primary (Sensor 1) IMU Sensor - Lateral Acceleration Circuit	C0186	This monitor cover various aspects of the lateral acceleration 1 sensor circuit Upon fault detection, the emissions neutral default action of disabling adaptive cruise control will be enabled	Self contious test fails on IMU Chip	Fault Detected	Comm_Enable Operating Voltage DTC Enabled SDM Configuration	= Available = 9.0 - 19.0v = True = True	0.05 s	Safety Non-MIL Emissions Neutral Diagnostic
Primary (Sensor 1) IMU Sensor - Yaw Rate Circuit	C0196	This monitor cover various aspects of the yaw acceleration 1 sensor circuit Upon fault detection, the emissions neutral default action of disabling adaptive cruise control will be enabled	Self contious test fails on IMU Chip	Fault Detected	Comm_Enable Operating Voltage DTC Enabled	= Available = 9.0 - 19.0v = True	0.05 s	Safety Non-MIL Emissions Neutral Diagnostic
		General Failure Upon fault detection, the emissions neutral default action of disabling adaptive cruise control will be enabled (this applies to all failure modes within B101D)	Stuck CPU OR Addressing Error OR Stuck ALU OR Stuck Registers (GPIO, Internal RAM) OR Stuck Clock OR Programming flow/sequence stuck OR Stuck Interrupt/Event Manager	For RAM, ROM and EEPROM errors, CRC is used.	Power Mode DTC	= RUN, CRANK or PROLONGATION TIME power mode. = Enabled	0.02 s	Safety Non-MIL Emissions Neutral Diagnostic
		RAM Failure	Microprocessor ECC test, checksum test	Fault Detected	Power Mode DTC	= RUN, CRANK or PROLONGATION TIME power mode. = Enabled	0.001 s	Safety Non-MIL Emissions Neutral Diagnostic
		ROM Failure	Microprocessor ECC test, checksum test	Fault Detected	Power Mode DTC	= RUN, CRANK or PROLONGATION TIME power mode. = Enabled	0.001 s	Safety Non-MIL Emissions Neutral Diagnostic
		Internal Electronic Failure	Sensor, Microprocessor or Power supply Failure	Fault Detected	Power Mode DTC	= RUN, CRANK or PROLONGATION TIME power mode. = Enabled	0.2 s	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNCTC_START	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurances	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNCTC_ASSERT	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurances	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNCTC_DEASSERT	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurances	Safety Non-MIL Emissions Neutral Diagnostic

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECU Hardware Performance	B101D	IMU_IC_RUNCAP_START	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurances	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNCAP	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurances	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNBIST_START	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurances	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNBIST	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurances	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_WRONG_SENSOR	IMU IC reports an incorrect configuration	Fault Detected	SDM Power	= ON	1 occurance	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_INIT_STAT	IMU IC reports internal error on power up	Fault Detected	SDM Power	= ON	2 occurances	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_CONFIG	IMU does not accept configuration commands for Filter setting, etc	Fault Detected	SDM Power	= ON	2 occurances	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_TEMPERATURE	IMU temperature reading out of range	Fault Detected	SDM Power	= ON	0.1 s	Safety Non-MIL Emissions Neutral Diagnostic
		INCORRECT_HSCAN_IC_VDD	VDD outside range	= 5 +/- 0.5V	SDM Power Battery Voltage	= ON = Within normal rage	0.02 s	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_VECTOR_DATA_MISMATCH	HSCAN Data to transmit does not match data requested to transmit	Fault Detected	SDM Power	= ON	0.04 s	Safety Non-MIL Emissions Neutral Diagnostic
ECU Software Performance	B101E	IMU Offset Data failure. IMUs have an offselt calculated. This diagnostic will be set if the data for the offset is compromised	Checksum of offset data not correct.	Fault Detected	SDM Power IMU Configuration IMU Rezero	= ON = True = Passed	0.05 s	Safety Non-MIL Emissions Neutral Diagnostic

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Device Power Circuit	B1325	Voltage Below Threshold The fault will set at the 8V threshold, however the emissions neutral default action of disabling adaptive cruise control will occur until < 5V threshold. This is due to the safety case design .	V Battery	Vbatt < 8 V	Power Mode DTC	= RUN, CRANK or PROLONGATION TIME power mode. = Enabled	1 s	Safety Non-MIL Emissions Neutral Diagnostic
Control Module Communication CAN Bus	U0077	Monitoring to check if the CAN Bus is ON Upon fault detection, the emissions neutral default action of disabling adaptive cruise control will be enabled	CAN Shorted to Ground OR A fault CAN controller	Fault Detected	Power Mode DTC Calibration Comm Enabled Operating Voltage	= OFF, ACC or RUN = Enabled = Active = 9.0 to 19.0v	5 s	Safety Non-MIL Emissions Neutral Diagnostic

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lateral Acceleration Sensor Circuit Low	C124F	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	< -3.8500 g > -3.8500 g (< 0.5 Q impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lateral Acceleration Sensor Circuit High	C1250	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	> 3.8500 g < 3.8500 g (< 0.5 Q impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lateral Acceleration Sensor Performance	C1251	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a signal value that is stuck in a valid range by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	ABS(raw lateral acceleration signal) AND ABS(raw lateral acceleration signal) update raw lateral acceleration signal fail, 50 millisecond update rate	> 0.5000 g < 3.8500 g	battery voltage run crank voltage diagnostic monitor enable update raw lateral acceleration signal stablity time: TOSS vehicle speed automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw lateral acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	> 11.00 volts > 11.00 volts = 1 Boolean > 15.0 KPH = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th < 0.5000 g = FALSE = FALSE VehicleSpeedSensor_FA	raw lateral acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Longitudinal Acceleration Sensor Circuit Low	C1252	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	< -3.8500 g > -3.8500 g (< 0.5 Q impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Longitudinal Acceleration Sensor Circuit High	C1253	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	> 3.8500 g < 3.8500 g (< 0.5 Q impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time > 30.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Longitudinal Acceleration Sensor Performance	C1254	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal rationalized against the TOSS vehicle speed acceleration. The diagnostic monitor can be designed to detect an invalid longitudinal acceleration signal based on the TOSS vehicle speed windows and TOSS vehicle speed acceleration, 4 windows can be enabled. The delta between the TOSS vehicle speed acceleration and longitudinal acceleration signal is taken within each window to verify the delta is small, no failure indicated, or the delta is large indicating the longitudinal acceleration signal is in error. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 1 fail time, 50 millisecond update rate	> 0.5300 g	battery voltage run crank voltage diagnostic monitor enable region 1 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 1 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed	> 11.00 volts > 11.00 volts = 1 Boolean = 0 Boolean > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th > 0.5300 g < 3.8500 g < 0.70 % > 80.0 Nm > 0.1500 g > 15.0 KPH < 200.0 KPH	raw lateral longitudinal acceleration signal stability time > 10.0 seconds fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate region 1 fail time > 75.0 seconds out of region 1 sample time > 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	< 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 2 fail time, 50 millisecond update rate	> 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 2 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal)	> 11.00 volts > 11.00 volts = 1 Boolean = 0 Boolean > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th > 0.5300 g < 3.8500 g	raw longitudinal acceleration signal stability time > 10.0 seconds raw longitudinal acceleration signal fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate region 2 fail time > 75.0 seconds out of region 2 sample time > 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					update region 2 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	 < 0.70 % > 80.0 Nm > 0.1500 g > 0.0 KPH < 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 3 fail time, 50 millisecond update rate	> 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on	> 11.00 volts > 11.00 volts = 1 Boolean = 0 Boolean > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE	raw longitudinal acceleration signal stability time > 10.0 seconds raw longitudinal acceleration signal fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate region 3 fail time > 75.0 seconds out of region 3 sample time > 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 3 sample time: brake pedal position engine torque ABS(TOSS vehicle speed acceleration) TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	= FALSE = FALSE = 1st thru 10th > 0.5300 g < 3.8500 g < 0.70 % > 80.0 Nm < 0.1000 g > 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 4 fail time, 50 millisecond update rate	> 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable	> 11.00 volts > 11.00 volts = 1 Boolean = 0 Boolean > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE	raw longitudinal acceleration signal stability time > 10.0 seconds raw longitudinal acceleration signal fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 4 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	= FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th > 0.5300 g < 3.8500 g < 0.70 % < 80.0 Nm < 0.1500 g > 0.0 KPH < 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	region 4 fail time > 75.0 seconds out of region 4 sample time > 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
System Voltage Performance	P0561	Detects a low performing 12V battery system. This diagnostic reports the DTC when the absolute value of the difference between the battery voltage and the run/ crank voltage exceeds a calibrated value.	Run Crank voltage low and high	ABS(Battery voltage - Run Crank voltage) > 3.00	Battery voltage B+ line present = TRUE Battery voltage low and high diag enable = TRUE Run Crank voltage	1.00 1.00 Voltage >5.00 volts	40 failures out of 50 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect or the flash memory detects an uncorrectable error via the Error Correcting Code.	The Primary Processor's calculated checksum does not match the stored checksum value. Covers all software and calibrations.	1 failure if the fault is detected during the first pass. 5.00 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	Type A, 1 Trips
			The Primary Processor's Error Correcting Code hardware in the flash memory detects an error. Covers all software and calibrations.	254 failures detected via Error Correcting Code			Diagnostic runs continuously via the flash hardware.	
			The Primary Processor's calculated checksum does not match the stored checksum value for a selected subset of the calibrations.	2 consecutive failures detected or 5 total failures detected.			Diagnostic runs continuously. Will report a detected fault within 200 ms.	
			The Secondary Processor's calculated checksum does not match the stored checksum value. Covers all software and calibrations.	1 failure if the fault is detected during the first pass. 5 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	
				In all cases, the failure count is cleared when controller shuts down				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Not Programmed	P0602	This DTC will be stored if the DEC ECU has not been flash programmed with production software and calibration.	controller not flash programmed calibration	= 1 Boolean	controller normal power up initialization, ignition run crank transtions from low to high		at controller power up intitalization one time (one event/ occurance) OR in one second time loop	Type A, 1 Trips
					service Mode $04 active during one second loop	= FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
ECM Long Term Memory Reset	P0603	This DTC detects an invalid NVM which includes a Static NVM, Perserved NVM, ECC ROM in NVM Flash Region, and Perserved NVM during shut down.	Static NVM region error detected during initialization				Diagnostic runs at controller power up.	Type A, 1 Trips
			Perserved NVM region error detected during initialization				Diagnostic runs at controller power up.	
			ECC ROM fault detected in NVM Flash region ECC ROM Error Count >	 3			Diagnostic runs at controller power up.	
			Perserved NVM region error detected during shut down.				Diagnostic runs at controller power down.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
ECM RAM Failure	P0604	Indicates that the ECM has detected a RAM fault. This includes Primary Processor System RAM Fault, Primary Processor Cache RAM Fault, Primary Processor TPU RAM Fault, Primary Processor Update Dual Store RAM Fault, Primary Processor Write Protected RAM Fault, and Secondary Processor RAM Fault. This diagnostic runs continuously.	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	Type A, 1 Trips
			Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written >=	3 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 >	0.40000 s			When dual store updates occur.	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal ECM Processor Integrity Fault	P0606	Indicates that the ECM has detected an internal processor integrity fault. These include diagnostics done on the SPI Communication as well as a host of diagnostics for both the primary and secondary processsors.	Loss or invalid message of SPI communication from the Secondary Processor at initialization detected by the Primary Processor or loss or invalid message of SPI communication from the Secondary Processor after a valid message was received by the Primary Processor	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved	Run/Crank voltage Run/Crank voltage	>= 8.00 Volts or >= 11.00 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent or 10 counts continuous; 100 counts continuous @ initialization. 12.5 ms /count in the ECM main processor	Type A, 1 Trips
			Loss or invalid message of SPI communication from the Primary Processor at initialization detected by the Secondary Processor or loss or invalid message of SPI communication from the Primary Processor after a valid message was received by the Secondary Processor	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved			In the secondary processor, 64/161 counts intermittent or 0.1875s continuous; 0.4875 s continuous @ initialization. 12.5 ms /count in the ECM secondary processor	
			Checks for stack over or underflow in secondary processor by looking for corruption of known pattern at stack boundaries. Checks number of stack over/ under flow since last powerup reset >=	5		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			MAIN processor is verified by responding to a seed sent from the secondary with a key response to secondary. Checks number of incorrect keys	2 incorrect seeds within 8 messages, 0.2000 seconds		ignition in Run or Crank	150 ms for one seed continually failing	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			received > or Secondary processor has not received a new within time limit					
			Time new seed not received exceeded			always running	0.450 seconds	
			MAIN processor receives seed in wrong order			always running	3 / 17 counts intermittent. 50 ms/count in the ECM main processor	
			2 fails in a row in the Secondary processor's ALU check			Test is Enabled: 1 (If 0, this test is disabled)	25 ms	
			2 fails in a row in the Secondary processor's configuration register masks versus known good data			Test is Enabled: 1 (If 0, this test is disabled)	12.5 to 25 ms	
			Secondary processor detects an error in the toggling of a hardware discrete line controlled by the MAIN processor: number of discrete changes > = or < = over time window(50ms)	7 17		Test is Enabled: 0 . (If 0, this test is disabled) time from initialization >= 0.5000 seconds	50 ms	
			Software background task first pass time to complete exceeds			Run/Crank voltage > 6.41	35.000 seconds	
			2 fails in a row in the MAIN processor's ALU check			Test is Enabled: 0 CPU 1 enable 1 CPU 2 enable 0 CPU 3 enable 0 CPU 4 enable	25 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						(If 0, this test is disabled)		
			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 >=	5		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. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			MAIN processor DMA transfer from Flash to RAM has 1 failure			Test is Enabled: 1 (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: **P0606 enable (CPU, 100 msec)** **P0606 enable (CPU, 10 msec)** **P0606 enable (CPU, 12.5 msec)** **P0606 enable (CPU, 20 msec)** **P0606 enable (CPU, 25 msec)** **P0606 enable (CPU, 40 msec)** **P0606 enable (CPU, 50 msec)** **P0606 enable (CPU, 5 msec)** **P0606 enable (CPU, 6.25 msec)** **P0606 enable (CPU, 80 msec)** **P0606 enable (CPU, EventA)** **P0606 enable (CPU, EventB)** **P0606 enable (CPU, EventC)** see supporting table	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	
			MAIN processor determines a seed has not changed within a specified time period within the 50ms task.	Previous seed value equals current seed value.		Test is Enabled: 1 (If 0, this test is disabled)	Table, f(Loop Time). See supporting tables:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							P0606_Last Seed Timeout f (Loop Time)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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 A, 1 Trips
			HWIO reports the assembly calibration integrity check has failed				Diagnostic runs at controller power up.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Actuator Supply Voltage Circuit Low	P0658	Controller specific output driver circuit diagnoses the high sided driver circuit for a short to ground failure, or where controller H/W cannot differentiate, diagnoses the high sided driver circuit for a short to ground failure or open circuit failure, when the output is powered on, by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 Q impedance between signal and controller ground	diagnostic monitor enable high side drive ON service mode $04 not active service fast learn not active P0658 fault active P0658 test fail this key on	= 1 Boolean = TRUE = FALSE = FALSE	fail count > 6 counts out of sample count > 2,400 counts 6.25 millisecond update rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Range (TR) Switch Circuit Low Voltage	P0707	Diagnoses the internal range sensor circuit A and wiring for a ground short circuit fault using controller specific PWM duty cycle measurement thresholds.	when PWM sensor type and PWM voltage direct conditional internal range sensor A PWM duty cycle when PWM sensor type and PWM voltage inverse conditional internal range sensor A PWM duty cycle Increment fail and sample time, update rate 25 milliseconds Controller specific PWM duty cycle thresholds are set to meet the following controller specification for a short to ground.	< 8.789 % duty cycle > 8.789 % duty cycle < 0.5 Q impedance between signal and controller ground	diagnostic monitor enable battery voltage when sensor type is PWM duty cycle direct or inverse conditional for fail threshold is used conditional type check calibration	= 1 Boolean > 9.00 volts = CeTRGD_e_VoltDirctProP	fail time > 0.500 seconds out of sample time > 1.500 seconds battery voltage time > 1.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Range (TR) Switch Circuit High Voltage	P0708	Diagnoses the internal range sensor circuit A and wiring for a short to voltage circuit fault using controller specific PWM duty cycle measurement thresholds.	when PWM sensor type and PWM voltage direct conditional internal range sensor A PWM duty cycle when PWM sensor type and PWM voltage inverse conditional internal range sensor A PWM duty cycle Increment fail and sample time, update rate 25 milliseconds Controller specific PWM duty cycle thresholds are set to meet the following controller specification for a short to power.	> 91.190 % duty cycle < 91.190 % duty cycle < 0.5 Q impedance between signal and controller power	diagnostic monitor enable battery voltage when sensor type is PWM duty cycle direct or inverse conditional for fail threshold is used conditional type check calibration	= 1 Boolean > 9.00 volts = CeTRGD_e_VoltDirctProP	fail time > 1.800 seconds out of sample time > 2.250 seconds battery voltage time > 1.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Fluid Temperature (TFT) Sensor Performance	P0711	The diagnostic monitor will verify the time to transmission fluid temperature warm up based on the raw transmission fluid temperature sesnor, any intermittent signal that causes multiple unrealistic delta changes (intermittent faults) based on the raw transmission fluid temperature sesnor, and, raw transmission fluid temperature sesnor signal stuck in valid range.	raw transmission fluid temperature and the transmission fluid temperature warm up time has elapsed	< 15.0 °C	diagnsotic monitor enable P0712 NOT fault active P0713 NOT fault active battery voltage run crank voltage warm up test enable TFT rationality diagnostic monitor enabled driver accelerator pdeal position engine torque engine speed vehicle speed engine coolant temperature engine coolant temperature raw transmission fluid temperature raw transmission fluid temperature P2818 fault active P2818 test fail this key on DTCs not fault active	= 1 Boolean > 9.00 volts > 9.00 volts = 1 Boolean = VeTFSR_b_TFT_RatlEnbl > 5.0 % > 50.0 Nm > 500.0 RPM > 10.0 KPH > -40.0 °C < 150.0 °C > -273.0 °C < 150.0 °C = FALSE = FALSE	transmission fluid temperature warm up time > **transmission fluid temperature warm up time** seconds battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						EngineTorqueEstInaccurate AcceleratorPedalFailure CrankSensor_FA ECT_Sensor_FA VehicleSpeedSensor_FA		
			current transmission fluid temperature string length = previous transmission fluid temperature transmission temperature string length + (raw transmission fluid temperature - previous raw transmission fluid temperature, update rate 100 milliseconds, increment sample count	> 80.0 °C			sample count > 10 counts evaluate fail temperature threshold, 100 millisecond update rate, if transmission fluid temperature string length above fail threshold increment fail time fail time > 8.0 seconds out of sample time > 12.0 seconds	
					diagnsotic monitor enable P0712 NOT fault active P0713 NOT fault active battery voltage	= 1 Boolean > 9.00 volts	 battery voltage time > 0.100 seconds	
					run crank voltage	> 9.00 volts	run crank voltage time > 0.100 seconds	
					intermittent test enable propulsion system active	= 1 Boolean = TRUE		
			raw transmission fluid temperature - previous	< 0.0000 °C			fail time > 300.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			raw transmission fluid temperature, update rate 100 milliseconds, update fail time		diagnsotic monitor enable P0712 NOT fault active P0713 NOT fault active battery voltage run crank voltage stuck in range test enable propulsion system active raw transmission fluid temperature raw transmission fluid temperature	= 1 Boolean > 9.00 volts > 9.00 volts = 1 Boolean = TRUE > -273.0 °C < 150.0 °C	 battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Fluid Temperature Sensor Circuit Low Voltage	P0712	Controller specific analog circuit diagnoses the transmission fluid temperature sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds, converted to a resistance value.	circuit resistance update fail time 1 seconds update rate	< 13.500 Q	diagnostic monitor enable battery voltage run crank voltage run crank voltage in range time	= 1 Boolean > 9.00 volts > 9.00 volts	fail time > 5.00 seconds out of sample time > 6.00 seconds 1 seconds update rate battery voltage in range time > 0.100 seconds run crank voltage in range time > 0.100 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Fluid Temperature Sensor Circuit Low Voltage	P0713	Controller specific analog circuit diagnoses the transmission fluid temperature sensor and wiring for an open circuit or short to voltage failure by comparing a voltage measurement to controller specific voltage thresholds, converted to a resistance value.	circuit resistance update fail time 1 seconds update rate	>284,177.0 Ω	diagnostic monitor enable battery voltage run crank voltage run crank voltage in range time	= 1 Boolean > 9.00 volts > 9.00 volts	fail time > 5.00 seconds out of fail time > 6.00 seconds 1 seconds update rate battery voltage in range time > 0.100 seconds run crank voltage in range time > 0.100 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Input Speed Sensor Performance	P0716	Detects unrealistic drop in raw transmission input speed signal RPM. Drop events are counted up to fail threshold. A drop event is defined by a sudden delta change in RPM from one value to a lower value. The raw transmission input speed must achieve a value high enough to record an unrealistic drop sample to sample. Once the drop threshold is met, fail time is accumualted indicating the raw transmission input speed has not recovered above a threshold, allowing the fail event count to increment. Multiple fail event counts must occur, but if the signal remains low, no further deltas occur, the "Input Speed Sensor Circuit Low Voltage" DTC will set before P0716, as P0716 is designed to set based on an intermittent raw transmission input speed signal RPM.	delta raw transmission input speed delta raw transmission input speed = raw transmission input speed - last valid raw transmission input speed, 25 millisecond update rate	> 2,000.0 RPM	service mode $04 active diagnostic monitor enable P0717 test fail this key on P07BF test fail this key on P07C0 test fail this key on last valid raw transmission input speed OR valid raw transmission input speed (before drop event) last valid raw transmission input speed updates very 25 milliseconds when stablity time complete as long as (delta delta raw transmission input speed AND raw transmission input speed) raw transmission output speed accelerator pedal position engine torque engine torque transmission hydraulic pressure available: engine speed DTCs not fault active	= FALSE = 1 Boolean = FALSE = FALSE = FALSE > 160.0 RPM > 160.0 RPM < 320.0 RPM > 160.0 RPM > 254.0 RPM > 5.0 % < 8,191.9 Nm > 30.0 Nm > 500.0 RPM AcceleratorPedalFailure EngineTorqueEstInaccurate	fail time > 1.500 seconds updated fail event count, fail event count > 5 counts, 25 millisecond update rate raw transmission input speed time > 2.000 seconds stability time > 0.100 seconds engine speed time >	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							engine speed time for transmission hydraulic pressure available	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Input Speed Sensor Circuit Low Voltage	P0717	Detects no activity in raw transmission input speed signal RPM due to open ciruit electrical failure mode or sensor internal faults, or, controller internal failure modes. The raw transmission input speed signal RPM is rationalized against vehicle conditions in which the the powertrain is producing torque available at the drive wheels, but raw transmission input speed signal RPM remains low. After a sudden drop in raw transmission input speed signal RPM, a race condition can occur between P0717 and "Input Speed Sensor Performance" depending on the true nature of the failure.	raw transmission input speed OR TISS/TOSS fault (single power supply to TISS and TOSS) = TRUE, update fail time 25 millisecond update rate	< 100.0 RPM < 475.0 RPM	service mode $04 active diagnostic monitor enable run crank voltage service fast learn active run crank voltage P0722 fault active P0723 fault active P077C fault active P077D fault active brake pedal position sesnor must be OBDII to use brake pedal conditional brake pedal position sesnor type brake pedal position P0716 test fail this key on P07BF test fail this key on P07C0 test fail this key on accelerator pedal position engine torque engine torque (transmission current attained gear transmission current attained gear raw transmission output speed OR transmission current attained gear transmission current attained gear raw transmission output speed) P0717 fault active P0717 test fail this key on	= FALSE = 1 Boolean > 5.00 volts = FALSE > 9.00 volts = FALSE = FALSE = FALSE = FALSE = CeBRKR_e_OBD < 70.0 % = FALSE = FALSE = FALSE > 5.0 % >30.0 Nm < 8,191.9 Nm ≤ CeCGSR_e_CR_Seventh > CeCGSR_e_CR_First > 162.0 RPM < CeCGSR_e_CR_Tenth ≥ CeCGSR_e_CR_Seventh	fail time > 4.00 seconds run crank voltage time > 25 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					TISS/TOSS fault (single power supply to TISS and TOSS) = TRUE occurs when: (P0722 fail time high gear exceeds fail threshold OR P0722 fail time low gear exceeds fail threshold) TISS/TOSS has single power supply calibration TISS/TOSS single power supply test enabled transmission hydraulic pressure available: engine speed DTCs not fault active	> 263.0 RPM = FALSE = FALSE = 0 Boolean = 1 Boolean > 500.0 RPM EngineTorqueEstInaccurate	engine speed time > **engine speed time for transmission hydraulic pressure available**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Output Speed Sensor Performance	P0721	The diagnostic monitor determines if the direction TOSS value is coherent based on the on period time of the directional sensor and TOSS raw. When the on period time indicates a transitional state, the direction must also be transitional as measured by very slow TOSS raw RPM. When the on period time indicates a non-transitional state, forward or reverse, the direction must also be transition, not forward and not reverse.	TOSS raw direction when TOSS transitional period = FALSE AND TOSS raw direction when TOSS transitional period = FALSE OR TOSS raw when TOSS transitional period = TRUE update fail and sample time 6.26 millisecond update rate	# FORWARD # REVERSE > 225.0 RPM	service mode $04 active diagnostic monitor enable TOSS count sample period P0721 fault active P0721 test fail this key on TOSS transitional period detected = FALSE when: on period on period when direction unknown OR on period on period when direction is reverse OR on period on period when direction is forward TOSS transitional period detected = TRUE when: on period on period when direction unknown senor type is directional senor type calibration	= FALSE = 1 Boolean # 0 counts = FALSE = FALSE > 0.4434 seconds < 0.2773 seconds < 0.2363 seconds > 0.1240 seconds < 0.0811 seconds > 0.0088 seconds < 0.4434 seconds > 0.2773 seconds = CeTOSR_e_Directional	fail time > 3.500 seconds out of sample time > 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Output Speed Sensor Circuit Low Voltage	P0722	Detects no activity in raw transmission output speed signal RPM due to open ciruit electrical failure mode or sensor internal faults, or, controller internal failure modes. The raw transmission output speed signal RPM is rationalized against vehicle conditions in which the the powertrain is producing torque, but raw transmission output speed signal RPM remains low. After a sudden drop in raw transmission output speed signal RPM, a race condition can occur between P0722 and "Output Speed Sensor Circuit Intermittent" depending on the true nature of the failure.	raw transmission output speed, update fail time 6.25 millisecond update rate when: attained gear attained gear AND attained gear use high gear fail time threshold ELSE use low gear fail time threshold	< 30.0 RPM ≥ CeCGSR_e_CR_First ≤ CeCGSR_e_CR_Tenth > CeCGSR_e_CR_Fourth	service mode $04 active diagnostic monitor enable when neutral range occurs: (garage shift OR PRNDL OR PRNDL OR range inhibit state) AND (engine torque accelerator pedal position) when not neutral range occurs: attained gear attained gear (attained gear engine torque hysteresis high engine torque hysteresis low accelerator pedal position hysteresis high accelerator pedal position hysteresis low) when not neutral range occurs: (attained gear engine torque hysteresis high engine torque hysteresis low	= FALSE = 1 Boolean # COMPLETE = PARK = NEUTRAL # no inhibt active > 8,192.0 Nm > 100.0 % > CeCGSR_e_CR_First < CeCGSR_e_CR_Tenth > CeCGSR_e_CR_Fourth > 50.0 Nm > 30.0 Nm > 5.0 % > 3.0 % ≤ CeCGSR_e_CR_Fourth > 80.0 Nm > 50.0 Nm	fail time > 5.00 seconds high gear OR fail time > 3.50 seconds low gear	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					accelerator pedal position hysteresis high	> 8.0 %		
					accelerator pedal position hysteresis low)	> 5.0 %		
					TISS enable occurs when:			
					(TISS speed select	= 1 Boolean		
					OR			
					TISS/TOSS has single power supply calibration	= 0 Boolean		
					AND			
					TISS	< 8,191.9 RPM		
					AND			
					TISS)	> 475.0 RPM		
					OR			
					(TISS speed select	# 1 Boolean		
					OR			
					TISS/TOSS has single power supply calibration	= 0 Boolean		
					AND			
					TISS	< 8,191.9 RPM		
					AND			
					TISS)	> 5,800.0 RPM		
					P0716 test fail this key on	= FALSE		
					P0717 test fail this key on	= FALSE		
					P07BF test fail this key on	= FALSE		
					P07C0 test fail this key on	= FALSE		
					PTO check:			
					PTO enable calibration is FALSE	# 1 Boolean		
					OR			
					(PTO enable calibration is TRUE	= 1 Boolean		
					AND			
					PTO active)	= TRUE		
					run crank voltage	> 5.00 volts	run crank voltage time > 25 milliseconds	
					service fast learn active	= FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					run crank voltage	> 9.00 volts		
					transmission fluid temperature	> -40.00 °C		
					P0723 test fail this key on	= FALSE		
					P077C test fail this key on	= FALSE		
					P077D test fail this key on	= FALSE		
					P0722 fault active	= FALSE		
					P0722 test fail this key on	= FALSE		
					transmission hydraulic pressure available:			
					engine speed	> 500.0 RPM	engine speed time > **engine speed time for transmission hydraulic pressure available**	
					DTCs not fault active	AcceleratorPedalFailure EngineTorqueEstInaccurate		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Output Speed Sensor Circuit Intermittent	P0723	Detects unrealistic drop in raw transmission output speed signal RPM. Drop events are counted up to fail threshold. A drop event is defined by a sudden delta change in RPM from one value to a lower value. The raw transmission output speed must achieve a value high enough to record an unrealistic drop sample to sample. Once the drop threshold is met, fail time is accumualted indicating the raw transmission output speed has not recovered above a threshold, allowing the fail event count to increment. Multiple fail event counts must occur, but if the signal remains low, no further deltas occur, the "Output Speed Sensor Circuit Low Voltage" DTC will set before P0723, as P0723 is designed to set based on an intermittent raw transmission output speed signal RPM.	4WD low fail threshold: delta raw transmission output speed OR NOT 4WD low fail threshold, update fail time, delta raw transmission output speed = raw transmission output speed previous loop - raw transmission output speed, 25 millisecond update rate	> 700.0 RPM > 700.0 RPM	service mode $04 active diagnostic monitor enable transmission engaged state 4WD low state PTO check: PTC enable calibration is FALSE OR (PTO enable calibration is TRUE AND PTO active) run crank voltage service fast learn active run crank voltage P077C test fail this key on P077D test fail this key on when PRNDL is moved to	= FALSE = 1 Boolean # not engaged = 4WD low state previous loop, 25 millisecond update rate # 1 Boolean = 1 Boolean = TRUE > 5.00 volts = FALSE > 9.00 volts = FALSE = FALSE	fail time > 1.500 seconds updated fail event count, fail event count > 5 counts, 25 millisecond update rate transmission engaged state time > **P0723 transmission engaged state time threshold** 4WD low change time > 3.0 seconds run crank voltage time > 25 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					NEUTRAL allow transmission engaged state time before enabling fail evaluation, or, if raw raw transmission output speed is active in NEUTRAL enable fail evaluation:			
					PRNDL OR	= CeTRGR_e_PRNDL_Neutral		
					PRNDL OR	= CeTRGR_e_PRNDL_Transitional1 N-D transitional		
					PRNDL OR	= CeTRGR_e_PRNDL_Transitional4 R-N transitional		
					raw transmission output speed OR	> 250.0 RPM		
					last valid raw transmission output speed	> 250.0 RPM		
					determine if raw transmission input speed is stable:			
					(raw transmission input speed - raw transmission input speed previous, 25 millisecond update AND	< 4,095.9 RPM	raw transmission input speed stability time > 2.00 seconds	
					raw transmission input speed) OR	> 160.0 RPM		
					(TISS/TOSS has single power supply calibration AND	= 0 Boolean	no time required	
					raw transmission input speed)	= 0.0 RPM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					select delta RPM fail theshold: (4WD low state AND $WD low valid) select P0723 4WD TOSS delta fail threshold otherwise use P0723 TOSS delta fail threshold last valid raw transmission output speed OR valid raw transmission output speed (before drop event) last valid raw transmission output speed updates very 25 milliseconds when stablity time complete as long as (delta delta raw transmission output speed AND raw transmission output speed) transmission hydraulic pressure available: engine speed DTCs not fault active	 = TRUE = TRUE > 89.0 RPM > 89.0 RPM < 140.0 RPM > 89.0 RPM > 500.0 RPM AcceleratorPedalFailure EngineTorqueEstInaccurate	 raw transmission output speed time > 2.00 seconds stability time > 0.100 seconds engine speed time > **engine speed time for transmission hydraulic pressure available**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Torque Converter Clutch (TCC) System Performance -GF9 specific	P0741	The GF9 diagnostic monitor detects the transmission torque converter control valve failed hydraulically on. The torque converter hydraulic control circuit is multiplexed with the transmission clutch select valve hydraulic control circuit, allowing for the torque converter control valve stuck on test to execute when the clutch select valve solenoid is commanded ON. When the clutch select valve solenoid is commanded ON as the vehicle speed decreases toward zero KPH, and, if the torque converter control valve is stuck on, the torque converter slip speed rate of change will have a large slope while decreasing toward zero RPM, and the torque converter slip speed will remain low near zero RPM.	while control valve test time timing down: rate of change of torque convert slip speed = (ABS (current loop value torque convert slip speed - previous loop value torque convert slip speed) / 25 milliseconds) when clutch select valve soleniod multiplexed to TCC hydraulic AND torque convert slip speed = ABS(engine speed - transmission input shaft speed) THEN increment fail time 25 millisecond update rate	≥ **P0741 (GF9 specific) torque convert derivative slip speed fail threshold** see supporting tables ≤ **P0741 (GF9 specific) TCC slip speed crash RPM**	diagnostic monitor enable (TCC stuck off enable OR TCC stuck on enable) hydraulic pressure available: engine speed service fast learn active battery voltage run crank voltage P281B falut active P281D falut active P281E falut active PRNDL PRNDL PRNDL transmission fluid temperature	= 1 Boolean = 1 Boolean = 1 Boolean > 500.0 RPM = FALSE > 9.00 volts > 9.00 volts = FALSE = FALSE = FALSE # PARK # NEUTRAL # REVERSE > -6.66 °C	failt ime > 0.250 seconds, increment fail count fail count > 4 counts 25 millisecond update rate engine speed time > **engine speed time for transmission hydraulic pressure available** see supporting table battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					transmission fluid temperature	< 130.00 °C		
					accelerator pedal position	> 0.00 %		
					accelerator pedal position	< 1.00 %		
					vehicle speed	> 3.0 KPH		
					vehicle speed	< 9.5 KPH		
					TCC command mode	= OFF		
					break latch state (clutch select valve solenoid control)	# disabled (clutch select valve transitioning)		
					P0722 fault pending	= FALSE		
					P0723 fault pending	= FALSE		
					P0716 fault pending	= FALSE		
					P0717 fault pending	= FALSE		
					P07BF fault pending	= FALSE		
					P07C0 fault pending	= FALSE		
					(PTO active OR	= FALSE		
					PTO disable calibration)	= 1 Boolean		
					transmission fluid temperature	> -6.66 °C		
					transmission fluid temperature	< 130.00 °C		
					engine torque	> 55.0 Nm		
					engine torque	< 800.0 Nm		
					P0741 test fail this key on	= FALSE		
					vehicle speed	< 45.0 KPH		
					engine speed	> 400.0 RPM		
					engine speed	< 5,500.0 RPM		
					accelerator pedal position	< 95.0 %		
					4WD low state	= FALSE		
					(driver shift mode active OR	= FALSE		
					driver shift mode calibration)	= 0 Boolean		
					(misfire requests TCC off OR			
					misfire TCC off calibration)	= 0 Boolean		
					(clucth control solenoid stuck on OR solenoid stuck OFF intrusive shift active)	= FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					P0746 fault pending P0747 fault pending P0776 fault pending P0777 fault pending P0796 fault pending P0797 fault pending P2714 fault pending P2715 fault pending P2723 fault pending P2724 fault pending P2732 fault pending P2733 fault pending P2820 fault pending P2821 fault pending vehicle speed accelerator pedal position hysteresis when: break latch state (clutch select valve solenoid) previous break latch state (clutch select valve solenoid) set stuck on test time and begin time down, stuck on test time must time down from calibration value to zero (0.0) seconds break latch state AND previous break latch state THEN initialize control valve test time, control valve test time must time down from calibration value to zero (0.0) seconds	= FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE < 8.0 KPH > 4.0 % > 1.0 % = disabled (clutch select valve not transitioning) = complete (clutch select valve transition complete) = **P0741 stuck on test time** see supporting tables = clutch select valve solenoid mutliplexed to TCC hydraulic = disabled (clutch select valve not transitioning) = 2.50 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					DTCs not fault active	AcceleratorPedalFailure EngineTorqueEstInaccurate P0716, P0717, P07BF, P07C0 P0722, P0723, P077C, P077D		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid A Stuck Off (GF9)	P0746	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near oratzeroRPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C1 clutch slip speed, update fail time 6.25 milliscond update	> 200.0 RPM	****************************** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TOM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning	****************************** = 1 Boolean = 1 Boolean > 9.00 volts = 1 Boolean = 1 Boolean > 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean	fail time > 1.00 seconds, update fail count, fail count > 3 counts 6.25 milliscond update battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					****************************	****************************		
					enable C1 clutch slip speed fail compare when:			
					((startle mitigation active	= FALSE		
					OR			
					(startle mitigation active	= TRUE		
					AND			
					startle mitigation gear)) (see startle mitigation active NOTE below)	# initial startle mitigation gear		
					unintended deceleration fault pending	= FALSE		
					OR			
					unintended deceleration fault pending enable cal is FALSE (startle mitigation)	= 0 (0 to enable, 1 to disable)		
					clutch steady state adaptive active	= FALSE		
					(transmission output shaft speed	> 89.0 RPM		
					OR			
					(accelerator pedal position	> 2.00 %		
					OR			
					engine speed)	> 1,500.0 RPM	> 0.900 seconds	
					C1 clutch slip speed valid	= TRUE (all speed sensors are functional for lever node clutch slip speed calculation)		
					C1 clutch pressured map	= mapped to line		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to GF9 C1 CB123456 clutch pressure control solenoid.			 (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) P2821 (clutch select valve stuck on) test active range shift state ****************************** DTCs not fault pending DTCs not fault active	pressure, C1 clutch pressure has reached fully applied state = 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE = FALSE = range shift complete ****************************** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid A Stuck On	P0747	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C1 clutch slip speed OR shift type is garage shift: C1 clutch slip speed ELSE shift is another type: C1 clutch slip speed update fail time 6.25 milliscond update	 < 50.0 RPM < 100.00 RPM < 50.0 RPM			Base fail time: shift type is power down shift: fail time > 0.80 seconds shift type is garage shift: fail time > 0.25 shift type is another type: fail time > 0.150 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			******************************	******************************	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count > 3 counts 6.25 milliscond update	
					system-level enables:			
					use battery voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use battery voltage calibration is TRUE	= 1 Boolean		
					AND			
					battery voltage)	> 9.00 volts	battery voltage time > 0.100 seconds	
					use run crank voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use run crank voltage calibration is TRUE	= 1 Boolean		
					AND			
					run crank voltage)	> 9.00 volts	run crank voltage time > 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		is disabled. This diagnostic monitor is relative to the GF9 C1 CB123456, GR10 C1 CB123456R, or 8 Speed C1 CB1278R clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					*****************************	******************************		
					range shift state	# range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	> 89.0 RPM		
					((C1 off going clutch pressure control ramp time out complete	= TRUE		
					AND			
					off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to disable)		
					OR			
					C1 off going clutch command pressure)	< 100.0 kPa	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							closed throttle upshift: **C1 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C1 exhaust delay open throttle power on up shift** garage shifts: **C1 exhaust delay garage shift** closed throttle downshift: **C1 exhaust delay closed throttle down shift** negative torque upshift: **C1 exhaust delay negative torque up shift** open throttle downshift: **C1 exhaust delay open throttle power down shift**	
					(engine torque AND Primary oncoming stuck on toraue enable cal)	> 8,191.8 Nm = 0 (0 is enable, 1 is enable)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					OR			
					(primary oncoming clutch active	= TRUE		
					primary on coming control state	# clutch fill phase		
					primary on coming commanded pressure)	> pressure clip threshold according to shift type: closed throttle upshift: **Clutch Clip Press CU Shifts** open throttle upshift: **Clutch Clip Press PU Shifts** garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts**	absolute value of (-0.60) seconds	
					C1 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					*****************************	******,************,******* ·*****,		
					conditions needed to trigger test:			
					(current shift type	# Garage shift		
					AND			
					shift type enable cal for current shift type)	**Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable)		
					OR			
					(Intrusive shift active	= FALSE		
					AND			
					shift type enable cal for garage shift	= 0 (0 will enable, 1 will enable)		
					AND			
					Attained Gear	= NEUTRAL OR commanded gear		
					AND			
					(stuck on enable cal for forward garge shifts	= 0 (0 to disable, 1 to enable)		
					AND			
					driver requested direction	= FORWARD		
					AND			
					commanded gear)	= a FORWARD gear		
					OR			
					(stuck on enable cal for reverse garage shifts	= 0 (0 to disable, 1 to enable)		
					AND			
					driver requested direction	= REVERSE		
					AND			
					commanded gear))	= REVERSE		
					clutch stuck off intrusive shift active	= FALSE		
					startle mitigation active (see note on startle mitigation below)	= FALSE		
					(new clutch controller has been initalized	= TRUE		
					OR			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					transitioning to a different clutch controller)	= TRUE		
					current clutch solenoid test state	transitions to Teststate or TUT_HOLD (see note below about state transitions)		
					******************************	******************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					***************************** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission shift, until:	P172AP172B *****************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration occurred. Once a safe			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCstoset P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid B Stuck Off (GF9)	P0776	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near oratzeroRPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C2 clutch slip speed, update fail time 6.25 milliscond update	> 200.0 RPM	******************************	******************************	fail time > 1.00 seconds, update fail count, fail count > 3 counts 6.25 milliscond update	Type A, 1 Trips
					system-level enables:			
					use battery voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use battery voltage calibration is TRUE	= 1 Boolean		
					AND			
					battery voltage)	> 9.00 volts	battery voltage time > 0.100 seconds	
					use run crank voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use run crank voltage calibration is TRUE	= 1 Boolean		
					AND			
					run crank voltage)	> 9.00 volts	run crank voltage time > 0.100 seconds	
					TOM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active hydraulic pressure available **************************** enable C2 clutch slip speed fail compare when: ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable cal is FALSE (startle mitigation) clutch steady state adaptive active (transmission output shaft speed OR (accelerator pedal position OR engine speed) C2 clutch slip speed valid C2 clutch pressured map	= FALSE Boolean = TRUE **************************** = FALSE = TRUE # initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE > 89.0 RPM > 2.00 % > 1,500.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation) = mapped to line	> 0.900 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to GF9 C2 CB29 clutch pressure control solenoid.			 (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) P2821 (clutch select valve stuck on) test active range shift state ****************************** DTCs not fault pending DTCs not fault active	pressure, C2 clutch pressure has reached fully applied state = 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE = FALSE = range shift complete ****************************** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid B Stuck On	P0777	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node desian, reauirina	shift type is power down shift: C2 clutch slip speed OR shift type is garage shift: C2 clutch slip speed ELSE shift is another type: C2 clutch slip speed update fail time 6.25 milliscond update	< 50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time > 0.80 seconds shift type is garage shift: fail time > 0.25 shift type is another type: fail time > 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			****************************** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)	****************************** = 1 Boolean = 1 Boolean > 9.00 volts = 1 Boolean = 1 Boolean > 9.00 volts	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count > 3 counts 6.25 milliscond update battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		is disabled. This diagnostic monitor is relative to the GF9 C2 CB29, GR10 C2 CB128910R, or 8 Speed C2 CB12345R clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					*****************************	******************************		
					range shift state	# range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	> 89.0 RPM		
					((C2 off going clutch pressure control ramp time out complete	= TRUE		
					AND			
					off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to disable)		
					OR			
					C2 off going clutch command pressure)	< 171 kPa	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							closed throttle upshift: **C2 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C2 exhaust delay open throttle power on up shift** garage shifts: **C2 exhaust delay garage shift** closed throttle downshift: **C2 exhaust delay closed throttle down shift** negative torque upshift: **C2 exhaust delay negative torque up shift** open throttle downshift: **C2 exhaust delay open throttle power down shift**	
					(engine torque AND Primary oncomina stuck	> 8,192 Nm = 0 tO is enable. 1 is		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					on torque enable cal)	enable)		
					OR			
					(primary oncoming clutch active	= TRUE		
					primary on coming control state	+ clutch fill phase		
					primary on coming commanded pressure)	> pressure clip threshold according to shift type:		
						closed throttle upshift: **Clutch Clip Press CU Shifts**		
						open throttle upshift: **Clutch Clip Press PU Shifts**	absolute value of (-0.60) seconds	
						garage shifts: **Clutch Clip Press GS Shifts**		
						closed throttle downshift: **Clutch Clip Press CD Shifts**		
						negative torque upshift: **Clutch Clip Press NU Shifts**		
						open throttle downshift: **Clutch Clip Press PD Shifts**		
					C2 clutch slip speed valid, all speed sensors are functional for lever node clucth slio soeed	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					calculation ****************************** conditions needed to trigger test: (current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND shift type enable cal for garage shift AND Attained Gear AND (stuck on enable cal for forward garge shifts AND driver requested direction AND commanded gear) OR (stuck on enable cal for reverse garage shifts AND driver requested direction AND commanded gear)) clutch stuck off intrusive shift active startle mitigation active (see note on startle mitigation below) (new clutch controller has	****************************** # Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable) = FALSE = 0 (0 will enable, 1 will enable) = NEUTRAL OR commanded gear = 0 (0 to disable, 1 to enable) = FORWARD = a FORWARD gear = 0 (0 to disable, 1 to enable) = REVERSE = REVERSE = FALSE = FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					been initalized OR transitioning to a different clutch controller)	= TRUE = TRUE		
					current clutch solenoid test state	transitions to Teststate or TUT_HOLD (see note below about state transitions)		
					******************************	******************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					****************************** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the	P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B ******************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					automatic transmission shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					vehicle deceleration occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCstoset P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Output Speed Sensor Circuit Low	P077C	Controller specific analog circuit diagnoses the transmission output speed sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission output speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	< 0.2500 volts (< 0.5 Q impedance between signal and controller ground)	service mode $04 active diagnostic monitor enable P077D fault active service fast learn run crank voltage battery voltage P077C fault active P077C test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE > 10.00 volts > 10.00 volts = FALSE = FALSE	fail time > 0.050 seconds, update fail count 12.5 millisecond update rate fail count > 16 counts 12.5 millisecond update rate run crank and battery voltage time > 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Output Speed Sensor Circuit High	P077D	Controller specific analog circuit diagnoses the transmission output speed sensor and wiring for a short to voltage fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission output speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	> 4.7500 volts (< 0.5 Q impedance between signal and controller power)	service mode $04 active diagnostic monitor enable P077C fault active service fast learn run crank voltage battery voltage P077D fault active P077D test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE > 10.00 volts > 10.00 volts = FALSE = FALSE	fail time > 0.050 seconds, update fail count 12.5 millisecond update rate fail count > 16 counts 12.5 millisecond update rate run crank and battery voltage time > 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid C Stuck Off (GF9)	P0796	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near oratzeroRPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C3 clutch slip speed, update fail time 6.25 milliscond update	> 200.0 RPM	******************************	******************************	fail time > 1.00 seconds, update fail count, fail count > 3 counts 6.25 milliscond update	Type A, 1 Trips
					system-level enables:			
					use battery voltage calibration is FALSE OR	= 1 Boolean		
					(use battery voltage calibration is TRUE AND	= 1 Boolean		
					battery voltage)	> 9.00 volts	battery voltage time > 0.100 seconds	
					use run crank voltage calibration is FALSE OR	= 1 Boolean		
					(use run crank voltage calibration is TRUE AND	= 1 Boolean		
					run crank voltage)	> 9.00 volts	run crank voltage time > 0.100 seconds	
					TOM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					****************************	****************************		
					enable C3 clutch slip speed fail compare when:			
					((startle mitigation active OR	= FALSE		
					(startle mitigation active AND	= TRUE		
					startle mitigation gear)) (see startle mitigation active NOTE below)	# initial startle mitigation gear		
					unintended deceleration fault pending OR	= FALSE		
					unintended deceleration fault pending enable cal is FALSE (startle mitigation)	= 0 (0 to enable, 1 to disable)		
					clutch steady state adaptive active	= FALSE		
					(transmission output shaft speed OR	> 89.0 RPM		
					(accelerator pedal position OR	> 2.00 %		
					engine speed)	> 1,500.0 RPM	> 0.900 seconds	
					C3 clutch slip speed valid	= TRUE (all speed sensors are functional for lever node clutch slip speed calculation)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to C3 GF9 CB38 clutch pressure control solenoid.			C3 clutch pressured map	= mapped to line pressure, C3 clutch pressure has reached fully applied state		
					(enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear)	= 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE		
					P2821 (clutch select valve stuck on) test active	= FALSE		
					range shift state	= range shift complete		
					■k-kick-k-k-kiek-kiekititit-k-kiifk-k-kick-kitit-k-k-k-k	*****************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid C Stuck On	P0797	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C3 clutch slip speed OR shift type is garage shift: C3 clutch slip speed ELSE shift is another type: C3 clutch slip speed update fail time 6.25 milliscond update	 <50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time > 0.80 seconds shift type is garage shift: fail time > 0.25 shift type is another type: fail time > 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			******************************	******************************	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count > 3 counts 6.25 milliscond update	
					system-level enables:			
					use battery voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use battery voltage calibration is TRUE	= 1 Boolean		
					AND			
					battery voltage)	> 9.00 volts	battery voltage time > 0.100 seconds	
					use run crank voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use run crank voltage calibration is TRUE	= 1 Boolean		
					AND			
					run crank voltage)	> 9.00 volts	run crank voltage time > 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		is disabled. This diagnostic monitor is relative to the GF9 C3 CB38, GR10 C3 C23457910, or 8 Speed C3 C13567 clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					*****************************	******************************		
					range shift state	# range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	> 89.0 RPM		
					((C3 off going clutch pressure control ramp time out complete	= TRUE		
					AND			
					off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to disable)		
					OR			
					C3 off going clutch command pressure)	< 115 kPa	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							closed throttle upshift: **C3 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C3 exhaust delay open throttle power on up shift** garage shifts: **C3 exhaust delay garage shift** closed throttle downshift: **C3 exhaust delay closed throttle down shift** negative torque upshift: **C3 exhaust delay negative torque up shift** open throttle downshift: **C3 exhaust delay open throttle power down shift**	
					(engine torque AND Primary oncoming stuck on toraue enable cal)	> 8,192 Nm = 0 (0 is enable, 1 is enable)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					OR			
					(primary oncoming clutch active	= TRUE		
					primary on coming control state	# clutch fill phase		
					primary on coming commanded pressure)	> pressure clip threshold according to shift type: closed throttle upshift: **Clutch Clip Press CU Shifts** open throttle upshift: **Clutch Clip Press PU Shifts** garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts**	absolute value of (-0.60) seconds	
					C3 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					******************************	******,************,******* ·*****,		
					conditions needed to trigger test:			
					(current shift type AND shift type enable cal for current shift type)	# Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable)		
					OR			
					(Intrusive shift active	= FALSE		
					AND shift type enable cal for garage shift	= 0 (0 will enable, 1 will enable)		
					AND Attained Gear	= NEUTRAL OR commanded gear		
					AND (stuck on enable cal for forward garge shifts	= 0 (0 to disable, 1 to enable)		
					AND driver requested direction	= FORWARD		
					AND commanded gear)	= a FORWARD gear		
					OR (stuck on enable cal for reverse garage shifts	= 0 (0 to disable, 1 to enable)		
					AND driver requested direction	= REVERSE		
					AND commanded gear))	= REVERSE		
					clutch stuck off intrusive shift active	= FALSE		
					startle mitigation active (see note on startle mitigation below)	= FALSE		
					(new clutch controller has been initalized	= TRUE		
					OR			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					transitioning to a different clutch controller)	= TRUE		
					current clutch solenoid test state	transitions to Teststate or TUT_HOLD (see note below about state transitions)		
					******************************	******************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					****************************** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission shift, until:	P172AP172B ******************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration occurred. Once a safe			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCstoset P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Input/Turbine Speed Sensor A Circuit Low	P07BF	Controller specific analog circuit diagnoses the transmission input/ turbine speed sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission intput/turbine speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	< 0.2500 volts (< 0.5 Q impedance between signal and controller ground)	service mode $04 active diagnostic monitor enable P07C0 fault active service fast learn run crank voltage battery voltage P07BF fault active P07BF test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE > 10.00 volts > 10.00 volts = FALSE = FALSE	fail time > 0.050 seconds, update fail count 12.5 millisecond update rate fail count > 16 counts 12.5 millisecond update rate run crank and battery voltage time > 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Input/Turbine Speed Sensor A Circuit High	P07C0	Controller specific analog circuit diagnoses the transmission input/ turbine speed sensor and wiring for a short to voltage fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission input/turbine speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	> 4.7500 volts (< 0.5 Q impedance between signal and controller power)	service mode $04 active diagnostic monitor enable P07BF fault active service fast learn run crank voltage battery voltage P07C0 fault active P07C0 test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE > 10.00 volts > 10.00 volts = FALSE = FALSE	fail time > 0.050 seconds, update fail count 12.5 millisecond update rate fail count > 16 counts 12.5 millisecond update rate run crank and battery voltage time > 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Upshift Switch Circuit	P0815	Diagnoses the state of the upshift switch circuit, stuck in the state "tap up" (upshift) active. Emissions neutral default, disables tap-up tap-down or manual-up manual-down.	switch state update fail time 1 100 millisecond update rate	= tap up (upshift) state active	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time run crank voltage P1761 fault active P0826 fault active P0826 test fail this key on P0826 fault pending (P0815 fault active OR P0815 fault active test fail this key on) PRNDL range change time PRNDL in range: D1 OR D2 OR D3 OR D4 OR D5 OR D6 OR D7 OR D8 OR D9 OR D10 OR NEUTRAL OR PARK OR REVERSE DTCs not fault pending	= FALSE = 1 Boolean > 5.00 volts > 25 milliseconds > 9.00 volts = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE > 1.00 seconds = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 0 Boolean = 0 Boolean = 0 Boolean Transmission Shift Lever Position Validity	fail time 1 > 1.00 seconds	Emissions Neutral Diagnostics - Type C
			switch state update fail time 2 100 millisecond update rate	= tap up (upshift) state active	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time run crank voltage P1761 fault active	= FALSE = 1 Boolean > 5.00 volts > 25 milliseconds > 9.00 volts = FALSE	fail time 2 > 120.00 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					P0826 fault active P0826 test fail this key on P0826 fault pending (P0815 fault active OR P0815 fault active test fail this key on) PRNDL range change time PRNDL in range: D1 OR D2 OR D3 OR D4 OR D5 OR D6 OR D7 OR D8 OR D9 OR D10 OR NEUTRAL OR PARK OR REVERSE DTCs not fault pending	= FALSE = FALSE = FALSE = FALSE = FALSE > 1.00 seconds = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 0 Boolean = 0 Boolean = 0 Boolean Transmission Shift Lever Position Validity		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Downshift Switch Circuit	P0816	Diagnoses the state of the downshift switch circuit, stuck in the state "tap down" (downshift) active. Emissions neutral default, disables tap-up tap-down or manual-up manual-down.	switch state update fail time 1 100 millisecond update rate	= tap down (downshift) state active	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time run crank voltage P1761 fault active P0826 fault active P0826 test fail this key on P0826 fault pending (P0816 fault active OR P0816 fault active test fail this key on) PRNDL range change time PRNDL in range: D1 OR D2 OR D3 OR D4 OR D5 OR D6 OR D7 OR D8 OR D9 OR D10 OR NEUTRAL OR PARK OR REVERSE DTCs not fault pending	= FALSE = 1 Boolean > 5.00 volts > 25 milliseconds > 9.00 volts = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE > 1.00 seconds = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 0 Boolean = 0 Boolean = 0 Boolean Transmission Shift Lever Position Validity	fail time 1 > 1.00 seconds	Emissions Neutral Diagnostics - Type C
			switch state update fail time 2 100 millisecond update rate	= tap down (downshift) state active	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time run crank voltage P1761 fault active	= FALSE = 1 Boolean > 5.00 volts > 25 milliseconds > 9.00 volts = FALSE	fail time 2 > 120.00 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					P0826 fault active P0826 test fail this key on P0826 fault pending (P0816 fault active OR P0816 fault active test fail this key on) PRNDL range change time PRNDL in range: D1 OR D2 OR D3 OR D4 OR D5 OR D6 OR D7 OR D8 OR D9 OR D10 OR NEUTRAL OR PARK OR REVERSE DTCs not fault pending	= FALSE = FALSE = FALSE = FALSE = FALSE > 1.00 seconds = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 0 Boolean = 0 Boolean = 0 Boolean Transmission Shift Lever Position Validity		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Up and Down Shift Switch Circuit	P0826	Diagnoses the state of the upshift/downshift switch circuit at an illegal voltage, voltage out of range. Emissions neutral default, disables tap-up tap-down or manual-up manual-down.	switch state update fail time 100 millisecond update rate	= illegal (voltage out of range)	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage P1761 fault active (P0826 fault active OR P0826 fault active test fail this key on)	= FALSE = 1 Boolean > 5.00 volts > 9.00 volts = FALSE = FALSE = FALSE	fail time > 60.00 seconds run crank voltage time > 25 milliseconds	Emissions Neutral Diagnostics - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid A Control Circuit Open	P0960	Controller specific circuit diagnoses 9 speed CB123456, 10 speed CB123456R, 8 speed CB1278R clutch, or CVT secondary pulley solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit Increment fail time	> 200 K Q impedance between signal and controller ground	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.00 seconds > 25 milliseconds > 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid A Control Circuit Low	P0962	Controller specific circuit diagnoses 9 speed CB123456, 10 speed CB123456R, 8 speed CB1278R clutch, or CVT secondary pulley solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid A Control Circuit High	P0963	Controller specific circuit diagnoses 9 speed CB123456, 10 speed CB123456R, 8 speed CB1278R clutch, or CVT secondary pulley solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage Increment fail time	< 0.5 Q impedance between signal and controller voltage source			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid B Control Circuit Open	P0964	Controller specific circuit diagnoses 9 speed CB29, 10 speed CB128910R, 8 speed CB12345R clutch, or CVT primary pulley solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit Increment fail time	> 200 K Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active OR Power Mode	> 5.00 volts = TRUE = ACCESSORY	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid B Control Circuit Low	P0966	Controller specific circuit diagnoses 9 speed CB29, 10 speed CB128910R, 8 speed CB12345R clutch, or CVT primary pulley solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.00 seconds > 25 milliseconds > 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid B Control Circuit High	P0967	Controller specific circuit diagnoses 9 speed CB29, 10 speed CB128910R, 8 speed CB12345R clutch, or CVT primary pulley solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage Increment fail time	< 0.5 Q impedance between signal and controller voltage source			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid C Control Circuit Open	P0968	Controller specific circuit diagnoses 9 speed CB38, 10 speed C23457910, 8 speed C13567 clutch, or CVT line pressure solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit Increment fail time	> 200 K Q impedance between signal and controller ground	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.000 seconds 25 milliseconds 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid C Control Circuit Low	P0970	Controller specific circuit diagnoses 9 speed CB38,10 speed C23457910, 8 speed C13567 clutch, or CVT line pressure solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid C Control Circuit High	P0971	Controller specific circuit diagnoses 9 speed CB38, 10 speed C23457910, 8 speed C13567 clutch, or CVT line pressure solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage Increment fail time	< 0.5 Q impedance between signal and controller voltage source			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Wheel Speed Sensor Sequence Number Incorrect	P15FD	This DTC monitors wheel speed signals for an incorrect sequence	Communication of the wheel speed sequence numbers from the ABS / Brake Control Module is incorrect. A complete set of sequence numbers has not been received for and this state is continuous for out of a total sample time of	> 10.00 seconds >2.00 seconds > 12.00 seconds	Sequence Number Error DTC is enabled Power Mode Run/Crank Ignition Voltage Driven and non-driven wheel rotational status is currently being received and not failsoft.	= 1 (1 indicates enabled) = Run or Crank >=11.00 Volts	Diagnostic executes in 25ms loop	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 2	P16E9	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor before receiving a valid message.		Run/Crank voltage	>6.41 Volts	100/ 16 counts continuous; 12.5 ms /count in the TCM main processor	Type A, 1 Trips
			This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor after receiving a valid message.		Run/Crank voltage	>6.41 Volts	8 / 16 counts continuous; 12.5 ms /count in the TCM main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Serial Peripheral Interface Bus 1	P16F0	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor before receiving a valid message.		Run/Crank voltage	>6.41 Volts	100/ 16 counts continuous; 12.5 ms /count in the TCM main processor	Type A, 1 Trips
			This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor after receiving a valid message.		Run/Crank voltage	>6.41 Volts	8 / 16 counts continuous; 12.5 ms /count in the TCM main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Redundant Memory Performance	P16F3	The diagnostic monitor is a rationalization of command values: command clutch pressures and command gear. The monitor is broken up into two fault detection routines, command pressure (tie up) fault detection and command gear/shift fault detection. The command pressure (tie up) fault detection is designed to verify the number of clutches applied in a given gear state is limited, in order to prevent a transmission internal mechanical tie-up condition. A condition which could lead to a vehicle deceleration above the design safety metric. If commanded clutch pressures are above a threshold which would allow multiple clutches to carry torque, the clutch is considered applied, otherwise the clutch is considered released. If there are more clutches applied, via the commanded clutch pressures, in a given gear state than is rational, one or more of	command pressure (tie up) fault detection minimum # of clutches ON by attained gear and by comanded gear, take lower of the 2 values, where attained gear is the current operating gear and command gear is the targetted value to transtion toward see **9 speed transmission clutch definition and gear state to clutch map** and **10 speed transmission clutch definition and gear state to clutch map** attached supporting tables for clutch 1 through clutch 7 definition and gear state to clutch map	≤ **NumClchTieUp** See Attached Supporting Tables	Reduandant Memory Command Pressure Enable Calibraiton Not Reduandant Memory Command Pressure Enable Calibraiton No traction event in progress: ABS((driven wheel speed - non-drive wheel speed) / driven wheel speed) 25 millisecond derivative TOSS RPM, (TOSS delta 25 millisecond loop to 25 milsecond loop) / 25 millisecond for time Clutch 1 hydraulic volume fill factor Clutch 2 hydraulic volume fill factor Clutch 3 hydraulic volume fill factor Clutch 4 hydraulic volume fill factor Clutch 5 hydraulic volume fill factor Clutch 6 hydraulic volume fill factor Clutch 7 hydraulic volume fill factor when clutch is off going (releasing) clutch the commanded clutch pressure equation = ((pressure control solenoid command	= 0 Boolean = 1 Boolean > 0.00 % < 0.750 * **P2D2 Cltch Slip Sum** see attached supporting Table > 0.0500 seconds > 1.000 unitless > 1.000 unitless > 1.000 unitless > 1.000 unitless > 1.000 unitless > 1.000 unitless > 1.000 unitless	single event 6.25 millisecond update rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		the clutch pressure command values are in error. Given rate of change of transmission output shaft speed, command gear state clutches and clutch hydraulic fill volumes, those clutches in transition from the hydraulic released state to the hydraulic applied state and from the hydraulic applied state to the hydraulic released state, the rationality detects any number of command clutch pressures above a threshold, that are simultaneously active to cause a vehicle deceleration above the design safety metric. The command gear/ shift fault detection is designed to verify the commanded gear will not induce a downshift resulting in a gear state that is erroneous given vehicle operating conditions. The detection rationalizes the command gear against a minimum gear, highest gear ratio, for given vehicle speed and driver accelerator position.			pressure - pressure offset) * regulator valve gain) - regulator valve return spring pressure adaptive when clutch 1 is off going clutch: clutch 1 command pressure clutch 1 state is OFF when: clutch 1 command pressure, else clutch is ON and count clutch 1 toward minimum # of clutches ON when clutch 2 is off going clutch: clutch 2 command pressure clutch 2 state is OFF when: clutch 2 command pressure, else clutch is ON and count clutch 2 toward minimum # of clutches ON when clutch 3 is off going clutch: clutch 3 command pressure	= ((clutch 1 pressure control solenoid command pressure - 0.00)* 1.00)- regulator valve return spring pressure adaptive, kPa **P2D2 Decel Pressure - <C1** see attached supporting tables = ((clutch 2 pressure control solenoid command pressure - 0.00)* 1.00)- regulator valve return spring pressure adaptive, kPa **P2D2 Decel Pressure - <C2** see attached supporting tables = /(clutch 3 pressure		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						control solenoid command pressure - 177.00) * 1.51) - regulator valve return spring pressure adaptive, kPa		
					clutch 3 state is OFF when: clutch 3 command pressure, else clutch is ON and count clutch 3 toward minimum # of clutches ON	**P2D2 Decel Pressure - <C3** see attached supporting tables		
					when clutch 4 is off going clutch: clutch 4 command pressure	= ((clutch 4 pressure control solenoid command pressure - 160.00) * 2.25) - regulator valve return spring pressure adaptive, kPa		
					clutch 4 state is OFF when: clutch 4 command pressure, else clutch is ON and count clutch 4 toward minimum # of clutches ON	**P2D2 Decel Pressure - <C4** see attached supporting tables		
					when clutch 5 is off going clutch: clutch 5 command pressure	= ((clutch 5 pressure control solenoid command pressure - 0.00)* 1.00)- regulator valve return spring pressure adaptive, kPa		
					clutch 5 state is OFF when: clutch 5 command pressure,			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					else clutch is ON and count clutch 5 toward minimum # of clutches ON	**P2D2 Decel Pressure - <C5** see attached supporting tables		
					when clutch 6 is off going clutch: clutch 6 command pressure	= ((clutch 6 pressure control solenoid command pressure - 0.00)* 1.00)- regulator valve return spring pressure adaptive, kPa		
					clutch 6 state is OFF when: clutch 6 command pressure,			
					else clutch is ON and count clutch 6 toward minimum # of clutches ON	**P2D2 Decel Pressure - <C6** see attached supporting tables		
					when clutch 7 is off going clutch: clutch 7 command pressure	= ((clutch 7 pressure control solenoid command pressure - 0.00)* 1.00)- regulator valve return spring pressure adaptive, kPa		
					clutch 7 state is OFF when: clutch 7 command pressure,			
					else clutch is ON and count clutch 7 toward minimum # of clutches ON	**P2D2 Decel Pressure - <C7** see attached supporting tables		
					service fast learn not active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					no speed sensor DTCs fault active: P0716, P0717, P0721, P0722, P0723, P077C, P077D, P07BF, P07C0, P172A, P172B, P176B, P176C, P176D, P1783, P178F, P17C4, P17C5, P17C6, P17CC, P17CD, P17CE, P17D3, P17D6 no high side driver DTCs fault active: P0658, P2670			
			command gear/shift fault detection 1st gear commanded and vehicle seed OR 2nd gear commanded and vehicle seed OR 3rd gear commanded and vehicle seed OR 4th gear commanded and vehicle seed OR 5th gear commanded and vehicle seed OR 6th gear commanded and vehicle seed OR 7th gear commanded and vehicle seed OR 8th gear commanded and	> 56.60 KPH > 80.28 KPH > 88.11 KPH > 108.50 KPH > 138.01 KPH > 183.54 KPH > 265.40 KPH	Reduandant Memory Command Gear Enable Calibraiton Not Reduandant Memory Command Gear Enable Calibraiton service fast learn not active no speed sensor DTCs fault active: P0716, P0717, P0721, P0722, P0723, P077C, P077D, P07BF, P07C0, P172A, P172B, P176B, P176C, P176D, P1783, P178F, P17C4, P17C5, P17C6, P17CC, P17CD, P17CE, P17D3, P17D6 no high side driver DTCs fault active:	= 0 Boolean = 1 Boolean	command gear fail event count > 3 counts 6.25 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			vehicle seed OR 9th gear commanded and vehicle seed OR 10th gear commanded and vehicle seed THEN increment command gear fail event count and abort commanded gear and delay for time before next fail evaluation	> 355.29 KPH > 430.15 KPH > 430.15 KPH > 5.00 seconds	P0658, P2670			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Speed Signal Analog to Digital Converter Performance	P16FB	The diagnostic monitor validates the controller calculated transmission output speed sensor data parameters, calculated in multiple paths/subroutines and at different rates. There are multiple transmission output speed sensor data parameters, calculated at rates of 6.25 milliseconds, 12.5 milliseconds and 25 milliseconds. While the same subroutine, a generic “calculate TOSS” is called from different time loops, each call stores that current value of the calculated TOSS to a different memory location. For example, a 12.5 millisecond loop calling “calculate TOSS” stores the calculated TOSS value to a “12.5 millisecond TOSS calculated” data parameter in memory, while a 25 millisecond loop calling “calculate TOSS” stores the calculated TOSS value to a “25 millisecond TOSS calculated” data parameter in memory. The raw transmission output speed sensor	ABS(raw transmission output speed, 6.25 millisecond data parameter - raw transmission output speed, 25 millisecond data parameter) update fail and sample time 25 millisecond update rate	> 60.0 RPM	service mode $04 active diagnsotic monitor enable raw transmission output speed, 25 millisecond data parameter raw transmission output speed, 6.25 millisecond data parameter run crank voltage battery voltage	= FALSE = 1 Boolean > 356.0 RPM > 356.0 RPM > 10.00 volts > 10.00 volts	fail time > 8.000 seconds out of sample time > 10.000 seconds 25 millisecond update rate run crank and battery voltage time > 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		signal is diagnosed independently electrically and for performance of this DTC. The transmission output speed sensor data parameters that are calculated at different rates must always be within a negligible difference of each other.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Surge Solenoid Circuit Low	P171B	Controller specific transmission surge accumulator control circuit diagnoses the transmission surge accumulator and wiring for a ground short circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground	battery voltage battery voltage battery enable time run/crank voltage run crank voltage time > diagnostic monitor enable	> 9.00 volts < 32.00 volts > 1.00 seconds > 5.00 volts 25 milliseconds = 1 Boolean	fail time > 0.300 seconds out of sample time > 0.500 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Surge Solenoid Circuit High	P171C	Controller specific transmission surge accumulator control circuit diagnoses the transmission surge accumulator and wiring for a short to voltage circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage Increment fail time	< 0.5 Q impedance between signal and controller voltage source	battery voltage battery voltage battery voltage enable time run/crank voltage run crank voltage time diagnostic monitor enable	> 9.00 volts < 32.00 volts > 1.00 seconds > 5.00 volts time > 25 milliseconds = 1 Boolean	fail time > 0.300 seconds out of > 0.500 seconds sample time	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Surge Accumulator System Performance	P171D	Detects when the surge accumulator system, used to provide transmission hydraulic pressure, is not capable of supplying adequate hydraulic pressure during an engine auto-start. The transmission holding clutch pressures are commanded to meet the engine crank shaft torque output, to prevent clutch slip to those holding clutches, during the engine auto-start. The diagnostic monitors transmission input shaft speed during the auto-start event as the primary malfunction criteria. Measured input shaft speed that is excessive is an indication the holding clutches are slipping due to inadequate hydraulic pressure, as a result of a failed surge accumulator system.	Transmission turbine speed is greater than predicted turbine speed during autostart event, update initial fail count	**> P171D predicted turbine speed error** Refer to "Transmission Supporting Tables" for details	PRNDL state defaulted Transmission shift lever position Propulsion system active Ignition voltage Ignition voltage Transmission fluid temp Transmission fluid temp Hybrid state AutoStop duration min During autostop Engine speed was **************************** If above conditions are met then the following must occur: Turbine speed Engine speed Hydraulic pressure delay time If above conditions are met then increment time-out timer. Time-out timer Note: The initial fail	= False = Forward range A = True > 9.00 volts < 32.00 volts > 0.00 °C < 110.00 °C = Engine off > 1.200 seconds < 5.0 RPM > 80.0 RPM > 450.0 RPM **> P171D hydraulic pressure delay** Refer to "Transmission Supporting Tables" for details < 0.38 seconds	> 8 counts (initial fail count) Frequency =12.5ms Once the above counts are achieved then increment the final fail counter once. The final fail counter can only increment once per autostart event > 3 counts (final fail counter) If above counter is greater than threshold then report DTC failed. Frequency = 12.5ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					counter must achieve it's fail threshold in less than the time-out time.			
					****************************			
					If vehicle is launched then:			
					Transmission gear ratio	= 4.689 1st gear ratio = 3.306 2nd gear ratio = 3.012 3rd gear ratio = 2.446 4th gear ratio = 1.923 5th gear ratio = 1.446 6th gear ratio		
					Trans 1st gear ratio	< 1.120 % of 1st gear ratio		
					Trans 1st gear ratio	> 0.880 % of 1st gear ratio		
					Trans gear ratio not 1st gear	< 1.070 % of gear ratio		
					Trans gear ratio not 1st gear	> 0.930 % of gear ratio		
					Valid transmission gear ratio achieved time	> 0.500 seconds		
					OR			
					If vehicle is not launched but autostart occurs then:			
					Turbine speed	< 5.00 RPM		
					Turbine speed less then above threshold for	> 0.500 seconds		
					Note: During an autostart event the lack of hydraulic pressure will result in momentarv clutch slio in			

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Control System - Shift Limiting Active	P175E	The latent fault diagnostic monitors detects when the vehicle has been driven excessively with an emission MIL request. The DTCs requesting the emission MIL are all due to a safety critical system or component fault present in which a DTC is set fault active, test fail this key on or fault pending (fault pending is fail time # 0). The safety critical systems or safety critical components include: transmission input, output and intermediate speed sensors, transmission range sensors, clutch pressure control solenoids including unintended deceleration detected due to clutch pressure control solenoids, driver accelerator pedal position, engine crankshaft position and engine torque. The DTCs for these safety critical systems or safety critical components include both electrical fault DTCs and performance fault DTCs. The latent fault diagnostic monitor	P0747 OR P0777 OR P0797 OR P2715 OR P2724 OR P2731 OR P2733 fault active due to unintended deceleration detection, increment unintended deceleration latent fault fail count		transmission default gear active (emission MIL active) calibration CeTRDR_e_DSG_DfltGr Opt5_Action any non-zero (0) option	> CeTRDR_e_DSG_DfltGr OptNone, zero (0) element in default gear array	unintended deceleration latent fault fail count > 100 counts 25 millisecond update rate	Type A, 1 Trips
			P0747 OR P0777 OR P0797 OR P2715 OR P2724 OR P2731 OR P2733 clutch pressure control solenoid fault active due to clutch stuck on during shift, increment clutch pressure control solenoid latent fault fail count		transmission default gear active (emission MIL active) calibration CeTRDR_e_DSG_DfltGr Opt5_Action any non-zero (0) option	> CeTRDR_e_DSG_DfltGr OptNone, zero (0) element in default gear array	clutch pressure control solenoid latent fault fail count > 100 counts 25 millisecond update rate	
			P2802 OR P2803 fault active, increment transmission range sensor latent fault fail count		transmission default gear active (emission MIL active) calibration CeTRDR_e_DSG_DfltGr Opt5_Action any non-zero (0) option	> CeTRDR_e_DSG_DfltGr OptNone, zero (0) element in default gear array	transmission range sensor latent fault fail count > 200 counts 25 millisecond update rate	
			P0721 OR P0722 OR P0723 OR P077C OR P077D or P172A fault active, increment transmission output speed sensor latent fault fail count		transmission default gear active (emission MIL active) calibration CeTRDR_e_DSG_DfltGr Opt5_Action any non-zero (0) option	> CeTRDR_e_DSG_DfltGr OptNone, zero (0) element in default gear array	transmission output speed sensor latent fault fail count > 100 counts 25 millisecond update rate	
			P0716 OR P0717 OR P0721 OR P07BF OR P07C0 fault active OR		transmission default gear active (emission MIL active) calibration	>	transmission input output speed sensor latent fault fail	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		counts the run/crank ignition cycles before the latent fault DTC is set fault active.	P077D OR P077D OR P1783 OR P17CE fault active OR P0722 OR P0723 OR P172A test fail this key on OR P0716 OR P0717 OR P0721 OR P0722 OR P0723 OR P077C OR P077D OR P07BF OR P07C0 OrP172AOR P172B OR P1783 OR P17CE fault pending (fail time # 0) increment transmission input output speed sensor latent fault fail count		CeTRDR_e_DSG_DfltGr OptNone any non-zero (0) option	CeTRDR_e_DSG_DfltGr OptNone, zero (0) element in default gear array	count > 100 counts 25 millisecond update rate	
			AcceleratorPedalFailure OR EngineTorqueEstInaccurate OR P2534 fault active OR CrankSensor_FA OR P0707 OR P0708 fault active OR test fail this key on OR P2805 fault active OR P0716 OR P0717 OR P07BF OR P07C0 fault active OR P0722 OR P0723 test fail this key on OR P077C OR P077D fault active OR P176C OR P176D OR	= TRUE = TRUE = TRUE	transmission default gear active (emission MIL active) calibration CeTRDR_e_DSG_DfltGr Opt5_Action any non-zero (0) option ignition run crank voltage for time	> CeTRDR_e_DSG_DfltGr OptNone, zero (0) element in default gear array > 5.00 volts > 12.5 milliseconds	system latent fault fail count > 100 counts 6.25 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			P17CC OR P17CD OR P176B OR P17D6 fault active OR test fail this key on OR P0747 OR P0777 OR P0797 OR P2715 OR P2724 OR P2733 OR P0746 OR P0776 OR P0796 OR P2714 OR P2723 OR P2732 OR P178F OR P17C4 OR P17C6 OR P172AOR P172B test fail this key on OR P0960 OR P0962 OR P0963 OR P0964 OR P0966 OR P0967 OR P0968 OR P0970 OR P0971 ORP2718OR P2720 OR P2721 OR P2727 OR P2729 OR P2730 OR P2736 OR P2738 OR P2739 OR P17C5 OR P17D3OR P0721 fault active OR P0716 OR P0717 OR P0721 OR P0722 OR P0723 OR P077C OR P077D OR P07BF OR P07C0 fault pending (fail time # 0) OR P176B OR P176C OR P176D OR P17CC OR P17CD ORP17D6OR P1783 OR P178F OR P17C4 OR P17C5 OR P17C6 OR P17CE OR P17D3 OR P172A or P172B fault oending (fail					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			time *t* 0) OR P1783 fault active OR P1783 fault pending (fail time *t* 0) update system fault time when system fault time increment system latent fault fail count	 > 10.0 seconds				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Acceleration Sensor Signal Message Counter Incorrect	P175F	The diagnostic monitor detects an alive rolling count error or checksum error in the CAN frame containing the lateral acceleration signal value and longitudinal acceleration sensor signal value. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	rolling count value received from EBCM and expected TCM calculated value not equal OR checksum lateral and longitudinal acceleration CAN frame message value error 50 millisecond update rate	= TRUE = TRUE	enable alive rolling count error detection: diagnostic monitor enable lateral and longitudinal acceleration CAN frame message received battery voltage run crank voltage enable checksum error detection: diagnostic monitor enable lateral and longitudinal acceleration CAN frame message received normal CAN battery voltage run crank voltage communication enabled DTCs not fault active	 = 1 Boolean = TRUE >11.0 volts >11.0 volts = 1 Boolean = TRUE >11.0 volts >11.0 volts = TRUE U0073	alive rolling count errors > 54 out of 9 sample counts 50 millisecond update rate checksum error time > 54.00 seconds	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Up and Down Shift Switch Signal Circuit	P1761	The alive rolling count normally cycles 0, 1, 2, and 3 as a serial data periodic frame is processed normally. The diagnostic monitor counts the number of times an alive rolling count error occurs over a period of time. The TCM receives a serial data frame at a periodic rate, during which, the receive data is processed the comparing the current value of the alive rolling count in the frame date to the incremented value of the diagnostic alive rolling count. When the two values of the alive rolling count do not agree, an alive rolling count error has occurred. The error indicator is saved in an array buffer, and when the number of error indicators in the buffer exceed the fail threshold the fail time is allowed to time up. Emissions neutral default, disables tap-up tap-down or manual-up manual-down.	alive rolling count error counter update fail time 100 millisecond update rate	> 3 counts	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time up and down shift serial data frame receive occurred when up and down shift serial data frame receive occurred: increment the diagnsotic alive rolling count data value, if the diagnsotic alive rolling count data value, set alive rolling count error to TRUE, when alive rolling count error AND previous alive rolling count error in 10 element arrary buffer, increment alive rolling count error counter	= FALSE = 1 Boolean > 9.00 volts > 0.100 seconds = TRUE # frame alive rolling count data value = TRUE = FALSE	fail time > 10.00 seconds	Emissions Neutral Diagnostics - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Planetary Gearset Ring Gear Speed Sensor Circuit Range/ Performance	P176B	The diagnostic monitor rationalizes the transmission intermediate shaft speed sensor by using the transmission output shaft output speed sensor and the known ratio between the transmission intermediate shaft speed and the transmission output shaft output speed based on the commanded gear and the transmission lever node design. The estimated transmission intermediate shaft speed is equal to the gear ratio times the transmission output shaft output speed. The absolute value of the delta between the measured transmission intermediate shaft speed and the estimated transmission intermediate shaft speed is used to determine if the measured transmission intermediate shaft speed is rational.	deltal =ABS (transmission input speed - (transmission output speed * gear ratio commanded)) update faiil time 25 millisecond update rate	> 10.0 RPM	diagnostic monitor enable speed sesnor configuration calibration is single OR dual ratio calibration is function of command gear and intermediate speed sesnor when not REVERSE ratio calibration is function of command gear and intermediate speed sesnor when REVERSE ****************************** delay time updates when: estimated transmission intermediate speed (transmission input speed / ratio calibration)	= 1 Boolean = CeTNSR_e_NSPD_SinglеSpdSnsr **P176B ratio calibration = when not REVERSE** see supporting tables **P176B ratio calibration = when REVERSE** see supporting tables ****************************** ≥ **P176B minimum estimated transmission intermediate speed to enable fail evaluation** see supporting tables	fail time > **P176B intermediate speed sensor fail time threshold** see supporting tables fail time threshold met increments fail count, fail count > **P176B intermediate speed sensor fail count threshold** see supporting tables ******************* delay time >	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					with transmission input speed input speed sensor ready based on commaned gear and transmission intermediate speed sensor (state output must be FALSE to enable fail evaluation) with with attained gear ***************************** transmission input speed transmission output speed neutral idle mode range shift state P0716 fault active P0717 fault active P07BF fault active P07C0 fault active P0722 fault active P0723 fault active P077C fault active P077D fault active P176C fault active P176D fault active battery voltage	**> P176B minimum transmission input speed to enable fail evaluation** see supporting tables **= P176B holding clutch states** see supporting tables = REVERSE OR = 1st thru 10th ***************************** > 172.0 RPM > 89.0 RPM = nuetral idle mode ON = range shift complete = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE > 9.00 volts = FALSE > 9.00 volts	**P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation** see supporting tables	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					service fast learn active run crank voltage transmission hydraulic pressure available: engine speed	> 500.0 RPM	battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds engine speed time > **engine speed time for transmission hydraulic pressure available** see supporting tables	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Planetary Gearset Ring Gear Speed Sensor Circuit Low	P176C	Controller specific analog circuit diagnoses the transmission intermediate speed sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission intermediate speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	< 0.2500 volts (< 0.5 Q impedance between signal and controller ground)	service mode $04 active diagnostic monitor enable P176D fault active service fast learn run crank voltage battery voltage P176C fault active P176C test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE > 10.00 volts > 10.00 volts = FALSE = FALSE	fail time > 0.050 seconds, update fail count 12.5 millisecond update rate fail count > 40 counts 12.5 millisecond update rate run crank and battery voltage time > 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Planetary Gearset Ring Gear Speed Sensor Circuit High	P176D	Controller specific analog circuit diagnoses the transmission intermediate speed sensor and wiring for a short to voltage fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission intermediate speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	> 4.7500 volts (< 0.5 Q impedance between signal and controller power)	service mode $04 active diagnostic monitor enable P176C fault active service fast learn run crank voltage battery voltage P176D fault active P176D test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE > 10.00 volts > 10.00 volts = FALSE = FALSE	fail time > 0.050 seconds, update fail count 12.5 millisecond update rate fail count > 40 counts 12.5 millisecond update rate run crank and battery voltage time > 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Intermediate Speed Sensor 1 Direction Error	P17D3	The diagnostic monitor determines if the direction transmission intermediate speed sensor value is coherent based on the on period time of the directional sensor and raw speed sensor value. When the on period time indicates a transitional state, the direction must also be transitional as measured by very slow raw signal RPM. When the on period time indicates a non-transitional state, forward or reverse, the direction must also be transition, not forward and not reverse.	intermediate speed sesnor raw direction when transitional period = FALSE AND intermediate speed sesnor raw direction when transitional period = FALSE OR intermediate speed sesnor raw when transitional period = TRUE update fail and sample time 6.26 millisecond update rate	# FORWARD * REVERSE **P17C5 P17D3 intermediate speed** **> sensor RPM**	service mode $04 active diagnostic monitor enable intermediate speed sesnor count sample period P17D3 fault active OR P17D3 test fail this key on senor type cailbration (senortype is directional) transitional period detected = FALSE when: on period OR on period when direction unknown OR on period on period when direction is reverse OR on period on period when direction is forward transitional period detected = TRUE when: on period on period when direction unknown	= FALSE = 1 Boolean # 0 counts = FALSE = FALSE = CeTNSR_e_NSPD_SinglеSpdSnsr > 0.4434 seconds < 0.2773 seconds < 0.2363 seconds > 0.1240 seconds < 0.0811 seconds > 0.0088 seconds < 0.4434 seconds > 0.2773 seconds	fail time > 3.500 seconds out of sample time > 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Cabin Warm Up Request Signal Message Counter Incorrect	P18F2	The diagnostic monitor detects an alive rolling count error in the CAN frame containing the cabin warm up request signal value. The alive rolling count sequences 0, 1, 2, 3 repeatedly. As each serial data frame is broadcast by the transmitting controller, the transmitting controller increments the alive rolling count in this sequence manner. The receiving controller compares the most recent received alive rolling count value to the previous value plus one. If the values are not equal, an alive rolling count error has occurred. If continuous alive rolling count errors occur the DTC is set.	rolling count value received from cabin warm up request Tx module and expected TCM calculated value not equal	= TRUE	Loop rate calibration either 10 milliseconds or 12.5 milliseconds service mode $04 active battery voltage battery voltage time cabin warm up request Rx frame recieved	= CeCFMD_e_DEC_TimeBase_12p5 = FALSE > 11.00 volts > 300.000 seconds = TRUE	alive rolling count errors > 8 out of 10 sample counts	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Switch Run/ Start Position Circuit Low	P2534	Detects a low ignition switch run/start position curcuit. This diagnostic reports the DTC when this circut is low. Monitoring occurs when the TCM run/ crank is active.	Ignition switch Run/Start position circuit low	Run / Crank = FALSE	Ignition switch Run/Start position circuit low diag enable and Run / Crank active ECM	= 1.00 = TRUE	99 failures out of 240 samples 25 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Ignition Switch Run/ Start Position Circuit High	P2535	Detects a high ignition switch run/start position curcuit. This diagnostic reports the DTC when this circut is high. Monitoring occurs when the TCM run/ crank is NOT active.	Ignition switch Run/Start position circuit high	Run / Crank = TRUE	Ignition switch Run/Start position circuit low diag enable and Run / Crank active ECM	= 1.00 = FALSE	280 failures out of280 samples 25 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Actuator Supply Voltage B Circuit Low	P2670	Controller specific output driver circuit diagnoses the high sided driver circuit for a short to ground failure, or where controller H/W cannot differentiate, diagnoses the high sided driver circuit for a short to ground failure or open circuit failure, when the output is powered on, by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<<0.5 Q impedance between signal and controller ground	diagnostic monitor enable high side drive 2 ON P2670 fault active P2670 test fail this key on	= 1 Boolean = TRUE = FALSE = FALSE	fail count > 6 counts out of sample count > 2,400 counts 6.25 millisecond update rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid D Stuck Off (GF9)	P2714	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near oratzeroRPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C4 clutch slip speed, update fail time 6.25 milliscond update	> 200.0 RPM	****************************** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TOM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning	****************************** = 1 Boolean = 1 Boolean > 9.00 volts = 1 Boolean = 1 Boolean > 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean	fail time > 1.00 seconds, update fail count, fail count > 3 counts 6.25 milliscond update battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active hydraulic pressure available ***************************** enable C4 clutch slip speed fail compare when: ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable cal is FALSE (startle mitigation) clutch steady state adaptive active (transmission output shaft speed OR (accelerator pedal position OR engine speed) C4 clutch slip speed valid	= FALSE Boolean = TRUE ***************************** = FALSE = TRUE # initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE > 89.0 RPM > 2.00 % > 1,500.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation)	> 0.900 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to C4 GF9 clutch pressure control solenoid.			C4 clutch pressured map	= mapped to line pressure, C4 clutch pressure has reached fully applied state		
					(enable forward gear cal AND	= 1 (1 to enable, 0 to disable)		
					driver direction request AND	= FORWARD		
					Attained Gear)	= a FORWARD gear		
					OR			
					(enable reverse gear cal AND	= 0 (1 to enable, 0 to disable)		
					driver direction request AND	= REVERSE		
					Attained Gear)	= REVERSE		
					P2821 (clutch select valve stuck on) test active	= FALSE		
					range shift state	= range shift complete		
					■k-kick-k-k-kiek-kiekititit-k-kiifk-k-kick-kitit-k-k-k-k	******************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid D Stuck On	P2715	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C4 clutch slip speed OR shift type is garage shift: C4 clutch slip speed ELSE shift is another type: C4 clutch slip speed update fail time 6.25 milliscond update	 < 50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time > 0.80 seconds shift type is garage shift: fail time > 0.25 shift type is another type: fail time > 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			****************************** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)	****************************** = 1 Boolean = 1 Boolean > 9.00 volts = 1 Boolean = 1 Boolean > 9.00 volts	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count > 3 counts 6.25 milliscond update battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		is disabled. This diagnostic monitor is relative to the GF9 C4 C4, GR10 C4 C2346781OR,or 8 Speed C4 C23468 clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					*****************************	******************************		
					range shift state	# range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	> 89.0 RPM		
					((C4 off going clutch pressure control ramp time out complete	= TRUE		
					AND			
					off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to disable)		
					OR			
					C4 off going clutch command pressure)	< 113 kPa	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							closed throttle upshift: **C4 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C4 exhaust delay open throttle power on up shift** garage shifts: **C4 exhaust delay garage shift** closed throttle downshift: **C4 exhaust delay closed throttle down shift** negative torque upshift: **C4 exhaust delay negative torque up shift** open throttle downshift: **C4 exhaust delay open throttle power down shift**	
					(engine torque AND Primary oncomina stuck	> 8,192 Nm = 0 tOis enable. 1 is		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					on torque enable cal)	enable)		
					OR			
					(primary oncoming clutch active	= TRUE		
					primary on coming control state	+ clutch fill phase		
					primary on coming commanded pressure)	> pressure clip threshold according to shift type: closed throttle upshift: **Clutch Clip Press CU Shifts** open throttle upshift: **Clutch Clip Press PU Shifts** garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts**	absolute value of (-0.60) seconds	
					C4 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					******************************	******************************		
					conditions needed to trigger test:			
					(current shift type AND shift type enable cal for current shift type)	# Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable)		
					OR			
					(Intrusive shift active AND	= FALSE		
					shift type enable cal for garage shift AND	= 0 (0 will enable, 1 will enable)		
					Attained Gear AND	= NEUTRAL OR commanded gear		
					(stuck on enable cal for forward garge shifts AND	= 0 (0 to disable, 1 to enable)		
					driver requested direction AND	= FORWARD		
					commanded gear) OR	= a FORWARD gear		
					(stuck on enable cal for reverse garage shifts AND	= 0 (0 to disable, 1 to enable)		
					driver requested direction AND	= REVERSE		
					commanded gear))	= REVERSE		
					clutch stuck off intrusive shift active	= FALSE		
					startle mitigation active (see note on startle mitigation below)	= FALSE		
					(new clutch controller has been initalized	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					OR transitioning to a different clutch controller)	= TRUE		
					current clutch solenoid test state	transitions to TestState or TUT_HOLD (see note below about state transitions)		
					-k-k-k-k-k-k-k-k-kidtidek-k-k-k-k-kiekiek-k-k-k-k	*****************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensorFA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					****************************** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission	P17C6 P17C4 P17C7 P172AP172B ******************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCs to set P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid D Control Circuit Open	P2718	Controller specific circuit diagnoses 9 speed C4, 10 speed C23467810R, 8 speed C23468 clutch, or CVT input clutch solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit Increment fail time	> 200 K Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage	> 5.00 volts	> 25 milliseconds	
					OR			
					accessory voltage active)	= TRUE	> 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid D Control Circuit Low	P2720	Controller specific circuit diagnoses 9 speed C4, 10 speed C23467810R, 8 speed C23468 clutch, or CVT input clutch, solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid D Control Circuit High	P2721	Controller specific circuit diagnoses 9 speed C4, 10 speed C23467810R, 8 speed C23468 clutch, or CVT input clutch, solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage Increment fail time	< 0.5 Q impedance between signal and controller voltage source	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.00 seconds > 25 milliseconds > 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid E Stuck Off (GF9)	P2723	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near oratzeroRPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C5 clutch slip speed, update fail time 6.25 milliscond update	> 200.0 RPM	******************************	******************************	fail time > 1.00 seconds, update fail count, fail count > 3 counts 6.25 milliscond update	Type A, 1 Trips
					system-level enables:			
					use battery voltage calibration is FALSE OR	= 1 Boolean		
					(use battery voltage calibration is TRUE AND	= 1 Boolean		
					battery voltage)	> 9.00 volts	battery voltage time > 0.100 seconds	
					use run crank voltage calibration is FALSE OR	= 1 Boolean		
					(use run crank voltage calibration is TRUE AND	= 1 Boolean		
					run crank voltage)	> 9.00 volts	run crank voltage time > 0.100 seconds	
					TOM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					*****************************	*****************************		
					enable C5 clutch slip speed fail compare when:			
					((startle mitigation active OR	= FALSE		
					(startle mitigation active AND	= TRUE		
					startle mitigation gear)) (see startle mitigation active NOTE below)	# initial startle mitigation gear		
					unintended deceleration fault pending OR	= FALSE		
					unintended deceleration fault pending enable cal is FALSE (startle mitigation)	= 0 (0 to enable, 1 to disable)		
					clutch steady state adaptive active	= FALSE		
					(transmission output shaft speed OR	> 89.0 RPM		
					(accelerator pedal position OR	> 2.00 %		
					engine speed)	> 1,500.0 RPM	> 0.900 seconds	
					C5 clutch slip speed valid	= TRUE (all speed sensors are functional for lever node clutch slip speed calculation)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to C5 GF9 C57R clutch pressure control solenoid.			C5 clutch pressured map	= mapped to line pressure, C5 clutch pressure has reached fully applied state		
					(enable forward gear cal AND	= 1 (1 to enable, 0 to disable)		
					driver direction request AND	= FORWARD		
					Attained Gear) OR	= a FORWARD gear		
					(enable reverse gear cal AND	= 0 (1 to enable, 0 to disable)		
					driver direction request AND	= REVERSE		
					Attained Gear)	= REVERSE		
					P2821 (clutch select valve stuck on) test active	= FALSE		
					range shift state	= range shift complete		
					■k-kick-k-k-kiek-kiekititit-k-kiifk-k-kick-kitit-k-k-k	******************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid E Stuck On	P2724	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C5 clutch slip speed OR shift type is garage shift: C5 clutch slip speed ELSE shift is another type: C5 clutch slip speed update fail time 6.25 milliscond update	< 50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time > 0.40 seconds shift type is garage shift: fail time > 0.25 shift type is another type: fail time > 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			******************************	******************************	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count > 3 counts 6.25 milliscond update	
					system-level enables:			
					use battery voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use battery voltage calibration is TRUE	= 1 Boolean		
					AND			
					battery voltage)	> 9.00 volts	battery voltage time > 0.100 seconds	
					use run crank voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use run crank voltage calibration is TRUE	= 1 Boolean		
					AND			
					run crank voltage)	> 9.00 volts	run crank voltage time > 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		is disabled. This diagnostic monitor is relative to the GF9 C5 C57R, GR10 C5 C1356789, or 8 Speed C5 C45678R clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning procedure active hydraulic pressure available ***************************** range shift state diagnostic clutch test transmission output shaft speed ((C5 off going clutch pressure control ramp time out complete AND off going clutch pressure ramp control ramp time out enable) OR C5 off going clutch command pressure)	= TRUE Boolean = TRUE Boolean = FALSE Boolean = FALSE Boolean = TRUE ****************************** # range shift complete = OFF GOING CLUTCH TEST > 89.0 RPM = TRUE = 1 (1 to enable, 0 to disable) < 145 kPa	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							closed throttle upshift: **C5 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C5 exhaust delay open throttle power on up shift** garage shifts: **C5 exhaust delay garage shift** closed throttle downshift: **C5 exhaust delay closed throttle down shift** negative torque upshift: **C5 exhaust delay negative torque up shift** open throttle downshift: **C5 exhaust delay open throttle power down shift**	
					(engine torque AND Primary oncomina stuck	> 8,192 Nm = 0 tOis enable. 1 is		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					on torque enable cal)	enable)		
					OR			
					(primary oncoming clutch active	= TRUE		
					primary on coming control state	+ clutch fill phase		
					primary on coming commanded pressure)	> pressure clip threshold according to shift type:		
						closed throttle upshift: **Clutch Clip Press CU Shifts**		
						open throttle upshift: **Clutch Clip Press PU Shifts**	absolute value of (-0.60) seconds	
						garage shifts: **Clutch Clip Press GS Shifts**		
						closed throttle downshift: **Clutch Clip Press CD Shifts**		
						negative torque upshift: **Clutch Clip Press NU Shifts**		
						open throttle downshift: **Clutch Clip Press PD Shifts**		
					C5 clutch slip speed valid, all speed sensors are functional for lever node clucth slio soeed	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					calculation ****************************** conditions needed to trigger test: (current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND shift type enable cal for garage shift AND Attained Gear AND (stuck on enable cal for forward garge shifts AND driver requested direction AND commanded gear) OR (stuck on enable cal for reverse garage shifts AND driver requested direction AND commanded gear)) clutch stuck off intrusive shift active startle mitigation active (see note on startle mitigation below) (new clutch controller has	****************************** # Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable) = FALSE = 0 (0 will enable, 1 will enable) = NEUTRAL OR commanded gear = 0 (0 to disable, 1 to enable) = FORWARD = a FORWARD gear = 0 (0 to disable, 1 to enable) = REVERSE = REVERSE = FALSE = FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					been initalized OR transitioning to a different clutch controller)	= TRUE = TRUE		
					current clutch solenoid test state	transitions to Teststate or TUT_HOLD (see note below about state transitions)		
					******************************	******************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					***************************** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the	P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B *****************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					automatic transmission shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					vehicle deceleration occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCstoset P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid E Control Circuit Open	P2727	Controller specific circuit diagnoses 9 speed C57R, 10 speed C1356789, 8 speed C45678R clutch solenoid, or CVT TCC Control solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit Increment fail time	> 200 K Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage	> 5.00 volts	> 25 milliseconds	
					OR			
					accessory voltage active)	= TRUE	> 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid E Control Circuit Low	P2729	Controller specific circuit diagnoses 9 speed C57R, 10 speed C1356789, 8 speed C45678R clutch, or CVT TCC Control solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.00 seconds > 25 milliseconds > 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid E Control Circuit High	P2730	Controller specific circuit diagnoses 9 speed C57R, 10 speed C1356789, 8 speed C45678R, or CVT TCC Control solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage Increment fail time	< 0.5 Q impedance between signal and controller voltage source			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid F (GF9)	P2731	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	common logic between P2731 and P2733 shift type is power down shift: C6 clutch slip speed OR shift type is garage shift: C6 clutch slip speed ELSE shift is another type: C6 clutch slip speed P2731 specific attained gear update fail time 6.25 milliscond update	 < 50.00 RPM < 100.00 RPM < 50.00 RPM = 1st lock OR = 1st free wheel			Base fail time: shift type is power down shift: fail time > 0.80 seconds shift type is garage shift: fail time > 0.25 shift type is another type: fail time > 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test					**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count > 3 counts 6.25 milliscond update	
					******************************	******************************		
					system-level enables:			
					use battery voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use battery voltage calibration is TRUE	= 1 Boolean		
					AND			
					battery voltage)	> 9.00 volts	battery voltage time > 0.100 seconds	
					use run crank voltage	= 1 Boolean		
					calibration is FALSE			
					OR			
					(use run crank voltage	= 1 Boolean		
					calibration is TRUE			
					AND			
					run crank voltage)	> 9.00 volts	run crank voltage time > 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		is disabled. This diagnostic monitor is relative to the GF9 C6 Selectable One Way Clutch (SOWC) / CBR1 clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					*****************************	******************************		
					range shift state	# range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	> 89.0 RPM		
					((C6 off going clutch pressure control ramp time out complete	= TRUE		
					AND			
					off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to disable)		
					OR			
					C6 off going clutch command pressure)	< 235 kPa	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							closed throttle upshift: **C6 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C6 exhaust delay open throttle power on up shift** garage shifts: **C6 exhaust delay garage shift** closed throttle downshift: **C6 exhaust delay closed throttle down shift** negative torque upshift: **C6 exhaust delay negative torque up shift** open throttle downshift: **C6 exhaust delay open throttle power down shift**	
					(engine torque AND Primary oncoming stuck on toraue enable cal)	> 8,192 Nm = 0 (0 is enable, 1 is enable)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					OR			
					(primary oncoming clutch active	= TRUE		
					primary on coming control state	# clutch fill phase		
					primary on coming commanded pressure)	> pressure clip threshold according to shift type: closed throttle upshift: **Clutch Clip Press CU Shifts** open throttle upshift: **Clutch Clip Press PU Shifts** garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts**	absolute value of (-0.60) seconds	
					C5 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					*****************************	*****************************		
					conditions needed to trigger test:			
					(current shift type AND shift type enable cal for current shift type) OR	# Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable)		
					(Intrusive shift active AND shift type enable cal for garage shift AND Attained Gear AND (stuck on enable cal for forward garge shifts AND driver requested direction AND commanded gear) OR (stuck on enable cal for reverse garage shifts AND driver requested direction AND commanded gear))	= FALSE = 0 (0 will enable, 1 will enable) = NEUTRAL OR commanded gear = 0 (0 to disable, 1 to enable) = FORWARD = a FORWARD gear = 0 (0 to disable, 1 to enable) = REVERSE = REVERSE		
					clutch stuck off intrusive shift active	= FALSE		
					startle mitigation active (see note on startle mitigation below)	= FALSE		
					(new clutch controller has been initalized	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					OR transitioning to a different clutch controller)	= TRUE		
					current clutch solenoid test state	transitions to TestState or TUT_HOLD (see note below about state transitions)		
					-k-k-k-k-k-k-k-k-kidtidek-k-k-k-k-k-kiekiek-k-k-k-k-k	*****************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensorFA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					****************************** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission	P17C6 P17C4 P17C7 P172AP172B ******************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCs to set P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid F Stuck Off (GF9)	P2732	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near oratzeroRPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C6 clutch slip speed, update fail time 6.25 milliscond update	> 200.0 RPM			fail time > 1.00 seconds, update fail count, fail count > 3 counts 6.25 milliscond update	Type A, 1 Trips
					******************************	******************************		
					system-level enables:			
					use battery voltage calibration is FALSE OR	= 1 Boolean		
					(use battery voltage calibration is TRUE AND	= 1 Boolean		
					battery voltage)	> 9.00 volts	battery voltage time > 0.100 seconds	
					use run crank voltage calibration is FALSE OR	= 1 Boolean		
					(use run crank voltage calibration is TRUE AND	= 1 Boolean		
					run crank voltage)	> 9.00 volts	run crank voltage time > 0.100 seconds	
					TOM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active hydraulic pressure available **************************** enable C6 clutch slip speed fail compare when: ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable cal is FALSE (startle mitigation) clutch steady state adaptive active (transmission output shaft speed OR (accelerator pedal position OR engine speed) C6 clutch slip speed valid	= FALSE Boolean = TRUE **************************** = FALSE = TRUE # initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE > 89.0 RPM > 2.00 % > 1,500.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation)	> 0.900 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to GF9 C6 C6789/Selectable One Way Clutch (SOWC) CBR1 clutch pressure control solenoid.			C6 clutch pressured map	= mapped to line pressure, C6 clutch pressure has reached fully applied state		
					(enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear)	= 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE		
					P2821 (clutch select valve stuck on) test active	= FALSE		
					range shift state	= range shift complete		
					■k-kick-k-k-kiek-kiekitititit-k-kiifk-k-kick-kitit-k-k-k-k	*****************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid F Stuck On (GF9 and GR10)	P2733	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	common logic between P2731 and P2733 shift type is power down shift: C6 clutch slip speed OR shift type is garage shift: C6 clutch slip speed ELSE shift is another type: C6 clutch slip speed P2733 specific attained gear update fail time 6.25 milliscond update	< 50.00 RPM < 100.00 RPM < 50.00 RPM # 1st lock AND # 1st free wheel			Base fail time: shift type is power down shift: fail time > 0.80 seconds shift type is garage shift: fail time > 0.25 shift type is another type: fail time > 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			****************************** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)	****************************** = 1 Boolean = 1 Boolean > 9.00 volts = 1 Boolean = 1 Boolean > 9.00 volts	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count > 3 counts 6.25 milliscond update battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		is disabled. This diagnostic monitor is relative to the GF9 C6 C6789 or GRW C6 C4567891OR clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					*****************************	******************************		
					range shift state	# range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	> 89.0 RPM		
					((C6 off going clutch pressure control ramp time out complete	= TRUE		
					AND			
					off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to disable)		
					OR			
					C6 off going clutch command pressure)	< 235 kPa	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							closed throttle upshift: **C6 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C6 exhaust delay open throttle power on up shift** garage shifts: **C6 exhaust delay garage shift** closed throttle downshift: **C6 exhaust delay closed throttle down shift** negative torque upshift: **C6 exhaust delay negative torque up shift** open throttle downshift: **C6 exhaust delay open throttle power down shift**	
					(engine torque AND Primary oncoming stuck on toraue enable cal)	> 8,192 Nm = 0 (0 is enable, 1 is enable)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					OR			
					(primary oncoming clutch active	= TRUE		
					primary on coming control state	# clutch fill phase		
					primary on coming commanded pressure)	> pressure clip threshold according to shift type: closed throttle upshift: **Clutch Clip Press CU Shifts** open throttle upshift: **Clutch Clip Press PU Shifts** garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts**	absolute value of (-0.60) seconds	
					C5 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					*****************************	*****************************		
					conditions needed to trigger test:			
					(current shift type	# Garage shift		
					AND			
					shift type enable cal for current shift type)	**Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable)		
					OR			
					(Intrusive shift active	= FALSE		
					AND			
					shift type enable cal for garage shift	= 0 (0 will enable, 1 will enable)		
					AND			
					Attained Gear	= NEUTRAL OR commanded gear		
					AND			
					(stuck on enable cal for forward garge shifts	= 0 (0 to disable, 1 to enable)		
					AND			
					driver requested direction	= FORWARD		
					AND			
					commanded gear)	= a FORWARD gear		
					OR			
					(stuck on enable cal for reverse garage shifts	= 0 (0 to disable, 1 to enable)		
					AND			
					driver requested direction	= REVERSE		
					AND			
					commanded gear))	= REVERSE		
					clutch stuck off intrusive shift active	= FALSE		
					startle mitigation active (see note on startle mitigation below)	= FALSE		
					(new clutch controller has been initalized	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					OR transitioning to a different clutch controller)	= TRUE		
					current clutch solenoid test state	transitions to TestState or TUT_HOLD (see note below about state transitions)		
					-k-k-k-k-k-k-k-k-k-kidtidek-k-k-k-k-k-kiekiek-k-k-k-k-k	******************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensorFA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					****************************** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission	P17C6 P17C4 P17C7 P172AP172B ******************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCs to set P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid F Control Circuit Open	P2736	Controller specific circuit diagnoses 9 speed (C6789/SOWC CBR1) clutch, 10 speed C45678910R clutch, 8 speed Line Pressure Control Circuit, or CVT binary pump, solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit Increment fail time	> 200 K Q impedance between signal and controller ground	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.00 seconds > 25 milliseconds > 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid F Control Circuit Low	P2738	Controller specific circuit diagnoses 9 speed (C6789/SOWC CBR1), 10 speed C4567891OR clutch, 8 speed line pressure control, or CVT binary pump, solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid F Control Circuit High	P2739	Controller specific circuit diagnoses 9 speed (C6789/SOWC CBR1), 10 speed C4567891OR clutch, 8 speed line pressure control, or CVT binary pump, solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.000 seconds 25 milliseconds 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid A Calibration Incorrect	P27A7	The diagnostic monitor verifies that the pressure control solenoid A (GF9 line or GR10 C1 C123456R clutch or CVT secondary pulley) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid A electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault - the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch - the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault - pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid B Calibration Incorrect	P27A8	The diagnostic monitor verifies that the pressure control solenoid B (GF9 TCC orGRIO C2 C128910R clutch or CVT primary pulley) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid B electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault - the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch - the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault - pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power event during the controller initialization before normal time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid C Calibration Incorrect	P27A9	The diagnostic monitor verifies that the pressure control solenoid C (GF9 C1 CB123456 clutch or GR10 C3 C23457910 clutch or CVT line) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid C electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault - the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch - the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault - pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid D Calibration Incorrect	P27AA	The diagnostic monitor verifies that the pressure control solenoid D (GF9 C2 CB29 clutch or GR10 C5C1356789 clutch pressure or CVT C1 clutch) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid D electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault - the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch - the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault - pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid E Calibration Incorrect	P27AB	The diagnostic monitor verifies that the pressure control solenoid E (GF9 C3 CB38 clutch or GR10 C4 C2346781OR clutch or CVT TCC) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid E electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault - the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch - the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault - pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid F Calibration Incorrect	P27AC	The diagnostic monitor verifies that the pressure control solenoid F (GF9 C4 C4 clutch or GR10 C6 C45678910R clutch or CVT binary pump) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid F electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault - the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch - the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault - pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid G Calibration Incorrect	P27AD	The diagnostic monitor verifies that the pressure control solenoid G (GF9 C5 C57R clutch or GR10 line or CVT mode valve A ETRS only) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid G electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault - the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch - the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault - pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid H Calibration Incorrect	P27AE	The diagnostic monitor verifies that the pressure control solenoid H (GF9 C6 C6789 clutch or GR10 TCC or CVT mode valve B ETRS only) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid H electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault - the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch - the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault - pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Transmission Range Sensor A/B Correlation	P2805	Internal range sensor A is wired independently to the TCM while internal range sensor B is wired independently to the ECM. The monitor diagnoses the internal range sensor A PWM duty cycle by comparing the raw sensor A value against the raw sensor B adjusted value, to verify signals are consistent, or determine the TCM internal range sensor A does not correlate to the ECM internal range sensor B. The ECM transmits internal range sensor B raw PWM to the TCM over the serial data bus.	ABS((TCM internal range sesnorA+ ECM internal range sesnor B raw adjusted for high or low time) - 100 %)) Increment fail and sample time, update rate 25 milliseconds	> 5.200 % duty cycle	diagnostic monitor enable P0707 fault active P0708 fault active U0100 fault active ECM internal range sesnor B available from ECM ECM internal range sesnor B fault active battery voltage ABS(TCM internal range sesnor A current loop value - TCM internal range sesnor A previous loop value), update TCM internal range sesnor A stablity time, update rate 25 milliseconds ABS(ECM internal range sesnor B current loop value - ECM internal range sesnor B previous loop value), update ECM internal range sesnor B stablity time, update rate 25 milliseconds TCM internal range sesnor A stability time met OR ECM internal range sesnor B stability time met ECM internal range sesnor B raw adjusted for	= 1 Boolean = FALSE = FALSE = FALSE = TRUE = FALSE > 9.00 volts < 1.001 % duty cycle < 1.001 % duty cycle = ABS(ECM internal range sesnor B raw -	PWM fail time > 2.000 seconds out of sample time > 2.500 seconds battery voltage time > 1.000 seconds TCM internal range sesnor A stability time > 1.000 seconds ECM internal range sesnor B stability time > 1.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					high or low time	0.000 %)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid G Control Circuit Open	P2812	Controller specific circuit diagnoses 9 speed Line Pressure Control Circuit, 10 speed Line Pressure Control Circuit, 8 speed TCC Control, or CVT Mode Valve A Circuit for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit Increment fail time	> 200 K Q impedance between signal and controller ground	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.00 seconds > 25 milliseconds > 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid G Control Circuit Low	P2814	Controller specific circuit diagnoses 9 speed Line Pressure Circuit, 10 speed Line Pressure Circuit, 8 speed TCC Control, or CVT Mode Valve A Circuit for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid G Control Circuit High	P2815	Controller specific circuit diagnoses 9 speed Line Pressure Circuit, 10 speed Line Pressure Circuit, 8 speed TCC Control, or CVT Mode Valve A Circuit for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage Increment fail time	< 0.5 Q impedance between signal and controller voltage source	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.00 seconds > 25 milliseconds > 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control Solenoid H Performance /Stuck Off - GF9 Specific	P2817	The diagnostic monitor detects the transmission torque converter control valve solenoid failed hydraulically off. The monitor executes when the transmission torque converter is commanded to a “lock” mode during which the torque converter will be controlled to near zero (0.0) RPM slip speed, or, an “on” mode during which the torque converter will be controlled to target slip speed using slip speed error. The transmission torque converter control valve solenoid is considered failed hydraulically off when the “lock” mode slip speed is excessive, or, when the ‘on” mode slip speed error is excessive.	if use TCC slip speed error OR TCC control mode TCC slip speed error = TCC slip speed - TCC comand slip speed else if TCC control mode torque convert slip = engine speed - transmission input shaft speed then update fail time 25 millisecond update rate	= 0 Boolean = ON mode (controlled slip mode) ≥ **P2817TCC stuck off fail TCC slip speed** see supporting table = LOCK > 130.0 RPM	diagnostic monitor enable TCC command capacity TCC command pressure (TCC control mode previous TCC control mode previous TCC control mode previous) AND (TCC control mode current OR TCC control mode current) (TCC stuck off enable OR TCC stuck on enable) hydraulic pressure available: engine speed	= 1 Boolean > 0.00 % > 800.0 kPa ± TCC control mode current ± ON mode (controlled slip mode) # LOCK = ON mode (controlled slip mode) = LOCK = 1 Boolean = 1 Boolean > 500.0 RPM	fail time > 2.500 seconds increment fail count fail count > 3 counts 25 millisecond update rate TCC command capacity time > 0.00 seconds TCC command pressure time > 2.00 seconds engine speed time > **engine speed time for transmission hydraulic pressure available**	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							see supporting table	
					service fast learn active	= FALSE		
					battery voltage	> 9.00 volts	battery voltage time > 0.100 seconds	
					run crank voltage	> 9.00 volts	run crank voltage time > 0.100 seconds	
					P281B falut active	= FALSE		
					P281D falut active	= FALSE		
					P281E falut active	= FALSE		
					P0722 fault pending	= FALSE		
					P0723 fault pending	= FALSE		
					P0716 fault pending	= FALSE		
					P0717 fault pending	= FALSE		
					P07BF fault pending	= FALSE		
					P07C0 fault pending	= FALSE		
					(PTO active OR	= FALSE		
					PTO disable calibration)	= 1 Boolean		
					accelerator pedal position	> 8.0 %		
					accelerator pedal position	< 100.0 %		
					range shift state	= range shift complete		
					transmission fluid temperature	> -6.66 °C		
					transmission fluid temperature	< 130.0 °C		
					engine torque	> 50.0 Nm		
					engine torque	< 8,191.8 Nm		
					P2817 test fail this key on	= FALSE		
					(TCC control mode OR	= ON mode (controlled slip mode)		
					TOO control mode)	= LOCK		
					break latch state (clutch select valve solenoid)	= disabled (clutch select valve not transitioning)		
					attained gear	> CeCGSR_e_CR_Third		
					attained gear slip	< 25 RPM		
					DTCs not fault active	AcceleratorPedalFailure EngineTorqueEstInaccurate		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P0716, P0717, P07BF, P07C0 P0722, P0723, P077C, P077D		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control Solenoid H Stuck On - GF9 specific	P2818	The diagnostic monitor detects if the TCC Variable Force Solenoid (VFS) H is on incorrectly, the solenoid electrical circuit not damaged, but the solenoid has failed hydraulically to an on state. In this failure mode hydraulic fluid is routed wrongly to engage both the TCC Regulator Valve and the TCC Control Valve. This will allow hydraulic fluid pressure to immediately apply the TCC when the Clutch Select Valve is disabled.	while control valve test time timing down: rate of change of torque convert slip speed = (ABS (current loop value torque convert slip speed - previous loop value torque convert slip speed) / 25 milliseconds) when clutch select valve soleniod multiplexed to TCC hydraulic AND torque convert slip speed = ABS(engine speed - transmission input shaft speed) AND torque convert slip speed = engine speed - transmission input shaft speed torque convert slip speed torque convert slip speed THEN increment fail time 25 millisecond update rate	≥ **P2818 torque convert derivative slip speed fail threshold** see supporting table ≤ **P0741 (GF9 specific) TCC slip speed crash RPM** > -50.0 RPM < 30.0 RPM	diagnostic monitor enable (TCC stuck off enable OR TCC stuck on enable) hydraulic pressure available: engine speed service fast learn active battery voltage run crank voltage P281B falut active P281D falut active P281E falut active PRNDL PRNDL transmission fluid temperature transmission fluid	= 1 Boolean = 1 Boolean = 1 Boolean > 500.0 RPM = FALSE > 9.00 volts > 9.00 volts = FALSE = FALSE = FALSE # NEUTRAL # REVERSE > -6.66 °C < 130.00 °C	fail time > 1.500 seconds increment fail count fail count > 4 counts 25 millisecond update rate engine speed time > **engine speed time for transmission hydraulic pressure available** see supportinf table battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					temperature			
					accelerator pedal position	> 0.00 %		
					accelerator pedal position	< 1.00 %		
					vehicle speed	> 3.0 KPH		
					vehicle speed	< 9.5 KPH		
					TCC command mode	= OFF		
					break latch state (clutch select valve solenoid)	# disabled (clutch select valve transitioning)		
					P0722 fault pending	= FALSE		
					P0723 fault pending	= FALSE		
					P0716 fault pending	= FALSE		
					P0717 fault pending	= FALSE		
					P07BF fault pending	= FALSE		
					P07C0 fault pending	= FALSE		
					(PTO active OR	= FALSE		
					PTO disable calibration)	= 1 Boolean		
					transmission fluid temperature	> -6.66 °C		
					transmission fluid temperature	< 130.00 °C		
					engine torque	> 55.0 Nm		
					engine torque	< 800.0 Nm		
					P2818 test fail this key on	= FALSE		
					vehicle speed	< 45.0 KPH		
					engine speed	> 400.0 RPM		
					engine speed	< 5,500.0 RPM		
					accelerator pedal position	< 95.0 %		
					4WD low state	= FALSE		
					(driver shift mode active OR	= FALSE		
					driver shift mode calibration)	= 0 Boolean		
					(misfire requests TCC off OR	= FALSE		
					misfire TCC off calibration)	= 0 Boolean		
					(clucth control solenoid stuck on OR stuck OFF intrusive shift active)	= FALSE		
					P0746 fault pending	= FALSE		
					P0747 fault pending	= FALSE		
					P0776 fault oendina	= FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					P0777 fault pending	= FALSE		
					P0796 fault pending	= FALSE		
					P0797 fault pending	= FALSE		
					P2714 fault pending	= FALSE		
					P2715 fault pending	= FALSE		
					P2723 fault pending	= FALSE		
					P2724 fault pending	= FALSE		
					P2732 fault pending	= FALSE		
					P2733 fault pending	= FALSE		
					P2820 fault pending	= FALSE		
					P2821 fault pending	= FALSE		
					vehicle speed	< 8.0 KPH		
					accelerator pedal position	> 4.0 %		
					hysteresis	> 1.0 %		
					when:			
					break latch state (clutch select valve solenoid)	= disabled (clutch select valve not transitioning)		
					previous break latch state (clutch select valve solenoid)	= complete (clutch select valve transition complete)		
					set stuck on test time and begin time down, stuck on test time must time down from calibration value to zero (0.0) seconds	= **P2818 stuck on test time** see supporting tables		
					break latch state (clutch select valve solenoid) AND	= clutch select valve solenoid mutliplexed to TCC hydraulic		
					previous break latch state (clutch select valve solenoid)	= disabled (clutch select valve not transitioning)		
					THEN initialize control valve test time, control valve test time must time down from calibration value to zero (0.0) seconds	= **P2818(GF9 specific) control valve test time** see supporting tables		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					DTCs not fault active	AcceleratorPedalFailure EngineTorqueEstInaccura te P0716, P0717, P07BF, P07C0 P0722, P0723, P077C, P077D		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control Solenoid H Control Circuit Open	P281B	Controller specific circuit diagnoses 9 speed TCC Control Circuit, 10 speed TCC Control Circuit, 8 speed T93 Default Valve Control Circuit, or CVT Mode Valve B Control Circuit for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit Increment fail time	> 200 K Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type B, 2 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage	> 5.00 volts	> 25 milliseconds	
					OR			
					accessory voltage active)	= TRUE	> 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control Solenoid H Control Circuit Low	P281D	Controller specific circuit diagnoses 9 speed TCC Pressure Control Circuit, 10 speed TCC Control Circuit, 8 speed Default Valve Control Circuit, or CVT Mode Valve B for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds. For 8 speed T87a controllers, an open circuit on the Default Valve Control Circuit will also set P281D.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.00 seconds > 25 milliseconds > 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control Solenoid H Control Circuit High	P281E	Controller specific circuit diagnoses 9 speed TCC Pressure Control Circuit, 10 speed TCC Control Circuit, 8 speed Default Valve Control Circuit, or CVT Mode Valve B Control Circuit for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage Increment fail time	< 0.5 Q impedance between signal and controller voltage source	battery voltage (run crank voltage OR accessory voltage active) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	> 9.00 volts and < 32.00 volts > 5.00 volts = TRUE = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time > 0.30 seconds out of sample time > 0.50 seconds > 1.00 seconds > 25 milliseconds > 12.5 milliseconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control (PC) Solenoid J Stuck Off (GF9)	P2820	Each pressure control solenoid stuck off diagnostic monitor detects a control solenoid failed hydraulically off, while the solenoid is electrically functional. This diagnostic monitor detects the clutch select valve solenoid failed hydraulically off. The clutch select valve is used to route hydraulic fluid to, either, the selectable one way clutch hydraulic circuit used to attain transmission 1st gear lock state, or, to the C6 - C6789 clutch hydraulic circuit necessary for transmission higher gear states. When the clutch select valve is failed hydraulically off, and transmission is in 1st gear lock state, it is possible to measure low C6 - C6789 clutch slip speed or 6th gear transmission ratio, since hydraulic fluid is routed to the clutch C6 - C6789. This can be determined based on transmission lever node design, the	(gear ratio AND gear ratio) OR C6 clutch slip speed update fail time 6.25 milliscond update	< 1.700 > 1.200 < 20.0 RPM	****************************** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TOM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active	****************************** = 1 Boolean = 1 Boolean > 9.00 volts = 1 Boolean = 1 Boolean > 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean	fail time > 0.250 seconds, update fail count, fail count > 3 counts 6.25 milliscond update battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		transmission input shaft speed, the transmission output shaft speed, and one transmission intermediate shaft speed, while not commanding 6th-9th gear. This diagnostic monitor is relative to the GF9 clutch select valve pressure control solenoid.			service solenoid cleaning procedure active hydraulic pressure available ***************************** diagnostic monitor enabled transmission output shaft speed transmission fluid temperature transmission fluid temperature (command gear AND attained gear) OR (attained gear AND SOWC state) C6 clutch slip speed valid ***************************** DTCs not fault pending DTCs not fault active	= FALSE Boolean = TRUE ***************************** = 1 (1 to enable, 0 to disable) > 35 RPM > -256.00 °C < 130.0 °C = 1st lock = 1st lock = 2nd lock = APPLY COMPLETE = TRUE ***************************** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control Solenoid J Stuck On (GF9)	P2821	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch select pressure control solenoid must be hydraulically off and the clutch select valve in the off state, to allow hydraulic fluid supply to the C3 (CB38) or C4 (C4) or C5 (C57R) clutches, such that when activated, commanded gear 3rd or 4th or 5th can be attained. With the clutch select valve pressure control solenoid failed hydraulically on, commanded gear 3rd or 4th or 5th cannot be attained. In the failure mode, the clutch slip speed, and gear box gear slip, will be excessive, not near or at zero RPM, when commanding 3rd or 4th or 5th gear, but due to the clutch select pressure control solenoid failed hydraulically on and not	Cx clutch slip speed fail compare C3 (CB38) OR C4 (C4) OR C5 (C57R) update Cx clutch slip speed fail time 6.25 milliscond update once intrusive gear is commanded and clutch select stuck on test active remains and Cx clutch fail count limit occurs, increment clutch select valve solenoid stuck on fail count and time up clutch select stuck on test gear time 6.25 milliscond update	 > 200.0 RPM > 200.0 RPM > 200.0 RPM = TRUE			Cx clutch slip speed fail time > (C3 (CB38) 1.00 seconds OR C4 (C4) 1.00 seconds OR C5 (C57R) 1.00 seconds) update Cx fail count, Cx fail count > (C3 (CB38) 3 counts OR C4 (C4) 3 counts OR C5 (C57R) 3 counts) Cx clutch fail count limit occurs 6.25 milliscond update clutch select valve solenoid stuck on fail count > 2 counts OR clutch select stuck on test gear time > 9.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		individual clutch control faults. It is thus necessary, when individual clutch slip occurs in 3rd or 4th or 5th gear and counted toward the clutch pressure control solenoid stuck on failure, for an intrusive gear commanded from 3rd or 4th or 5th to verify the clutch slip in the remaining gear states. The individual clutch slip that occurs in those intrusive gears, 3rd or 4th or 5th, is also counted toward the clutch pressure control solenoid stuck on failure. As individual clutch slip is accumulated in each commanded gear 3rd or 4th or 5th, that failure time is the verification of the clutch pressure control solenoid failed hydraulically on. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch			****************************** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning procedure active hydraulic pressure available ****************************** diaonostic monitor enable	****************************** = 1 Boolean = 1 Boolean > 9.00 volts = 1 Boolean = 1 Boolean > 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean = FALSE Boolean = TRUE ****************************** = 1 Boolean	6.25 milliscond update battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch select pressure control solenoid is failed hydraulically on, C3 (CB38) or C4 (C4) or C5 (C57R) clutches cannot maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is			P2821 test fail this key on test trigger set to TRUE: enable forward gear AND direction request OR enable reverse gear AND direction request current loop test trigger clutch control solenoid test state range shift state clutch solenoid test state set to NEUTRAL TEST when: test trigger initialize range shift complete time, when range shift state, range shift complete time must time down to zero when range shift complete Cx indicates any one of the 3 clutches: C3 (CB38) OR C4 (C4) OR C5 (C57R) enable Cx clutch slip speed fail compare when: diagnostic clutch test Cx ((startle mitigation active OR (startle mitigation active	= FALSE = 1 Boolean = forward gear = 0 Boolean = reverse gear = FALSE # NEUTRAL TEST = range shift completed = TRUE # range shift completed = HOLDING CLUTCH = FALSE = TRUE	initialize range shift complete time = 0.900 seconds, range shift complete time must time down to zero when range shift complete	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
		active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional, which, must take priority over this clutch select pressure control solenoid stuck off diagnostic monitor. All clutch pressure control solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the a clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to the GF9 clutch select valve pressure control solenoid.			AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable FASLE (startle mitigation) clutch steady state adaptive active transmission output shaft speed Cx clutch slip speed valid, all speed sesnors are functional for lever node clucth slip speed calculation accelerator pedal position engine speed diagnostic clutch test Cx set to HOLDING CLUTCH when: clutch solenoid test state ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) Cx clutch pressured map ****************************** clutch select stuck on test active set to TRUE when:	 # initial startle mitigation gear = FALSE = 0 Boolean = FALSE > 89.0 RPM > 2.00 % > 1,500.0 RPM = NEUTRAL TEST = FALSE = TRUE # initial startle mitigation gear = mapped to line pressure, Cx clutch pressure has transtioned from off-applying-applied ******************************		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					command gear clutch control solenoid test state any Cx clutch fail count limit occurs break latch state, clutch select valve hydraulic latch fluid is applied, hydraulic latch fluid force balance acts with clutch select valve return spring, to force the clutch select valve to the off postion in normal operation, allowing hydraulic fluid to C3 (CB38) C4 (C4) and C5 (C57R) clutches clutch select stuck on test active driver direction (PRNDL) change request, select intrusive gear to verify clutch select valve solenoid when HOLDING CLUTCH: C3 (CB38) C4 (C4) C5 (C57R) enable clutch select stuck on test gear time NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797	# REVERSE = NEUTRAL TEST = complete = TRUE = FALSE = CeCGSR_e_Fifth = CeCGSR_e_Fifth = CeCGSR_e_Third		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					P2715 P2724 P2733 P2821			
					*****************************	*****************************		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not test fail this key on	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not fault active	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172AP172B		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control Solenoid J Control Circuit Low	P2826	Controller specific circuit diagnoses 9 speed Clutch Select Valve Control Circuit, 10 speed Default Disable Control Circuit, or 8 speed Boost Valve Control Circuit for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds. For T87a controllers, an open circuit on solenoid I/J will also set P2826	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short Increment fail time	< 0.5 Q impedance between signal and controller ground			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Pressure Control Solenoid J Control Circuit High	P2827	Controller specific circuit diagnoses 9 speed Clutch Valve Control Circuit, 10 speed Default Disable Control Circuit, or 8 speed Boost Valve Control Circuit for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage Increment fail time	< 0.5 Q impedance between signal and controller voltage source			fail time > 0.30 seconds out of sample time > 0.50 seconds	Type A, 1 Trips
					battery voltage	> 9.00 volts and < 32.00 volts	> 1.00 seconds	
					(run crank voltage OR accessory voltage active)	> 5.00 volts = TRUE	> 25 milliseconds > 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Engine Stall Prevention Active Signal Message Counter Incorrect	P30BD	The diagnostic monitor detects an alive rolling count error in the CAN frame containing the engine stall protection signal value. The alive rolling count sequences 0, 1, 2, 3 repeatedly. As each serial data frame is broadcast by the transmitting controller, the transmitting controller increments the alive rolling count in this sequence manner. The receiving controller compares the most recent received alive rolling count value to the previous value plus one. If the values are not equal, an alive rolling count error has occurred. If continuous alive rolling count errors occur the DTC is set.	rolling count value received from ECM and expected TCM calculated value not equal	= TRUE	Loop rate calibration either 10 milliseconds or 12.5 milliseconds service mode $04 active battery voltage battery voltage time engine stall protection ECM frame recieved	= CeCFMD_e_DEC_Time Base_12p5 = FALSE > 11.00 volts > 300.000 seconds = TRUE	alive rolling count errors > 8 out of 10 sample counts	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures exceeds before the sample time of is reached	3 counts (equivalent to 0.04 seconds) 0.81 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds CAN hardware is bus OFF for	 Not Active on Current Key Cycle Enabled Not Active Not Active >6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 Volts > 0.1625 seconds	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With ECM	U0100	This DTC monitors for a loss of communication with the engine control module	Message is not received from controller for Message $0BE Message $0C9 Message $18E Message $1A1 Message $1A3 Message $1AA Message $1BA Message $287 Message $3D1 Message $3E9 Message $4C1 Message $4C7 Message $4D1 Message $4F1 Message $589	 > 0.50 seconds > 0.50 seconds > 0.50 seconds > 0.50 seconds > 12.00 seconds > 12.00 seconds > 12.00 seconds > 0.50 seconds > 12.00 seconds > 12.00 seconds > 12.00 seconds > 12.00 seconds > 12.00 seconds > 12.00 seconds > 12.00 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual	 Not Active on Current Key Cycle Enabled Not Active Not Active >6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					Network Management is not active for	> 0.4000 seconds		
					U0100	Not Active on Current Key Cycle		
					ECM	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Anti-Lock Brake System (ABS) Control Module	U0121	This DTC monitors for a loss of communication with the Anti-Lock Brake System (ABS) Control Module (Non-OBD Module ID 243).	Message is not received from controller for Message $0C1 Message $0C5 Message $1E9 Message $2F9	 > 0.5 seconds > 12.0 seconds > 12.0 seconds > 12.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active >6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 Volts >0.4000 seconds	Diagnostic runs in 12.5 ms loop	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					U0121	Not Active on Current Key Cycle		
					Anti-Lock Brake System Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for Message $0F1 Message $12A Message $1F1 Message $1F3 Message $4E1 Message $4E9	 > 0.5 seconds > 12.0 seconds > 12.0 seconds > 12.0 seconds > 12.0 seconds > 12.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active >6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 Volts >0.4000 seconds	Diagnostic runs in 12.5 ms loop	Emissions Neutral Diagnostic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					U0140 Body Control Module	Not Active on Current Key Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication With Gateway A	U0146	This DTC monitors for a loss of communication with Gateway A	Message is not received from controller for Message $3CF	>10.00 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 5.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	Not Active on Current Key Cycle Enabled Not Active Not Active >6.41 Volts = run = 1 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					U0146 Gateway A	Not Active on Current Key Cycle is present on the bus		

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

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

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

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	200.000	200.000	200.000	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_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	3	3	3	3	3	3	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	3	3	3	3	3	3	

Initial Supporting table - P0606 PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

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

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	4	4	4	4	4	4	

Initial Supporting table - P0606 enable (CPU, 10 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: 10 msec

y/x	1
1	0

Initial Supporting table - P0606 enable (CPU, 100 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: 100 msec

y/x	1
1	0

Initial Supporting table - P0606 enable (CPU, 12.5 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: 12.5 msec

y/x	1
1	1

Initial Supporting table - P0606 enable (CPU, 20 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: 20 msec

y/x	1
1	0

Initial Supporting table - P0606 enable (CPU, 25 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: 25 msec

y/x	1
1	1

Initial Supporting table - P0606 enable (CPU, 40 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: 40 msec

y/x	1
1	0

Initial Supporting table - P0606 enable (CPU, 5 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: 50 msec

y/x	1
1	0

Initial Supporting table - P0606 enable (CPU, 50 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: 50 msec

y/x	1
1	0

Initial Supporting table - P0606 enable (CPU, 6.25 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: 50 msec

y/x	1
1	1

Initial Supporting table - P0606 enable (CPU, 80 msec)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: EventA

y/x	1
1	0

Initial Supporting table - P0606 enable (CPU, EventA)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: EventB

y/x	1
1	0

Initial Supporting table - P0606 enable (CPU, EventB)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean
X Unit: CPU
Y Units: EventB

y/x	1
1	0

Initial Supporting table - P0606 enable (CPU, EventC)

Description: P0606 program sequence watch diagnostic monitor enable, function of CPU and loop time or event

Value Units: Boolean

y/x	1
1	1

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

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

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

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	200.000	200.000	200.000	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_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	3	3	3	3	3	3	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	3	3	3	3	3	3	

Initial Supporting table - P0606 PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

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

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	4	4	4	4	4	4	

Initial Supporting table - 10 speed transmission clutch definition and gear state to clutch map

Description: indicates clutch definition and gear state verses applied and released clutches for 10 speed transmission

Value Units: applied or released
X Unit: clutch
Y Units: gear index Y axis, actual gear column 1

y/x	1	2	3	4	5	6	7	8
1		C1 = C123456R	C2 = C1289-10R	C3 = C234579-10	C4 = C234678-10R	C5 = C1356789	C6 = C456789-10R	C7 = 0WC12
2	1st gear braking	applied	applied	released	released	applied	released	applied
3	1st gear free wheel	applied	applied	released	released	applied	released	released
4	2nd gear braking	applied	applied	applied	applied	released	released	applied
5	2nd gear free wheel	applied	applied	applied	applied	released	released	released
6	3rd gear	applied	released	applied	applied	applied	released	released
7	4th gear	applied	released	applied	applied	released	applied	released
8	5th gear	applied	released	applied	released	applied	applied	released
9	6th gear	applied	released	released	released	applied	applied	released
10	7th gear	released	released	applied	applied	applied	applied	released
11	8th gear	released	applied	released	applied	applied	applied	released
12	9th gear	released	applied	applied	released	applied	applied	released
13	10th gear	released	applied	applied	applied	released	applied	released
14	reverse gear	applied	applied	released	applied	released	released	released

Initial Supporting table - 9 speed transmission clutch definition and gear state to clutch map

Description: indicates clutch definition and gear state verses applied and released clutches for 9 speed transmission

Value Units: applied or released
X Unit: clutch
Y Units: gear index Y axis, actual gear column 1

y/x	1	2	3	4	5	6	7	8
1		C1 = CB123456	C2 = C6789	C3 = CB1R	C4 = CB29	C5 = CB38	C6 = C4	C7 = C57R
2	1st gear braking	applied	released	applied	released	released	released	released
3	1st gear free wheel	applied	released	released	released	released	released	released
4	2nd gear	applied	released	released	applied	released	released	released
5	3rd gear	applied	released	released	released	applied	released	released
6	4th gear	applied	released	released	released	released	applied	released
7	5th gear	applied	released	released	released	released	released	applied
8	6th gear	applied	applied	released	released	released	released	released
9	7th gear	released	applied	released	released	released	released	applied
10	8th gear	released	applied	released	released	applied	released	released
11	9th gear	released	applied	released	applied	released	released	released
12	reverse gear	released	released	applied	released	released	released	applied

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.275	0.200	0.200

Initial Supporting table - NumClchTieUp

Description: NumClchTiellp

Value Units: minimum # of clutches
X Unit: command gear or attained gear
Y Units: not applicable, no units, single row table f(gear)

NumClchTieUp - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5
1	2	3	2	2	2	2	2

NumClchTieUp - Part 2

y/x	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3
1	2	2	1	1	1	1	1

NumClchTieUp - Part 3

y/x	CeCGSR_e_NeutralC2C4	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6	CeCGSR_e_NeutralC4C5
1	1	1	1	1	1	1	1

NumClchTieUp - Part 4

y/x	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4
1	1	1	3	2	2	2	2

NumClchTieUp - Part 5

y/x	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	2	2	2	1	1	1	1

NumClchTieUp - Part 6

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5
1	1	1	1	1	1	1	1

NumClchTieUp - Part 7

y/x	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth
1	1	1	2	1	1	1	1

NumClchTieUp - Part 8

y/x	CeCGSR_e_Fifth	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth	

Initial Supporting table - NumClchTiellp

1	1	1	1	1	1	1	

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

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

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

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	200.000	200.000	200.000	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_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	3	3	3	3	3	3	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	3	3	3	3	3	3	

Initial Supporting table - P0606 PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

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

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	4	4	4	4	4	4	

Initial Supporting table - P0723 transmission engaged state time threshold

Description: time necessary after transmission engaged state indicates transmsision engaged to allow P0723 enable

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.000	0.000	40.000
1	5.000	3.000	1.000

Initial Supporting table - P171D hydraulic pressure delay

Description: Time to delay the initial x of y counter due to hydraulic transients. Thresholds are a function of transmission fluid temperature. Horizontal axis is transmission fluid temperature (DegC) and table output is delay time (seconds).

Value Units: delay time seconds
X Unit: transmission fluid temperature DegC

y/x	-40	0	20	30	40	50	60
1	0.090	0.090	0.080	0.050	0.050	0.050	0.050

Initial Supporting table - P171D predicted turbine speed error

Description: Predicted turbine speed vs actual turbine speed error. Thresholds are a function of engine speed and transmission fliud temperature. Diagnostic is considered failing above these values. Table vertical axis is engine speed (RPM), horizontal axis is transmission fluid temperature (DegC) and table output is predicted turbine speed error (RPM).

Value Units: turbine speed RPM error
X Unit: transmission fluid temperature DegC
Y Units: engine speed RPM

y/x	-40	0	10	20	40
0	300	300	300	300	300
500	300	300	300	300	300
1,100	300	300	300	300	300
1,500	300	300	300	300	300
2,500	300	300	300	300	300

Initial Supporting table - P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.000	1.000

Initial Supporting table - P176B holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: intermediate speed sensor select
Y Units: commanded gear

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	0	1
CeCGSR_e_CR_First	0	1
CeCGSR_e_CR_Second	0	1
CeCGSR_e_CR_Third	1	1
CeCGSR_e_CR_Fourth	0	1
CeCGSR_e_CR_Fifth	0	1
CeCGSR_e_CR_Sixth	0	1
CeCGSR_e_CR_Seventh	0	1
CeCGSR_e_CR_Eighth	1	1
CeCGSR_e_CR_Ninth	0	1
CeCGSR_e_CR_Tenth	1	1

Initial Supporting table - P176B intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	4	4

Initial Supporting table - P176B intermediate speed sensor fail time threshold

Description: P176B intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	2.000	2.000

Initial Supporting table - P176B minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P176B ratio calibration when REVERSE or P176B ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	172.0	172.0

Initial Supporting table - P176B minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	172.0	172.0

Initial Supporting table - P176B ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.5848	6.3694	1.0000	2.4450	1.0000	0.5227	1.0000	1.0000	1.1905	1.0000
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Initial Supporting table - P176B ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P17C5 P17D3 intermediate speed sensor RPM

Description: P17C5 P17D3 intermediate speed sensor RPM at signal period transtion to enable fail time update

Value Units: intermediate speed sensor RPM
X Unit: intermediate speed sensor 1 or 2

y/x	0	1
1	25	25

Initial Supporting table - P2D2 Cltch Slip Sum

Description:

Value Units: rate of change of output rpm (dn) per 25 milliseconds
X Unit: % brake pedal position
Y Units: not applicable, no units, single row table f(brake pedal position)

y/x	0	15	20	30	35	50	75	88	100
1	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192

Initial Supporting table - P2D2 Decel Pressure - C1

Description: clutch 1 command pressure threshold below which clutch 1 is considered released, such that, clutch 1 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C1 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	139.2	139.2	9,999.0	369.5	439.5

P2D2 Decel Pressure - C1 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	9,999.0	139.2	369.5	139.2	9,999.0

P2D2 Decel Pressure - C1 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	9,999.0	9,999.0	9,999.0	50.0	50.0

P2D2 Decel Pressure - C1 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50.0	369.5	50.0	50.0	439.5

P2D2 Decel Pressure - C1 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	691.2	691.2	50.0	139.2	9,999.0

P2D2 Decel Pressure - C1 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	369.5	439.5	9,999.0	139.2	369.5

P2D2 Decel Pressure - C1 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	139.2	9,999.0	50.0	50.0	50.0

P2D2 Decel Pressure - C1 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	369.5	50.0	50.0	439.5	691.2

P2D2 Decel Pressure - C1 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C1

1	691.2	50.0	139.2	9,999.0	9,999.0

P2D2 Decel Pressure - C1 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	9,999.0	9,999.0	9,999.0	9,999.0	9,999.0

P2D2 Decel Pressure - C1 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	9,999.0	691.2	439.5	369.5	50.0

P2D2 Decel Pressure - C1 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C2

Description: clutch 2 command pressure threshold below which clutch 2 is considered released, such that, clutch 2 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C2 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	384	384	384	9,999	2,125

P2D2 Decel Pressure - C2 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	852	522	384	543	9,999

P2D2 Decel Pressure - C2 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	2,125	852	522	50	50

P2D2 Decel Pressure - C2 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	9,999	50	50	2,125

P2D2 Decel Pressure - C2 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	820	820	50	384	384

P2D2 Decel Pressure - C2 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	9,999	2,125	852	522	384

P2D2 Decel Pressure - C2 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	543	9,999	50	50	50

P2D2 Decel Pressure - C2 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	9,999	50	50	2,125	820

P2D2 Decel Pressure - C2 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C2

1	820	50	543	595	595
P2D2 Decel Pressure - C2 - Part 10					
y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	9,999	9,999	2,125	852	522
P2D2 Decel Pressure - C2 - Part 11					
y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	384	820	2,125	9,999	50
P2D2 Decel Pressure - C2 - Part 12					
y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C3

Description: clutch 3 command pressure threshold below which clutch 3 is considered released, such that, clutch 3 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C3 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	260	260	265	1,295	9,999

P2D2 Decel Pressure - C3 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	751	260	265	260	1,295

P2D2 Decel Pressure - C3 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	9,999	751	385	50	50

P2D2 Decel Pressure - C3 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	1,295	50	50	9,999

P2D2 Decel Pressure - C3 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	723	723	50	260	265

P2D2 Decel Pressure - C3 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	1,295	9,999	751	260	265

P2D2 Decel Pressure - C3 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	260	1,295	50	50	50

P2D2 Decel Pressure - C3 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	1,295	50	50	9,999	723

P2D2 Decel Pressure - C3 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C3

1	723	50	260	285	285

P2D2 Decel Pressure - C3 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	1,295	1,295	9,999	751	385

P2D2 Decel Pressure - C3 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	265	723	9,999	1,295	50

P2D2 Decel Pressure - C3 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C4

Description: clutch 4 command pressure threshold below which clutch 4 is considered released, such that, clutch 4 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C4 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	459	459	503	1,117	1,700

P2D2 Decel Pressure - C4 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	9,999	459	979	459	1,211

P2D2 Decel Pressure - C4 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	1,815	9,999	1,892	50	50

P2D2 Decel Pressure - C4 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	1,117	50	50	1,700

P2D2 Decel Pressure - C4 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	9,999	9,999	50	459	503

P2D2 Decel Pressure - C4 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	1,117	1,700	9,999	459	979

P2D2 Decel Pressure - C4 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	459	1,211	50	50	50

P2D2 Decel Pressure - C4 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	1,117	50	50	1,700	9,999

P2D2 Decel Pressure - C4 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C4

1	9,999	50	459	503	503

P2D2 Decel Pressure - C4 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	1,211	1,211	1,815	9,999	1,892

P2D2 Decel Pressure - C4 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	979	2,030	1,700	1,117	50

P2D2 Decel Pressure - C4 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C5

Description: clutch 5 command pressure threshold below which clutch 5 is considered released, such that, clutch 5 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C5 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	146	146	146	269	337

P2D2 Decel Pressure - C5 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	687	9,999	734	146	269

P2D2 Decel Pressure - C5 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	337	687	9,999	50	50

P2D2 Decel Pressure - C5 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	838	50	50	1,274

P2D2 Decel Pressure - C5 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	9,999	50	50	146	146

P2D2 Decel Pressure - C5 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	269	337	687	9,999	734

P2D2 Decel Pressure - C5 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	146	269	50	50	50

P2D2 Decel Pressure - C5 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	838	50	50	1,274	9,999

P2D2 Decel Pressure - C5 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C5

1	50	50	9,999	146	146

P2D2 Decel Pressure - C5 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	269	269	337	687	9,999

P2D2 Decel Pressure - C5 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	734	9,999	1,274	838	50

P2D2 Decel Pressure - C5 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C6

Description: clutch 6 command pressure threshold below which clutch 6 is considered released, such that, clutch 6 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C6 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	186	186	186	299	350

P2D2 Decel Pressure - C6 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	536	268	9,999	186	299

P2D2 Decel Pressure - C6 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	350	536	1,106	50	50

P2D2 Decel Pressure - C6 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	9,999	50	50	9,999

P2D2 Decel Pressure - C6 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	50	9,999	50	186	186

P2D2 Decel Pressure - C6 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	299	350	536	268	9,999

P2D2 Decel Pressure - C6 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	186	299	50	50	50

P2D2 Decel Pressure - C6 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	9,999	50	50	9,999	50

P2D2 Decel Pressure - C6 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C6

1	9,999	50	268	186	186

P2D2 Decel Pressure - C6 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	299	299	350	536	1,106

P2D2 Decel Pressure - C6 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	9,999	9,999	9,999	9,999	50

P2D2 Decel Pressure - C6 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C7

Description: clutch 7 command pressure threshold below which clutch 7 is considered released, such that, clutch 7 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C7 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	50	50	50	9,999	50

P2D2 Decel Pressure - C7 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	9,999	50	50	50	50

P2D2 Decel Pressure - C7 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C7

1	50	50	9,999	9,999	50

P2D2 Decel Pressure - C7 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 12

y/x					
1					

Initial Supporting table - transmission fluid temperature warm up time

Description:

Value Units: transmission fluid temperature normal warn up time, seconds
X Unit: transmission fluid temperature at controller power up, °C

y/x	-40.00	-30.00	-20.00	0.00	20.00
1	1,800.0	1,500.0	1,200.0	600.0	60.0

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

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

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	200.000	200.000	200.000	8,191.875	8,191.875	8,191.875	

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

Description: Fail threshold for PSW per operating loop.

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	3	3	3	3	3	3	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	3	3	3	3	3	3	

Initial Supporting table - P0606 PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_1OmsSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_1OOmsSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	4	4	4	4	4	4	

Initial Supporting table - 10 speed transmission clutch definition and gear state to clutch map

Description: indicates clutch definition and gear state verses applied and released clutches for 10 speed transmission

Value Units: applied or released
X Unit: clutch
Y Units: gear index Y axis, actual gear column 1

y/x	1	2	3	4	5	6	7	8
1		C1 = C123456R	C2 = C1289-10R	C3 = C234579-10	C4 = C234678-10R	C5 = C1356789	C6 = C456789-10R	C7 = 0WC12
2	1st gear braking	applied	applied	released	released	applied	released	applied
3	1st gear free wheel	applied	applied	released	released	applied	released	released
4	2nd gear braking	applied	applied	applied	applied	released	released	applied
5	2nd gear free wheel	applied	applied	applied	applied	released	released	released
6	3rd gear	applied	released	applied	applied	applied	released	released
7	4th gear	applied	released	applied	applied	released	applied	released
8	5th gear	applied	released	applied	released	applied	applied	released
9	6th gear	applied	released	released	released	applied	applied	released
10	7th gear	released	released	applied	applied	applied	applied	released
11	8th gear	released	applied	released	applied	applied	applied	released
12	9th gear	released	applied	applied	released	applied	applied	released
13	10th gear	released	applied	applied	applied	released	applied	released
14	reverse gear	applied	applied	released	applied	released	released	released

Initial Supporting table - 9 speed transmission clutch definition and gear state to clutch map

Description: indicates clutch definition and gear state verses applied and released clutches for 9 speed transmission

Value Units: applied or released
X Unit: clutch
Y Units: gear index Y axis, actual gear column 1

y/x	1	2	3	4	5	6	7	8
1		C1 = CB123456	C2 = C6789	C3 = CB1R	C4 = CB29	C5 = CB38	C6 = C4	C7 = C57R
2	1st gear braking	applied	released	applied	released	released	released	released
3	1st gear free wheel	applied	released	released	released	released	released	released
4	2nd gear	applied	released	released	applied	released	released	released
5	3rd gear	applied	released	released	released	applied	released	released
6	4th gear	applied	released	released	released	released	applied	released
7	5th gear	applied	released	released	released	released	released	applied
8	6th gear	applied	applied	released	released	released	released	released
9	7th gear	released	applied	released	released	released	released	applied
10	8th gear	released	applied	released	released	applied	released	released
11	9th gear	released	applied	released	applied	released	released	released
12	reverse gear	released	released	applied	released	released	released	applied

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.275	0.200	0.200

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.275	0.200	0.200

Initial Supporting table - NumCIchTieUp

Description: NumCIchTiellp

Value Units: minimum # of clutches
X Unit: command gear or attained gear
Y Units: not applicable, no units, single row table f(gear)

NumCIchTieUp - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5
1	2	3	2	2	2	2	2

NumCIchTieUp - Part 2

y/x	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3
1	2	2	1	1	1	1	1

NumCIchTieUp - Part 3

y/x	CeCGSR_e_NeutralC2C4	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6	CeCGSR_e_NeutralC4C5
1	1	1	1	1	1	1	1

NumCIchTieUp - Part 4

y/x	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4
1	1	1	3	2	2	2	2

NumCIchTieUp - Part 5

y/x	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	2	2	2	1	1	1	1

NumCIchTieUp - Part 6

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5
1	1	1	1	1	1	1	1

NumCIchTieUp - Part 7

y/x	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth
1	1	1	2	1	1	1	1

NumCIchTieUp - Part 8

y/x	CeCGSR_e_Fifth	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth	

Initial Supporting table - NumClchTiellp

1	1	1	1	1	1	1	

Initial Supporting table - P0723 transmission engaged state time threshold

Description: time necessary after transmission engaged state indicates transmsision engaged to allow P0723 enable

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.000	0.000	40.000
1	5.000	3.000	1.000

Initial Supporting table - P0741 (GF9 specific) TOO slip speed crash RPM

Description: RPM limit used to establish slip crashed when TCC oil became available

Value Units: RPM
X Unit: % accelerator position

y/x	0.00	15.00	25.00	50.00	75.00
1	100	100	160	233	300

Initial Supporting table - P0741 (GF9 specific) torque convert derivative slip speed fail threshold

Description: he fail threshold, rate of change of torque converter slip speed, at which the torque convert clutch is considered stuck on.

Value Units: RPM/second
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
0	-600	-600	-600
15	-600	-600	-600
25	-900	-900	-900
50	-1,200	-1,200	-1,200
75	-1,500	-1,500	-1,500

Initial Supporting table - P0741 stuck on test time

Description: Value to initialize the TCC Stuck On test time to after transition of clutch select valve allowing TCC hydraulic circuit connectivity. Window is a time down window from the calibration value to zero (0.0) seconds.

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
1	1.500	1.250	1.000

Initial Supporting table - P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.000	1.000

Initial Supporting table - P176B holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: intermediate speed sensor select
Y Units: commanded gear

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	0	1
CeCGSR_e_CR_First	0	1
CeCGSR_e_CR_Second	0	1
CeCGSR_e_CR_Third	1	1
CeCGSR_e_CR_Fourth	0	1
CeCGSR_e_CR_Fifth	0	1
CeCGSR_e_CR_Sixth	0	1
CeCGSR_e_CR_Seventh	0	1
CeCGSR_e_CR_Eighth	1	1
CeCGSR_e_CR_Ninth	0	1
CeCGSR_e_CR_Tenth	1	1

Initial Supporting table - P176B intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	4	4

Initial Supporting table - P176B intermediate speed sensor fail time threshold

Description: P176B intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	2.000	2.000

Initial Supporting table - P176B minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P176B ratio calibration when REVERSE or P176B ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	172.0	172.0

Initial Supporting table - P176B minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	172.0	172.0

Initial Supporting table - P176B ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.5848	6.3694	1.0000	2.4450	1.0000	0.5227	1.0000	1.0000	1.1905	1.0000
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Initial Supporting table - P176B ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P17C5 P17D3 intermediate speed sensor RPM

Description: P17C5 P17D3 intermediate speed sensor RPM at signal period transtion to enable fail time update

Value Units: intermediate speed sensor RPM
X Unit: intermediate speed sensor 1 or 2

y/x	0	1
1	25	25

Initial Supporting table - P2817 TCC stuck off fail TCC slip speed

Description: TCC stuck off slip speed fail threshold when TCC is in ON mode (controlled slip mode)

Value Units: RPM
X Unit: engine torque Nm

y/x	0.00	64.00	128.00	192.00	256.00	320.00	384.00	448.00	512.00
1	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0

Initial Supporting table - P2818 (GF9 specific) control valve test time

Description: Value to initialize the torque converter clutch control valve test time to after clutch select valve solenoid is turned on, window of time in which the torque converter clutch slip speed and derivative slip speed must be evaluated for failure. Window is a time down window from the calibration value to zero (0.0) seconds.

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
1	0.600	0.300	0.100

Initial Supporting table - P2818 stuck on test time

Description: Value to initialize the TCC Stuck On test time to after transition of clutch select valve allowing TCC hydraulic circuit connectivity. Window is a time down window from the calibration value to zero (0.0) seconds.

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
1	1.500	1.250	1.000

Initial Supporting table - P2818 torque convert derivative slip speed fail threshold

Description: The fail threshold, rate of change of torque converter slip speed, at which the torque convert clutch is considered stuck on.

Value Units: RPM/second
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
0	-600.0	-600.0	-600.0
15	-600.0	-600.0	-600.0
25	-900.0	-900.0	-900.0
50	-1,200.0	-1,200.0	-1,200.0
75	-1,500.0	-1,500.0	-1,500.0

Initial Supporting table - P2D2 Cltch Slip Sum

Description:

Value Units: rate of change of output rpm (dn) per 25 milliseconds
X Unit: % brake pedal position
Y Units: not applicable, no units, single row table f(brake pedal position)

y/x	0	15	20	30	35	50	75	88	100
1	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192

Initial Supporting table - P2D2 Decel Pressure - C1

Description: clutch 1 command pressure threshold below which clutch 1 is considered released, such that, clutch 1 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C1 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	139.2	139.2	9,999.0	369.5	439.5

P2D2 Decel Pressure - C1 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	9,999.0	139.2	369.5	139.2	9,999.0

P2D2 Decel Pressure - C1 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	9,999.0	9,999.0	9,999.0	50.0	50.0

P2D2 Decel Pressure - C1 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50.0	369.5	50.0	50.0	439.5

P2D2 Decel Pressure - C1 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	691.2	691.2	50.0	139.2	9,999.0

P2D2 Decel Pressure - C1 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	369.5	439.5	9,999.0	139.2	369.5

P2D2 Decel Pressure - C1 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	139.2	9,999.0	50.0	50.0	50.0

P2D2 Decel Pressure - C1 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	369.5	50.0	50.0	439.5	691.2

P2D2 Decel Pressure - C1 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C1

1	691.2	50.0	139.2	9,999.0	9,999.0

P2D2 Decel Pressure - C1 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	9,999.0	9,999.0	9,999.0	9,999.0	9,999.0

P2D2 Decel Pressure - C1 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	9,999.0	691.2	439.5	369.5	50.0

P2D2 Decel Pressure - C1 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C2

Description: clutch 2 command pressure threshold below which clutch 2 is considered released, such that, clutch 2 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C2 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	384	384	384	9,999	2,125

P2D2 Decel Pressure - C2 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	852	522	384	543	9,999

P2D2 Decel Pressure - C2 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	2,125	852	522	50	50

P2D2 Decel Pressure - C2 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	9,999	50	50	2,125

P2D2 Decel Pressure - C2 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	820	820	50	384	384

P2D2 Decel Pressure - C2 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	9,999	2,125	852	522	384

P2D2 Decel Pressure - C2 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	543	9,999	50	50	50

P2D2 Decel Pressure - C2 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	9,999	50	50	2,125	820

P2D2 Decel Pressure - C2 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C2

1	820	50	543	595	595

P2D2 Decel Pressure - C2 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	9,999	9,999	2,125	852	522

P2D2 Decel Pressure - C2 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	384	820	2,125	9,999	50

P2D2 Decel Pressure - C2 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C3

Description: clutch 3 command pressure threshold below which clutch 3 is considered released, such that, clutch 3 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C3 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	260	260	265	1,295	9,999

P2D2 Decel Pressure - C3 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	751	260	265	260	1,295

P2D2 Decel Pressure - C3 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	9,999	751	385	50	50

P2D2 Decel Pressure - C3 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	1,295	50	50	9,999

P2D2 Decel Pressure - C3 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	723	723	50	260	265

P2D2 Decel Pressure - C3 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	1,295	9,999	751	260	265

P2D2 Decel Pressure - C3 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	260	1,295	50	50	50

P2D2 Decel Pressure - C3 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	1,295	50	50	9,999	723

P2D2 Decel Pressure - C3 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C3

1	723	50	260	285	285

P2D2 Decel Pressure - C3 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	1,295	1,295	9,999	751	385

P2D2 Decel Pressure - C3 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	265	723	9,999	1,295	50

P2D2 Decel Pressure - C3 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C4

Description: clutch 4 command pressure threshold below which clutch 4 is considered released, such that, clutch 4 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C4 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	459	459	503	1,117	1,700

P2D2 Decel Pressure - C4 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	9,999	459	979	459	1,211

P2D2 Decel Pressure - C4 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	1,815	9,999	1,892	50	50

P2D2 Decel Pressure - C4 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	1,117	50	50	1,700

P2D2 Decel Pressure - C4 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	9,999	9,999	50	459	503

P2D2 Decel Pressure - C4 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	1,117	1,700	9,999	459	979

P2D2 Decel Pressure - C4 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	459	1,211	50	50	50

P2D2 Decel Pressure - C4 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	1,117	50	50	1,700	9,999

P2D2 Decel Pressure - C4 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C4

1	9,999	50	459	503	503

P2D2 Decel Pressure - C4 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	1,211	1,211	1,815	9,999	1,892

P2D2 Decel Pressure - C4 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	979	2,030	1,700	1,117	50

P2D2 Decel Pressure - C4 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C5

Description: clutch 5 command pressure threshold below which clutch 5 is considered released, such that, clutch 5 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C5 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	146	146	146	269	337

P2D2 Decel Pressure - C5 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	687	9,999	734	146	269

P2D2 Decel Pressure - C5 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	337	687	9,999	50	50

P2D2 Decel Pressure - C5 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	838	50	50	1,274

P2D2 Decel Pressure - C5 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	9,999	50	50	146	146

P2D2 Decel Pressure - C5 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	269	337	687	9,999	734

P2D2 Decel Pressure - C5 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	146	269	50	50	50

P2D2 Decel Pressure - C5 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	838	50	50	1,274	9,999

P2D2 Decel Pressure - C5 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C5

1	50	50	9,999	146	146

P2D2 Decel Pressure - C5 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	269	269	337	687	9,999

P2D2 Decel Pressure - C5 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	734	9,999	1,274	838	50

P2D2 Decel Pressure - C5 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C6

Description: clutch 6 command pressure threshold below which clutch 6 is considered released, such that, clutch 6 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C6 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	186	186	186	299	350

P2D2 Decel Pressure - C6 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	536	268	9,999	186	299

P2D2 Decel Pressure - C6 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	350	536	1,106	50	50

P2D2 Decel Pressure - C6 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	9,999	50	50	9,999

P2D2 Decel Pressure - C6 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	50	9,999	50	186	186

P2D2 Decel Pressure - C6 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	299	350	536	268	9,999

P2D2 Decel Pressure - C6 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	186	299	50	50	50

P2D2 Decel Pressure - C6 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	9,999	50	50	9,999	50

P2D2 Decel Pressure - C6 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C6

1	9,999	50	268	186	186

P2D2 Decel Pressure - C6 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	299	299	350	536	1,106

P2D2 Decel Pressure - C6 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	9,999	9,999	9,999	9,999	50

P2D2 Decel Pressure - C6 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C7

Description: clutch 7 command pressure threshold below which clutch 7 is considered released, such that, clutch 7 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C7 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	50	50	50	9,999	50

P2D2 Decel Pressure - C7 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	9,999	50	50	50	50

P2D2 Decel Pressure - C7 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C7

1	50	50	9,999	9,999	50

P2D2 Decel Pressure - C7 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 12

y/x					
1					

Initial Supporting table - transmission fluid temperature warm up time

Description:

Value Units: transmission fluid temperature normal warn up time, seconds
X Unit: transmission fluid temperature at controller power up, °C

y/x	-40.00	-30.00	-20.00	0.00	20.00
1	1,800.0	1,500.0	1,200.0	600.0	60.0

Initial Supporting table - 10 speed transmission clutch definition and gear state to clutch map

Description: indicates clutch definition and gear state verses applied and released clutches for 10 speed transmission

Value Units: applied or released
X Unit: clutch
Y Units: gear index Y axis, actual gear column 1

y/x	1	2	3	4	5	6	7	8
1		C1 = C123456R	C2 = C1289-10R	C3 = C234579-10	C4 = C234678-10R	C5 = C1356789	C6 = C456789-10R	C7 = 0WC12
2	1st gear braking	applied	applied	released	released	applied	released	applied
3	1st gear free wheel	applied	applied	released	released	applied	released	released
4	2nd gear braking	applied	applied	applied	applied	released	released	applied
5	2nd gear free wheel	applied	applied	applied	applied	released	released	released
6	3rd gear	applied	released	applied	applied	applied	released	released
7	4th gear	applied	released	applied	applied	released	applied	released
8	5th gear	applied	released	applied	released	applied	applied	released
9	6th gear	applied	released	released	released	applied	applied	released
10	7th gear	released	released	applied	applied	applied	applied	released
11	8th gear	released	applied	released	applied	applied	applied	released
12	9th gear	released	applied	applied	released	applied	applied	released
13	10th gear	released	applied	applied	applied	released	applied	released
14	reverse gear	applied	applied	released	applied	released	released	released

Initial Supporting table - 9 speed transmission clutch definition and gear state to clutch map

Description: indicates clutch definition and gear state verses applied and released clutches for 9 speed transmission

Value Units: applied or released
X Unit: clutch
Y Units: gear index Y axis, actual gear column 1

y/x	1	2	3	4	5	6	7	8
1		C1 = CB123456	C2 = C6789	C3 = CB1R	C4 = CB29	C5 = CB38	C6 = C4	C7 = C57R
2	1st gear braking	applied	released	applied	released	released	released	released
3	1st gear free wheel	applied	released	released	released	released	released	released
4	2nd gear	applied	released	released	applied	released	released	released
5	3rd gear	applied	released	released	released	applied	released	released
6	4th gear	applied	released	released	released	released	applied	released
7	5th gear	applied	released	released	released	released	released	applied
8	6th gear	applied	applied	released	released	released	released	released
9	7th gear	released	applied	released	released	released	released	applied
10	8th gear	released	applied	released	released	applied	released	released
11	9th gear	released	applied	released	applied	released	released	released
12	reverse gear	released	released	applied	released	released	released	applied

Initial Supporting table - C1 exhaust delay closed throttle down shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C1 exhaust delay closed throttle lift foot up shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	3.200	2.000	0.950	0.850	0.850

Initial Supporting table - C1 exhaust delay garage shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C1 exhaust delay negative torque up shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - C1 exhaust delay open throttle power down shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C1 exhaust delay open throttle power on up shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	3.200	2.000	0.950	0.850	0.850

Initial Supporting table - C2 exhaust delay closed throttle down shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.700	0.600

Initial Supporting table - C2 exhaust delay closed throttle lift foot up shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	3.100	1.100	0.950	0.850	0.850

Initial Supporting table - C2 exhaust delay garage shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C2 exhaust delay negative torque up shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - 02 exhaust delay open throttle power down shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.212	0.212

Initial Supporting table - C2 exhaust delay open throttle power on up shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	3.100	1.100	0.950	0.850	0.850

Initial Supporting table - C3 exhaust delay closed throttle down shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	3.000	2.500	1.800	0.650	0.600

Initial Supporting table - C3 exhaust delay closed throttle lift foot up shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.900	1.100	0.950	0.900	0.900

Initial Supporting table - 03 exhaust delay garage shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C3 exhaust delay negative torque up shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - 03 exhaust delay open throttle power down shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.387	0.144

Initial Supporting table - C3 exhaust delay open throttle power on up shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.900	1.100	0.950	0.900	0.900

Initial Supporting table - C4 exhaust delay closed throttle down shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.400	0.900	0.700	0.663	0.600

Initial Supporting table - C4 exhaust delay closed throttle lift foot up shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.900	1.100	0.950	0.850	0.850

Initial Supporting table - 04 exhaust delay garage shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C4 exhaust delay negative torque up shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - 04 exhaust delay open throttle power down shift

.

Description: P2715 C4 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.119	0.119

Initial Supporting table - C4 exhaust delay open throttle power on up shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.900	1.100	0.950	0.850	0.850

Initial Supporting table - C5 exhaust delay closed throttle down shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	3.000	2.000	1.750	1.400	1.400

Initial Supporting table - C5 exhaust delay closed throttle lift foot up shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	3.500	2.300	1.100	0.850	0.850

Initial Supporting table - 05 exhaust delay garage shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	2	1	1	1	1

Initial Supporting table - C5 exhaust delay negative torque up shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - 05 exhaust delay open throttle power down shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.900	0.613	0.450	0.300	0.163

Initial Supporting table - C5 exhaust delay open throttle power on up shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	3.500	2.300	1.100	0.850	0.850

Initial Supporting table - C6 exhaust delay closed throttle down shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	2.500	1.950	1.400	1.400	1.400

Initial Supporting table - C6 exhaust delay closed throttle lift foot up shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - 06 exhaust delay garage shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C6 exhaust delay negative torque up shift

.

Description: P2733 C6 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - 06 exhaust delay open throttle power down shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.850	0.350	0.300	0.238	0.131

Initial Supporting table - C6 exhaust delay open throttle power on up shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - Clutch Clip Press CD Shifts

Description: Oncoming clutch clip pressure for closed throttle down shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	690	800	500	850	703	655

Initial Supporting table - Clutch Clip Press CU Shifts

Description: Oncoming clutch clip pressure for closed throttle lift foot up shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	690	800	500	850	703	655

Initial Supporting table - Clutch Clip Press GS Shifts

Description: Oncoming clutch clip pressure for garage shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	750	750	750	750	750	750

Initial Supporting table - Clutch Clip Press NU Shifts

Description: Oncoming clutch clip pressure for negative torque up shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	690	800	500	850	703	655

Initial Supporting table - Clutch Clip Press PD Shifts

Description: Oncoming clutch clip pressure for open throttle power down shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	400	800	500	850	703	655

Initial Supporting table - Clutch Clip Press PU Shifts

Description: Oncoming clutch clip pressure for open throttle powered up shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	2,100	900	500	850	703	655

Initial Su ortin table - Clutch Stuck On Fail Offset Time CD Shifts

Description: Used for closed throttle down shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - Clutch Stuck On Fail Offset Time GS Shifts

Description: Used for garage shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - Clutch Stuck On Fail Offset Time PD Shifts

Description: Used for open throttle power down shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	1	0	0	0	0

Initial Supporting table - Clutch Stuck On Fail Offset Time PU Shifts

Description: Used for powered up shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - Clutch Stuck On Fail Offset Time STGR Shifts

Description: Used for clutch staging shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - Clutch Stuck On Shift Type Enable

Description: Calibration to enable the clutch stuck on test for each shift type

X Unit: Shift Type
Y Units: Boolean

y/x	CeTSER_e_STGR	CeTSER_e_GSCR	CeTSER_e_NUCR	CeTSER_e_PUCR	CeTSER_e_CDCR	CeTSER_e_PDCR	CeTSER_e_CLAR
1	0	0	1	1	1	1	0

Initial Supporting table - engine speed time for transmission hydraulic pressure available

.

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.275	0.200	0.200

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.275	0.200	0.200

Initial Supporting table - NumClchTieUp

Description: NumClchTiellp

Value Units: minimum # of clutches
X Unit: command gear or attained gear
Y Units: not applicable, no units, single row table f(gear)

NumClchTieUp - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5
1	2	3	2	2	2	2	2

NumClchTieUp - Part 2

y/x	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3
1	2	2	1	1	1	1	1

NumClchTieUp - Part 3

y/x	CeCGSR_e_NeutralC2C4	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6	CeCGSR_e_NeutralC4C5
1	1	1	1	1	1	1	1

NumClchTieUp - Part 4

y/x	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4
1	1	1	3	2	2	2	2

NumClchTieUp - Part 5

y/x	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	2	2	2	1	1	1	1

NumClchTieUp - Part 6

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5
1	1	1	1	1	1	1	1

NumClchTieUp - Part 7

y/x	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth
1	1	1	2	1	1	1	1

NumClchTieUp - Part 8

y/x	CeCGSR_e_Fifth	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth	

Initial Supporting table - NumClchTiellp

1	1	1	1	1	1	1	

Initial Supporting table - P0723 transmission engaged state time threshold

Description: time necessary after transmission engaged state indicates transmsision engaged to allow P0723 enable

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.000	0.000	40.000
1	5.000	3.000	1.000

Initial Supporting table - P0741 (GF9 specific) TOO slip speed crash RPM

Description: RPM limit used to establish slip crashed when TCC oil became available

Value Units: RPM
X Unit: % accelerator position

y/x	0.00	15.00	25.00	50.00	75.00
1	100	100	160	233	300

Initial Supporting table - P0741 (GF9 specific) torque convert derivative slip speed fail threshold

Description: he fail threshold, rate of change of torque converter slip speed, at which the torque convert clutch is considered stuck on.

Value Units: RPM/second
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
0	-600	-600	-600
15	-600	-600	-600
25	-900	-900	-900
50	-1,200	-1,200	-1,200
75	-1,500	-1,500	-1,500

Initial Supporting table - P0741 stuck on test time

Description: Value to initialize the TCC Stuck On test time to after transition of clutch select valve allowing TCC hydraulic circuit connectivity. Window is a time down window from the calibration value to zero (0.0) seconds.

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
1	1.500	1.250	1.000

Initial Supporting table - P171D hydraulic pressure delay

Description: Time to delay the initial x of y counter due to hydraulic transients. Thresholds are a function of transmission fluid temperature. Horizontal axis is transmission fluid temperature (DegC) and table output is delay time (seconds).

Value Units: delay time seconds
X Unit: transmission fluid temperature DegC

y/x	-40	0	20	30	40	50	60
1	0.090	0.090	0.080	0.050	0.050	0.050	0.050

Initial Supporting table - P171D predicted turbine speed error

Description: Predicted turbine speed vs actual turbine speed error. Thresholds are a function of engine speed and transmission fliud temperature. Diagnostic is considered failing above these values. Table vertical axis is engine speed (RPM), horizontal axis is transmission fluid temperature (DegC) and table output is predicted turbine speed error (RPM).

Value Units: turbine speed RPM error
X Unit: transmission fluid temperature DegC
Y Units: engine speed RPM

y/x	-40	0	10	20	40
0	300	300	300	300	300
500	300	300	300	300	300
1,100	300	300	300	300	300
1,500	300	300	300	300	300
2,500	300	300	300	300	300

Initial Supporting table - P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.000	1.000

Initial Supporting table - P176B holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: intermediate speed sensor select
Y Units: commanded gear

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	0	1
CeCGSR_e_CR_First	0	1
CeCGSR_e_CR_Second	0	1
CeCGSR_e_CR_Third	1	1
CeCGSR_e_CR_Fourth	0	1
CeCGSR_e_CR_Fifth	0	1
CeCGSR_e_CR_Sixth	0	1
CeCGSR_e_CR_Seventh	0	1
CeCGSR_e_CR_Eighth	1	1
CeCGSR_e_CR_Ninth	0	1
CeCGSR_e_CR_Tenth	1	1

Initial Supporting table - P176B intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	4	4

Initial Supporting table - P176B intermediate speed sensor fail time threshold

Description: P176B intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	2.000	2.000

Initial Supporting table - P176B minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P176B ratio calibration when REVERSE or P176B ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	172.0	172.0

Initial Supporting table - P176B minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	172.0	172.0

Initial Supporting table - P176B ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.5848	6.3694	1.0000	2.4450	1.0000	0.5227	1.0000	1.0000	1.1905	1.0000
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Initial Supporting table - P176B ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P17C5 P17D3 intermediate speed sensor RPM

Description: P17C5 P17D3 intermediate speed sensor RPM at signal period transtion to enable fail time update

Value Units: intermediate speed sensor RPM
X Unit: intermediate speed sensor 1 or 2

y/x	0	1
1	25	25

Initial Supporting table - P2817 TCC stuck off fail TCC slip speed

Description: TCC stuck off slip speed fail threshold when TCC is in ON mode (controlled slip mode)

Value Units: RPM
X Unit: engine torque Nm

y/x	0.00	64.00	128.00	192.00	256.00	320.00	384.00	448.00	512.00
1	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0

Initial Supporting table - P2818 (GF9 specific) control valve test time

Description: Value to initialize the torque converter clutch control valve test time to after clutch select valve solenoid is turned on, window of time in which the torque converter clutch slip speed and derivative slip speed must be evaluated for failure. Window is a time down window from the calibration value to zero (0.0) seconds.

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
1	0.600	0.300	0.100

Initial Supporting table - P2818 stuck on test time

Description: Value to initialize the TCC Stuck On test time to after transition of clutch select valve allowing TCC hydraulic circuit connectivity. Window is a time down window from the calibration value to zero (0.0) seconds.

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
1	1.500	1.250	1.000

Initial Supporting table - P2818 torque convert derivative slip speed fail threshold

Description: The fail threshold, rate of change of torque converter slip speed, at which the torque convert clutch is considered stuck on.

Value Units: RPM/second
X Unit: transmission fluid temperature °C

y/x	-7.00	10.00	40.00
0	-600.0	-600.0	-600.0
15	-600.0	-600.0	-600.0
25	-900.0	-900.0	-900.0
50	-1,200.0	-1,200.0	-1,200.0
75	-1,500.0	-1,500.0	-1,500.0

Initial Supporting table - P2D2 Cltch Slip Sum

Description:

Value Units: rate of change of output rpm (dn) per 25 milliseconds
X Unit: % brake pedal position
Y Units: not applicable, no units, single row table f(brake pedal position)

y/x	0	15	20	30	35	50	75	88	100
1	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192	-8,192

Initial Supporting table - P2D2 Decel Pressure - C1

Description: clutch 1 command pressure threshold below which clutch 1 is considered released, such that, clutch 1 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C1 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	139.2	139.2	9,999.0	369.5	439.5

P2D2 Decel Pressure - C1 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	9,999.0	139.2	369.5	139.2	9,999.0

P2D2 Decel Pressure - C1 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	9,999.0	9,999.0	9,999.0	50.0	50.0

P2D2 Decel Pressure - C1 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50.0	369.5	50.0	50.0	439.5

P2D2 Decel Pressure - C1 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	691.2	691.2	50.0	139.2	9,999.0

P2D2 Decel Pressure - C1 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	369.5	439.5	9,999.0	139.2	369.5

P2D2 Decel Pressure - C1 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	139.2	9,999.0	50.0	50.0	50.0

P2D2 Decel Pressure - C1 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	369.5	50.0	50.0	439.5	691.2

P2D2 Decel Pressure - C1 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C1

1	691.2	50.0	139.2	9,999.0	9,999.0

P2D2 Decel Pressure - C1 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	9,999.0	9,999.0	9,999.0	9,999.0	9,999.0

P2D2 Decel Pressure - C1 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	9,999.0	691.2	439.5	369.5	50.0

P2D2 Decel Pressure - C1 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C2

Description: clutch 2 command pressure threshold below which clutch 2 is considered released, such that, clutch 2 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C2 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	384	384	384	9,999	2,125

P2D2 Decel Pressure - C2 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	852	522	384	543	9,999

P2D2 Decel Pressure - C2 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	2,125	852	522	50	50

P2D2 Decel Pressure - C2 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	9,999	50	50	2,125

P2D2 Decel Pressure - C2 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	820	820	50	384	384

P2D2 Decel Pressure - C2 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	9,999	2,125	852	522	384

P2D2 Decel Pressure - C2 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	543	9,999	50	50	50

P2D2 Decel Pressure - C2 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	9,999	50	50	2,125	820

P2D2 Decel Pressure - C2 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C2

1	820	50	543	595	595

P2D2 Decel Pressure - C2 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	9,999	9,999	2,125	852	522

P2D2 Decel Pressure - C2 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	384	820	2,125	9,999	50

P2D2 Decel Pressure - C2 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C3

Description: clutch 3 command pressure threshold below which clutch 3 is considered released, such that, clutch 3 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C3 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	260	260	265	1,295	9,999

P2D2 Decel Pressure - C3 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	751	260	265	260	1,295

P2D2 Decel Pressure - C3 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	9,999	751	385	50	50

P2D2 Decel Pressure - C3 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	1,295	50	50	9,999

P2D2 Decel Pressure - C3 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	723	723	50	260	265

P2D2 Decel Pressure - C3 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	1,295	9,999	751	260	265

P2D2 Decel Pressure - C3 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	260	1,295	50	50	50

P2D2 Decel Pressure - C3 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	1,295	50	50	9,999	723

P2D2 Decel Pressure - C3 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C3

1	723	50	260	285	285
P2D2 Decel Pressure - C3 - Part 10					
y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	1,295	1,295	9,999	751	385
P2D2 Decel Pressure - C3 - Part 11					
y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	265	723	9,999	1,295	50
P2D2 Decel Pressure - C3 - Part 12					
y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C4

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Description: clutch 4 command pressure threshold below which clutch 4 is considered released, such that, clutch 4 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C4 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	459	459	503	1,117	1,700

P2D2 Decel Pressure - C4 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	9,999	459	979	459	1,211

P2D2 Decel Pressure - C4 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	1,815	9,999	1,892	50	50

P2D2 Decel Pressure - C4 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	1,117	50	50	1,700

P2D2 Decel Pressure - C4 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	9,999	9,999	50	459	503

P2D2 Decel Pressure - C4 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	1,117	1,700	9,999	459	979

P2D2 Decel Pressure - C4 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	459	1,211	50	50	50

P2D2 Decel Pressure - C4 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	1,117	50	50	1,700	9,999

P2D2 Decel Pressure - C4 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C4

1	9,999	50	459	503	503
P2D2 Decel Pressure - C4 - Part 10					
y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	1,211	1,211	1,815	9,999	1,892
P2D2 Decel Pressure - C4 - Part 11					
y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	979	2,030	1,700	1,117	50
P2D2 Decel Pressure - C4 - Part 12					
y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C5

Description: clutch 5 command pressure threshold below which clutch 5 is considered released, such that, clutch 5 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C5 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	146	146	146	269	337

P2D2 Decel Pressure - C5 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	687	9,999	734	146	269

P2D2 Decel Pressure - C5 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	337	687	9,999	50	50

P2D2 Decel Pressure - C5 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	838	50	50	1,274

P2D2 Decel Pressure - C5 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	9,999	50	50	146	146

P2D2 Decel Pressure - C5 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	269	337	687	9,999	734

P2D2 Decel Pressure - C5 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	146	269	50	50	50

P2D2 Decel Pressure - C5 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	838	50	50	1,274	9,999

P2D2 Decel Pressure - C5 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C5

1	50	50	9,999	146	146

P2D2 Decel Pressure - C5 - Part 10

y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	269	269	337	687	9,999

P2D2 Decel Pressure - C5 - Part 11

y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	734	9,999	1,274	838	50

P2D2 Decel Pressure - C5 - Part 12

y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C6

Description: clutch 6 command pressure threshold below which clutch 6 is considered released, such that, clutch 6 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C6 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	186	186	186	299	350

P2D2 Decel Pressure - C6 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	536	268	9,999	186	299

P2D2 Decel Pressure - C6 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	350	536	1,106	50	50

P2D2 Decel Pressure - C6 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	9,999	50	50	9,999

P2D2 Decel Pressure - C6 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	50	9,999	50	186	186

P2D2 Decel Pressure - C6 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	299	350	536	268	9,999

P2D2 Decel Pressure - C6 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	186	299	50	50	50

P2D2 Decel Pressure - C6 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	9,999	50	50	9,999	50

P2D2 Decel Pressure - C6 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C6

1	9,999	50	268	186	186
P2D2 Decel Pressure - C6 - Part 10					
y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	299	299	350	536	1,106
P2D2 Decel Pressure - C6 - Part 11					
y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	9,999	9,999	9,999	9,999	50
P2D2 Decel Pressure - C6 - Part 12					
y/x					
1					

Initial Supporting table - P2D2 Decel Pressure - C7

Description: clutch 7 command pressure threshold below which clutch 7 is considered released, such that, clutch 7 cannot carry enough clutch torque that would induce a vehicle deceleration above the design safety metric

Value Units: kPa
X Unit: command gear
Y Units: not applicable, no units, single row table f(command gear)

P2D2 Decel Pressure - C7 - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 2

y/x	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2
1	50	50	50	9,999	50

P2D2 Decel Pressure - C7 - Part 3

y/x	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3	CeCGSR_e_NeutralC2C4
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 4

y/x	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 5

y/x	CeCGSR_e_NeutralC4C5	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC2C3C4C5	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 6

y/x	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 7

y/x	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
1	9,999	50	50	50	50

P2D2 Decel Pressure - C7 - Part 8

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5
1	50	50	50	50	50

P2D2 Decel Pressure - C7 - Part 9

y/x	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC2C3C4C5	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW

Initial Supporting table - P2D2 Decel Pressure - C7

1	50	50	9,999	9,999	50
P2D2 Decel Pressure - C7 - Part 10					
y/x	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth	CeCGSR_e_Fifth
1	50	50	50	50	50
P2D2 Decel Pressure - C7 - Part 11					
y/x	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth
1	50	50	50	50	50
P2D2 Decel Pressure - C7 - Part 12					
y/x					
1					

Initial Supporting table - transmission fluid temperature warm up time

Description:

Value Units: transmission fluid temperature normal warn up time, seconds
X Unit: transmission fluid temperature at controller power up, °C

y/x	-40.00	-30.00	-20.00	0.00	20.00
1	1,800.0	1,500.0	1,200.0	600.0	60.0